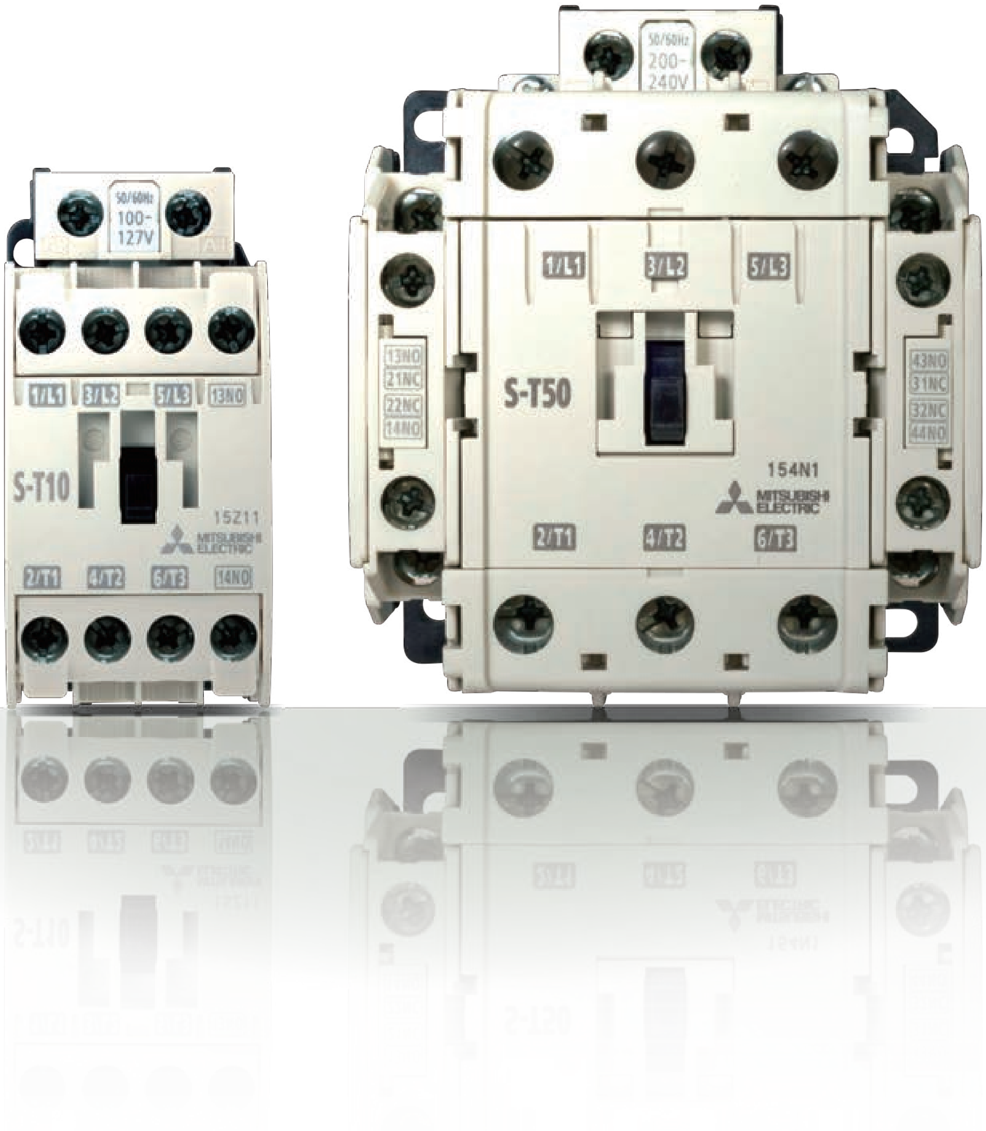
MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

Mitsubishi Electric Magnetic Starters MS-T/N Series

MS-T/N
SERIES



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GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric’s vision, “Changes for the Better“ are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing great-er comfort to daily life, maximiz-ing the efficiency of businesses and keeping things running across society, we integrate technology and innova-tion to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems
A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance
Dependable consumer products like air conditioners and home entertain-ment systems.

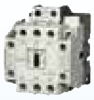
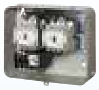
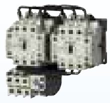
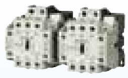
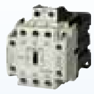
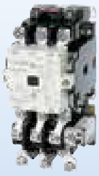
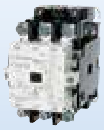
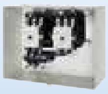
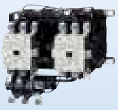
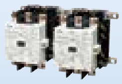
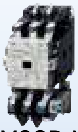
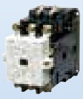
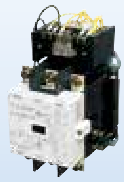
Information and Communication Systems
Commercial and consumer-centric equipment, products and systems

Industrial Automation Systems
Maximizing productivity and efficiency with cutting-edge automation technology.

OVERVIEW

Contents

Line-up A Wide Variation that Suits User Needs

Application Based Name		MS-T/N Series Magnetic Starters/Contactors			
		Standard Type (AC Operated)	Reversible Type	DC Operated Type	Mechanically Latched Type
External Appearance of Representative Model	MS-T Series	 MS-T  MSO-T  S-T	 MS-2xT  MSO-2xT  S-2xT	 MSOD-T  SD-T	 SL/SLD-T
	MS-N Series	 MS-N  MSO-N  S-N	 MS-2xN  MSO-2xN  S-2xN	 MSOD-N  SD-N	 SL/SLD-N
Application/ Function		· Usable in general applications such as motor starting, stopping, and burnout protection.	· Ideal for forward rotation, reverse rotation, or plugging, as well as for the switching of normal and emergency power supplies.	· Can be used if the control circuit is DC. (Can be used whether the main circuit is AC or DC.)	· Because it is mechanically maintained, it does not open in the case of power stoppages or voltage drops. · Applications · Street Lighting · Storage Circuits at Plants, etc. · For Power Supply Switching Between Purchased Power and Home Generated Power
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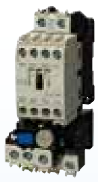
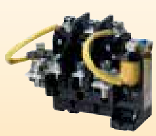
Application Based Name		MS-T/N Series Magnetic Starters/Contactors		Thermal Overload Relays	Contactor Relays
		With Wiring Streamlining Terminal	Main Circuit 3-Pole Magnetic Contactors		Standard Type (AC Operated)
External Appearance of Representative Model	MS-T Series	 MSO-T□BC  S-T□BC	 S-T32	 TH-T  TH-T□SR	 SR-T
	MS-N Series	–	 S-N□8	 TH-N  TH-N□SR	–
Application/ Function		· Designed to provide safety during maintenance and inspection, for example by allowing wiring operations to be performed more easily and by providing protection against electrical shocks without using a protective cover, etc.	· Because there are only 3 main contacts and no auxiliary contact, the required surface area for mounting panels has been significantly reduced. · By additionally installing an auxiliary contact unit, it is possible to attach a auxiliary contact.	· Can be used for protecting motors from burnout caused by overload or restriction, and depending on the application, selection is possible among models that provide overload open phase protection (TH-T/N□KP), delay trip types (TH-T/N□SR), and speed types (TH-T/N□FS, TH-T□FSKP, TH-N□KF), etc.	· Can be used as an operating relay for magnetic contactors, etc., and can direct/transmit signals using multiple contacts.
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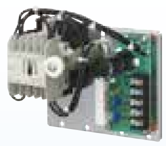
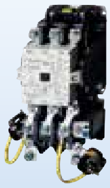
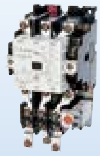
MS-T/N Series Magnetic Starters/Contactors			
Delay Open Type	Magnetic Starters with Saturable Reactors and Thermal Overload Relays	Magnetic Starters with Quick-acting characteristics Thermal Overload Relays	Magnetic Starters with Push-Buttons
 MSO/S-T□DL	 MSO-T□KPSR	 MSO-T□FSKP	 MS-T□PM
 MSO/S-N□DL	 MSO-N□KPSR	 MSO-N□KF	-
· By allowing retention of status for a few seconds (1 to 4 seconds) during a momentary power failure or a drop in voltage, there is no need for the magnetic contactors to reactivate when power returns, enabling continuous operation of load. · Applications · Temporary Storage Circuits such as Automatic Control Devices	· Prevents motor overload or restriction when starting time is long or starting current is large, as well as preventing unnecessary thermal overload relay operation. · Can be used to protect intermittently operating motors.	· Ideal for protecting motors with short time allowances for restriction, such as submersible motors or compressors.	· Because the push-button is integrated with the magnetic starter, operation can be performed without the need for a separate push-button.
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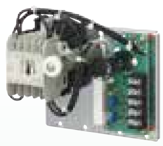
Contactor Relays				Optional Units
DC Operated Type	Mechanically Latched Type	Delay Open Type	With Wiring Streamlining Terminal	Failure Detection Units (Contact Welding Detection)
 SRD-T	 SRL-T SRLD-T	 SR-T□DL	 SR/SRD-T□BC	–
–	–	–	–	 UN-FD
· Can be used if the control circuit is DC. (Contact Areas can be used for both AC and DC)	· Because it is mechanically maintained, it does not open in the case of power stoppages or voltage drops.	· By allowing retention of status for a few seconds (1 to 4 seconds) during a momentary power failure or a drop in voltage, there is no need for the contactor relay to reactivate when power returns, enabling signals to be transmitted continuously.	· Designed to provide safety during maintenance and inspection, for example by allowing wiring operations to be performed more easily and by providing protection against electrical shocks without using a protective cover, etc.	· Detects failures (contact welding) that occur to the main circuit contact of a magnetic starter when in conduction mode, and can be used to prevent the running away of load devices by interrupting the power supply by combining a non-fuse breaker or magnetic contactor.
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Application Based Name	Optional Units (For Magnetic Starters/Contactors/Relays)	
	UT Series	UN Series
External Appearance of Representative Model	 Surge Absorber Units UT-SA  Auxiliary Contact Units UT-AX  Mechanical Interlock Units UT-ML  DC/AC Interface Units for Control Coils UT-SY  Independent Mounting Units UT-HZ  Reset Release for Thermal Overload Relays UT-RR	 Live Part Protection Cover Units UN-CV/UN-CZ  Terminal Protection Cover Units UN-CW  Surge Absorber Units UN-SA  Auxiliary Contact Units UN-AX  Auxiliary Contact Units With Contact for Low-level Signals UN-LL22  DC/AC Interface Units for Control Coils UN-SY  Fluorescent Display Lamps UN-TL for Thermal Overload Relays  Mechanical Interlock Units UN-ML  Reset Release for Thermal Overload Relays UN-RR
Application/ Function	· Can be easily mounted to and used in combination with magnetic contactors, contactor relays, and thermal overload relays. Please use separately as necessary. · Applications · UT/UN-CV/CZ: Protection from Live Parts · UT-CW: Protection of Terminals · UT/UN-SA: Control of Coil Opening/Closing Surges · UT/UN-AX: Expansion of Auxiliary Contacts · UN-LL: Switching of Low Voltages and Very Small Currents · UT/UN-SY: Switching of AC Operated Magnetic Contactor can be Performed Using PLC Output (DC24 V) · UN-TL: Displays the Trip Status of Thermal Overload Relays · UT/UN-ML: Prevents Simultaneous Switching On of Reversible Magnetic Contactors · UT/UN-RR: Can Perform Thermal Reset from Outside the Control Panel	
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Application Based Name	Magnetic Contactors According to Application	Related Equipment		
	Vacuum Magnetic Contactors	Solid State Contactors	Optional Units for Solid State Contactors	Electric Motor Protection Relays
External Appearance of Representative Model	 SH-V	 US-N  US-H	 Drive Units with Outputs UA-SH  Drive Units UA-DR1  Power Control Units UA-PC	 ET-N
Application/ Function	· A large capacity magnetic contactor with a shut-off within a vacuum valve that does not arc and excellent safety.	· A maintenance-free product ideal for applications in which high-frequency switching, long product lifetime, and quiet operation are a priority. · Applications · Facilities Such as Hotels or Cleanrooms · For Heater Load Switching in Injection Molding Machinery etc.	· The range of application is expanded by using in combination with a US-N or US-H Series solid state contactor. · Applications · UA-DR1: For Control When Using AC Control Circuits · UA-PC: For Electrical Control	· An electric motor protection relay that can protect against overloads, restriction, and open phase during AC motor start-up or running, as well as detect reciprocal states.
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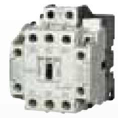
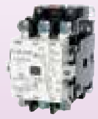
Magnetic Starters/Contactors/Relays According to Application			
DC Interface Contactors	NC Main Contact Contactors	DC Contactors	Safety Contactors
 MSOD-Q  SD-Q  SD-QR (Reversible)	 B(D)-T  B(D)-N	 DU(D)-N	 S(D)-T  SD-Q  S(D)-N
· Capable of being directly driven by the transistor output (DC24 V 0.1 A) of PLCs etc.	· Main circuit break contact (normally closed contact) can be used for motor control and power switching for lighting circuits. · Applications · For Motor Starting Resistance Shortcircuits · For Cushioned Starting of AC Motors	· Can be used for applications controlling DC motors at 440 V or less and other general DC circuits. · Applications · Variable Speed Motor Control · For Dynamic Brakes	· Suitable for standard products in which the auxiliary break contact is a mirror contact. · Can be applied to mechanical safety category 4 circuits. (Can detect malfunction of break contacts)
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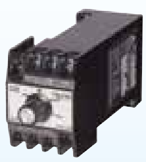
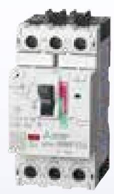
Related Equipment		Motor Circuit Breakers
Voltage Detection Relays	Instantaneous Stop/Restart Relays	
 SRE	 UA-DL2	 MMP-T32
· Can be used to detect drops in power supply voltage, such as a warning when switching to home generated power during a power outage or when battery voltage drops.	· This is a relay that automatically restarts load equipment that has stopped momentarily due to a voltage drop or temporary outage, when power returns. · Applications · Motors or Heater Load Circuits at Various Types of Industrial Plants	· A device that integrates a low voltage circuit breaker with thermal overload relay functionality. · One unit protects motor branch circuits from overloads, open phase and short-circuits.
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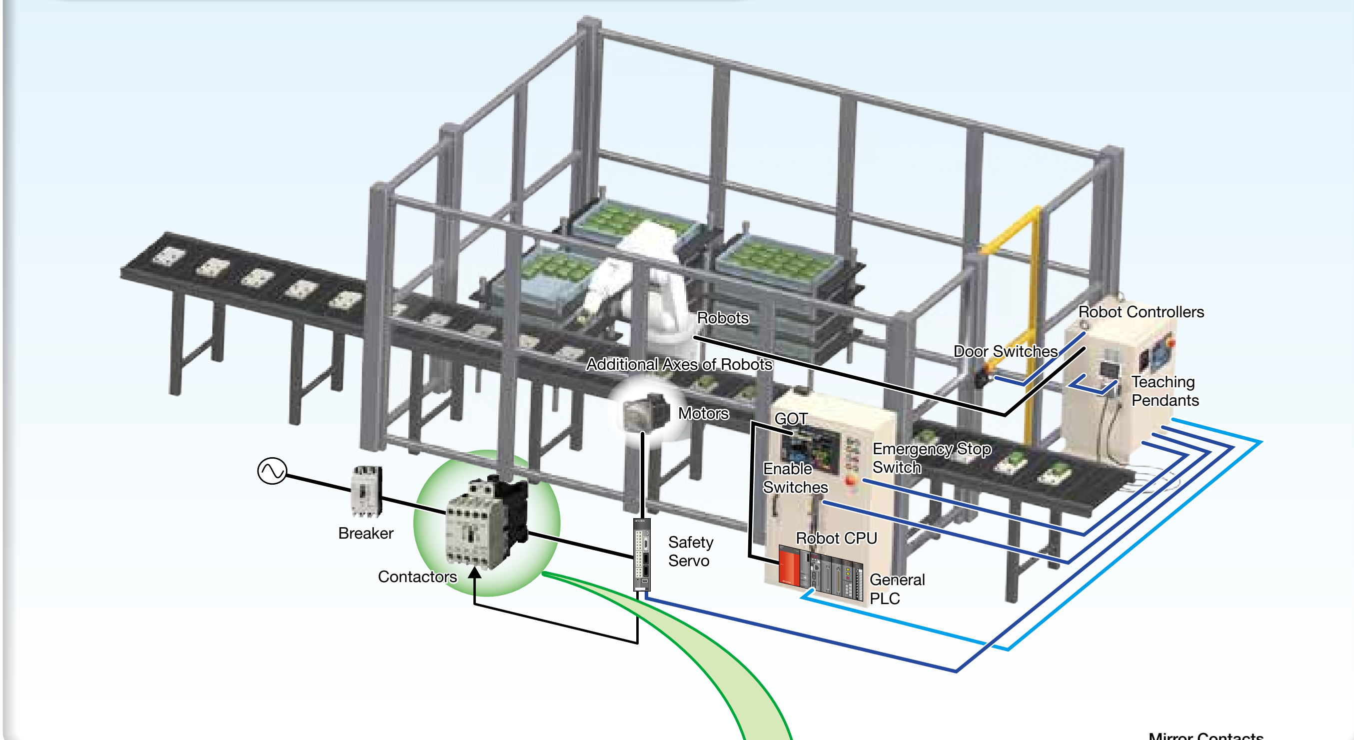
For Use in Various Industries

Our company's FA product line is employed in various industries manufacturing industry.

Assembly/Transport Solutions

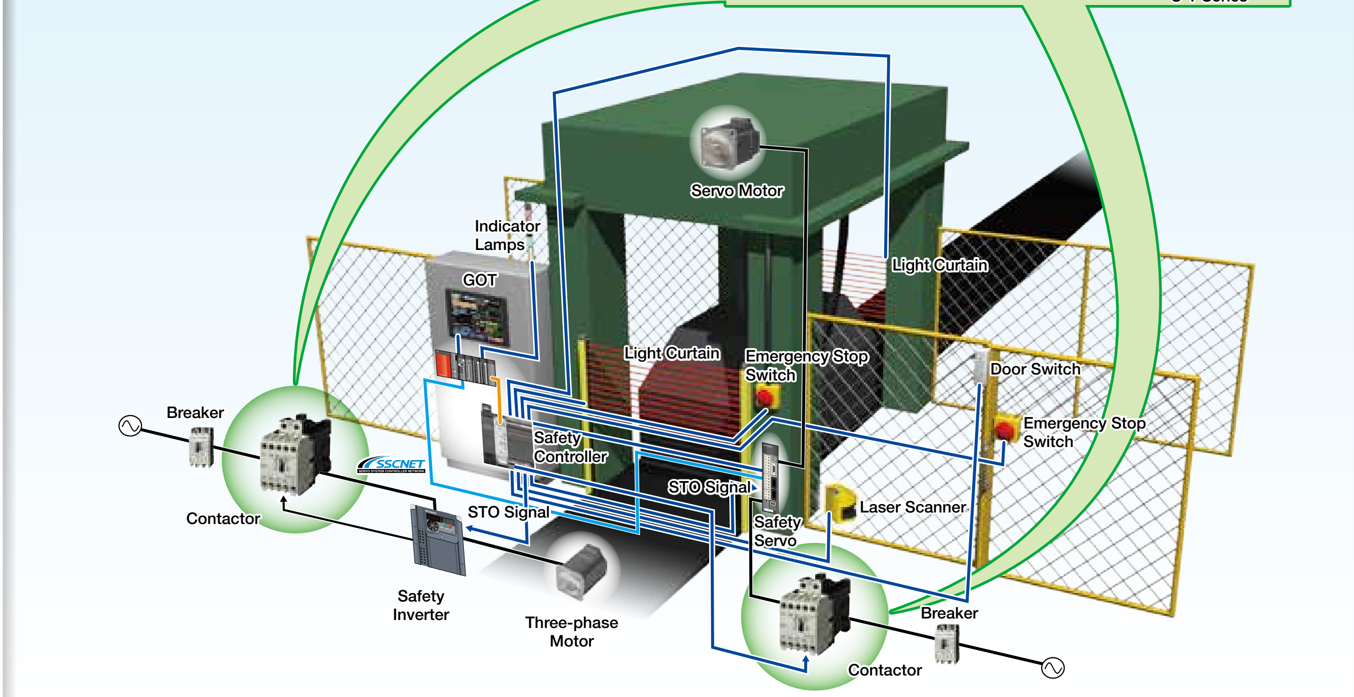


Mirror Contacts (With Safety Separation Function)

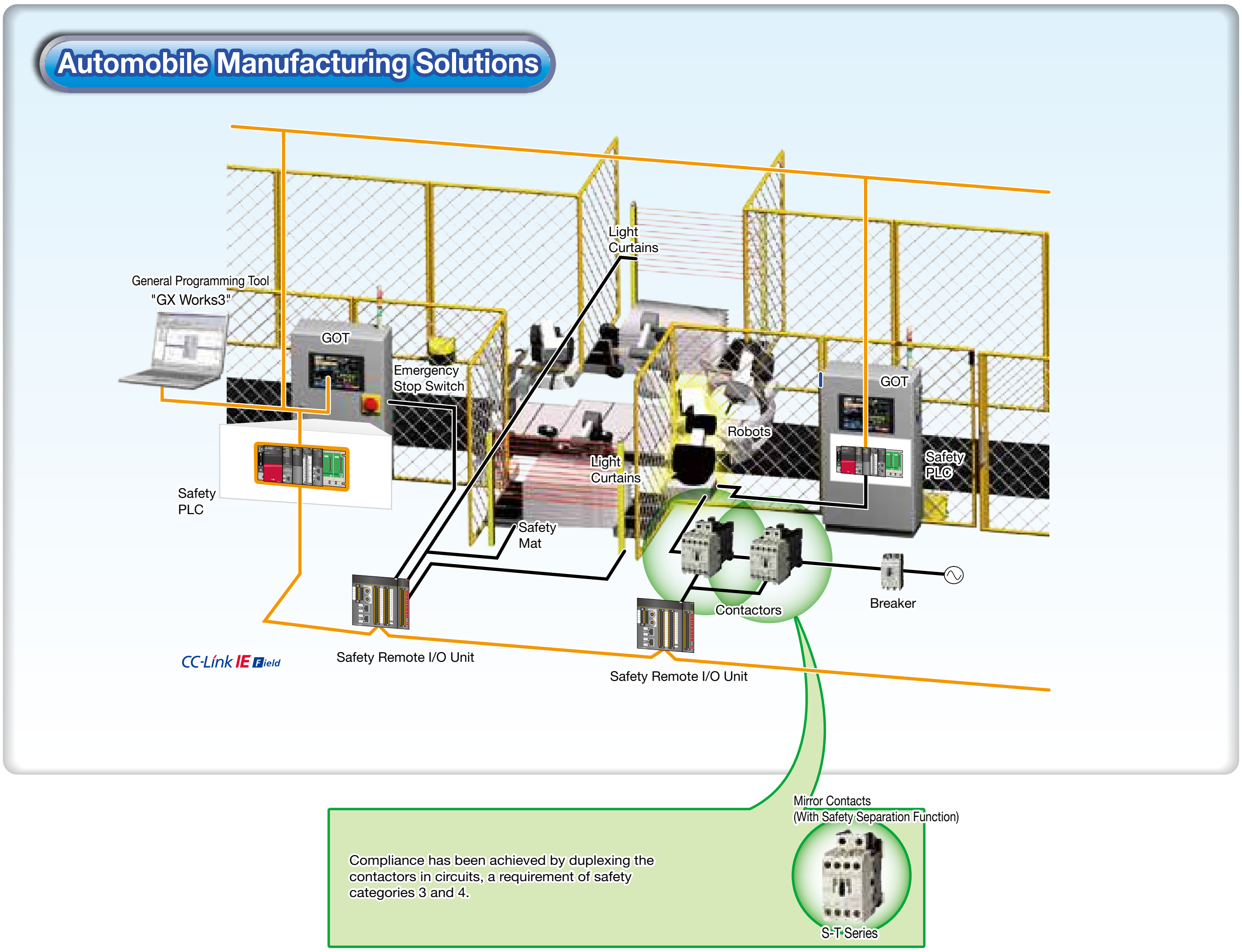
It is best to employ S-T series/S-N series/SD-Q series models with mirror contacts (safety separation function) in safety inverter/servo circuits for the shutting down of power in the event of an abnormality. With this application, compliance with safety categories 3 and 4 is achieved.

S-T Series

Press Machining Solutions



familiar to customers, starting with the

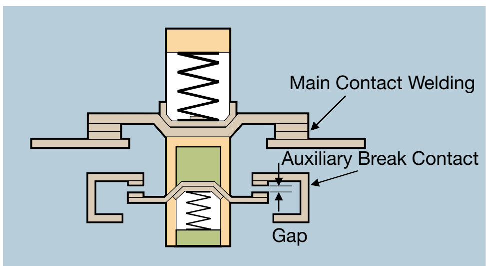


Mitsubishi Electric can provide an assortment of controllers and drivers that serve as accessory devices for magnetic starters and that are necessary for system structures, as well as other safety solutions related to these products.

Contactors with Mirror Contacts

<Auxiliary Break Contact OFF During Main Contact Welding>

- Compliant with TÜV regulations for mirror contacts. Complies with requirements for "control functionality during failures" stipulated in the section "Electrical Devices of Industrial Equipment" in EN regulation EN60204-1 and can be used as an interlocking circuit contact.
(Refer to page 282 for certified models)
- Can be applied to mechanical safety category 4 circuits.
(Can detect malfunction of break contacts)
- Features safety contactors and can be used to construct a completely safe system using a wide assortment of safe parts.



Notes for adopting the product

Before purchasing and using our products, please confirm the following product warranty.

1. Period and Scope of Warranty

- **Warranty Period**
  (1) The warranty period for our products shall be one year after purchase or delivery to the designated location. However the maximum warranty period shall be 18 months after production, in consideration that the maximum length of distribution period is to be 6 months after shipping.
  (2) This warranty period may not apply in the case where the use environment, use conditions, or the number of open/close operation times specifically impact the lives of products.
- **Scope of Warranty**
  (1) When any failure occurs during the above warranty period which is clearly our responsibility, we will replace or repair the failed portion of the product free of charge at the location of purchase or delivery.
  Note that the "failure" mentioned here shall not include such items as scratches and discoloration which do not affect performance.
  (2) In the following cases, even during the warranty period, charged repair services shall be applied.
    (1) Failures caused by inappropriate conditions, environment, handling, and uses other than those specified in catalogs, instruction manuals or specifications.
    (2) Failures caused by inappropriate installation.
    (3) Failures caused by the design of customer's equipment or software.
    (4) Failures caused by the customer tampering with our products such as reworks without our authorization.
    (5) Failures caused by the customer failing to correctly maintain or replace components such as spare parts, as specified by documents such as instruction manuals.
    (6) Failures caused by uses of the product other than ordinarily intended.
    (7) Failures caused by force majeure such as fire and abnormal voltage accidents, and natural disasters such as earthquake, wind and flood.
    (8) Failures caused by reasons that were unforeseeable with the level of technology at the time of shipment.
  (3) The warranty that is mentioned here shall mean warranty of the unit of delivery, and any losses induced by the failures of delivered products shall be excluded from our warranty.
- **Failure Diagnosis**

In principle, primary failure diagnosis shall be conducted by the customer. However this job, if requested by the customer, can be performed by us or by our service company with charge. In this case, a service fee shall be charged to the customer in accordance with our price list.

2. Recommendation for Renewal Due to Life

Our magnetic starters and magnetic contactors with contacts and mechanical parts have certain wear life in line with the number of switching operations, while our coil wires and electronic parts have aging degradation life influenced by the use environment and use conditions.
Regarding the use of the products described in this catalog, we recommend that customers replace the products when the number of open/close operations specified in this catalog or instruction manuals is reached or after 10 years of use, whichever comes earlier.
Reference: "Guidance for Replacement of Magnetic Starters and Magnetic Contactors" issued by the Japan Electrical Manufacturers' Association (JEMA)

3. Exemption from Warranty Related to Opportunity or Secondary Losses

Regardless of in or out of warranty period, loss of opportunity and lost earnings at the customer side caused by the failures of our products, any damages caused by special situations regardless of our potential foresight, secondary losses, accident compensation, damages to anything other than our products, compensation for jobs including replacement work, readjustment of field machinery equipment, startup test runs, etc. performed by the customer, and damages caused by any reasons for which we are not held responsible, shall be outside the scope of our compensation.

4. Applicable Range of Products

(1) The contents of products shown in this catalog are for your selection of models. When you actually use the product, read the "Instruction Manual" carefully beforehand and use correctly.
Please note that exterior views and/or specifications may change without notice, in no way affecting your product selection.

(2) When using a product listed in this catalog, you are constrained to conditions of use such that your applications will not lead to a serious accident even if the product develops a breakdown or failure, and that in the event of a breakdown or failure systematic backups and/or failsafe functions exist outside the device.

(3) The products described in this catalog are designed and manufactured as general products to be used for general industrial fields. For this reason, the products described in this catalog should not be used for applications requiring special quality assurance systems, such as atomic power plants and other power plants owned by power companies which seriously affect the public good, railway applications, and government and public office applications.
Note, however, that the products shall be applicable to such uses if the use is limited and the customer agrees not to require specially high quality.
Furthermore, when the customer is investigating application for the uses where serious impact is foreseen to the human body and assets and therefore high reliability for security and control system is required, such as aviation, medical services, railways, combustion and fuel equipment, manned transportation equipment, entertainment facilities and safety equipment, please contact our representatives and discuss any necessary agreement or specifications.

5. Supply Period of Spare Goods After Production Stop

(1) While we do not repair our company's magnetic starters or magnetic contactors, we can supply discontinued main contacts and coils as auxiliary parts for 7 years after their discontinuation (only for models that support auxiliary parts).
Please confirm with our company's sales office for details regarding supply availability.

(2) For the discontinuation of production, we will announce in such media as "sales and service" paper created by us.

Notes for security related issues

- Before performing the installation, wiring works, operation and maintenance/check for the products described in this catalog, make sure to read the "Instruction Manual" or "Notes for Use" attached to the product for correct usage.
- Do not modify or disassemble the products listed in this catalog. There is a risk of breakdown.
- In spite of our continued efforts to enhance the quality and reliability of our product, the product can fail. The products described in this catalog can bring about serious results, such as malfunctions of machinery, short circuit at power supply, and catching fire), by the malfunction caused by vibration, physical shock and improper wiring. Pay special attention to avoid any secondary accidents such as injuries and fire, as the result of failures or malfunctions.
- When you find any questions or you need more details after reading this catalog, please contact your dealer or our company.

<For using the products described in this catalog, please observe the following items.>

⚠ Danger

- Make sure to disconnect the power before you perform installation, removal, wiring works, or maintenance/checking. There is a risk of receiving an electric shock or occurrence of a malfunction.
- When the product is energized, avoid touching or coming near the product, especially the terminals having electricity. There is a risk of receiving an electric shock or burn injury.
- Prevent wire ends from coming loose. If bare wires come in contact with each other, a phase-to-phase short circuit may occur.

⚠ Notes

- Use the product in the use environment described in this catalog and Instruction Manual. Do not install the product in any abnormal environment with high temperature, high humidity, dust, corrosive gas or excessive vibration/shock. There is a risk of catching fire, malfunctions, electric shock or failure.
- Avoid applying shocks by dropping or falling the product during transportation and unpacking. This will lead to breakage or failure of products.
- Do not use the product when it has received damage during transportation, installation or wiring. This can cause fire or malfunctions.

⚠ Notes

- Make sure that only technicians qualified for electric work or wiring should perform installation, wiring works and maintenance/checking of the product.
- Make sure that no foreign objects such as dust, iron powder and wire chips enter the product during installation and wiring works. There is a risk of contact failures and malfunctions leading to damage or fire at the load.
- When you use mounting screws of the wrong size or use a small number of screws than specified, or when the mounting to the rail of IEC 35mm width is defective, there is a risk that the product may fall.
- When you apply wiring works, be sure to use the wire size that suits the applied voltage, flow current and inrush current, and to fasten wires with the correct torque as specified in this catalog or the instruction manual. Defective wiring can cause fires, accidents and failures.
- To terminal screws and mounting screws, apply the torque as we specify for tightening, and regularly apply retorquing. When the tightening torque is too large, the work can damage terminal screws or mounting screws. When the terminal screws or mounting screws slacken or are broken, they can cause overheat or fire, or the body can fall off to create serious accidents.
- Confirm the rated values and specifications, and make sure to use a product that meets the requirements. When you use a product exceeding the rated/specified values, it may cause insulation breakdown leading to earth fault or short circuit accidents, or create the cause of fire by overheat or breakdown due to inability to shutdown.
- When a product described in this catalog is to be used in a facility where a failure can lead to injury to the human body or serious damage to earnings, make sure to install some safety mechanism.
- Apply regular checks to the product and use safety measures on the sequence to the critical circuits. The contacts of Contactors and Magnetic Starters can develop defective conduction, welding or burnout.
- Contactors and Magnetic Starters can create welding of contacts disabling the opening, due to such causes as switching operation for excessive current, abnormal wearing of contacts, chattering at operational instruction contacts, aging degradation and product life. Also the contacts may fail to open due to unexpected mechanical constraints other than contact adhesion. Since the disability of contact to open can cause the machine to go out of control, secure safety by assuming the mechanical constraints or contact welding leading to inability of open/close operations. There remains a risk of fire even when an overload protective device (Thermal Overload Relays) is provided.
- The example connection described in this catalog only shows a typical one to run a system. For the protection of each device and safety measures, the customer is requested to consider the connection for each system.
- Do not apply reworks to the product or disassemble the product. These may cause failures.
- When you dispose of the products, treat them as industrial waste products.

<For using the products with spring clamp terminals, observe the following rules as well.>

⚠ Notes

- Keep enough spaces around the product more than shown in this document. Failure to keep it may result in electric shock or burn.
- Connect according to the wire type.
  (a)Solid wire: Insert wire in straight till the core wire hits the bottom.
  (b)Ferrule: Insert wire in straight till ferrule hits the bottom. Please confirm that the sleeve should be inside A-side when it's sleeve.
  (c)Strand wire: Insert applicable operating tool in insertion slot. Then insert wire and remove applicable operating tool after opening spring.
- Please confirm wire connection by pulling wire lightly after inserting wire.
- Do not use any other tools except for the applicable when inserting wire. May cause damage to the equipment.
- Use the specified wire, ferrule, and crimp tool.
- Do not insert multiple wires in a insertion slot. May cause damage to the equipment.
- Please contact us if you might use other type of wires.
- Do not insert electroscope into other insertion. May cause damage to the equipment.
- Please confirm peeled length of wire. Watch out wire loosing. May cause poor connection, which leads to abnormal heating and fire disaster.
- Do not use any other wires expect for copper wire. May cause abnormal heating and fire disaster.
- Use operating tool properly. May cause damage to the equipment.
- Do not forcibly bend or pull the wire in the side direction of the circuit breaker. May cause damage to the equipment.
- Please insert operating tool sideways. May cause damage to the equipment.
- Please use applicable operating tool for connecting wire when solid wire or strand wire is hard-plug.

1

Features

Down-sizing Small

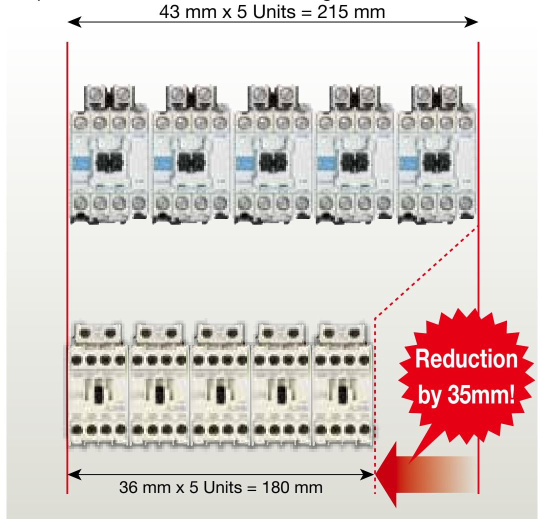
10A frame model is over 16% smaller with a width of just 36mm!!

There is a saying that "every bit helps" and now with the industries smallest* general purpose Magnetic Contactor in its class, customers are able to more easily down-size their boards than ever before.

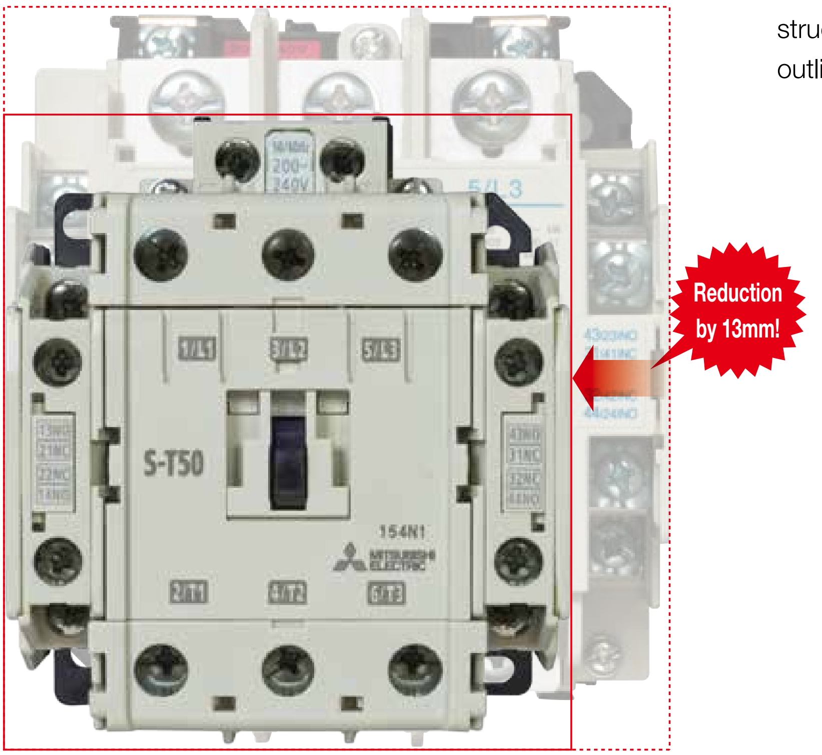
∗For AC-operated 10A frame class general-purpose Magnetic Contactor (based on survey conducted by Mitsubishi dated September 2016)

S-T10 (Actual Size)

Example: Status where 5 units are arranged



(For mounting details, refer to "Mounting" on page 64)



S-T50 (Actual Size)

The optimized high-temperature gas discharge structure and arc runner shape streamline the outline dimensions!!

<AC Operated Type>

(Unit: mm)

Frame Size		11A	13A	13A	20A	25A	32A
Traditional MS-N Series	Front View	43 S-N10	43 S-N11 (Auxiliary 1-pole)	53 S-N12 (Auxiliary 2-pole)	63 S-N20	75 S-N25	None
New slimline MS-T Series	Front View	36 -7mm! S-T10	44 -9mm! S-T12 (Auxiliary 2-pole)		44 -19mm! S-T20	63 -12mm! S-T25	43 New S-T32

Frame Size		35A	50A	50A	65A	65A	80A	100A
Traditional MS-N Series	Front View	75 S-N35	88 S-N50	88 S-N50AE	88 S-N65	88 S-N65AE	100 S-N80	100 S-N95
New slimline MS-T Series	Front View	75 S-T35	75 -13mm! S-T50		88 S-T65		88 -12mm! S-T80	100 S-T100

<DC Operated Type>

Frame Size		13A	13A	18A	20A	32A
Traditional MS-N Series	Front View	43 SD-N11	53 SD-N12	None	63 SD-N21	None
New slimline MS-T Series	Front View	44 -9mm! SD-T12		44 New SD-T20	63 SD-T21	43 New SD-T32

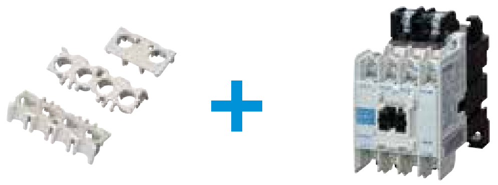
Frame Size		35A	50A	65A	80A	100A
Traditional MS-N Series	Front View	75 SD-N35	88 SD-N50	88 SD-N65	100 SD-N80	100 SD-N95
New slimline MS-T Series	Front View	75 SD-T35	75 -13mm! SD-T50	88 SD-T65	88 -12mm! SD-T80	100 SD-T100

Standardization

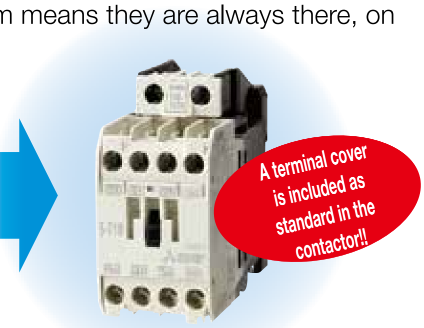
New integrated terminal covers

Target Frames: 10 A to 50 A Frame

The perennial issues of remembering to order the terminal covers, fitting them correctly or loosing them in the process are challenges of the past. The integrated terminal cover system means they are always there, on the Magnetic Contactor or its Auxiliary contact, ready to be used.



Traditional solution: Cover + Contactor



Reduce your coil inventory by up to 50%

Target Frames: 10 A to 35 A Frame

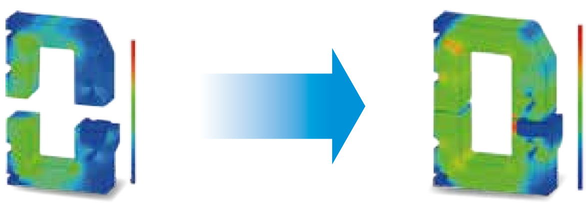
The 13 types of operation coil ratings available with the SN Series have been halved to 7 types with that increasing the applicable voltage range. Users can reduce their inventory, and by integrating the types of coils manufactured, a shorter delivery can be realized.

Coil designation	Rated Voltage [V]	
	50 Hz	60 Hz
AC24V	24	24
AC48V	48 to 50	48 to 50
AC100V	100	100 to 110
AC120V	110 to 120	115 to 120
AC127V	125 to 127	127
AC200V	200	200 to 220
AC220V	208 to 220	220
AC230V	220 to 240	230 to 240
AC260V	240 to 260	260 to 280
AC380V	346 to 380	380
AC400V	380 to 415	400 to 440
AC440V	415 to 440	460 to 480
AC500V	500	500 to 550

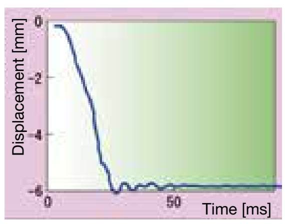
Coil designation	Rated Voltage [V]
	50 Hz/60 Hz
AC24V	24
AC48V	48 to 50
AC100V	100 to 127
AC200V	200 to 240
AC300V	260 to 300
AC400V	380 to 440
AC500V	460 to 550

∗ The conventional 7 types are available for the 50A and larger frames.

By integrating the electromagnetic field analysis and drive analysis, inconsistency in the electromagnetic attraction force is suppressed and rise of the coil temperature is reduced.



OFF State　　ON State



When AC150 V 60 Hz is applied on AC200V coil

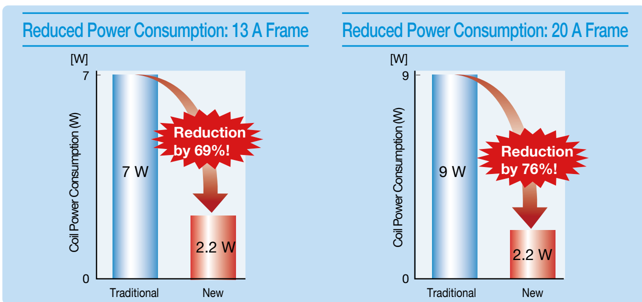
Capable of direct drive with transistor output of PLC, etc

Target Frames: 13 A to 32 A Frame ∗ DC Operated Models

The adopted high-efficiency polarized electromagnet greatly reduces the coil power consumption, and enables all models to be directly driven with a DC24 V, 0.1 A rating transistor output. (DC24V coil)

	Traditional Model	New Model	Lowering Rate
13 A Frame (Coil: DC12/24V)	7W	2.2W	69%
20 A Frame (Coil: DC12/24V)	9W	2.2W	76%
32 A Frame (Coil: DC12/24V)	–	2.2W	–

∗ DC48V to 220V: 3.3 W.



Safety & Quality

Terminal Covers with Finger Protection Function

Target Frames: 10 A to 50 A Frame

In addition to the Magnetic Contactor, a terminal cover has been provided as a standard for the thermal, magnetic relay and auxiliary contact unit options. This realizes a finger protection function that complies with the DIN and VDE Standards, prevents electric shocks, and increases safety during maintenance and inspections.

[Finger Protection]

In the provisions regarding worker safety and accident protection during use of low-voltage switchgear and controlgear assemblies set forth with DIN EN 50274/VDE 0660 Teil 514, the range for providing protection against contact of live sections is divided into "Finger Safe (preventing finger contact)" and "Back of hand safe (protecting back of hand contact), and standards are provided. The MS-T Series terminal cover satisfies the requirements of these provisions.

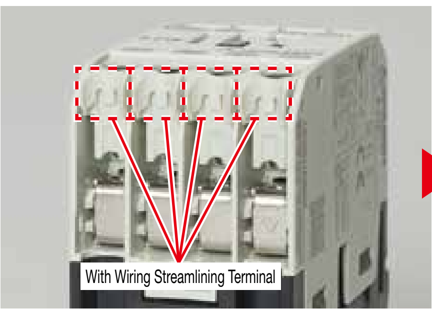
Smart Wiring

Smart Design Means Smart Wiring

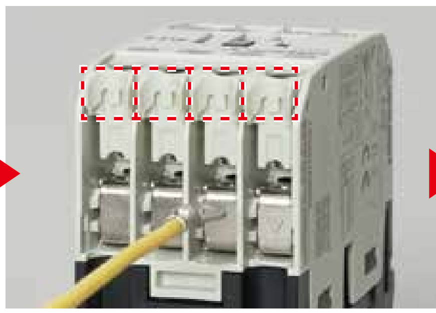
Target Frames: 10 A to 50 A Frame

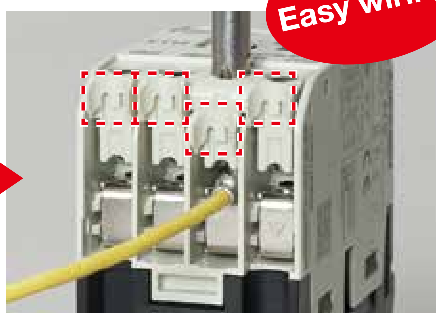
The integrated terminal covers have an additional benefit in that they act as a guide to improve wiring efficiency but also retain the terminal screw in place: no mislaying the screw, no dropping it or having trouble reinserting it in to the terminal block just fast efficient wiring. Fast wiring terminals (model name with suffix “BC”) are also available to further improve wiring efficiency, workability and hence productivity.

Easy wiring!



(1) The screw holder lifts up the screw.


(2) Insert the ring crimp lug.


(3) Tighten the screw.

Easy branch circuit wiring with Motor Circuit Breaker and optional connection conductor unit.

Target Frames: 10 A to 32 A Frame

Easy wiring is available for the new MS-T Series by using the Motor Circuit Breaker and optional connection conductor unit, contributing your productivity improvement.

Global Standard

Global Standard

Complies with main International Standards

In addition to certification for use under various countries' standards such as IEC, JIS, UL, CE and CCC, etc., plans are also underway to obtain certification for the standards of other countries.
We aim to contribute to helping customers expand their overseas business.

Standards	Applicable standard					Safety Certification Standard
	International	Japan	European countries		China	U.S. & Canada
			EN / EC Directive	Certifying Body	GB	
	IEC *	JIS	CE	TÜV Rheinland	CCC	c UL us

Note: Compliant with the requirements for mirror contacts in standards such as IEC60947-4-1, and TÜV-certified.

Higher SCCR values achieved by using with motor circuit breaker.

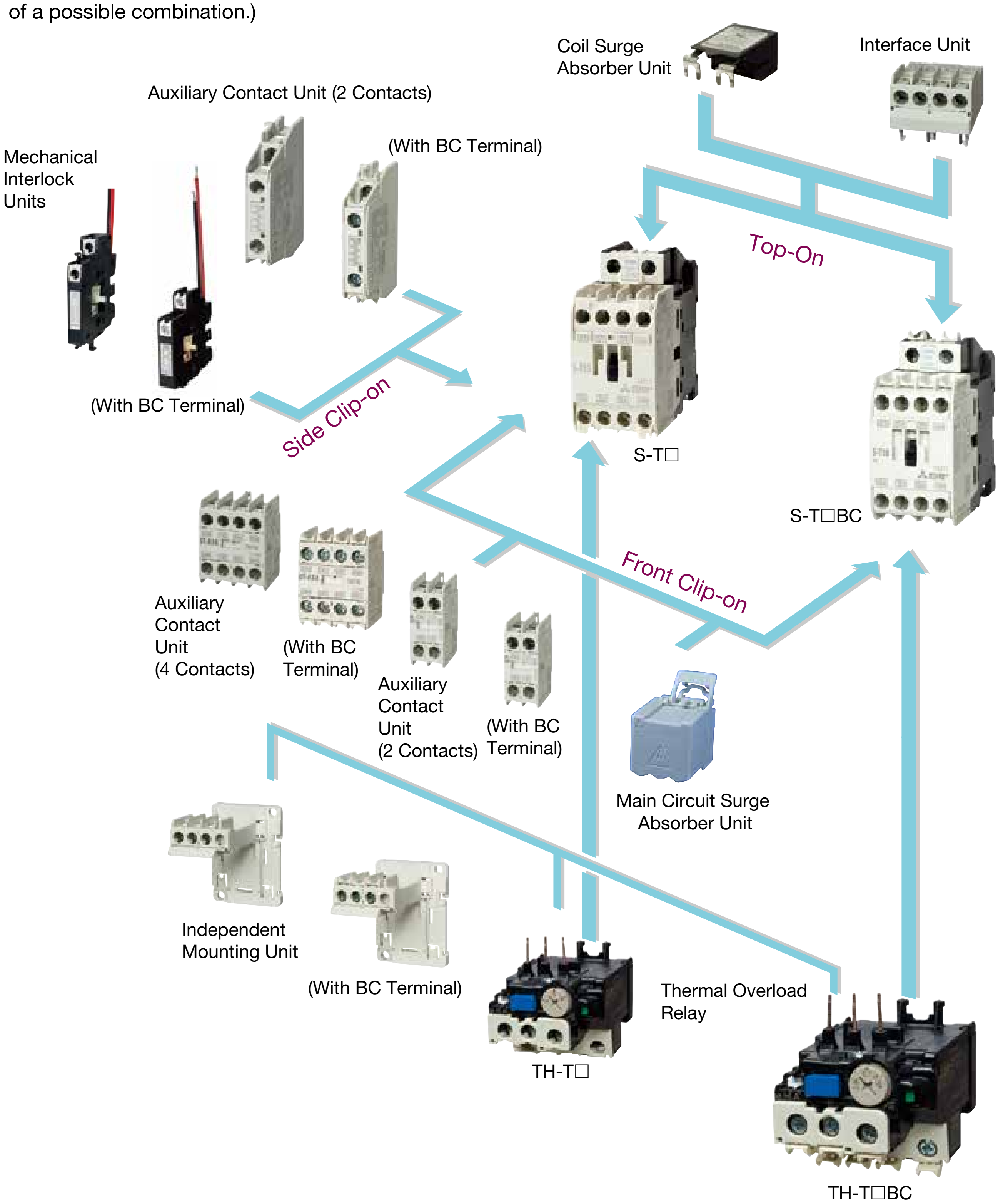
When the MMP-T Series and the S-T Series are used together, a higher SCCR (UL short-circuit current rating) value can be achieved. This will be a great support for your business in North America.

* Only applicable to the MMP-T series that bear the UL mark. (Refer to page 362 .)

An Extensive Line of MS-T Series Optional Units

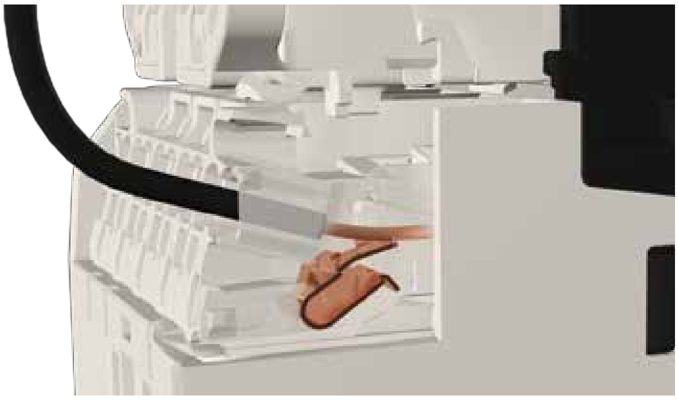
A Wide Selection of Optional Units

● We offer a wide range of optional units, including auxiliary contact units and surge absorber units, etc. Application ranges can be expandedby combining with optional units. (The photo shown is just one example of a possible combination.)



Just insert solid wires or ferrules into terminals for wiring!
No terminal screws are required, which makes wiring quicker and easier.

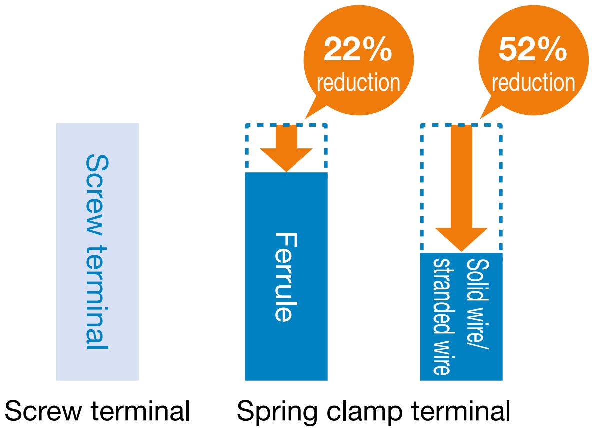
No special tools are required. The wiring requires only a flathead screwdriver (manufactured to DIN 5264 standard).
Not only ferrules but also stripped solid wires and stranded wires can be directly connected to the terminals.
No worry about screw dropping or unfastened screws.



Significantly Shorter Wiring Time

Comparison with the terminal screw model (with round crimp terminal)
Wiring with ferrules: Reduced by 22%
Wiring with solid or stranded wire: Reduced by 52%

∗Wiring performed by non-experts (with 2-year experience) (The research conducted by Japan Switchboard & control system Industries Association)



Easy Wiring For Whoever Works On

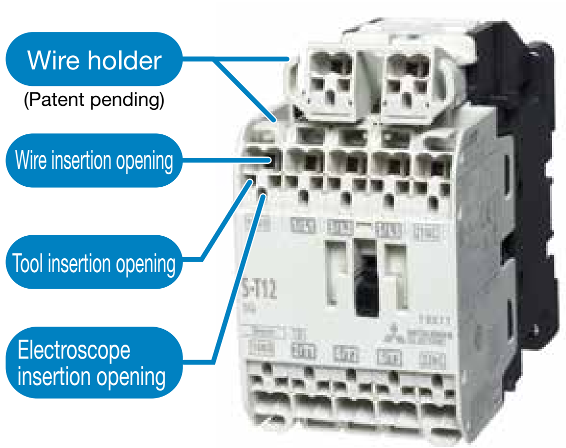
For screw-type wiring, the tightening torque is different from worker to worker, and the same worker does not necessarily tighten screws with the same torque at all times.
However, spring clamp terminals make wiring easy and reliable even for non-experts.

Less Maintenance

Excellent electrical characteristics can be maintained stably for a long period of time.
The wiring is highly resistant to vibrations and impacts, reducing maintenance labor.
For example, screw tightening is not required at the time of delivery or inspection of the panel or the mechanical system.
Products and equipment can be more reliable, reducing the total cost.

Product line and features

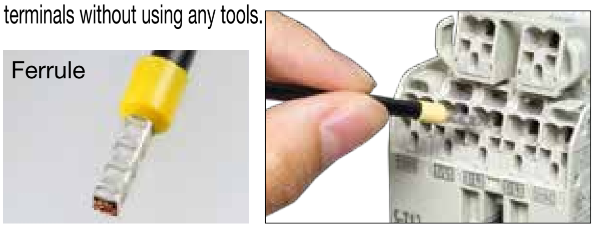
12A and 20A magnetic contactors and contactor relays are available.
AC operated models and DC operated models with low voltage inputs can also be manufactured.
Magnetic contactors: Page 125, Contactor relays: Page 175



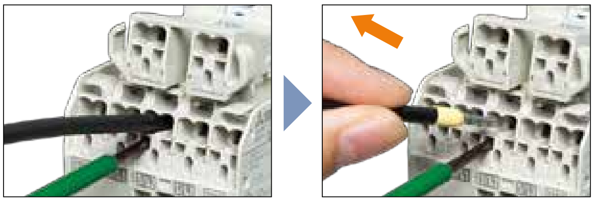
Wiring Features

● Elemental wires can be connected directly.

● Solid wires and ferrules can be connected simply by inserting them into the terminals without using any tools.



● For disconnection of a wire, insert a tool straight into a tool insertion opening on a magnetic contactor/magnetic relay and pull out the wire.



Insert the tool fully into the tool insertion opening.

Pull out the wire.

● Providing two wire insertion openings for per wiring enables crossover wiring.

● Providing the wire holders for control and auxiliary terminals* prevents fall-off of mark tubes.

* The magnetic relays have the wire holders for the outermost poles.

● Providing the electroscope insertion openings prevents come-off of wires during continuity check.

● WAGO PUSH-IN CAGE CLAMP®

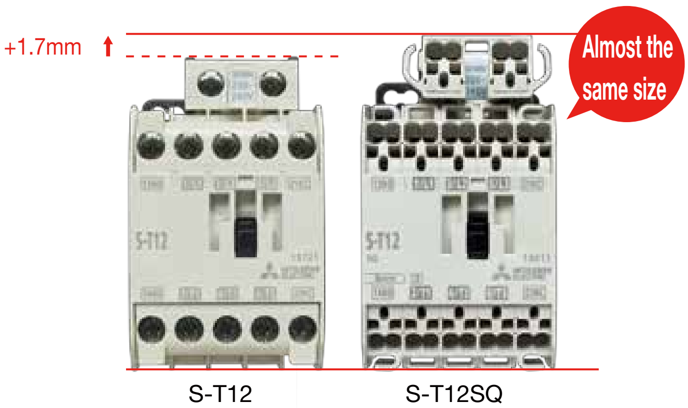
* Spring clamp terminals:PUSH-IN CAGE CLAMP® manufactured by WAGO Kontakttechnik GmbH & Co. KG, Germany

PUSH-IN CAGE CLAMP®

Other Features

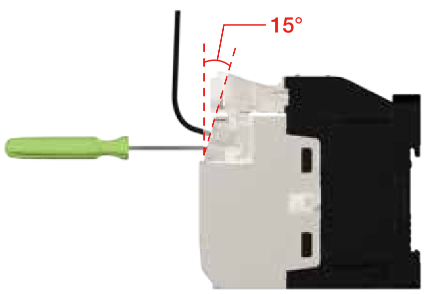
● Whether to use an IEC rail or screws for installation are selectable.

● The spring clamp model has almost the same size as the former product. (A 1.7mm increase in height) * The installation size remains the same.



● The wire protrusion is reduced.

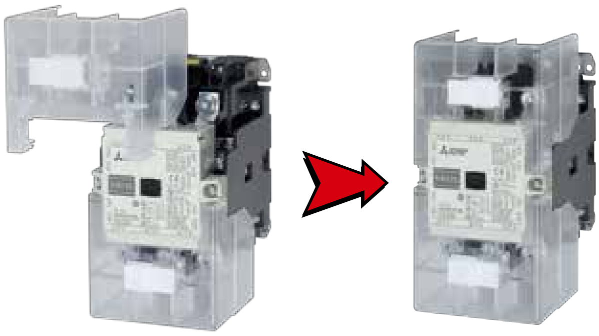
The spring clamp terminals have an inclination of about 15 degrees to the front surface of the product, which reduces the protrusion of wires and makes the wiring in the panel neat.
Tools can be inserted straight into the terminals, which makes it easier to connect and disconnect wires.



125 to 800 A Frame

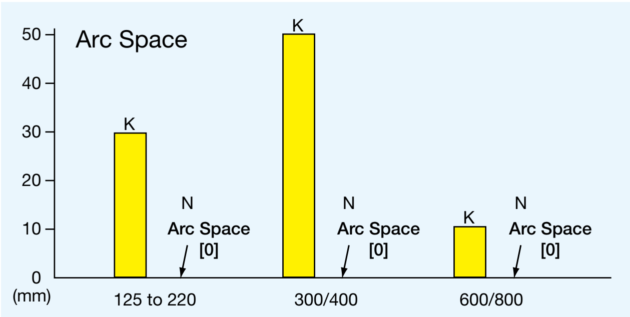
Live Part Protection Covers for Finger Protection
(125 to 400 A Frame, Optional)

· Attention has been paid to safety in order to provide live part protection covers that offer finger protection and that are easy to handle.
· Various types are offered including those for magnetic contactors, magnetic starters, reversible magnetic contactors, and reversible magnetic starters, etc.
· Installation and removal can be easily performed with one touch.



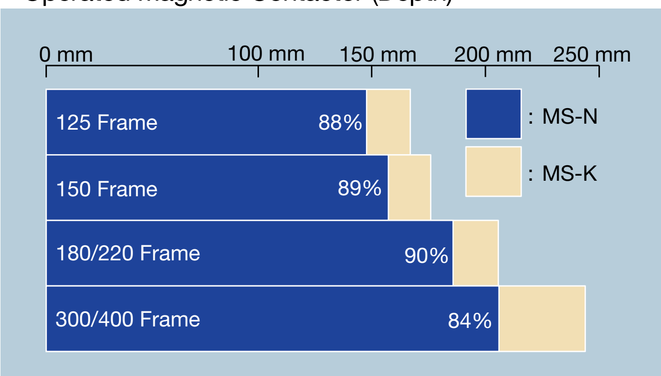
Arc Space of Zero Realized
(125 to 800 A frame)

· Safety and a long product life have been guaranteed by combining the current capacities of each magnetic contactor to form an ideal arc-suppression structure that effectively interrupts current. Also, by employing HGC arc-suppression (*), an arc space of "0" can be achieved, resulting in further improvements to safety and space-saving.
Even in overcurrent interruption conditions (interruptions at 13 times the rated operating current) or short-circuit conditions, the arc space dimensions prevent arc touching for safety.
∗HGC (Hot Gas Control) arc suppression method refers to a high-speed arc suppression method that provides control over arc discharge direction, as well as superior interrupting performance.

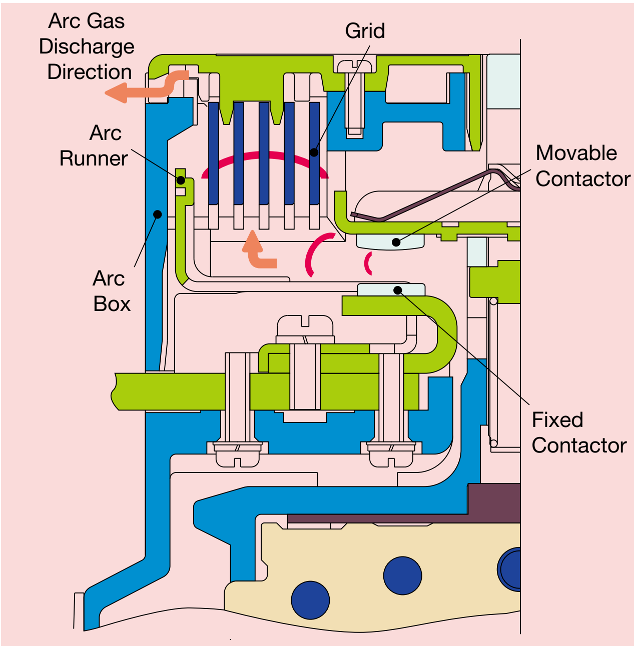


Realizing Space Saving

●Adoption of HGC Arc Suppression Method
· Because arc space has been reduced to zero by adopting HGC arc suppression, downsizing of control panels has been achieved.
· Required Panel Dimensions for AC Operated Magnetic Contactor (Depth)



· Arc Suppression Structure
(HGC Arc Suppression Method)



A Brightened Board Interior

· MS-N Series models feature a white front surface design that brightens the board interior.

Featuring an AC Operated DC Excitation Type Magnet

(MS-T Series T65 to T100 also used)

● Prevention of Buzzing

- Because DC excitation is used, there is no worry that magnetic buzzing sounds will be generated.

● Coils that Do Not Give Off Switching Surges

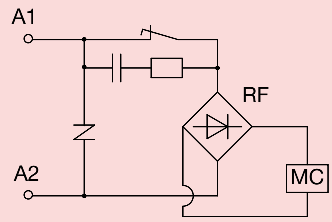
- Because a surge absorber function is built-in, coil switching surges are not generated.
- This simple circuit provides excellent reliability.

● Ultra-wide Dual Rated Coil

- The rated voltage range has been expanded, resulting in the number of coil types being reduced to a third. The mechanical switching durability within the rated voltage range is 5 million cycles.

● Coils Resistant to Voltage Drops

- Because the standard product is a low-voltage compensation type coil (operating will continue without interference even if voltage drops to 65% of rating during contact (first 1 to 2 cycles)), it has been made resistant to voltage drops.



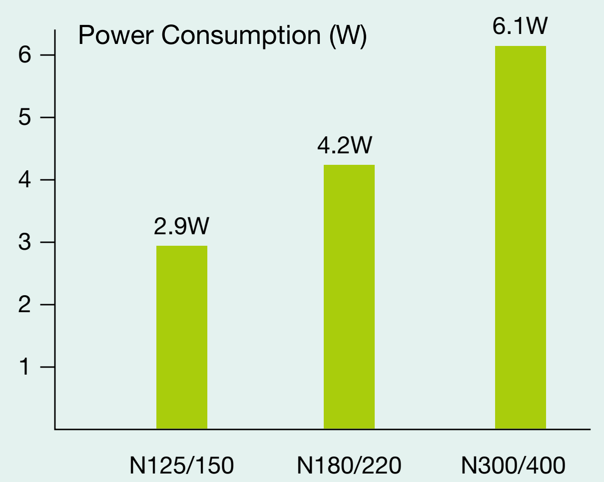
(Representative operation coil circuit diagram)

Designation	Rating
AC100V	100 to 127V 50/60Hz
AC200V	200 to 240V 50/60Hz
AC300V	260 to 350V 50/60Hz
AC400V	380 to 440V 50/60Hz
AC500V	460 to 550V 50/60Hz

We also manufacture those with AC24V and AC48V ratings. (N125, N150)

Low Power Consumption Coils

- Low power consumption has been realized by adopting an AC operated DC excitation magnet coil.



Support for Direct Drive Using PLC Transistor Output

DC Interface Contactors (12 A Frame)

SD-Q11 Type

MSOD-Q11 Type

■ Direct Drive of Contactors Using Semiconductor Output (Transistor Output)

Can drive a direct DC interface contactor using DC24 V transistor output without use of an intermediate relay.

Wide Range of Types

SD-Q11	AC200V	2.5kW	1a(1b)	Non-Reversible Type
SD-QR11	AC200V	2.5kW	1b×2	Reversible Type
SD-Q12	AC200V	2.5kW	1a1b(2a)	Non-Reversible Type
SD-QR12	AC200V	2.5kW	1a1b×2	Reversible Type

Can be manufactured with a thermal overload relay (model name: MSOD-Q(R)□).

■ An Extensive Line of Installable Optional Units

Features auxiliary contact units and a display window.

■ Surge Absorber Comes Standard Built-in

Because the built-in surge absorber function controls surge voltage, it serves to prevent the negative effects of surge voltage at coil OFF, such as damage to peripheral devices.

■ Realizing Large Capacity and Long Product Life

Because conventional free air thermal current (rated continuity current) has increased, these are only used for circuit current (for current switching of inverters, servos, etc.). Also, they can be applied to AC440 V circuits despite their compact size.

Model Name	Rated Capacity (kW) AC-3 200 to 240V	Rated Capacity (kW) AC-3 380 to 440V	Free Air Thermal Current (A)	Electrical Durability (x 10000)
SD-Q11/Q12	2.5	4	20	100

■ Minimal Load for Auxiliary Contacts DC5 V 3 mA

By doubling the auxiliary contacts, support for levels as low as DC5 V 3 mA has been made possible.
(The failure ratio in normal environments free of dust or corrosive gas is 5x10^{-7}/cycle.)

■ Rail Mounting Standardized

Can be mounted on an IEC and DIN regulation compliant 35 mm width rail.

■ Provides Support for a Large Number of International Standards

Model	Model Name	Applicable Standard				Safety Certified Standard		EC Directives	Certifying Body	CCC Certification
		JIS∗1 JEM	IEC	DIN VDE	BS EN	UL	CSA	CE Mark	TÜV	GB
		Japan	International	Germany	United Kingdom Europe	US	Canada	Europe	Germany	China
						c UL us LISTED		CE	TÜV	CCC
Magnetic Contactors	SD-Q11, Q12 SD-QR11, QR12	◎	◎	◎	◎	◎	◎	◎	◎	◎
Magnetic Starters	MSOD-Q11 (BC) KP, Q12 (BC) KP MSOD-QR11 (BC) KP, QR12 (BC) KP	◎	◎	◎	◎	◎	◎	◎	◎	◎

Note 1 ◎ : Standard product that conforms, is compliant, or for which certification has been obtained
Note 2 ∗1 : If JIS conformity declaration is required, please request.

US-N and US-H Series Solid State Contactors

Maintenance-Free and Noiseless

US-N□ Model Solid State Contactors for Motor/Heater Loads (5 A Frame to 200 A Frame)

US-N5SSTE Type

US-N20TE Type

■ High-Frequency Switching and Maintenance-Free
No parts subject to electrical or mechanical wear, making them maintenance-free and ideal for use in high-frequency switching (motors, heaters, lighting, condenser switching, etc.).

■ Noiseless and Clean Running
Can be used comfortably without sound for applications in which switching sounds would be a nuisance (hotels, hospitals, offices, cleanrooms, etc.).

■ Applicable for a Wide Range of Main Circuit Voltages (US-N20 (TE) to N50(TE))
Can be used for a wide range (AC100 to 480 V) of main circuit voltages.

■ Provides Support for a Large Number of International Standards (US-N Series)
Our standard products comply with the domestic standards as well as various overseas standards and are certified to meet all the standards.

■ Live Part Protection Covers Provided as Standard Equipment for Improved Safety (US-N Series)
In order to improve safety, live part protection covers with finger protection functionality and compliance with DIN and VDE regulations have been made standard equipment.

■ A Wide Range of Types and an Expanded Series
<Heater Load>

●2-circuit, 3-circuit Integrated Type
●Cycle Control Type Voltage Adjusters

<Motor Load>

●2-circuit, 3-circuit Integrated Type

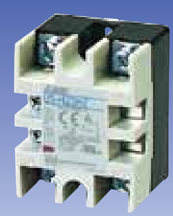
<Current Frame>

AC200 V 5 A to 200 A Frame
AC400 V 20 A to 200 A Frame
DC24 to 110 V 8 A Frame

US-H□ Solid State Contactors for Heater Load (20 A Frame to 50 A Frame)

US-H20 Type

US-H40DD Type



US-H20HZ Type

■ Ideal for Heater Loads
Ideal for high-frequency switching heater applications, such as injection molding machines or semiconductor manufacturing equipment, etc.

■ Applicable for a Wide Range of Main Circuit Voltages
Can be used for a wide range (AC24 to 480 V) of main circuit voltages.

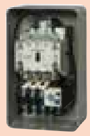
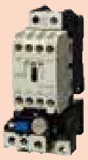
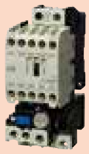
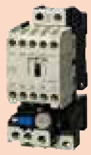
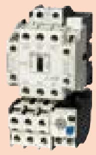
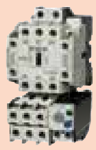
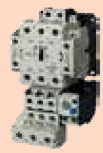
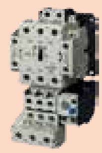
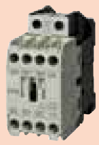
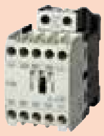
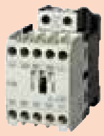
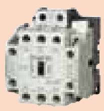
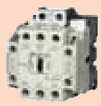
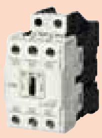
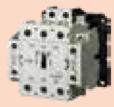
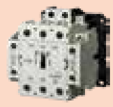
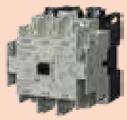
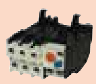
■ Provides Support for a Large Number of International Standards
Our standard products comply with the domestic standards as well as various overseas standards and are certified to meet all the standards.

■ Display Window for Confirmation of Operation Standardized
With indicator lamps on the front surface, the operating voltage input status can be checked at a glance.

■ Realizes a Long Product Lifetime When Used for High-frequency Switching Applications
Realizes a long product lifetime when used for high-frequency Switching applications by using a power semiconductor device.

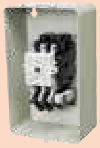
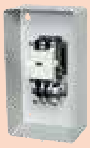
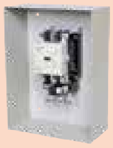
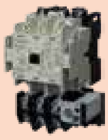
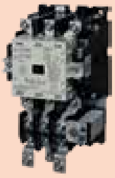
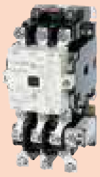
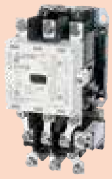
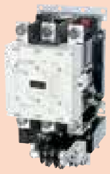
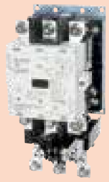
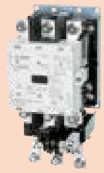
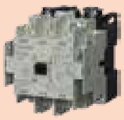
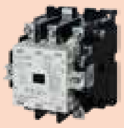
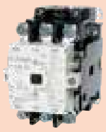
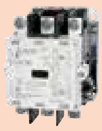
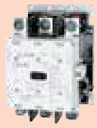
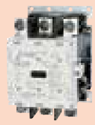
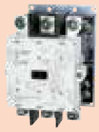
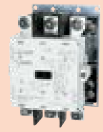
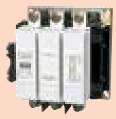
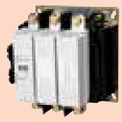
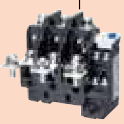
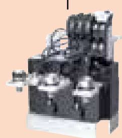
■ Live Part Protection Cover can be Mounted for Improved Safety
After control panel mounting, a live part protection cover (option: UN-CV501US) can be easily mounted for improved safety.

MS-T/N Series Specification List

AC Operated	Category AC-3 (Note 1) (Three-Phase Cage Motor Standard Duty) [kW/A] (Note 2)	AC220 to 240V	2.5/11 [2.2/11]	3.5/13 [2.7/13]	4.5/18 [3.7/18]	5.5/25 [4(3.7)/20]	7.5/30(26) [5.5/26]	7.5/32 [7.5/32]	11/40 [7.5/35]	15/55 (50) [11/50]	18.5/65 [15/65]
		AC380 to 440V	4/9 [2.7/7]	5.5/12 [4/9]	7.5/18 [7.5/18]	11/23 [7.5/20]	15/30(26) [11/25]	15/32 [15/32]	18.5/40 [15/32]	22/50 [22/48]	30/65 [30/65]
		AC500V	4/7 [2.7/6]	5.5/9 [5.5/9]	7.5/17 [7.5/17]	11/17 [7.5/17]	15/24 [11/20]	15/24 [11/20]	18.5/32 [15/26]	25/38 [22/38]	37/60 [30/45]
		AC690V	4/5	5.5/7	7.5/9	7.5/9	11/12	11/12	15/17	22/26	30/38
	Conventional Free Air Thermal Current Ith [A]		20			32			60	80	100
			1a	1a1b		2a2b		—	2a2b	2a2b	2a2b
MS-T/N Type Enclosed Magnetic Starters			 MS-T10	 MS-T12	—	 MS-T21	—	—	 MS-T35	 MS-T50	 MS-T65
MSO-T/N Type Open Magnetic Starters			 MSO-T10 MSO-T10BC	 MSO-T12 MSO-T12BC	 MSO-T20 MSO-T20BC	 MSO-T21 MSO-T21BC	 MSO-T25 MSO-T25BC	—	 MSO-T35 MSO-T35BC	 MSO-T50 MSO-T50BC	 MSO-T65
S-T/N Type Magnetic Contactors			 S-T10 S-T10BC	 S-T12 S-T12BC	 S-T20 S-T20BC	 S-T21 S-T21BC	 S-T25 S-T25BC	 S-T32 S-T32BC	 S-T35 S-T35BC	 S-T50 S-T50BC	 S-T65
TH-T/N Type Thermal Overload Relays				 TH-T18(BC) TH-T18(BC)KP			 TH-T25(BC) TH-T25(BC)KP		 TH-T50(BC) TH-T50(BC)KP		 TH-T65 TH-T65KP
Current Range of Thermal Overload Relays [A]			0.1 to 11	0.1 to 13	0.1 to 18	0.2 to 18	0.2 to 26	—	0.2 to 34	0.2 to 50	12 to 65
Electromagnetic Method			AC Operation/AC Excitation								
IEC 35 mm Rail Mounting											
Applicable to AC690 V											
Surge Absorber			Externally Mounted Units (Model names with "SA" are externally mounted.)								
Auxiliary Twin Contacts											
Applied Products	DC Operated										
	Mechanically Latched Type										
	Delayed Release										

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
Note 2. □ ,□ ,□ stand for "manufactured range", while□stands for "outside manufactured range".
Note 3. "BC" in the model name refers to "wiring streamlining terminal".
Note 4. The value in parentheses for the motor capacity is applicable in the case of enclosed magnetic starters.
Note 5. Mechanically latched types and delay open types have differing auxiliary contact arrangements. Refer to page 102 for details about mechanically latched types, or page 111 for delay open types.
Note 6. Because there are products that cannot be mounted, please refer to combination details on page 192 when applying optional products.

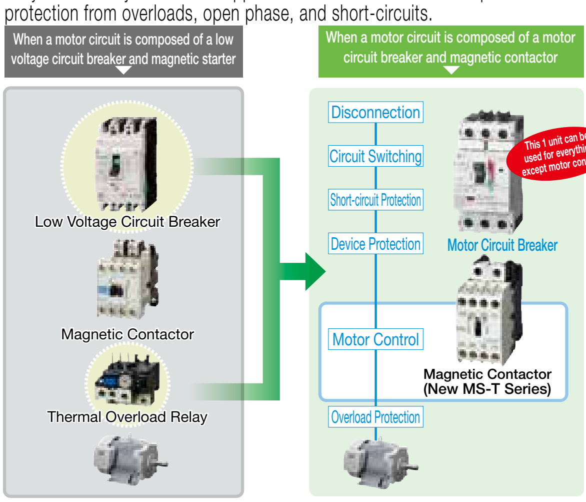
Magnetic Starters, Magnetic Contactors, Thermal Overload Relays

	22/85 [19/80]	30/105 [22/100]	37/125 [30/125]	45/150 [37/150]	55/180 [45/180]	75/250 [55/220]	90/300 [75/300]	125/400 [110/400]	190/630 [160/630]	220/800 [200/800]
	45/85 [37/80]	55/105 [45/93]	60/120 [60/120]	75/150 [75/150]	90/180 [90/180]	132/250 [110/220]	160/300 [150/300]	220/400 [200/400]	330/630 [300/630]	440/800 [400/800]
	45/75 [45/75]	55/85 [45/75]	60/90 [60/90]	90/140 [90/140]	110/180 [110/180]	132/200 [132/200]	160/250 [160/250]	225/350 [200/350]	330/500 [300/500]	500/720 [400/720]
	45/52	55/65	60/70	90/100	110/120	132/150	200/220	250/300	330/420	500/630
	120	150	150	200	260	260	350	450	660	800
	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b
	 MS-T80	 MS-T100	 MS-N125	 MS-N150	 MS-N180	 MS-N220	 MS-N300	 MS-N400	–	–
	 MSO-T80	 MSO-T100	 MSO-N125	 MSO-N150	 MSO-N180	 MSO-N220	 MSO-N300	 MSO-N400	–	–
	 S-T80	 S-T100	 S-N125	 S-N150	 S-N180	 S-N220	 S-N300	 S-N400	 S-N600	 S-N800
	 TH-T100 TH-T100KP		 TH-N120 TH-N120KP	 TH-N120TA TH-N120TAKP	 TH-N220RH TH-N220RHKP		 TH-N400RH TH-N400RHKP		 TH-N600 TH-N600KP (Excluding +CT supply)	
	12 to 80	12 to 100	34 to 125	34 to 150	65 to 180	65 to 220	85 to 300	85 to 400	200 to 800	
	AC Operation/DC Excitation									
	Built-in									

Introducing MMP-T

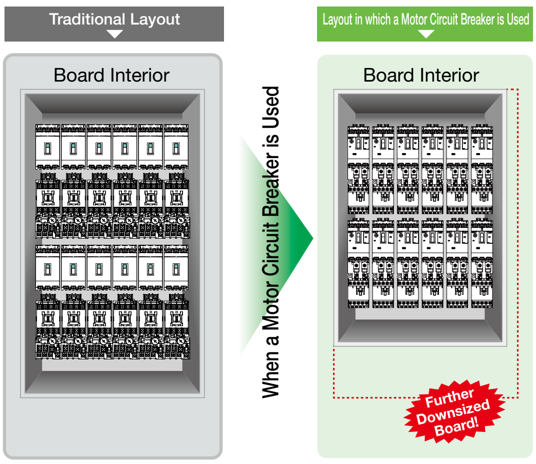
What is a motor circuit breaker?

This is a product that integrates a low voltage circuit breaker with thermal overload relay functionality and can be applied to motor circuits. One unit provides protection from overloads, open phase, and short-circuits.



Featuring a Space-saving Design that Results in Downsized Panels

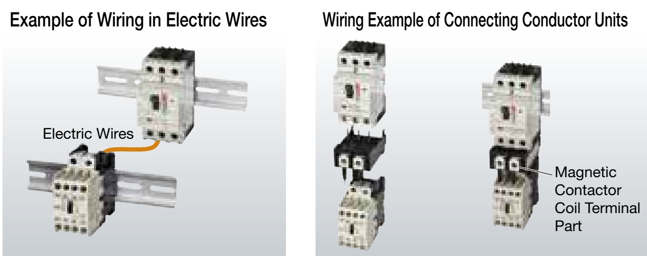
Example of Space Saving Application



Wire Saving

When wiring the motor circuit breaker and contactor, the number of wiring processes can be reduced by using a connecting conductor unit (optional). We also offer a DC interface contactor (SD-Q) and connecting conductor unit (model name: UT-MQ12), as well as a DC operated compact model (SD-T) and connecting conductor (model name: UT-MT20D).

Example of Application of Wire Saving

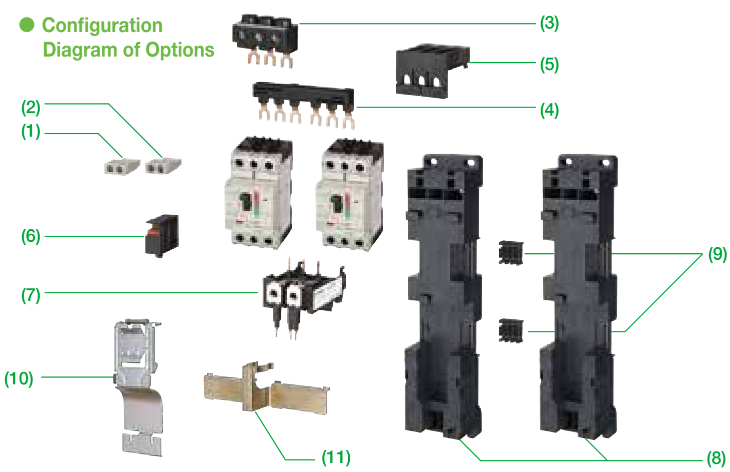


Usage Example With UT-MQ12

Ease-of-Use

A wide range of optional units is offered.
This is in order to satisfy the various usage applications of our customers.

● **Configuration Diagram of Options**



Number	Product Name	Model Name	Specifications	Description
(1)	Auxiliary Contact (Interior)	UT-MAX	1a	The contacts of this unit operate in unison with the turning ON/OFF of the main unit.
			1b	
		UT-MAXLL(For Very Small Loads)	1a	
			1b	
(2)	Alarm Contact (Interior)	UT-MAL	1a	The contacts of this unit operate (either short-circuits, overloads, open-phase) in unison with the trip operation of the main unit.
			1b	
		UT-MALLL(For Very Small Loads)	1a	
			1b	
(3)	Power Supply Block	UT-EP3		This is a terminal block unit that can enable the wiring of bare wires (single core wire/ stranded wire) on the power supply side if the unit is connected in parallel with a bus bar.
(4)	Bus Bar	UT-2B4	45 mm Clearance Row of 2	A unit that can supply power (parallel connection) to 2 or 3 units individually without use of electric wire.
		UT-3B4	45 mm Clearance Row of 3	
		UT-2B5	57 mm Clearance Row of 2	
		UT-3B5	57 mm Clearance Row of 3	
(5)	Power Side Terminal Cover	UT-CV3		Power side terminal cover for UL60947-4-1A, Type E/F.
(6)	Short-circuit Display Unit	UT-TU		A unit that operates and displays in red only when the unit trips due to a short circuit. Necessary for application to UL60947-4-1A, Type E/F.
(7)	Connecting Conductor Unit	UT-MT20		Unit for electrically and mechanically connecting MMP-T32 and a magnetic contactor.
		UT-MT32		
		UT-MQ12		
		UT-MT20D		
		UT-MT32D		
(8)	Mounting Base Unit	UT-BT20		Plate for mounting a combination starter by combining MMP-T32 and a magnetic contactor. Can be rail mounted or screw mounted.
		UT-BT32		
		UT-BT32D		
(9)	Mounting Base Unit	UT-BT32DMP		
(10)	Jointing Block Unit	UT-RT10		A block that connects the 2 mounting base units mechanically.
		UT-RT20		
		UT-RT32		
(11)	Jointing Block Unit	UT-RT32DMP		

∗For combination model names, please refer to the outline drawings on page 371.

2

Selection and Application

2.1 Model List

Frame				T10	T12	T20	T21	T25	T32	T35	T50
Applicable standard				JIS C8201-4-1, IEC60947-4-1, EN60947-4-1, GB14048.4							
Model Name	Magnetic Contactors (Without Thermal Overload Relay, Open Type)		Non-Reversing	S-T10	S-T12	S-T20	S-T21	S-T25	S-T32	S-T35	S-T50
			Reversing	S-2 x T10	S-2 x T12	S-2 x T20	S-2 x T21	S-2 x T25	S-2 x T32	S-2 x T35	S-2 x T50
	Magnetic Starters (With standard 2-element, With Thermal Overload Relay)	Enclosed Type	Non-Reversing	MS-T10	MS-T12	—	MS-T21	—	—	MS-T35	MS-T50
			Reversing	—			MS-2 x T21	—	—	MS-2 x T35	MS-2 x T50
		Open Type	Non-Reversing	MSO-T10	MSO-T12	MSO-T20	MSO-T21	MSO-T25	—	MSO-T35	MSO-T50
			Reversing	MSO-2 x T10	MSO-2 x T12	MSO-2 x T20	MSO-2 x T21	MSO-2 x T25	—	MSO-2 x T35	MSO-2 x T50
		Combined Thermal Overload Relays		TH-T18			TH-T25		—	TH-T25 / T50	TH-T25 / T50
	Magnetic Starters With 3-element type Thermal Overload Relays	Enclosed Type	Non-Reversing	MS-T10KP	MS-T12KP	—	MS-T21KP	—	—	MS-T35KP	MS-T50KP
			Reversing	—			MS-2 x T21KP	—	—	MS-2 x T35KP	MS-2 x T50KP
		Open Type	Non-Reversing	MSO-T10KP	MSO-T12KP	MSO-T20KP	MSO-T21KP	MSO-T25KP	—	MSO-T35KP	MSO-T50KP
			Reversing	MSO-2 x T10KP	MSO-2 x T12KP	MSO-2 x T20KP	MSO-2 x T21KP	MSO-2 x T25KP	—	MSO-2 x T35KP	MSO-2 x T50KP
		Combined Thermal Overload Relays		TH-T18KP			TH-T25KP		—	TH-T25 / T50KP	TH-T25 / T50KP
Main contact rating	Rated Insulation Voltage [V]			690							
	Rated Impulse Withstand Voltage [kV]			6							
	Rated Frequency [Hz]			50/60							
	Pollution Degree			3							
	Rated operational current / power Category AC-3 (Note 1) (Three-phase squirrel-cage motor load standard responsibility) (Note 2) [kW/A]		AC220 to 240V	2.5/11 [2.2/11]	3.5/13 [2.7/13]	4.5/18 [3.7/18]	5.5/25 [4/20]	7.5/30(26) [5.5/26]	7.5/32 [7.5/32]	11/40 [7.5/35]	15/55 (50) [11/50]
			AC380 to 440V	4/9 [2.7/7]	5.5/12 [4/9]	7.5/18 [7.5/18]	11/23 [7.5/20]	15/30(26) [11/25	15/32 [15/32]	18.5/40 [15/32]	22/50 [22/48]
			AC500V	4/7 [2.7/6]	5.5/9 [5.5/9]	7.5/17 [7.5/17]	11/17 [7.5/17]	15/24 [11/20]	15/24 [11/20]	18.5/32 [15/26]	25/38 [22/38]
			AC690V	4/5	5.5/7	7.5/9	7.5/9	11/12	11/12	15/17	22/26
	Rated operational current / power Category AC-4 (Three-phase squirrel-cage motor load inching responsibility) [kW/A]		AC220 to 240V	1.5/8	2.2/11	3.7/18		4.5/20	5.5/26	5.5/26	7.5/35
			AC380 to 440V	2.2/6	4/9	5.5/13		7.5/17	11/24	11/24	15/32
			AC500V	2.7/6	5.5/9	5.5/10		7.5/12	7.5/13	11/17	15/24
	Rated operational current / power Category AC-1 (Resistance, heater load)		AC100 to 240V	20			32			60	80
			AC380 to 440V	11	13		32			60	80
			AC500 to 550V	8	11	13	32			60	
	Conventional Free Air Thermal Current Ith [A]			20			32			60	80
Auxiliary contact rating	Contact Arrangement	Standard Accessory (Note 7)	Non-Reversing	1a	1a1b		2a2b		—	2a2b	2a2b
			Reversing (Note 8, Note 9)	1a x 2 + 2b	1a1b x 2 + 2b		2a2b x 2		2a2b x 2	2a2b x 2	2a2b x 2
		Max. number of additional options (Note 11)	Non-Reversing	1 for UT-AX2/4, 2 for UT-AX11							
			Reversing (Note 8, Note 9)	2 for any UT-AX2/4/11					—	2 for any UT-AX2/4/11	
	Rated Operating Current (Category AC-15: Alternating current coil load) [A]		AC120V	6	6	6	6	6	6	6	6
			AC240V	3	3	3	3	3	3	3	3
	Rated Operational Current (Category DC-13 : Direct current coil load)		DC24V	3							
			DC110V	0.6							
	Conventional Free Air Thermal Current Ith [A]			10	10	10	10	10	10	10	10
Performance	Mechanical Durability [x 10000]			1000							
	Electrical Durability (Note 5) [Ten thousand times]		Category AC-3	200 (Note 5, 6)							
			Category AC-4	3 (Note 5)							
			Category AC-1	50							
	Switching Frequency [Times/Hour]		Category AC-3	1800							1200
			Category AC-4	300							
			Category AC-1	1200							
Characteristic	Coil consumption (Note7) [VA]		Sealed	7			7		4.5	10	
			Inrush	45			75		55	110	
	Power Consumption (Note 7) [W]			2.2			2.4	2.4	1.8	3.8	3.8
Outside Dimensions	Magnetic Contactors (without Thermal Overload Relays) (Width x Height x Depth) [mm]		Non-Reversing	36 x 75 x 78	44 x 75 x 78		63 x 81 x 81		43 x 81 x 81	75 x 89 x 91	
			Reversing	82 x 85 x 78	98 x 85 x 78		136 x 81 x 81		96 x 81 x 111	160 x 114 x 97	
	Open Type Magnetic Starters (Width x Height x Depth) [mm]		Non-Reversing	46 x 115 x 79			63 x 128 x 82		—	75 x 157.5 x 91	
			Reversing	90.5 x 125 x 79	98.5 x 125 x 79		136 x 138 x 82		—	160 x 179 x 97	
	Enclosed Magnetic Starters (Width x Height x Depth) [mm]		Non-Reversing	76×165×97.5		—	104×176×110	—		135×231×126	
			Reversing	—		—	220×192×115	—		300×247×130	
IEC 35mm rail mounting				Possible (excluding Enclosed Magnetic Starters)							
Installable Optional Unit Model Names (Note 10)	Additional Auxiliary Contact Units	(Contact Arrangement 1a1b)		UT-AX2/AX11							
		(Contact Arrangement 2a2b)		UT-AX4							
		With Low-Level Signal Contact		—							
	Coil Surge Absorber Units (Note 4)	(Varistor) (Note 4)		UT-SA21							
		(Varistor + Display LED)		UT-SA22							
		(CR)		UT-SA23							
		(Varistor + CR)		UT-SA25							
	DC-AC Interface	Triac Output		UT-SY21							
		Contact Output		UT-SY22							
	Live Part Protection Cover	For Magnetic Starters	Non-Reversing	—							
			Reversing	—							
		For Magnetic Contactors	Non-Reversing	—							
			Reversing	—							
	Terminal Cover	For Magnetic Starters (Non-Reversing)		(Standard Equipment)							
		For Magnetic Contactors (Non-Reversing)		(Standard Equipment)							
	Mechanical Interlock Units			UT-ML20 (Note 11)			UN-ML21				

Note 1. The figure in the square brackets indicates the rated current shown on the rating plate of the product at which the category AC-3 opening/closing durability.
Note 2. The value between parentheses for the rated operating current is for the magnetic starter (with thermal overload relay).
Note 3. AC operated types T10 to T50, DC operated types T12 to T50 can be manufactured with coil surge absorber (□-□SA type). The UT-SA21 type can be mounted.
Note 4. T65 to N800 types have an integrated coil surge absorber rendering a coil surge absorber unit for prevention of coil switching surges unnecessary.
Note 5. 1 million times for T20 class AC-3 380 V or more types for the rating in parentheses and 15,000 times for class AC-4 types. 15 thousand times for T35 to N800 class AC-4 380 V or more types.
Note 6. Values are for the ratings in square brackets. The electrical durability for the current values not in parentheses varies inversely with the rough square of the current.
Note 7. Mechanically latched types and delay open types have differing auxiliary contact arrangements. Refer to page 102 for details about mechanically latched types, or page 111 for delay open types.

T65	T80	T100	N125	N150	N180	N220	N300	N400	N600	N800
JIS C8201-4-1, IEC60947-4-1, EN60947-4-1, GB14048.4										
S-T65	S-T80	S-T100	S-N125	S-N150	S-N180	S-N220	S-N300	S-N400	S-N600	S-N800
S-2 x T65	S-2 x T80	S-2 x T100	S-2 x N125	S-2 x N150	S-2 x N180	S-2 x N220	S-2 x N300	S-2 x N400	S-2 x N600	S-2 x N800
MS-T65	MS-T80	MS-T100	MS-N125	MS-N150	MS-N180	MS-N220	MS-N300	MS-N400	—	—
MS-2 x T65	MS-2 x T80	MS-2 x T100	MS-2 x N125	MS-2 x N150	MS-2 x N180	MS-2 x N220	MS-2 x N300	MS-2 x N400	—	—
MSO-T65	MSO-T80	MSO-T100	MSO-N125	MSO-N150	MSO-N180	MSO-N220	MSO-N300	MSO-N400	—	—
MSO-2 x T65	MSO-2 x T80	MSO-2 x T100	MSO-2 x N125	MSO-2 x N150	MSO-2 x N180	MSO-2 x N220	MSO-2 x N300	MSO-2 x N400	—	—
TH-T65	TH-T65 / T100	TH-T65 / T100	TH-N120(TA)	TH-N120(TA)	TH-N220RH	TH-N220RH	TH-N400RH	TH-N400RH	TH-N600(+CT)	TH-N600(+CT)
MS-T65KP	MS-T80KP	MS-T100KP	MS-N125KP	MS-N150KP	MS-N180KP	MS-N220KP	MS-N300KP	MS-N400KP	—	—
MS-2 x T65KP	MS-2 x T80KP	MS-2 x T100KP	MS-2 x N125KP	MS-2 x N150KP	MS-2 x N180KP	MS-2 x N220KP	MS-2 x N300KP	MS-2 x N400KP	—	—
MSO-T65KP	MSO-T80KP	MSO-T100KP	MSO-N125KP	MSO-N150KP	MSO-N180KP	MSO-N220KP	MSO-N300KP	MSO-N400KP	—	—
MSO-2 x T65KP	MSO-2 x T80KP	MSO-2 x T100KP	MSO-2 x N125KP	MSO-2 x N150KP	MSO-2 x N180KP	MSO-2 x N220KP	MSO-2 x N300KP	MSO-2 x N400KP	—	—
TH-T65KP	TH-T65 / T100KP	TH-T65 / T100KP	TH-N120(TA)KP	TH-N120(TA)KP	TH-N220RHKP	TH-N220RHKP	TH-N400RHKP	TH-K400RHKP	TH-N600KP(+CT)	TH-N600KP(+CT)
690					690 (1000)					
6					6 (8)					
50/60										
3										
18.5/65 [15/65]	22/85 [19/80]	30/105 [22/100]	37/125 [30/125]	45/150 [37/150]	55/180 [45/180]	75/250 [55/220]	90/300 [75/300]	125/400 [110/400]	190/630 [160/630]	220/800 [200/800]
30/65 [30/65]	45/85 [37/80]	55/105 [45/93]	60/120 [60/120]	75/150 [75/150]	90/180 [90/180]	132/250 [110/220]	160/300 [150/300]	220/400 [200/400]	330/630 [300/630]	440/800 [400/800]
37/60 [30/45]	45/75 [45/75]	55/85 [45/75]	60/90 [60/90]	90/140 [90/140]	110/180 [110/180]	132/200 [132/200]	160/250 [160/250]	225/350 [200/350]	330/500 [300/500]	500/720 [400/720]
30/38	45/52	55/65	60/70	90/100	110/120	132/150	200/220	250/300	330/420	500/630
11/50	15/65	19/80	22/93	30/125	37/150	45/180	55/220	75/300	110/400	160/630
22/47	30/62	37/75	45/90	55/110	75/150	90/180	110/220	150/300	200/400	300/630
22/38	30/45	37/55	45/65	55/80	75/140	90/140	110/200	150/250	200/350	300/500
100	120	150	150	200	260	260	350	450	660	800
100	120	150	150	200	260	260	350	450	660	800
100	120	150	150	200	260	260	350	450	660	800
100	120	150	150	200	260	260	350	450	660	800
2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b
2a2b x 2	2a2b x 2	2a2b x 2	2a2b x 2	3a3b x 2	3a3b x 2	3a3b x 2	3a3b x 2	3a3b x 2	4a4b x 2	4a4b x 1
1 for UT-AX2/4, 2 for UT-AX11		2 for UN-AX80		2 for UN-AX150					1 for UN-AX600	
2 for any UT-AX2/4/11		2 for UN-AX80		—	—	—	—	—	—	—
6	6	6	6	6	6	6	6	6	6	6
3	3	3	3	3	3	3	3	3	3	3
3			3	3	3	3	3	3	3	3
0.6										
10	10	10	10	10	10	10	10	10	10	10
500										
200	100 (Note 6)							50 (Note 6)		
3 (Note 5)										
50										
1200										
300										
1200		600								
20		23	24	24	40	40	50	50	90	90
115		210	270	270	440	440	440	440	790	790
2.2	2.2	2.8	2.9	2.9	4.2	4.2	6.1	6.1	17	17
88 x 106 x 106	88 x 106 x 106	100 x 124 x 127	100 x 150 x 137	120 x 160 x 145	138 x 204 x175	138 x 204 x 175	163 x 243 x 195	163 x 243 x 195	290 x 310 x 235	290 x 310 x 235
216 x 115 x 112	216 x 115 x 112	270 x 140 x 137	276 x 150 x 148	296 x 160 x 156	370 x 215 x189	370 x 215 x 189	395 x 250 x 209	895 x 250 x 209	660 x 435 x 254	660 x 435 x 254
90 x 158 x 106	90 x 174.5 x 106	100 x 196 x 127	112 x 239 x 137	120 x 250 x 145	144 x 282 x 180.5	144 x 282 x 180.5	163 x 360 x 195	163 x 360 x 195	—	—
216 x 169 x 112	216 x 185.5 x 112	270 x 213 x 137	276 x 251 x 148	296 x 276 x 156	370 x 304 x 194.5	370 x 304 x 194.5	395 x 392 x 209	395 x 392 x 209	—	—
160 x 282 x 145		190 x 317 x 163	230 x 396 x 190	270 x 496 x 209			—	—	—	—
320 x 282 x 140		410 x 347 x 154	440 x 436 x 170	520 x 536 x 209			600 x 616 x 230		—	—
Possible (excluding Enclosed Magnetic Starters)		—	—	—	—	—	—	—	—	—
UN-AX2/AX11		UN-AX80		UN-AX150					—	—
UN-AX4		—	—	—	—	—	—	—	UN-AX600	
UN-LL22		—	—	—	—	—	—	—	—	—
—		—	—	—	—	—	—	—	—	—
—		—	—	—	—	—	—	—	—	—
—		—	—	—	—	—	—	—	—	—
—		—	—	—	—	—	—	—	—	—
UN-SY31		—	—	—	—	—	—	—	—	—
UN-SY32		—	—	—	—	—	—	—	—	—
UN-CZ500 + UN-CZ501		UN-CZ800+ UN-CZ801	UN-CZ1250+ UN-CZ1251	UN-CZ1500+ UN-CZ1501	UN-CZ2200 + UN-CZ2201		UN-CZ3000 + UN-CZ3001		—	—
UN-CZ504		UN-CZ804	UN-CZ1254	UN-CZ1504	UN-CZ2204		UN-CZ3004		—	—
UN-CZ500 x 2		UN-CZ800 x 2	UN-CZ1250 x 2	UN-CZ1500 x 2	UN-CZ2200 x 2		UN-CZ3000 x 2		—	—
UN-CZ502		UN-CZ802	UN-CZ1252	UN-CZ1502	UN-CZ2202		UN-CZ3002		—	—
UT-CW800 + UT-CW655		—	—	—	—	—	—	—	—	—
UT-CW800		—	—	—	—	—	—	—	—	—
UN-ML21		UN-ML80		UN-ML150	UN-ML220				—	—

Note 8. The +2b on the auxiliary contact arrangement of reversible T10 to T20 types indicates the break contact of the integrated UT-ML20 interlock unit. There is no need to specify when ordering.

Note 9. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combined with two magnetic contactors. For standard contact arrangements there is no need to specify whe ordering; however, please specify a matching contact arrangement for 2 units if for a special configuration. <Example> For 1b x 2 + 2b: 2B

Note 10. Because there are products that cannot be mounted, please refer to combination details on page 192 when applying optional products.

Note 11. Not applicable to AC operated types produced before March, 2019.

2.2 Manufacturing Range List

● Non-Reversible Type

Model Name				T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100	N125	N150	N180	N220	N300	N400	N600	N800
Frame				T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100	N125	N150	N180	N220	N300	N400	N600	N800
Category AC-3 Rated Capacity [kW]			220V	2.5	3.5	4.5	5.5	7.5	7.5	11	15	18.5	22	30	37	45	55	75	90	125	190	220
			440V	4	5.5	7.5	11	15	15	18.5	22	30	45	55	60	75	90	132	160	220	330	440
Auxiliary Contact (Note 6)			Standard	1a	1a1b	1a1b	←2a2b→		—	←2a2b→												
			Special	1b	2a (Note 8)	2a (Note 8)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Magnetic Starters	Enclosed	Standard Specifications	MS-□	◎	◎	—	◎	—	—	◎	◎	○	○	○	○	○	○	○	○	○	—	—
		With Push-Button	MS-□PM	○	○	—	○	—	—	○	○	○	○	○	—	—	—	—	—	—	—	—
		3-Element (2E) Thermal	MS-□KP	○	○	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○	—	—
		Open Time Quick Motion Type	MS-□QM	—	—	—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	—	—
	Open Type	Standard Specifications	MSO-□	◎	◎	◎	◎	◎	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	—	—
			MSOD-□	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		3-Element (2E) Thermal	MSO-□KP	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□KP	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		With Saturable Reactor	MSO-□SR	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□SR	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		With 3-Element (2E) Thermal Saturable Reactor	MSO-□KPSR	—	—	—	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□KPSR	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		2-Element Quick-acting Characteristics Thermal	MSO-□FS	—	—	—	○	○	—	○	○	○	○	○	—	—	—	—	—	—	—	—
			MSOD-□FS	—	—	—	○	—	—	○	○	○	○	○	—	—	—	—	—	—	—	—
		3-Element (2E) Quick-acting Characteristics Thermal	MSO-□FSKP	○	○	○	○	○	—	○	○	○	○	○	—	—	—	—	—	—	—	—
			MSOD-□FSKP	—	○	○	○	—	—	○	○	○	○	○	—	—	—	—	—	—	—	—
		Open Time Quick Motion Type	MSO-□QM	—	—	—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	—	—
		Surge Absorber Mounted Type	MSO-□SA	○	○	○	○	○	—	○	○	—	—	—	—	—	—	—	—	—	—	—
			MSOD-□SA	—	○	○	○	—	—	○	○	—	—	—	—	—	—	—	—	—	—	—
		Wiring Streamlining Terminal	MSO-□BC	◎	◎	◎	◎	◎	—	○	○	—	—	—	—	—	—	—	—	—	—	—
			MSOD-□BC	—	○	○	○	—	—	○	○	—	—	—	—	—	—	—	—	—	—	—
		Anticorrosion Treatment	MSO-□YS	○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□YS	—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		Delay Open Type	MSO-□DL	—	○	—	○	—	—	○	○	○	○	○	—	○	—	○	○	○	—	—
		Mechanically Latched Type	MSOL-□	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
			MSOLD-□	—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		With Terminal Cover	MSO-□CW	—	—	—	—	—	—	—	—	○	○ (Note 7)	—	—	—	—	—	—	—	—	—
			MSOD-□CW	—	—	—	—	—	—	—	—	○	○ (Note 7)	—	—	—	—	—	—	—	—	—
Magnetic Contactors	Open Type	Standard Specifications	S-□	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
			SD-□	—	◎	◎	◎	—	◎	◎	◎	◎	◎	◎	◎	◎	—	◎	◎	◎	○	○
		Surge Absorber Mounted Type	S-□SA(Note3)	◎	◎	◎	◎	○	○	○	○	—	—	—	—	—	—	—	—	—	—	—
			SD-□SA	—	○	○	○	—	○	○	○	—	—	—	—	—	—	—	—	—	—	—
		Anticorrosion Treatment	S-□YS	—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	○	○	○	○
		Open Time Quick Motion Type	S-□QM	—	—	—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	—	—
		Wiring Streamlining Terminal	S-□BC	◎	◎	◎	◎	◎	◎	◎	◎	—	—	—	—	—	—	—	—	—	—	—
			SD-□BC	—	◎	◎	◎	—	◎	◎	◎	—	—	—	—	—	—	—	—	—	—	—
		With Spring Clamp Terminals	S-□SQ	—	○	○	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
			SD-□SQ	—	○	○	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		With Terminal Cover	S-□CW	—	—	—	—	—	—	—	—	○	○	—	—	—	—	—	—	—	—	—
			SD-□CW	—	—	—	—	—	—	—	—	○	○	—	—	—	—	—	—	—	—	—
		Delay Open Type	S-□DL	—	○	—	○	—	—	○	○	○	○	○	—	○	—	○	○	○	—	—
		Mechanically Latched Type	SL-□	—	—	—	◎	—	—	◎	◎	◎	◎	◎	◎	◎	—	◎	◎	◎	○	○
			SLD-□	—	—	—	◎	—	—	◎	◎	◎	◎	◎	◎	◎	—	◎	◎	◎	○	○

Reversible Type

Model					T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100	N125	N150	N180	N220	N300	N400	N600	N800
Frame					2 x T10	2 x T12	2 x T20	2 x T21	2 x T25	2 x T32	2 x T35	2 x T50	2 x T65	2 x T80	2 x T100	2 x N125	2 x N150	2 x N180	2 x N220	2 x N300	2 x N400	2 x N600	2 x N800
Category AC-3 Rated Capacity [kW]				220V	2.5	3.5	4.5	5.5	7.5	7.5	11	15	18.5	22	30	37	45	55	75	90	125	190	220
				440V	4	5.5	7.5	11	15	15	18.5	22	30	45	55	60	75	90	132	160	220	330	440
Auxiliary Contact (Note 4 to Note 6)				Standard	(1a x 2) + 2b	(1a1b × 2) + 2b		← 2a2b × 2 →									← 3a3b × 2 →					4a4b × 2	
				Special	(1b x 2) + 2b	(2a x 2) + 2b		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Magnetic Starters	Enclosed Type	Standard Specifications	MS-□		—	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○	—	—
		3-Element (2E) Thermal	MS-□KP		—	—	—	○	—	—	○	○	○	○	○	○	○	○	○	○	○	—	—
	Open Type	Standard Specifications	MSO-□		◎	◎	◎	◎	◎	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	—	—
			MSOD-□		—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		3-Element (2E) Thermal	MSO-□KP		○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□KP		—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		With Saturable Reactor	MSO-□SR		○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□SR		—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		With 3-Element (2E) Thermal Saturable Reactor	MSO-□KPSR		—	—	—	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□KPSR		—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		2-Element Quick-acting Characteristics Thermal	MSO-□FS		—	—	—	○	○	—	○	○	○	○	○	—	—	—	—	—	—	—	—
			MSOD-□FS		—	—	—	○	—	—	○	○	○	○	○	—	—	—	—	—	—	—	—
		3-Element (2E) Quick-acting Characteristics Thermal	MSO-□FSKP		○	○	○	○	○	—	○	○	○	○	○	—	—	—	—	—	—	—	—
			MSOD-□FSKP		—	○	○	○	—	—	○	○	○	○	○	—	—	—	—	—	—	—	—
		Surge Absorber Mounted Type	MSO-□SA		○	○	○	○	○	—	○	○	—	—	—	—	—	—	—	—	—	—	—
			MSOD-□SA		—	○	○	○	—	—	○	○	—	—	—	—	—	—	—	—	—	—	—
		Wiring Streamlining Terminal	MSO-□BC		○	○	○	○	○	—	○	○	—	—	—	—	—	—	—	—	—	—	—
			MSOD-□BC		—	○	○	○	—	—	○	○	—	—	—	—	—	—	—	—	—	—	—
		With Terminal Cover	MSO-□CW		—	—	—	—	—	—	—	—	○	○(Note 7)	—	—	—	—	—	—	—	—	—
			MSOD-□CW		—	—	—	—	—	—	—	—	○	○(Note 7)	—	—	—	—	—	—	—	—	—
		Anticorrosion Treatment	MSO-□YS		○	○	○	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	—
			MSOD-□YS		—	○	○	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
		Mechanically Latched Type	MSOL-□		—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
			MSOLD-□		—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	—	—
Magnetic Contactors	Open Type	Standard Specifications	S-□		◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○
			SD-□		—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		Surge Absorber Mounted Type	S-□SA(Note 3)		○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—	—	—	—
			SD-□SA		—	○	○	○	—	○	○	○	—	—	—	—	—	—	—	—	—	—	—
		Anticorrosion Treatment	S-□YS		—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	○	○	○	○
		Wiring Streamlining Terminal	S-□BC		○	○	○	○	○	○	○	○	—	—	—	—	—	—	—	—	—	—	—
			SD-□BC		—	○	○	○	—	○	○	○	—	—	—	—	—	—	—	—	—	—	—
		With Terminal Cover	S-□CW		—	—	—	—	—	—	—	—	○	○	—	—	—	—	—	—	—	—	—
			SD-□CW		—	—	—	—	—	—	—	—	○	○	—	—	—	—	—	—	—	—	—
		Mechanically Latched Type	SL-□		—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	○	○
			SLD-□		—	—	—	○	—	—	○	○	○	○	○	○	○	—	○	○	○	○	○
		Class 2 Heat Resistance	S-□FN		—	—	—	○	—	—	○	○	—	○	○	—	○	—	—	—	○	—	—
		With Reversing Connecting Conductor (Both Power and Load Sides)	S-□SD		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SD		—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		With Power Side 3-Pole In-Phase Crossover Conductor	S-□SG		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SG		—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		With Load Side 3-Pole In-Phase Crossover Conductor	S-□SX		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SX		—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○
		With Load Side 3-Pole Reverse-Phase Switching Crossover Conductor	S-□SF		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
			SD-□SF		—	○	○	○	—	○	○	○	○	○	○	○	○	—	○	○	○	○	○

Note 1. ◎ : Permanently in stock, depending on operation coil voltage and heater designation. ○ : Made to order.
— : Outside production range
Note 2. The value between parentheses for the class AC-3 rated capacity applies to an enclosed magnetic starter.
Note 3. T65 to N800 types have an AC control coil integrated surge absorber, rendering a coil surge absorber unit for prevention of coil switching surges unnecessary.
Note 4. The +2b on the auxiliary contact arrangement of reversible T10 to T20 types indicates the break contact of the integrated UT-ML20 interlock unit. There is no need to specify when ordering.
Note 5. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combining two magnetic contactors. For standard contact arrangements there is no need to specify when ordering; however, please specify a matching contact arrangement for 2 units if for a special configuration.
<Example> For 1b x 2 + 2b: 2B
Note 6. Mechanically latched types and delay open types have differing auxiliary contact arrangements. Refer to page 102 for details about mechanically latched types, or page 111 for delay open types.
Note 7. MSO(D)-(2x)T80CW(KP) heater designation 67A is not manufactured.
Note 8. S-T12/T20 auxiliary contact 2b can be manufactured.

2.3 Type Designation Structure

2.3.1 MS-T Magnetic Starters

Note 1. Refer to the Product Model List (page 30) or the individual listed page for details about product manufacturing specifications and target models. Furthermore, some types may be unable to be manufactured depending on the combination of symbols.

Enclosed Magnetic Starters

MS — 2 × T21 KP SA PM

Basic Type	
MS	AC Operated Type

Non-Reversing/Reversing	
No Code	Non-Reversing
2 ×	Reversing

Frame Size
T10, T12, T21, T35 to T100

Reset method of Thermal Overload Relays	
No Code	Manual Reset (Standard)
AR	Automatic Reset

Compatible Thermal Overload Relays	
No Code	With 2-Element Thermal Overload Relay
KP	With 3-Element (2E) Thermal Overload Relay
FS	With 2-Element Quick-acting Characteristics Thermal Overload Relay
FSKP	With 3-Element 2E Quick-acting Characteristics Thermal Overload Relay

Push-Button Operation (Non-Reversible Type Only)	
No Code	Standard Specifications without Push-Button
PM	With Push-Button (With Thermal Reset)
PS	With Push-Button (Without Thermal Reset)

Operation Coil Specification	
No Code	Standard
SA	Surge Absorber Mounted Type (Varistor Element)
QM	Open Time Quick Motion Type

Open Type Magnetic Starters

MSO — 2 × T10 BC KP SA YS

Basic Type	
MSO	AC Operated Type
MSOD	DC Operated Type
MSOL	Mechanically Latched AC Operated Type
MSOLD	Mechanically Latched DC Operated Type

Non-Reversing/Reversing	
No Code	Non-Reversing
2 ×	Reversing

Frame Size
T10 to T25, T35 to T100

Finger Protection	
No Code	Standard
BC	With Wiring Streamlining Terminal
CW	With Terminal Cover

Reset method of Thermal Overload Relays	
No Code	Manual Reset (Standard)
AR	Automatic Reset

Compatible Thermal Overload Relays	
No Code	With 2-Element Thermal Overload Relay
KP	With 3-Element (2E) Thermal Overload Relay
SR	With 2-Element Saturable Reactor and Thermal Overload Relay
KPSR	With 3-Element (2E) Saturable Reactor and Thermal Overload Relay
FS	With 2-Element Quick-acting Characteristics Thermal Overload Relay
FSKP	With 3-Element 2E Quick-acting Characteristics Thermal Overload Relay

Special Environments	
No Code	Standard
YS	Anticorrosion Treatment Specification

Operation Coil, Control Circuit Specification	
No Code	Standard
SA	Surge Absorber Mounted Type (Varistor Element)
DL	Delay Open Type
QM	Open Time Quick Motion Type

2.3.2 S-T Magnetic Contactors

S — 2 × T10 BC SA YS

Basic Type	
S	AC Operated Type
SD	DC Operated Type
SL	Mechanically Latched AC Operated Type
SLD	Mechanically Latched DC Operated Type

Non-Reversing/Reversing	
No Code	Non-Reversing
2 ×	Reversing Type

Frame Size
T10 to T100

Finger Protection	
No Code	Standard
BC	With Wiring Streamlining Terminal
CW	With Terminal Cover
SQ	With Spring Clamp Terminals

Operation Coil, Control Circuit Specification	
No Code	Standard
SA	Surge Absorber Mounted Type (Varistor Element)
DL	Delay Open Type
QM	Open Time Quick Motion Type

With Special Auxiliary Contacts	
No Code	Standard
JH	With Large Rated Auxiliary Contacts

Special Environments	
No Code	Standard
YS	Anticorrosion Treatment Specification

2

2.3.3 TH-T Thermal Overload Relays

TH — T18 BC KP YS

Basic Type	
TH	Thermal Overload Relays

Frame Size
T18,T25,T50,T65,T100

Note: Frame size classification by mounting type
Magnetic Starters for independent mounting→T25
For Magnetic Starters→T18

Reset method of Thermal Overload Relays	
No Code	Manual Reset (Standard)
AR	Automatic Reset
Thermal Overload Relay	
No Code	2-Element
KP	With 3-Element (2E)
SR	With 2-Element Saturable Reactor
KPSR	With 3-Element (2E) Saturable Reactor
FS	2-Element Quick Trip
FSKP	3-Element (2E) Quick Trip

Finger Protection	
No Code	Standard
BC	With Wiring Streamlining Terminal
CW	With Terminal Cover

Special Environments	
No Code	Standard
YS	Anticorrosion Treatment Specification

2.3.4 SR-T Contactor Relays

SR — T5 BC SA

Basic Type	
SR	AC Operated Type
SRD	DC Operated Type
SRL	Mechanically Latched AC Operated Type
SRLD	Mechanically Latched DC Operated Type

Frame Size
T5, T9

Finger Protection	
No Code	Standard
BC	With Wiring Streamlining Terminal
SQ	With Spring Clamp Terminals

Operation Coil, Control Circuit Specification	
No Code	Standard
SA	Surge Absorber Mounted Type (Varistor Element)

With Special Contacts	
No Code	Standard
JH	With Large Rated Auxiliary Contact
DL	Delay Open Type
LC	With Overlap Contacts

2.3.5 UT Optional Units

UT — AX 4 BC

Basic Type	
UT	Optional Units

Unit Types		Application
AX	Additional Auxiliary Contact	UT
ML	Mechanical Interlocks	UT
SA	External Surge Absorbers	UT
HZ	For Thermal Overload Relay Independent Mounting	UT
SD	Reversing Connecting Wire (Conductor)	UT
SG	Crossover Connecting Wire (Conductor)	UT
SY	DC/AC Interfaces for Operation Coil	UT

Finger Protection	
No Code	Standard
BC	With Wiring Streamlining Terminal

Unit Specifications/Applicable Models
1 to 2-Digit Number

2.3.6 MS-N Magnetic Starters

Note 1 . Refer to the Product Model List (page 30) or the individual listed page for details about product manufacturing specifications and target models. Furthermore, some types may be unable to be manufactured depending on the combination of symbols.
Note 2 . Symbols are indicated on the packaging box, but those marked with an ∗ are not displayed on the product.

● Enclosed Magnetic Starters

MS — 2 × N125 KP QM PM CN

Basic Type	
MS	Enclosed Type (AC Operation)

Non-Reversing/Reversing	
No Code	Non-Reversible Type
2 ×	Reversing

Frame Size
N125 to N400

Reset method of Thermal Overload Relays	
No Code	Manual Reset (Standard)
AR	Automatic Reset
Compatible Thermal Overload Relays	
No Code	With 2-Element Thermal Overload Relay
KP	With 3-Element (2E) Thermal Overload Relay

	Standards Compliant	
	No Code	Standard
∗	CN	CCC Certified Product

Push-Button Operation (Non-Reversible Type Only)	
No Code	Standard Specifications without Push-Button
PM	With Push-Button (With Thermal Reset)
PS	With Push-Button (Without Thermal Reset)

Operation Coil Specification	
No Code	Standard
QM	Open Time Quick Motion Type

● Open Type Magnetic Starters

MSO — 2 × N125 KP QM YN

	Basic Type	
∗	MSO	AC Operated Type
∗	MSOD	DC Operated Type
∗	MSOL	Mechanically Latched AC Operated Type
∗	MSOLD	Mechanically Latched DC Operated Type

	Non-Reversing/Reversing	
	No Code	Non-Reversible Type
∗	2 ×	Reversing (QR11 to QR19 not required)

Frame Size
N125 to N400
Q11,Q12
QR11,QR12(MSOD only)

	Reset method of Thermal Overload Relays	
	No Code	Manual Reset (Standard)
	AR	Automatic Reset
	Compatible Thermal Overload Relays	
	No Code	With 2-Element Thermal Overload Relay
	KP	With 3-Element (2E) Thermal Overload Relay
∗	SR	With 2-Element Saturable Reactor and Thermal Overload Relay
∗	KPSR	With 3-Element (2E) Saturable Reactor and Thermal Overload Relay

Special Environments	
No Code	Standard
YN	Heat Treatment Specification
YS	Anticorrosion Treatment Specification

Operation Coil, Control Circuit Specification	
No Code	Standard
QM	Open Time Quick Motion Type
DL	Delay Open Type

2.3.7 S-N Magnetic Contactors

S — 2 × N125 QM YN

Basic Type	
S	AC Operated Type
SD	DC Operated Type
SL	Mechanically Latched AC Operated Type
SLD	Mechanically Latched DC Operated Type

	Non-Reversing/Reversing	
	No Code	Non-Reversible Type
∗	2 ×	Reversible Type (QR11 and QR12 not required)

Frame Size
N125 to N800
Q11,Q12
QR11,QR12(SD only)

Operation Coil, Control Circuit Specification	
No Code	Standard
QM	Open Time Quick Motion Type
DL	Delay Open Type

With Special Auxiliary Contacts	
No Code	Standard
HM	With Large Rated Auxiliary Contact

	Standards Compliant/Special Application	
	No Code	Standard
∗	CN	CCC Certified Product

Special Environments	
No Code	Standard
YN	Heat Treatment Specification
YS	Anticorrosion Treatment Specification
LT	Low Temperature Specification

2.3.8 TH-N Thermal Overload Relays

TH — N120 KP YN

Basic Type	
TH	Thermal Overload Relays

Frame Size
N120 to N600

Note. Frame Size Class By Mounting Format
<For Both Magnetic Starters/ Independent Mounting>
N120
<For Magnetic Starters>
N120TA, N220RH, N400RH
<For Independent Mounting>
N120TAHZ, N220HZ, N400HZ, N600

	Reset Method	
	No Code	Manual Reset (Standard)
	AR	Automatic Reset
	Thermal Overload Relay Types	
	No Code	2-Element
	KP	3-Element (2E)
*	SR	With 2-Element Saturable Reactor
*	KPSR	With 3-Element (2E) Saturable Reactor

Special Environments	
No Code	Standard
YN	Heat Treatment Specification
YS	Anticorrosion Treatment Specification

2.3.9 SR-K Contactor Relays

SRD — K100 JH YN

Basic Type	
SR	AC Operated Type
SRD	DC Operated Type
SRL	Mechanically Latched AC Operated Type
SRLD	Mechanically Latched DC Operated Type

Frame Size
K100

With Special Contacts	
No Code	Standard
JH	With Large Rated Auxiliary Contact
LC	With Overlap Contacts

Special Environments	
No Code	Standard
YN	Heat Treatment Specification
YS	Anticorrosion Treatment Specification
LT	Low Temperature Specification

2.3.10 UN / UA / UQ Optional Units

UN — AX 4 CX

Basic Type	
UN	For N Series
UA	For K Series
UQ	For SD-Q Series

	Unit Types		Application
	AX	Additional Auxiliary Contact	UN/UQ
*	CV	Live Part Protection/Misoperation Preventing Cover	UN
	CW	Terminal Cover	UN
	CZ	Live Part Protection Cover	UN
	DL	Instantaneous Restart Relay	UA
	FD	Fault Detection (Contact Welding Detection Relay)	UN
	HZ	For Thermal Overload Relay (N12) Independent Mounting	UN
	LL	Auxiliary Contact for Low-Level Signals	UN
	ML	Mechanical Interlock	UN
	PL	Operation Indicator Lamp	UQ
	RM	For Thermal Overload Relay (N20) Independent Mounting	UN
*	RR	Reset Release for Thermal Overload Relays	UN
	RY	Reversing Connecting Conductor (Integrated)	UN
	SA	External Surge Absorber	UN
*	SD	Reversing Connecting Wire (Conductor)	UN
*	SG	Crossover Connecting Wire (Conductor)	UN
	SY	DC/AC Interface for Operation Coil	UN/UA
	TL	Thermal Overload Relay Trip Indicator Lamp	UN
*	YD	2-Pole Short-Circuit Conductor	UN
*	YG	3-Pole Short-Circuit Conductor	UN
	YY	3-Pole Parallel Connecting Conductor	UN

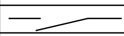
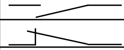
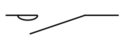
	Standards Compliant/Special Application	
	No Code	Standard
	KR	For QR11 Right-Sides
*	CN	CCC Certified Product

	Finger Protection	
	No Code	Standard
*	CX	With CAN Terminal

Special Environments	
No Code	Standard
YN	Heat Treatment Specification
YS	Anticorrosion Treatment Specification

Unit Specifications/Applicable Models
1 to 4-Digit Numerals, Letters

2.4 Explanations of Terms

Item	Application	Terminology Meaning	Typical Model Name/Display (☐ is replaced with a number)
1. Device	(1) Magnetic Starters (Magnetic Switches)	A set containing a magnetic contactor and thermal overload relay.	Enclosed: MS Open Type: MSO(D), MSOL(D)
	(2) Magnetic Contactors (Contactors)	The contactor opens and closes the main contact via a solenoid and comes as both an AC or DC contactor depending on the type of main circuitry to switch (AC or DC).	Main Circuit Dual AC/DC: S(D), SL(D) Main Circuit DC Only: DU(D)
	(3) AC Operated Magnetic Contactors	A magnetic contactor with a solenoid activated by AC current.	S
	(4) DC Operated Magnetic Contactors	A magnetic contactor with a solenoid activated by DC current.	SD
	(5) Mechanically Latched Magnetic Contactors	A magnetic contactor that can close the contact (ON) either electrically (closing coil) or mechanically and has a mechanical latch mechanism that retains the closed state without operational force until a time that it is electrically (opening coil) or mechanically open-circuited (OFF).	SL(D)
	(6) Delay Open Magnetic Contactors	A magnetic contactor that uses the discharge from a capacitor to keep the contact closed for a few seconds even if a voltage drop or momentary power failure occurs in the control circuit.	S-☐DL
	(7) Reversible Magnetic Contactors	A magnetic contactor that allows a motor to be reversed via switching the contact connections.	S-(D)-2×☐, SL(D)-2×☐
	(8) Thermal Overload Relays	If the motor is drawing too much current (overloaded) due to a motor overload, constraint or open-phase, then the integrated bi-metal curves due to the heat generated and its output opens the magnetic contactor, preventing heat damage to the motor.	TH
2. Rating	(1) Rated Insulation Voltage	The guaranteed withstanding voltage and the voltage that determines the isolation distance.	☐ V (Both AC/DC)
	(2) Rated Operational Voltage	The voltage that determines applications relating to making capacity, breaking capacity, switching frequency and switching durability.	AC ☐ to ☐ V, DC ☐ V
	(3) Rated Capacity	The maximum applicable load capacity at the rated operational voltage.	Motor ☐φ☐kW, Resistance ☐φ☐kW
	(4) Rated Operating Current	The maximum current for full performance at the rated operational voltage.	AC-3 ☐ A, AC-4 ☐ A, DC1 ☐ A
	(5) Conventional Free Air Thermal Current (Ith)	The current that can flow for 8 hours without causing a temperature rise exceeding the defined value when open/close operations are not being performed. An expression defined in JISC8201-1 specifying the rated continuity current.	Ith=☐A
	(6) Operation Coil	Magnetizes the solenoid for attractive force, or demagnetizes it for switching operation.	—
	· Coil Designation	Shows the typical value of the rated operating current to be specified by symbol when ordering.	AC☐V, DC☐V
	· Operation Coil Rating	The rated operational voltage (nominal voltage) range and frequency (for AC) of the operation coil	☐V☐Hz, DC☐V
3. Performance	(1) Making Capacity	The current value that can flow when making (ON) under conditions defined by the standards (tested 50 times for JIS and 100 times for JEM)	☐A
	(2) Breaking Capacity	The current value that can flow when breaking (OFF) under conditions defined by the standards (tested 50 times for JIS and 25 times for JEM)	☐A
	(3) Switching Frequency	The number of times switching can be performed in a 1-hour period under conditions defined by the standards.	☐ Times/Hr
	(4) Switching Durability (Lifetime)	The reference number of times that open/close operations can be performed under conditions based on the standards. It depends on the use environment.	☐ 10,000 Times
	· Mechanical Durability	The reference durability due to mechanical wear if switched under conditions based on the standards, without any current applied to the main circuit.	☐ 10,000 Times
	· Electrical Durability	The reference durability due to electrical wear if switched under conditions based on the standards, with current applied to the main circuit.	☐ 10,000 Times
4. Properties	(1) Closing Voltage	The minimum voltage required to close the contact (ON) through excitation of the operation coil. (input voltage and tripping voltage for mechanically latched types)	☐ to ☐ V (Standard Value: 85% or Less of Rated Operational Voltage)
	(2) Opening Voltage	The maximum voltage that can be reached by gradually dropping off the voltage applied to the operation coil before the contact opens(OFF).	☐ to ☐ V (Standard Value: 20% or More of Rated Operational Voltage for AC Operation 10% or More for DC Operation)
	(3) Operating Time	The time taken for the contact to transition (ON or OFF) once the operation coil has been excited or demagnetized.	☐ms
	(4) Operation Coil	[As per 2.(6)]	—
	· Inrush Input	The momentary capacity (input VA) immediately after the operation coil is excited, regular input or below for DC operated types.	AC: ☐ VA, DC: ☐ W (= ☐ VA)
	· Regular Input	The coil capacity (consumed electricity) when the operation coil is excited and in the closed-contact state	AC: ☐ VA, DC: ☐ W (= ☐ VA)
5. Operations/ Actions/Others	(1) Inching (Inching Operation)	Inching, also known as jogging, is a frequent switching of starting current for minor motor rotations.	—
	(2) Plugging (Reverse Phase Braking)	Sudden reversal of the contact connections result in stoppage of the motor.	—
	(3) Self-Retention	Uses the auxiliary make contact of an ON magnetic contactor to continuously apply current to the magnetic contactor operation coil causing it to retain its ON state after the ON command, only releasing via an OFF command or power failure.	(Refer to page 66)
	(4) Interlock	An interlocking system whereby if 2 magnetic contactors are not permitted to be simultaneously turned on, as with reversible types, when one contactor turns ON it prevents the other contactor from reaching the ON state. There is a mechanical interlock via a mechanical mechanism and an electrical interlock via the auxiliary break contact.	(Refer to page 66)
	(5) Make Contact	Normally open, closing when a current is applied to the operation coil. Also known as an NO (Normally Open) contact.	
	(6) Break Contact	Normally closed, opening when a current is applied to the operation coil. Also known as an NC (Normally Closed) contact.	
	(7) Main Circuit	Switches the main contact (terminal numbers 1/L1-2/T1, 3/L2-4/T2, 5/L3-6/T3) for circuits with large currents (several A to 1,000 A or more) such as with motors or illumination circuitry.	
	(8) Operation (Control) Circuit	Switches via auxiliary make contact or auxiliary break contact for circuits with small currents (several 10s of mA to several A) such as with operation coils or display circuitry.	—
	(9) Direct Start	The most general type of operation where the full voltage is applied for starting/stopping the motor. Also known as full-voltage operation.	—
	(10) Star/Delta Start	To soften the electrical/mechanical shock to the motor when starting, the motor windings are connected in star configuration for 1/3 of the full-voltage current. Once accelerated the windings are switched to delta configuration for the least expensive, reduced-voltage running.	—
	(11) Category AC-3	Motor regular start/stop switching duty. (Closed with 6 times the rated current and breaking with 1 times the rated current in durability testing)	(Refer to pages 46, 47)
	(12) Category AC-4	Motor starting current switching duty (Closed with 6 times the rated current and breaking with 6 times the rated current in durability testing) for more severe switching than category AC-3. This also applies to inching and plugging.	(Refer to pages 46, 47)
	(13) Category AC-1	Switching duty for electric heating or resistive loads with almost no inrush current when starting. (Closed/breaking with 1 time the rated current in durability testing)	(Refer to pages 46, 51)
	(14) 2E and 3E	2E: A thermal overload relay or electronic type that protects the motor from overload/constraint + open-phase conditions. 3E: An electronic motor protection relay that protects the motor from overload/constraint + open-phase + reverse-phase (opposing phase) conditions.	TH- ☐ KP, ET-N ☐ ET-N ☐

2.5 Main Contact Rating

● Rated Capacity (JISC8201-4-1, IEC60947-4-1)

The maximum applicable load capacity of magnetic starters/magnetic contactors under standard conditions is as per the table below.

Application / Frame	Rated Capacity [kW]											Rated Insulation Voltage [V]
	Standard Sequence						Inching Duty		Three-Phase Resistive Load (Category AC-1)			
	Three-Phase Squirrel-cage Motor (Category AC-3)				Single-Phase Motor Application Capacity (Category AC-3)		Three-Phase Squirrel-cage Motor (Category AC-4)					
	220 to 240V	380 to 440V	500V	690V	100 to 110V	220 to 240V	220 to 240V	380 to 500V	220 to 240V	400 to 440V	500 to 550V	
T10	2.5[2.2]	4[2.7]	4[2.7]	4	0.4	0.8	1.5	2.7(2.2)	6.5	8	7	690
T12	3.5[2.7]	5.5[4]	5.5[5.5]	5.5	0.55	1	2.2	5.5(4)	6.5	10	9.5	
T20	4.5[3.7]	7.5[7.5]	7.5[7.5]	7.5	0.75	1.5	3.7	5.5	6.5	12	14.5	
T21	5.5[4]	11[7.5]	11[7.5]	7.5	0.9	1.8	3.7	5.5	11	22	25	
T25	7.5[5.5]	15[11]	15[11]	11	1.2	—	4.5	7.5	11	22	25	
T32	7.5[7.5]	15[15]	15[11]	11	1.7	—	5.5	7.5(11)	11	22	25	
T35	11[7.5]	18.5[15]	18.5[15]	15	1.7	—	5.5	11	20	40	50	
T50	15[11]	22[22]	25[22]	22	—	—	7.5	15	27	55	50	
T65	18.5[15]	30[30]	37[30]	30	—	—	11	22	34	68	85	
T80	22[19]	45[37]	45[45]	45	—	—	15	30	41	83	85	
T100	30[22]	55[45]	55[45]	55	—	—	19	37	50	100	120	
N125	37[30]	60[60]	60[60]	60	—	—	22	45	50	100	120	
N150	45[37]	75[75]	90[90]	90	—	—	30	55	65	130	170	
N180	55[45]	90[90]	110[110]	110	—	—	37	75	90	180	220	690 (1000)
N220	75[55]	132[110]	132[132]	132	—	—	45	90	90	180	220	
N300	90[75]	160[150]	160[160]	200	—	—	55	110	120	240	300	
N400	125[110]	220[200]	225[200]	250	—	—	75	150	155	310	380	
N600	190[160]	330[300]	330[300]	330	—	—	110	200	220	440	570	
N800	220[200]	440[400]	500[400]	500	—	—	160	300	270	540	700	

Note 1. The rated values for single-phase class AC-4 motors are the same as for class AC-3.
Note 2. The numbers in parentheses for the inching duty indicate the rated values for 380 to 440 V.
Note 3. The 200 to 240 V ratings for enclosed magnetic starters below have changed ratings in accordance with the Electrical Appliance and Material Safety Law.
MS-T21: 3.7 kW
Note 4. Refer to page 30 for information regarding electrical durability.

● Rated Operating Current and Conventional Free Air Thermal Current (JISC8201-4-1, IEC60947-4-1)

The maximum applicable current that satisfies the making or breaking capacity, switching frequency and switching durability required by the standards is as per the table below.

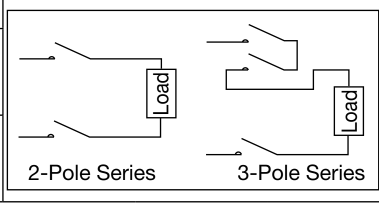
Application / Frame	Motor Load							Resistive Load			Conventional Free Air Thermal Current (Note 2) Ith [A]
	Category AC-3 Rated Operating Current [A]				Category AC-4 Rated Operating Current [A]			Category AC-1 Rated Operating Current [A]			
	220 to 240V	380 to 440V	500V	690V	220 to 240V	380 to 440V	500V	220 to 240V	400 to 440V	500 to 550V	
T10	11[11]	9[7]	7[6]	5	8	6	6	20	11	8	20
T12	13[13]	12[9]	9[9]	7	11	9	9	20	13	11	20
T20	18[18]	18[18]	17[17]	9	18	13	10	20	18	17	20
T21	25[20]	23[20]	17[17]	9	18	13	10	32	32	32	32
T25	30(26)[26]	30(26)[25]	24[20]	12	20	17	12	32	32	32	32
T32	32[32]	32[32]	24[20]	12	26	24	13	32	32	32	32
T35	40[35]	40[32]	32[26]	17	26	24	17	60	60	60	60
T50	55(50)[50]	50[48]	38[38]	26	35	32	24	80	80	60	80
T65	65[65]	65[65]	60[45]	38	50	47	38	100	100	100	100
T80	85[80]	85[80]	75[75]	52	65	62	45	120	120	100	120
T100	105[100]	105[93]	85[75]	65	80	75	55	150	150	150	150
N125	125[125]	120[120]	90[90]	70	93	90	65	150	150	150	150
N150	150[150]	150[150]	140[140]	100	125	110	80	200	200	200	200
N180	180[180]	180[180]	180[180]	120	150	150	140	260	260	260	260
N220	250[220]	250[220]	200[200]	150	180	180	140	260	260	260	260
N300	300[300]	300[300]	250[250]	220	220	220	200	350	350	350	350
N400	400[400]	400[400]	350[350]	300	300	300	250	450	450	450	450
N600	630[630]	630[630]	500[500]	420	400	400	350	660	660	660	660(800)
N800	800[800]	800[800]	720[720]	630	630	630	500	800	800	800	800(1000)

Note 1. The rated operating current indicates the maximum applicable current that satisfies the making capacity or breaking capacity, switching frequency and switching durability at the rated operational voltage.
Note 2. The values in the parentheses for N600 and N800 are applicable for ambient temperature of 40°C or less.
Note 3. The value between parentheses for the rated operating current for T21 and T35 is that applicable for the magnetic contactor.
Note 4. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Please refer to page 42 for details.
Note 5. Refer to page 30 for information regarding electrical durability.

DC Rating (JEM1038, JISC8201-5-1)

Frame	Rated Voltage DC (V)	Category DC2, DC4 Rated Operating Current (DC Motor Load) [A]		Category DC1 Rated Operating Current (Resistive Load) [A]		Category DC-13 Rated Operating Current (DC Coil Load) [A]		
		2-Pole Series	3-Pole Series	2-Pole Series	3-Pole Series	Single Pole	2-Pole Series	3-Pole Series
T10	24 48 110 220	8 4 2.5 0.8	8 6 4 2	10 10 6 3	10 10 8 8	5 3 0.6 0.2	8 4 2 0.3	8 6 3 0.8
T12	24 48 110 220	12 6 4 1.2	12 10 8 4	12 12 10 7	12 12 12 12	7 5 1.2 0.2	12 6 3 0.5	12 10 5 2
T20	24 48 110 220	18 15 8 2	18 18 15 8	18 18 13 8	18 18 18 18	10 5 1.2 0.2	14 7 3 0.5	15 12 5 2
T21	24 48 110 220	20 15 8 2	20 20 15 8	20 20 15 10	20 20 20 20	12 8 1.5 0.25	20 12 3 1.2	20 15 10 4
T25, T32	24 48 110 220	25 20 10 3	25 25 20 10	25 25 25 12	25 25 25 22	15 10 1.5 0.25	25 15 4 1.2	25 25 12 4
T35	24 48 110 220	35 20 10 3	35 30 20 10	35 35 25 12	35 35 35 30	15 10 1.5 0.25	35 15 4 1.2	35 25 12 4
T50	24 48 110 220	45 25 15 3.5	50 35 30 12	50 40 35 15	50 50 50 40			
T65	24 48 110 220	45 25 15 3.5	50 35 30 12	50 40 35 15	65 65 65 50			
T80	24 48 110 220	65 40 20 5	80 60 50 20	80 65 50 20	80 80 80 60			
T100	24 48 110 220	93 60 40 30	93 90 80 50	93 93 80 50	93 93 93 70			
N125	24 48 110 220	120 60 40 30	120 90 80 50	120 100 80 50	120 120 100 80			
N150	24 48 110 220	150 100 80 60	150 130 120 80	150 120 100 100	150 150 150 150			
N180(N220)	24 48 110 220	180(220) 150 120 80	180(220) 180(220) 150 100	180(220) 180 150 150	180(220) 180(220) 180(220) 180(220)			
N300	24 48 110 220	300 200 150 90	300 280 200 150	300 240 200 200	300 300 300 300			
N400	24 48 110 220	400 200 150 90	400 280 200 150	400 240 200 200	400 400 400 300			
N600(N800)	24 48 110 220	630(800) 630 630 630	630(800) 630 630 630	630(800) 630(800) 630 630	630(800) 630(800) 630(800) 630(800)			

Note 1. Electrical durability of 500,000 operations.
Note 2. The applicable switching frequency is as follows:
<DC2, DC4, DC-13 class>
T10 to T35: 1800 times/hour
T50 to T100, N125 to N800: 1200 times/hour
<DC1 class>
T10 to T80: 1200 times/hour
T100 and N125 to N800: 600 times/hour
Note 3. Connect for use in 2-pole series or 3-pole series as per the diagram below.
Note 4. The rated operating current increases when connected in series but the reliability of the contacts decreases.



● Standards for DC Rating

Standards	Category	Making Capacity Test			Breaking Capacity Test			Electrical Durability Test						Typical Application Example
								Making			Breaking			
		Current	Voltage	∗1	Current	Voltage	∗1	Current	Voltage	∗1	Current	Voltage	∗1	
JEM -1038	DC1	1.1Ie	1.1Ee	1(ms)	1.1Ie	1.1Ee	1(ms)	Ie	Ee	1(ms)	Ie	Ee	1(ms)	Resistive Load
	DC2	4Ie	1.1Ee	2.5(ms)	4Ie	1.1Ee	2.5(ms)	2.5Ie	Ee	2(ms)	Ie	0.1Ee	7.5(ms)	DC Shunt Motor Starting/Stopping
	DC4	4Ie	1.1Ee	15(ms)	4Ie	1.1Ee	15(ms)	2.5Ie	Ee	7.5(ms)	Ie	0.3Ee	10(ms)	DC Series-Wound Motor Starting/Stopping
JIS C8201 -5-1	DC-13	1.1Ie	1.1Ee	6P(ms)	1.1Ie	1.1Ee	6P(ms)	Ie	Ee	6P(ms)	Ie	Ee	6P(ms)	DC Inductive Load (DC Coil Load Control)

Note 1. Ie: Rated Operating Current, Ee: Rated Operational Voltage.
Note 2. ∗1 For JEM-1038: Time constant,
For JIS C8201-5-1: Time taken to reach 95% of rated operating current. Maximum 300 (ms)
P = No. watts consumed at steady state (calculated by Ee x Ie).
Note 3. Making capacity tests are performed 100 times, while breaking capacity tests are performed 25 times. (JIS C8201-5-1 calls for making and breaking capacity tests to be performed 10 times.)

2.6 Auxiliary Contact Arrangements and Ratings

● No. of Installed Auxiliary Contacts and Contact Arrangement

● All Auxiliary Contacts Are Twin Contacts

Frame Model	Non-Reversible Magnetic Contactors							Reversible Magnetic Contactor (Note 4)						
	T10	T12	T32	T20	T21 to T80	T100 N125	N150 to N800	2 × T10	2 × T12 2 × T20	2 x T32 (Note 6)	2 x T21 to 2 x T80	2×T100 2×N125	2 x N150 to 2 x N400	2 x N600 to 2 x N800
Standard	1a	1a1b	—	1a1b	2a2b	2a2b	2a2b	1ax2+2b (Note 3)	1a1bx2+2b (Note 3)	2a2b × 2	2a2b × 2	2a2b × 2	3a3b × 2	4a4b × 2
Special	1b	2a (Note 8)	—	2a (Note 8)	—	—	—	1bx2+2b (Note 3)	2ax2+2b (Note 3)	—	—	—	—	—
Maximum	5a 4a1b 3a2b	5a1b 4a2b 3a3b	4a 3a1b 2a2b	5a1b 4a2b 3a3b	6a2b 5a3b 4a4b	4a4b	4a4b	5a × 2 + 2b 4a1b × 2 + 2b 3a2b × 2 + 2b (Note 3)	5a1b × 2 + 2b 4a2b × 2 + 2b 3a3b × 2 + 2b (Note 3)	—	6a2b × 2 5a3b × 2 4a4b × 2	3a3b × 2	—	—

Note 1. The 2 auxiliary break contacts of reversible magnetic starters (MS-2x, MSO-2x) are wired as an electrical interlock.
Note 2. No specification needs to be made for standard contact arrangements. Specify only for special arrangements.
Note 3. The +2b on the auxiliary contact arrangement of reversible T10, T12 and T20 types indicates the break contact of the integrated UT-ML20 interlock unit. There is no need to specify when ordering.
Note 4. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combining two magnetic contactors. Please specify a matching contact arrangement for 2 units when ordering. <Example> For 1a1b x 2 + 2b: 2A2B
Note 5. The maximum number of units indicates that when using additional auxiliary contact units available as option parts for the magnetic contactor. The body and auxiliary contact unit can be additionally installed by the customer as a separate arrangement. Refer to page 197 for details about auxiliary contact units.
Mounting of auxiliary contact units to enclosed types or delay open types, and mounting of front clip-on auxiliary contact units to mechanically latched types are not possible.
Note 6. Reversible 2 x T32 type has auxiliary contact unit 2a2b (UT-AX4) x 2 included as standard.
Note 7. Mechanically latched types and delay open types have differing auxiliary contact arrangements as per the table above. Refer to page 102 for details about mechanically latched types, or page 111 for delay open types.
Note 8. S-T12/T20 auxiliary contact 2b can be manufactured.

● Rated Operating Current and Conventional Free Air Thermal Current of Auxiliary Contacts (Rated Continuity Current)

Frame	Rated Operating Current (A)																Conventional Free Air Thermal Current Ith [A]
	Category AC-15 (AC Coil Load)				Category DC-13 (DC Coil Load)				Category AC-12 (AC Resistive Load)				Category DC-12 (DC Resistive Load)				
	AC120V	AC240V	AC440V	AC500V	DC24V	DC48V	DC110V	DC220V	AC120V	AC240V	AC440V	AC500V	DC24V	DC48V	DC110V	DC220V	
T10 to T100 N125 to N800	6	3	1.5	1.2	3	1.5	0.6	0.3	10	8	5	5	10	8	5	1	10
T10JH to T100JH N125HM to N800HM	10(6)	10(5)	5(3)	4(3)	7[10]	5	1.2	0.2	20	16	10	10	10	8	5	1	20

Note 1. The minimal applicable load is T10 to T100, N125 to N800: 20V3mA, T10JH to T100JH, N125HM to N800HM: 48V200mA.
Note 2. Electrical durability of 500,000 operations.
Note 3. The rated operating current between parentheses indicate the same-pole make and break contact values for different operating voltage.
Note 4. JISC8201-5-1 classifications are class AC-15 applicable to AC inductive loads (AC coil load (exceeding 72 VA) control)) and class DC-13 applicable to DC inductive loads (DC coil load control).
Note 5. JISC8201-5-1 classifications are class AC-12 applicable to AC resistive loads and class DC-12 applicable to DC resistive loads.
Note 6. T10JH to T100JH and N125HM to N800HM use auxiliary contacts that do not have a twin contact shape. Electrical durability is 200,000 operations at DC24 V [10 A].
Note 7. Reversible T10JH to T20JH (including models with "MSO") can also be manufactured. For reversible T21JH to T100JH and N125HM to N800HM, magnetic contactors can be manufactured, but models with "MSO" cannot.
Note 8. Do not use the auxiliary contacts of T10JH to T100JH and N125HM to N800HM for self-retaining contacts or reversible electrical interlocks. Using contacts with the minimum applicable load or less will decrease contact reliability.

2.7 Contact Reliability of Main Contacts and Auxiliary Contacts

The minimum working voltage and current of the main and auxiliary contacts of the S, SD, SL(D)-T/N type and SD-Q type Magnetic Contactors and the contact of the SR, SRD, SRL(D)-T/K type Contactor Relays vary depending on the allowable failure rate. Apply the following diagrams.

- **The contact reliability reduces when a contact is connected in series or when the current is applied and broken at the time of opening and closing the contact.**
  Prescribe remedies such as connecting the contact in parallel (providing redundancy).
- **If a reliability higher than the contact reliability given in Diagram 1 to Diagram 7 is required, the contacts must be connected in parallel (redundant).**

Magnetic Contactors

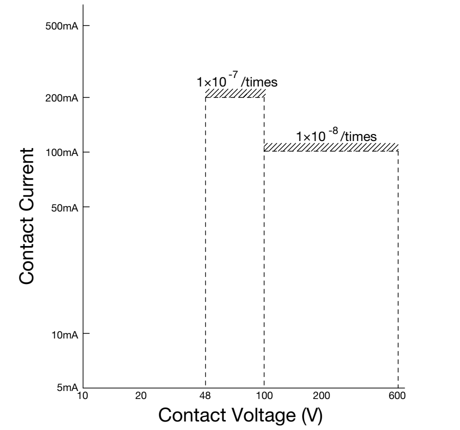


Fig 1. S, SD, SL(D)-T/N Main Circuit

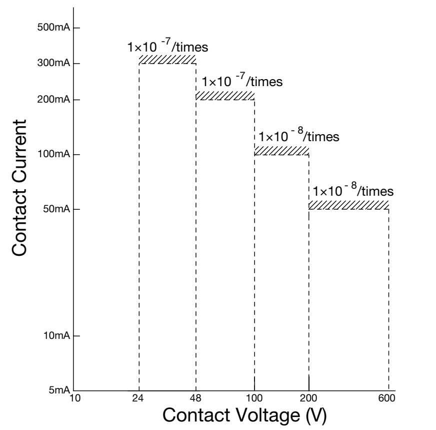


Fig. 2. SD-Q11, Q12, SD-QR11, QR12 Main Contact

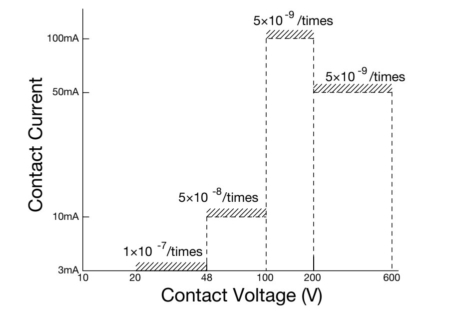


Fig. 3. S, SD, SL(D)-T/N UN-AX, UT-AX11 Auxiliary Contact

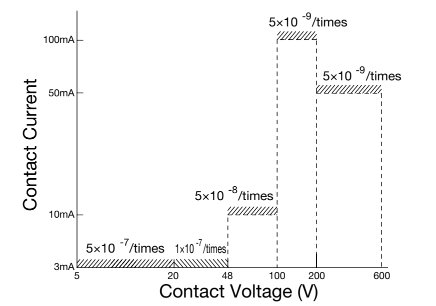


Fig. 4. SD-Q11, Q12, SD-QR11, QR12 UT-AX2/4 Auxiliary Contact

Note 1: The contact reliability indicates the failure rate λ60 (the number of failures/the number of opening and closing operations, per contact) at 60% reliability standard. This reliability is applied when the product is in use under a clean atmosphere in the standard specification environment (Refer to page 64).

Note 2: The contact resistance of the contacts may change due to economical corrosion and that may affect the contacts in the case of a light load. It is recommended that regular inspections to be conducted, with load opening and closing performed several times in the inspection, and that consideration be provided on the system side.

Contactor Relays

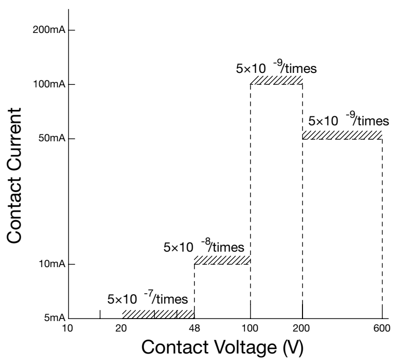


Fig. 5. SR, SRD, SRL(D)-K100

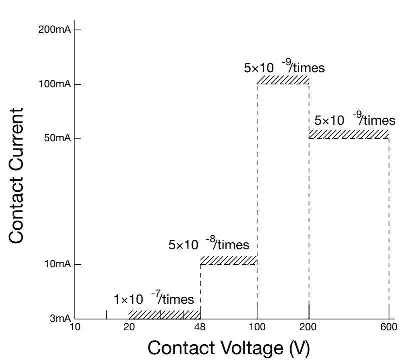


Fig. 6. SR/SR-D-T5, T9

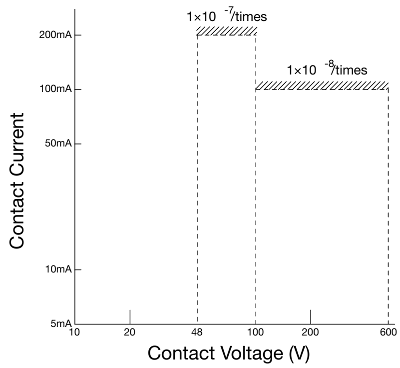


Fig. 7. SRD- □ JH (Large Capacity)

2.8 Coil Types and Rating

2.8.1 AC Operated Type

● For S-T10 to T50, B-T21, SR-T5/T9 Types

Coil Designation	Rated Voltage [V] 50 Hz/60 Hz	Coil Indication
AC24V	24	Rated Voltage/ Frequency
AC48V	48 to 50	
AC100V	100 to 127	
AC200V	200 to 240	
AC300V	260 to 300	
AC400V	380 to 440	
AC500V	460 to 550	

Note 1. Coil designation AC100V and AC200V are standard products.
Note 2. Some applicable models, such as the delay open type (S-T☐DL), have different coil ratings. Please check the individual pages.
Note 3. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated voltage of the product will be as displayed above.

● For S-T10SA to T50SA, B-T21SA, SR-T5SA/T9SA Types

Coil Designation	Rated Voltage [V] 50 Hz/60 Hz	Coil Indication	Varistor Voltage [V]
AC24V	24	Rated Voltage/ Frequency	120
AC48V	48 to 50		120
AC100V	100 to 127		470
AC200V	200 to 240		470
AC300V	260 to 300		910
AC400V	380 to 440		910

Note 1. Add "SA" to the end of the type name to order the operation coil surge absorber mounted type (varistor).
Example: S-T10SA AC100V
Note 2. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated voltage of the product will be as displayed above.

● For S-N38/N48, SR-K100 Types

Coil Designation	Rated Voltage [V] 50Hz	Rated Voltage [V] 60Hz	Coil Indication
AC24V	24	24	
AC48V	48 to 50	48 to 50	Rated Voltage/ Frequency
AC100V	100	100 to 110	
AC120V	110 to 120	115 to 120	
AC127V	125 to 127	127	
AC200V	200	200 to 220	
AC220V	208 to 220	220	
AC230V	220 to 240	230 to 240	
AC260V	240 to 260	260 to 280	
AC380V	346 to 380	380	
AC400V	380 to 415	400 to 440	
AC440V	415 to 440	460 to 480	
AC500V	500	500 to 550	

Note 1. Coil designation AC100V and AC200V are standard products.
Note 2. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated values of the product will be as displayed to the left.
Coil designations for the below voltages and frequencies are as follows.
220 V 60 Hz → Coil designation AC200V
380 V 50 Hz → Coil designation AC400V
240 V 50 Hz → Coil designation AC230V
220 V 50 Hz → Coil designation AC230V
415 V 50 Hz → Coil designation AC400V

● For S-N38SA/N48SA Types

Coil Designation	Rated Voltage [V] 50Hz	Rated Voltage [V] 60Hz	Coil Indication	Varistor Voltage [V]
AC24V	24	24	Rated Voltage/ Frequency	120
AC48V	48 to 50	48 to 50		120
AC100V	100	100 to 110		470
AC120V	110 to 120	115 to 120		470
AC127V	125 to 127	127		470
AC200V	200	200 to 220		470
AC220V	208 to 220	220		470
AC230V	220 to 240	230 to 240		470

Note 1. Append "SA" to the end of the model name when ordering for a type with an integrated surge absorber (varistor).
E.g. S-N38SA AC100V
Note 2. When ordering you may indicate a single rating (e.g. 200 V 60 Hz); however, the rated values of the product will be as displayed to the left.
Coil designations for the below voltages and frequencies are as follows.
220 V 60 Hz → Coil designation AC200V
240 V 50 Hz → Coil designation AC230V
220 V 50 Hz → Coil designation AC230V
Note 3. Models other than those on the left are not manufactured.

● For S-T65 to T100 Types
For S-N125 to N800, B-N65/N100, DU-N30 to N260 Types

Coil Designation	Rated Voltage [V] 50Hz/60Hz	Coil Indication
AC24V(Note1)	24	Rated Voltage/ Frequency
AC48V(Note1)	48 to 50	
AC100V	100 to 127	
AC200V	200 to 240	
AC300V	260 to 350	
AC400V	380 to 440	
AC500V	460 to 550	

Note 1. AC24V and AC48V coils for the model names below are not manufactured.
AC24V Coil: S-N180/N220, N300/N400, N600/N800
DU-N180, N260
AC48V Coil: S-N600/N800
Note 2. Some applicable models, such as the delay open type (S-T☐DL, S-N☐DL), have different coil ratings. Please check the individual pages.

● For S-T65QM to T100QM Types
For S-N125QM to N400QM Types

Coil Designation	Rated Voltage [V] 50Hz/60Hz	Coil Indication
AC100V	100 to 127	Rated Voltage/ Frequency
AC200V	200 to 240	

Note 1. Models other than AC100V, AC200V are not manufactured.

Refer below for information regarding model names for coils not listed above.
SH-V☐ :Page 260

The coil designation is a symbol to be specified when ordering. Please contact us regarding production capabilities for special nominal coil voltages. Special coils are produced without receiving certification from the various standards. (No Certification Symbols)

2.8.2 DC Operated Type

● For SD-T12 to T100, BD-T21, SRD-T5/T9 Types

Coil Designation	Rated Voltage	Coil Indication
DC12V	DC12 V	Rated Voltage
DC24V	DC24 V	
DC48V	DC48 V	
DC100V	DC100 V	
DC110V	DC110 V	
DC125V	DC120 to DC125 V	
DC200V	DC200 V	
DC220V	DC220 V	

Note 1. Operation coil terminals have polarity (excluding T35 to T100). Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.
Note 2. If the operating power supply is rectified, then switch the coil on the DC side.

● For SD-N125 to SD-N400, BD-N65/N100, DUD-N30 to N260 Types For SRD-K100

Coil Designation	Rated Voltage	Coil Indication
DC12V	DC12 V	Rated Voltage
DC24V	DC24 V	
DC48V	DC48 V	
DC100V	DC100 V	
DC110V	DC110 V	
DC125V	DC120 to DC125 V	
DC200V	DC200 V	
DC220V	DC220 V	

Note 1. The coil has no polarity.
Note 2. If the operating power supply is rectified, then switch the coil on the DC side.
Note 3. SD-N125 to N400, DUD-N60 to N260 types have 2 internal coils connected in series.

● For SD-T12SA to T50SA, BD-T21SA, SRD-T5SA/T9SA Types

Coil Designation	Rated Voltage	Coil Indication	Varistor Voltage
DC12V	DC12 V	Rated Voltage	47
DC24V	DC24 V		47
DC48V	DC48 V		120
DC100V	DC100 V		470
DC110V	DC110 V		470
DC125V	DC120 to 125 V		470
DC200V	DC200 V		470
DC220V	DC220 V		470

Note 1. Add "SA" to the end of the type name to order the operation coil surge absorber mounted type (varistor).
Example: SD-T21SA DC100V
Note 2. Operation coil terminals have polarity (excluding T35SA to T50SA). Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.
Note 3. Models other than those above are not manufactured.

● For SD-N600/N800 Types

Coil Designation	Rated Voltage	Coil Indication
DC24V	DC24 V	Rated Voltage
DC48V	DC48 V	
DC100V	DC100 to 110 V	
DC125V	DC120 to 125 V	
DC200V	DC200 to 220 V	

Note 1. Operation coil terminals have polarity. Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.
Note 2. If the operating power supply is rectified, then switch the coil on the DC side.
Note 3. DC12V models are not manufactured.

Refer below for information regarding model names for coils not listed above.
SD-Q□: Page 244 SHD-V□: Page 260

2.8.3 Mechanically Latched Type

● For SL(D)-T21 to T100, SL(D)-N125 to SL(D)-N800, SRL(D)-T5 Types

For AC		
Coil Designation	Rated Voltage (V) 50/60 Hz	Coil Indication
AC100V	100 to 127	Rated Voltage/ Frequency
AC200V	200 to 240	
AC300V	260 to 350	
AC400V	380 to 440	
AC500V	460 to 550	

For DC		
Coil Designation	Rated Voltage	Coil Indication
DC12V (Note 2)	DC12 V	Rated Voltage
DC24V	DC24 V	
DC48V	DC48 V	
DC100V	DC100V to 110 V	
DC125V	DC120V to 125 V	
DC200V	DC200V to 220 V	

Note 1. AC coils other than those shown to the left can be manufactured with ratings as below.
· For SRL-T5 and SL-T21:
AC24V (24 V 50/60 Hz)
AC48V (48 to 50 V 50/60 Hz)
Note 2. DC12V models are not manufactured for N125 to N800 types.
Note 3. DC coils have no polarity.

Refer below for information regarding model names for coils not listed above.
SRL(D)-K100: Page 186 SHL(D)-V□: Page 260

2.9 Properties

● AC Operated Type

Model Name	Input [VA]		Power Consumption [W]	Operating Voltage [V]		Coil Current [mA]	Operating Time [ms]		Operating Transformer Capacity [VA]
	Inrush	Regular		Close	Open		Coil ON→Main Contact ON	Coil OFF→Main Contact OFF	
S-T10, T12	45	7	2.2	120 to 150	75 to 115	30	12 to 18	5 to 20	15 to 30
S-T20	45	7	2.2	120 to 150	75 to 115	30	12 to 18	5 to 20	15 to 30
S-T21, T25	75	7	2.4	125 to 155	80 to 115	30	13 to 20	5 to 15	15 to 30
S-T32	55	4.5	1.8	125 to 155	80 to 115	20	15 to 22	5 to 15	15 to 30
S-T35, T50	110	10	3.8	120 to 150	80 to 115	45	10 to 20	5 to 14	30 to 50
S-T65, T80	115	20	2.2	110 to 135	60 to 100	67	20 to 30	35 to 65	30 to 50
S-T100	210	23	2.8	110 to 135	60 to 100	85	20 to 35	50 to 100	50 to 75
S-N125	270	24	2.9	110 to 135	70 to 105	100	20 to 30	60 to 110	75 to 100
S-N150	270	24	2.9	110 to 135	70 to 105	100	22 to 32	60 to 110	75 to 100
S-N180, N220	440	40	4.2	110 to 135	70 to 105	165	25 to 35	70 to 130	100 to 150
S-N300, N400	440	50	6.1	110 to 135	70 to 105	200	30 to 40	90 to 150	100 to 150
S-N600, N800	790	90	17.0	108 to 130	60 to 90	340	51 to 80	57 to 93	150 to 250
T65QM, T80QM	115	20	2.2	110 to 135	60 to 100	67	20 to 30	12 to 30	30 to 50
T100QM	210	23	2.8	110 to 135	60 to 100	85	20 to 35	13 to 30	50 to 75
S-N125QM	270	24	2.9	110 to 135	70 to 105	100	20 to 30	15 to 30	75 to 100
S-N150QM	270	24	2.9	110 to 135	70 to 105	100	22 to 32	15 to 30	75 to 100
S-N180QM, N220QM	440	40	4.2	110 to 135	70 to 105	165	25 to 35	20 to 40	100 to 150
S-N300QM, N400QM	440	50	6.1	110 to 135	70 to 105	200	30 to 40	20 to 40	100 to 150

Note 1. The above indicates rough property indices for AC200V coils.
Note 2. The operating voltage is that at a 20°C cold state at 60 Hz. Voltages for coils other than AC200V can be calculated proportionately.
E.g.: For a AC100V coil, operating voltage ≈ (100 ÷ 200) x operating voltage in table above
Note 3. The input and power consumption are average values. These are almost the same for coils other than AC200V.
Note 4. The coil current is the average normal value with a 220 V, 60 Hz applied voltage. Divide the regular input by the coil voltage for coils other than AC200V. E.g.: For a AC100V coil, coil current ≈ input from table above ÷ 100
Note 5. The drive time is that with 200V, 60 Hz applied to a standard auxiliary contact arrangement. These are almost the same for coils other than AC200V.
Note 6. S-T□QM and S-N□QM are open time quick motion types.

Refer below for information regarding model names for coils other than S-T/N□.
SR-T□: Page 164 B-T/N□: Page 250 DU-N□: Page 254 SH-V□: Page 260

● DC Operated Type

Model Name	Coil Properties			Operating Voltage [V]		Operating Time [ms]	
	Coil Current [A]	Power Consumption [W]	Coil Time Constant [ms]	Close	Open	Coil ON→Main Contact ON	Coil OFF→Main Contact OFF
SD-T12	0.033	3.3(2.2)	40(45)	60 to 75	10 to 30	60(85)	10
SD-T20	0.033	3.3(2.2)	40(45)	60 to 75	10 to 30	60(85)	10
SD-T21	0.033	3.3(2.2)	50(40)	60 to 75	10 to 30	65(90)	20
SD-T32	0.033	3.3(2.2)	50(40)	60 to 75	10 to 30	70(95)	20
SD-T35, T50	0.09	9	40	50 to 65	15 to 35	50	8
SD-T65, T80	0.18	18	65	52 to 63	20 to 35	50	13
SD-T100	0.24	24	80	50 to 65	15 to 30	75	18
SD-N125	0.31	31	100	50 to 63	16 to 28	125	22
SD-N150	0.31	31	100	50 to 63	17 to 30	135	37
SD-N220	0.41	41	125	52 to 61	12 to 25	145	40
SD-N300, N400	0.55	55	220	53 to 62	12 to 25	175	55
SD-N600, N800	0.72(6.0)	72(600)	50	54 to 62	23 to 42	105	80

Refer below for information regarding model names for coils other than SD-T/N□.
SRD-T□: Page 166 SD-Q□: Page 244 BD-T/N□: Page 250
DUD-N□: Page 254 SHD-V□: Page 260

Note 1. The left table indicates rough property indices for DC100V coils.
The values in the parentheses for SD-T12 to T32 indicate rough property indices for DC12V or DC24V coils.
Note 2. The operating voltage is that at a 20°C cold state. Voltages for coils other than DC100V can be calculated proportionately.
E.g.: For a DC24V coil, operating voltage ≈ (24 ÷ 100) x operating voltage in table above
Note 3. The power consumption and coil time constant are average values. These are almost the same for coils other than DC100V.
Note 4. The coil current is the average normal value with DC100V applied. Divide the power consumption by the coil voltage for coils other than DC100V
E.g.: For a DC24V coil, coil current ≈ power consumption from table above ÷ 24
Note 5. The drive time is that with DC100V applied to a standard auxiliary contact arrangement. These are almost the same for coils other than DC100V.
Note 6. The value in the parentheses for SD-N600, N800 types indicate the coil inrush current and momentary power consumption. There is no inrush current for other frames.
Note 7. The drive time (coil OFF→main contact OFF) slows down when combined with a surge absorber element, so care should be taken with sequence timing. Furthermore, use only after confirming there is no fault with the real-life application.

Mechanically Latched Type

Frame	Inrush Input [VA]				Operating Voltage [V]				Operating Time [ms]			
	AC Operated		DC Operated		AC Operated		DC Operated		AC Operated		DC Operated	
	Close	Trip	Close	Trip	Close	Trip	Close	Trip	Close	Trip	Close	Trip
SL(D)-T21	80*2	110*2	40*2	150*2	150	95	127	112	15	10	20	9
SL(D)-T35/T50	120*2	150*2	100*2	150*2	140	110	115	85	20	14	18	11
SL(D)-T65/T80	120*1	250*2	120*1	200*2	130	85	120	75	23	11	18	13
SL(D)-T100	250*1	250*1	250*1 (400)	300*1 (500)	130	95	115	90	30	15	29	18
SL(D)-N125	300*1	350*1	350*1 (500)	350*1 (500)	120	85	110	80	30	14	26	17
SL(D)-N150	300*1	350*1	350*1 (500)	350*1 (500)	140	89	130	85	35	14	31	17
SL(D)-N220	350*1	450*1	450*1 (600)	500*1 (700)	125	99	110	90	35	18	31	17
SL(D)-N300, N400	400*1	800*1	450*1 (600)	800*1 (1100)	143	112	125	95	50	17	50	17
SL(D)-N600, 800	1000*1	500*1	850*1	500*1	140	120	140	120	65	50	63	50

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SL-T/N☐) and for DC200V coils under DC operation (SLD-T/N☐).
The Class 2 heat-resistant magnetic contactors SL(D)-T50FN and SL(D)-T50, which have different properties.
Note 2. The operating voltage is the average value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC200V can be calculated proportionately. (E.g.: For a AC100V coil, operating voltage = (100 ÷ 200) x operating voltage in table above)
Note 3. The inrush input indicates the average value. However, the value in parentheses is the average value with DC120V applied to the DC125V coil. These values are almost the same for coils other than DC200V or AC200V, excluding DC125V. The values for AC24V and AC48V coils differ as per the table above.
Note 4. The drive time is the time taken from when the closing coil or tripping coil energizes until the main contact transitions (ON or OFF) when 220V, 60 Hz is applied for AC operation or DC200V is applied for DC operation. These are almost the same for coils other than AC200V or DC200V.
Note 5. ∗1 types have integrated surge absorber function. (Excluding AC/DC 24 or 48V types. SLD-T65/T80 type integrated closing coils are rated for DC100, 125, 200V only) ∗2 Coil surge absorber units can be additionally mounted.

Refer below for information regarding model names for coils other than SL(D)-T/N☐.
SRL(D)-T☐ : Page 168 SHL(D)-V☐ : Page 260

2.10 Performance

Classification and Making / Breaking Capacity Test Criteria

JISC8201-4-1 Low Voltage Switching and Control Devices and the International Electrotechnical Commission (IEC) implement the following standards to govern the breaking and making capacities of AC contactors.

Category	Making / Capacity Test		Breaking Capacity Test		Typical Application Example
	JIS, IEC		JIS, IEC		
JIS, IEC	Current	Power Factor	Current	Power Factor	
AC-1	1.5Ie	0.8	1.5Ie	0.8	Non-Inductive Or Low-Inductance Loads, Resistive Heaters
AC-2	4Ie	0.65	4Ie	0.65	Wound Motor Starting, Running, Stopping
AC-3	10Ie	(Note 3)	8Ie	(Note 3)	Cage Induction Motor Starting, Running, Stopping
AC-4	12Ie	(Note 3)	10Ie	(Note 3)	Cage Induction Motor Starting, Inching, Plugging
AC-5a	3Ie	0.45	3Ie	0.45	Switching Discharge Lamp Control Equipment
AC-5b	1.5Ie	(Note 4)	1.5Ie	(Note 4)	Switching Incandescent Lamps
AC-6a	(Note 5)		(Note 5)		Switching Transformers
AC-6b	(Note 6)		(Note 6)		Switching Capacitor Banks
AC-8a	6Ie	(Note 3)	6Ie	(Note 3)	Control of Closed-Type Refrigerant Compressor Motors with Manual Return Overload Tripping Devices
AC-8b	6Ie	(Note 3)	6Ie	(Note 3)	Control of Closed-Type Refrigerant Compressor Motors with Automatic Return Overload Tripping Devices

Note 1. Ie: Rated operating current. Note 2. Tested at a voltage 1.05 times greater than rated voltage.
Note 3. Ie ≤ 100 A: 0.45, Ie > 100 A: 0.35. Note 4. Carried out with an incandescent load.
Note 5. Class AC-6a Ie is 0.45 times that of class AC-3 Ie when switching a transformer with a peak inrush current less than 30 times greater than the rated current.
Note 6. Class AC-6b Ie can be found from the following formula when switching a single capacitor bank in a circuit with an estimated short-circuit current of ik at the location of the capacitor bank.

$$\text{Class AC-6b Ie} = ik \frac{x^2}{(x-1)^2} \qquad \text{Here, } x = 13.3 \frac{\text{Class AC-3 Ie}}{ik}$$

$$ik > 205 \times \text{Class AC-3 Ie}$$

Note 7. Class AC-3 ratings and performance can be substituted for AC-5a, AC-5b, AC-6a, AC-6b.

Category AC-3 Rated Performance

Performance of Magnetic Contactors

Frame	Rated Operational Voltage [V]	Rated Operational Current [A]	Making and Breaking Capacities [A]		AC Operated Types (S-☐)			DC Operated Types (SD-☐)			Mechanically Latched Types (SL(D)-☐)		
			Making	Breaking	Switching Frequency [Times/Hour] category AC-3	Switching Durability [x 10000] Mechanical	Switching Durability [x 10000] Electrical (category AC-3)	Switching Frequency [Times/Hour] category AC-3	Switching Durability [x 10000] Mechanical	Switching Durability [x 10000] Electrical (category AC-3)	Switching Frequency [Times/Hour] category AC-3	Switching Durability [x 10000] Mechanical	Switching Durability [x 10000] Electrical (category AC-3)
T10	220	11	110	88	1800	1000	200	—	—	—	—	—	—
	440	7	90	72									
T12	220	13	130	104	1800	1000	200	1800	1000	200	—	—	—
	440	9	120	96									
T20	220	18	180	144	1800	1000	200	1800	1000	200	—	—	—
	440	18	180	144			100			100			
T21	220	20	250	200	1800	1000	200	1800	1000	200	1200	50	50
	440	20	230	184									
T25	220	26	300	240	1800	1000	200	—	—	—	—	—	—
	440	25	300	240									
T32	220	32	320	256	1800	1000	200	1800	1000	200	—	—	—
	440	32	320	256									
T35	220	35	400	320	1800	1000	200	1800	1000	200	1200	50	50
	440	32	400	320									
T50	220	50	550	440	1200	1000	200	1200	1000	200	1200	25	25
	440	48	500	400									
T65	220	65	650	520	1200	500	200	1200	500	200	1200	25	25
	440	65	650	520									
T80	220	80	850	680	1200	500	100	1200	500	100	1200	25	25
	440	80	850	680									
T100	220	100	1050	840	1200	500	100	1200	500	100	1200	25	25
	440	93	1050	840									
N125	220	125	1250	1000	1200	500	100	1200	500	100	1200	25	25
	440	120	1200	960									
N150	220	150	1500	1200	1200	500	100	1200	500	100	1200	25	25
	440	150	1500	1200									
N180	220	180	1800	1440	1200	500	100	—	—	—	—	—	—
	440	180	1800	1440									
N220	220	220	2500	2000	1200	500	100	1200	500	100	1200	25	25
	440	220	2500	2000									
N300	220	300	3000	2400	1200	500	100	1200	500	100	1200	25	25
	440	300	3000	2400									
N400	220	400	4000	3200	1200	500	50	1200	500	50	1200	25	25
	440	400	4000	3200									
N600	220	630	6300	5040	1200	500	50	1200	500	50	1200	10	10
	440	630	6300	5040									
N800	220	800	8000	6400	1200	500	50	1200	500	50	1200	10	10
	440	800	8000	6400									

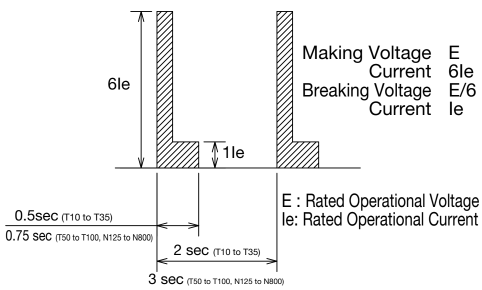
Note 1. The number of tests according to JISC8201-4-1 is shown in the table below.

	JIS
Making Capacities	50 times
Breaking Capacities	50 times

Note 2. It has 13 times the making breaking capacity (1 time) of the rated operating current.

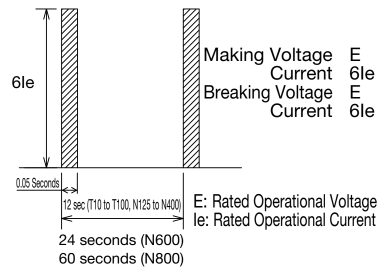
Note 3. The electrical durability test is conducted based on JIS C 8201-4-1.

AC-3 Electrical Durability Test Duty



· The duty of the mechanically latched types SL(D)-T21 and T35 is the same as that of N125 to N800.

AC-4 Electrical Durability Test Duty



· It does not apply to the mechanically latched types SL (D)-T and SL (D)-N.

Refer below for information regarding model performance not listed above.

SR,SRD,SRL(D)-T☐: Pages 164, 166, 168
B(D)-T/N☐: Page 249
SH,SHD,SHL(D)-V☐: Page 259
SD-Q☐: Page 243
DU(D)-N☐: Page 254

2.11 Application to Motor Loads

● Direct Start

In the case of the standard (not including inching, etc.) direct start, a frame is selected in which the rated capacity of the magnetic starter and magnetic contactor will be equal to or greater than the rated capacity of the motor.

● Application to Standard Three-Phase (3 ø) Cage Motor

It indicates the heater designation of the thermal overload relay for the standard three-phase cage motor and frame of the applicable magnetic starter.

200 to 240 V			400 to 440 V		
Motor Capacity [kW]	Heater Designation [A] (Adjustment Range of Settling Current)	Magnetic Starter Frame	Motor Capacity [kW]	Heater Designation [A] (Adjustment Range of Settling Current)	Magnetic Starter Frame
(0.015)	0.12 (0.1 to 0.16)	T10, T12, T20	(0.015)	–	
(0.025)	0.17 (0.14 to 0.22)	T10, T12, T20	(0.025)	–	
(0.03)	0.24 (0.2 to 0.32)	T10, T12, T20, T21, T25, T35, T50	(0.03)	–	
(0.035)	0.35 (0.28 to 0.42)	T10, T12, T20, T21, T25, T35, T50	(0.035)	–	
0.05	0.35 (0.28 to 0.42)	T10, T12, T20, T21, T25, T35, T50	0.05	0.24 (0.2 to 0.32)	T10, T12, T20, T21, T25, T35, T50
(0.07)	0.5 (0.4 to 0.6)	T10, T12, T20, T21, T25, T35, T50	(0.07)	0.35 (0.28 to 0.42)	T10, T12, T20, T21, T25, T35, T50
0.1	0.7 (0.55 to 0.85)	T10, T12, T20, T21, T25, T35, T50	0.1	0.35 (0.28 to 0.42)	T10, T12, T20, T21, T25, T35, T50
(0.15)	0.9 (0.7 to 1.1)	T10, T12, T20, T21, T25, T35, T50	(0.15)	0.5 (0.4 to 0.6)	T10, T12, T20, T21, T25, T35, T50
0.2	1.3 (1 to 1.6)	T10, T12, T20, T21, T25, T35, T50	0.2	0.7 (0.55 to 0.85)	T10, T12, T20, T21, T25, T35, T50
(0.3)	1.7 (1.4 to 2)	T10, T12, T20, T21, T25, T35, T50	(0.3)	0.9 (0.7 to 1.1)	T10, T12, T20, T21, T25, T35, T50
0.4	2.1 (1.7 to 2.5)	T10, T12, T20, T21, T25, T35, T50	0.4	1.3 (1 to 1.6)	T10, T12, T20, T21, T25, T35, T50
(0.55)	2.5 (2 to 3)	T10, T12, T20, T21, T25, T35, T50	(0.55)	1.3 (1 to 1.6)	T10, T12, T20, T21, T25, T35, T50
0.75	3.6 (2.8 to 4.4)	T10, T12, T20, T21, T25, T35, T50	0.75	1.7 (1.4 to 2)	T10, T12, T20, T21, T25, T35, T50
(1.0)	5 (4 to 6)	T10, T12, T20, T21, T25, T35, T50	(1.0)	2.5 (2 to 3)	T10, T12, T20, T21, T25, T35, T50
1.5	6.6 (5.2 to 8)	T10, T12, T20, T21, T25, T35, T50	1.5	3.6 (2.8 to 4.4)	T10, T12, T20, T21, T25, T35, T50
(1.9)2.2	9 (7 to 11)	T10, T12, T20, T21, T25, T35, T50	(1.9)2.2	5 (4 to 6)	T10, T12, T20, T21, T25, T35, T50
(2.5)	11 (9 to 13)	T12, T20, T21, T25, T35, T50	(2.5)	5 (4 to 6)	T10, T12, T20, T21, T25, T35, T50
(3.0)	11 (9 to 13)	T20, T21, T25, T35, T50	(3.0)	6.6 (5.2 to 8)	T10, T12, T20, T21, T25, T35, T50
3.7	15 (12 to 18)	T20, T21, T25, T35, T50, T65, T80, T100	3.7	6.6 (5.2 to 8)	T10, T12, T20, T21, T25, T35, T50
5.5	22 (18 to 26)	T21, T25, T35, T50, T65, T80, T100	5.5	11 (9 to 13)	T12, T20, T21, T25, T35, T50
7.5	29 (24 to 34)	T35, T50, T65, T80, T100	7.5	15 (12 to 18)	T20, T21, T25, T35, T50, T65, T80, T100
(9.0)	35 (30 to 40)	T35, T50, T65, T80, T100	(9.0)	15 (12 to 18)	T21, T25, T35, T50, T65, T80, T100
11	42 (34 to 50)	T50, T65, T80, T100, N125, N150	11	22 (18 to 26)	T21, T25, T35, T50, T65, T80, T100
15	54 (43 to 65)	T65, T80, T100, N125, N150	15	29 (24 to 34)	T35, T50, T65, T80, T100
18.5	67 (54 to 80)	T80, T100, N125, N150	18.5	35 (30 to 40)	T35, T50, T65, T80, T100
22	82 (65 to 100)	T100, N125, N150, N180, N220	22	42 (34 to 50)	T50, T65, T80, T100, N125, N150
30	105 (85 to 125)	N125, N150, N180, N220, N300, N400	30	54 (43 to 65)	T65, T80, T100, N125, N150
37	125 (100 to 150)	N150, N180, N220, N300, N400	37	67 (54 to 80)	T80, T100, N125, N150
45	150 (120 to 180)	N180, N220, N300, N400	45	82 (65 to 100)	T100, N125, N150, N180, N220
(50)	180 (140 to 220)	N220, N300, N400	(50)	105 (85 to 125)	N125, N150, N180, N220, N300, N400
55	180 (140 to 220)	N220, N300, N400	55	105 (85 to 125)	N125, N150, N180, N220, N300, N400
(60)	180 (140 to 220)	N300, N400	(60)	105 (85 to 125)	N125, N150, N180, N220, N300, N400
75	250 (200 to 300)	N300, N400	75	125 (100 to 150)	N150, N180, N220, N300, N400
90	330 (260 to 400)	N400, N600, N800	90	150 (120 to 180)	N180, N220, N300, N400
110	330 (260 to 400)	N400, N600, N800	110	180 (140 to 220)	N220, N300, N400
132	500 (400 to 600)	N600, N800	132	250 (200 to 300)	N300, N400, N600, N800
150	500 (400 to 600)	N600, N800	150	250 (200 to 300)	N300, N400, N600, N800
160	500 (400 to 600)	N600, N800	160	250 (200 to 300)	N400, N600, N800
200	660 (520 to 800)	N800	200	330 (260 to 400)	N400, N600, N800
300			300	500 (400 to 600)	N600, N800
400			400	660 (520 to 800)	N800

Note 1. The heater designation is a symbol to be specified when ordering.
Note 2. Refer to page 139 for details about selecting voltage and motor capacities for heater designations not listed in the above table.
Note 3. Please use N600/N800 in combination with TH-N600 and separately sold current transformer (Mitsubishi CW-☐).
Note 4. ( ) of the motor capacity indicates a special capacity.

● Application to Standard Single-Phase (1 ø) Motor

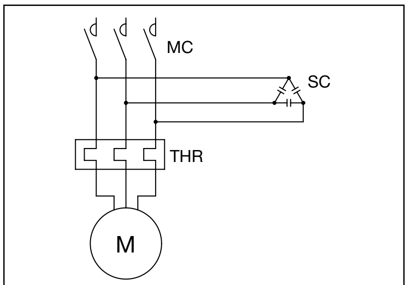
It indicates the heater designation of the thermal overload relay for the single-phase motor and frame of the applicable magnetic starter.

Motor Capacity [kW]	100 to 110V		200 to 240V	
	Heater Designation [A] (Adjustment Range of Settling Current)	Magnetic Starter Frame	Heater Designation [A] (Adjustment Range of Settling Current)	Magnetic Starter Frame
0.035	1.7 (1.4 to 2)	T10, T12, T20, T21, T25, T35	0.9 (0.7 to 1.1)	T10, T12, T20, T21, T25, T35
0.065	2.5 (2 to 3)	T10, T12, T20, T21, T25, T35	1.3 (1 to 1.6)	T10, T12, T20, T21, T25, T35
0.1	3.6 (2.8 to 4.4)	T10, T12, T20, T21, T25, T35	1.7 (1.4 to 2)	T10, T12, T20, T21, T25, T35
0.15	5 (4 to 6)	T10, T12, T20, T21, T25, T35	2.5 (2 to 3)	T10, T12, T20, T21, T25, T35
0.2	5 (4 to 6)	T10, T12, T20, T21, T25, T35	2.5 (2 to 3)	T10, T12, T20, T21, T25, T35
0.25	6.6 (5.2 to 8)	T10, T12, T20, T21, T25, T35	3.6 (2.8 to 4.4)	T10, T12, T20, T21, T25, T35
0.3	6.6 (5.2 to 8)	T10, T12, T20, T21, T25, T35	3.6 (2.8 to 4.4)	T10, T12, T20, T21, T25, T35
0.4	9 (7 to 11)	T10, T12, T20, T21, T25, T35	5 (4 to 6)	T10, T12, T20, T21, T25, T35
0.55	11 (9 to 13)	T12, T20, T21, T25, T35	5 (4 to 6)	T10, T12, T20, T21, T25, T35
0.75	15 (12 to 18)	T20, T21, T25, T35	6.6 (5.2 to 8)	T10, T12, T20, T21, T25, T35

Note 1. The heater designation is a symbol to be specified when ordering.
Note 2. Refer to page 139 for details about selecting voltage and motor capacities for heater designations not listed in the above table.
Note 3. For the enclosed type (MS-T12), the applicable capacity of the 100 to 110 V motor is 0.4 kW.

● Application to Motor Load Including Capacitor

When connecting a phase advanced capacitor in parallel to the motor, a series reactor for the inrush current suppression during input should ideally be inserted in the capacitor. For small capacity motors, there are many cases where the reactor has been omitted as shown in the figure at right, and therefore the electrical durability of the magnetic contactor may be shortened. In this case, special attention is necessary for the application of the magnetic contactor. Please consult us when selecting.



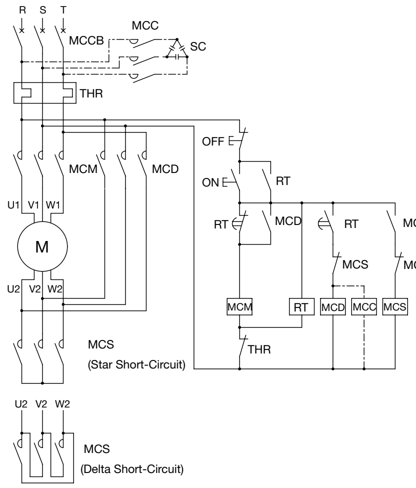
Connection Example Figure of Motor Load Including Capacitor

2

2.12 Application to Star/Delta Starting

Methods for star/delta starting include the use of 3 magnetic contactors (the 3-contactor type from figure 1), 2 magnetic contactors (the 2-contactor type from figure 2) or resistance insertion when switching from star to delta (the closed-transition type from figure 3).
Electrical interlocks are required to be installed between star (MCS or MCS1) and delta (MCD) magnetic contactors.
3-contactor types are the most generally used and do not apply voltage to the motor windings when stopped, suppressing damage to the insulation due to leakage currents.
2-contactor types are more economical but continue to apply voltage to the motor windings when stopped, so are not suitable for applications with a lot of downtime such as with fire extinguishing facilities.
Closed-transition types do not cut motor power when switching from star to delta configurations, suppressing inrush current and voltage drops.
The table below compares the various current values for direct start and star/delta starting.
Page 50 shows a selection of various magnetic contactors and thermal overload relays for the connections in figure 1 and figure 2.
Additionally, when applied to the high-frequency motors, the transient inrush current tends to increase during star starting current and delta switching, which may call for a review of the contactor selected.

3-Contactor Starters



(The dashed lines show the recommended circuit when connecting the phase advanced capacitor.)

Fig. 1. Star/Delta Starter Connection Diagram Example (3-Contactor)

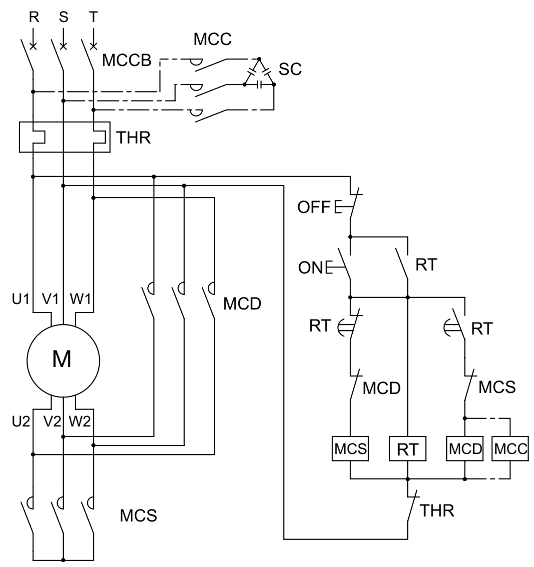
⚠ **The motor and equipment may be damaged if it is unable to switch from reduced voltage starting to full voltage running and continues in the reduced voltage starting state.**

Comparison of Direct and Star/Delta Starting

Starting Method	Starting (Star Magnetic Contactors)				Running (Delta Magnetic Contactors)		
	Starting Current	Torque	Contact Current	Contact Voltage	Full-Load Current	Contact Current	Contact Voltage
Direct	6Im	1.5T	6Im	$Em/\sqrt{3}$	Im	Im	$Em/\sqrt{3}$
Star/Delta	2Im	0.5T	2Im	$Em/\sqrt{3}$	Im	$Im/\sqrt{3}$	Em

Note 1. Im: Full-load current in delta configuration, Em: Line-to-line voltage, T: Rated torque
Note 2. Estimated torque value.

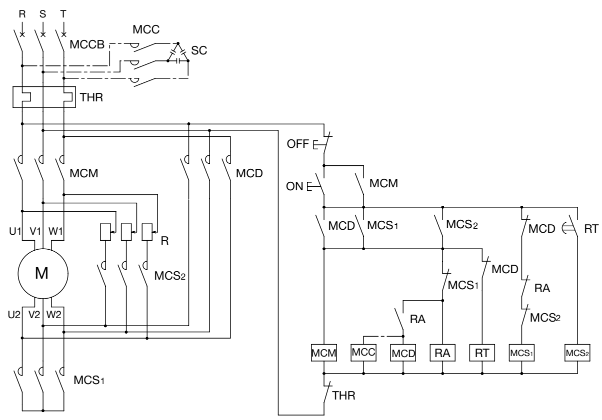
2-Contactor Starter



(The dashed lines show the recommended circuit when connecting the phase advanced capacitor.)

Fig. 2. Star/Delta Starter Connection Diagram Example (2-Contactor) (3-contactor types are recommended for applications with a lot of downtime)

Closed Transition Starter



(The dashed lines show the recommended circuit when connecting the phase advanced capacitor.)

Fig. 3. Closed Transition Type Star/Delta Starter Connection Diagram Example

2 Selection and Application

Star/Delta Starter Model Selection

Applicable Standard Three-Phase Squirrel-cage Motors			Magnetic Contactors for Main and Delta (MCM, MCD)	Star Magnetic Contactors (MCS) Note 5	Thermal Overload Relays (THR) Note 8	
Rated Voltage [V]	Rated Capacity [kW]	Rated Current [A]		Short Circuit Type: Star short circuit (Figs. 1, 2) [Delta short circuit (applicable to Fig. 1)]	Model Name	Heater Designation
AC200 to 220 V	5.5	26	S-T20	S-T10 [S-T10]	TH-T25	22A
	7.5	34	S-T21	S-T12 [S-T10]	TH-T65	29A
	11	48	S-T35	S-T20 [S-T10]	TH-T65	42A
	15	65	S-T50	S-T25 [S-T12]	TH-T65	54A
	18.5	79	S-T50	S-T35 [S-T20]	TH-N120	67A
	22	93	S-T65	S-T35 [S-T20]	TH-N120	82A
	30	124	S-T80	S-T50 [S-T25]	TH-N120TAHZ	105A
	37	152	S-T100	S-T65 [S-T35]	TH-N120TAHZ	125A
	45	180	S-N125	S-T65 [S-T35]	TH-N220HZ	150A
	55	220	S-N150	S-T80 [S-T50]	TH-N220HZ	180A
	75	300	S-N180	S-T100 [S-T65]	TH-N400HZ	250A
	90	360	S-N220	S-N125 [S-T80]	TH-N400HZ	330A
	110	440	S-N300	S-N150 [S-T100]	TH-N400HZ	330A
	132	528	S-N300	S-N180 [S-N125]	TH-N600+CT	500A
	160	640	S-N400	S-N220 [S-N125]	TH-N600+CT	660A
	200	800	S-N600	S-N300 [S-N180]	TH-N600+CT	660A
AC400 to 440 V	5.5	13	S-T12	S-T10 [S-T10]	TH-T25	11A
	7.5	17	S-T20	S-T10 [S-T10]	TH-T25	15A
	11	24	S-T20	S-T12 [S-T10]	TH-T25	22A
	15	32.5	S-T21	S-T20 [S-T10]	TH-T65	29A
	18.5	39.5	S-T25	S-T20 [S-T12]	TH-T65	35A
	22	46.5	S-T35	S-T20 [S-T12]	TH-T65	42A
	30	62	S-T50	S-T25 [S-T20]	TH-T65	54A
	37	76	S-T50	S-T35 [S-T20]	TH-N120	67A
	45	90	S-T65	S-T35 [S-T20]	TH-N120	82A
	55	110	S-T65	S-T50 [S-T25]	TH-N120TAHZ	105A
	75	150	S-T100	S-T65 [S-T35]	TH-N120TAHZ	125A
	90	180	S-N125	S-T65 [S-T50]	TH-N220HZ	150A
	110	220	S-N150	S-T80 [S-T50]	TH-N220HZ	180A
	132	264	S-N180	S-T100 [S-T65]	TH-N400HZ	250A
	160	320	S-N220	S-N125 [S-T65]	TH-N400HZ	330A
	200	400	S-N300	S-N150 [S-T80]	TH-N400HZ	330A
	250	500	S-N300	S-N180 [S-N125]	TH-N600+CT	500A
	300	600	S-N400	S-N220 [S-N125]	TH-N600+CT	500A

Note 1. Star magnetic contactors are fully capable of withstanding a continuity current 2 times the rated current for a running time of 15 seconds, and shut off when the current falls to 0.8 times the motor rated current.
Note 2. The making current of delta contacts is 6/√3 times the rated motor current.
Note 3. A saturable reactor (delay trip type, TH-T/N☐SR) or thermal overload relay short-circuited during start-up may be required depending on thermal overload relay starting current/time.
Note 4. A timer (RT) for setting the star magnetic contactor running time can be applied as an on-delay timer with momentary contacts by using the control circuit connections shown in Figs. 1 to 3.
Note 5. 2-contactor systems cannot be applied to star magnetic contactors with short-circuited delta connections.
Note 6. Electrical durability of 300,000 operations for 3-contactor types and 100,000 operations for 2-contactor types.
Note 7. Since 1b contact is required for internal wiring, select S-T10 with auxiliary contact 1b or S-T12.
Note 8. The thermal relay is intended for a line current detection. For a phase current detection, select a heater that can be set to 1 / √3 for the motor rated current.

2.13 Application to Resistive Loads

Switching resistive loads such as electric heaters or heating equipment have minimal inrush current and large power factor, allowing a larger current value to be applied compared to the magnetic contactor than with motor loads. MS-T/N series magnetic contactors are manufactured based on the standards (JISC8201-4-1, JEM1038) and possess the following properties. If the actual usage conditions differ from these conditions, users are asked to perform evaluations themselves (using the actual equipment). JISC8201-4-1 and JEM1038 standards define the following duties for when applying resistive loads to magnetic contactors.

● Standards for Resistive Loads

Applications	Standard	Category	Making and Breaking Capacities: Making	Making and Breaking Capacities: Breaking	Electrical Durability: Making	Electrical Durability: Breaking
Switching AC Resistive Loads	JIS	AC-1	1.5 Ie, 1.05 Ee, cos ø 0.8	1.5 Ie, 1.05 Ee, cos ø 0.8	Ie, Ee, cos ø 0.95	Ie, Ee, cos ø 0.95
	JEM	AC1	1.5 Ie, 1.1 Ee, cos ø 0.95	1.5 Ie, 1.1 Ee, cos ø 0.95	Ie, Ee, cos ø 0.95	Ie, Ee, cos ø 0.95
Switching DC Resistive Loads	JIS	DC-1	1.5 Ie, 1.05 Ee, L/R 1(ms)	1.5 Ie, 1.05 Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)
	JEM	DC1	1.1 Ie, 1.1 Ee, L/R 1(ms)	1.1 Ie, 1.1 Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)	Ie, Ee, L/R 1(ms)

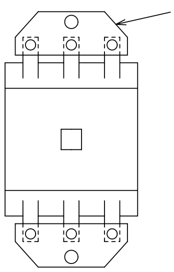
Note 1. Ie: rated operating current, Ee: rated voltage, cosφ: power factor, L/R: time constant.

● Applying Resistive Loads to Magnetic Contactors

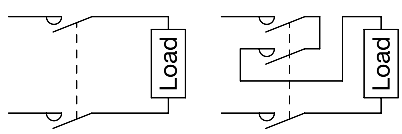
The table below shows the ratings for when applying resistive loads to MS-T/N series magnetic contactors.

Frame \ Application	Category AC-1 Rated Operating Current [A] 100 to 240 V	400 to 440 V	500 to 550 V	Category AC-1 Rated Capacity [kW] Three-Phase 200 to 240 V	400 to 440 V	500 to 550 V	Single-Phase 100 to 110 V	200 to 240 V	Category AC-1 Rated Operating Current (3-Pole Parallel) [A] 100 to 240 V	Category DC-1 Rated Operating Current 3-Pole Series (2-Pole Series) [A] 24 V	48 V	110 V	220 V
T10	20	11	8	6.5	8	7	2	4	40	10(10)	10(10)	8(6)	8(3)
T12	20	13	11	6.5	10	9.5	2	4	40	12(12)	12(12)	12(10)	12(7)
T20	20	18	17	6.5	12	14.5	2	4	40	18(18)	18(18)	18(13)	18(8)
T21	32	32	32	11	22	25	3.2	6.4	64	20(20)	20(20)	20(15)	20(10)
T25, T32	32	32	32	11	22	25	3.2	6.4	64	25(25)	25(25)	25(25)	22(12)
T35	60	60	60	20	40	50	6	12	120	35(35)	35(35)	35(25)	30(12)
T50	80	80	60	27	55	50	8	16	160	50(50)	50(40)	50(35)	40(15)
T65	100	100	100	34	68	85	10	20	200	65(50)	65(40)	65(35)	50(15)
T80	120	120	100	41	83	85	12	24	240	80(80)	80(65)	80(50)	60(20)
T100	150	150	150	50	100	120	15	30	300	93(93)	93(93)	93(80)	70(50)
N125	150	150	150	50	100	120	15	30	330	120(120)	120(100)	100(80)	80(50)
N150	200	200	200	65	130	170	20	40	400	150(150)	150(120)	150(100)	150(100)
N180	260	260	260	90	180	220	26	52	520	180(180)	180(180)	180(150)	180(150)
N220	260	260	260	90	180	220	26	52	520	220(220)	220(180)	220(150)	220(150)
N300	350	350	350	120	240	300	35	70	700	300(300)	300(240)	300(200)	300(200)
N400	450	450	450	155	310	380	45	90	800	400(400)	400(240)	400(200)	300(200)
N600	660	660	660	220	440	570	63	126	1200	630(630)	630(630)	630(630)	630(630)
N800	800	800	800	270	540	700	80	160	1600	800(800)	800(800)	800(630)	800(630)

Note 1. Use a terminal plate as per the figure below to give a uniform temperature rise on each pole for 3-pole parallel configurations.



Note 2. Connect contacts to both sides of the load for use in DC 2-pole series or 3-pole series applications as per the diagram below.



2-Pole Series 3-Pole Series

Note 3. Electrical durability of 500,000 operations.
(Models with mechanical durability of 500,000 operations or less use the mechanical durability value)
Note 4. De-rate by 10% if the current for T100 exceeds 80%.
Note 5. Switching frequencies are: T10 to T80: 1200 times/hour, T100, N125 to N800: 600 times/ hour.

2.14 Application to Lighting Loads

When switching fluorescent lights, mercury lights and incandescent lights, the starting current (immediately after the magnetic contactor closes) can be several times greater (10 times for fluorescent lights, 2 times for mercury lights and 10 times for incandescent lights) than the regular current (after settled on). This starting current can be close-circuited and must be capable of withstanding the time until illumination and have a predetermined switching durability. Lighting loads are governed by JIS and IEC standards and defined as class AC-5a (switching of discharge lamp control equipment) and AC-5b (switching incandescent lamps) (see page 46). However, the ratings and performance of class AC-3 can be substituted and the total regular current of the lighting load should be selected such that it is less than the rated operating current of the class AC-3 magnetic contactor. The below notes the number of applicable lamps for single-phase double-pole types per MS-T series magnetic contactor, based on the input current according to internal standards (article 3-6-3, 3-6-4).

2.15 Phase Advanced Capacitor Switching

● Switching Capacitor Banks

The following items should be investigated when using switching capacitors for power factor correction with magnetic contactors.

(1) Capacity to withstand the inrush current determined by the impedance of the circuit when switching.

(2) Conventional free air thermal current 1.3 x 1.1 times greater than the capacitor's rated current. (From JISC4901 - Phase Advanced Capacitor Switching Explained)

(3) Zero re-ignition or recurring arcs (arcing after being shut-off) when breaking.

The table below shows the applicable capacity (independent bank switching) of MS-T/N series magnetic contactor with capacitive loads.

Application / Frame	Three-Phase, With 6% or More Series Reactor (Note 1)				Three-Phase, Without Series Reactor (Notes 2, 3)				Single-Phase, Without Series Reactor (Notes 2, 3)			
	200 to 240 V		400 to 440 V		200 to 240 V		400 to 440 V		200 to 240 V		400 to 440 V	
	Capacity [kvar]	Current [A]	Capacity [kvar]	Current [A]	Capacity [kvar]	Current [A]	Capacity [kvar]	Current [A]	Capacity [kvar]	Current [A]	Capacity [kvar]	Current [A]
T10	3.8	11	4.8	7	2	6	3	4.3	1.2	6	1.7	4.3
T12	4.5	13	6.2	9	3	9	4	6	1.8	9	2.4	6
T20	4.8	14	9.6	14	4	12	8.3	12	2.4	12	4.8	12
T21	6.9	20	13	20	5	15	10	15	3	15	6	15
T25, T32	7.6	22	15	22	7.6	22	15	22	4.4	22	8.8	22
T35	12	35	22	32	11	32	20	30	6.4	32	12	30
T50	17	50	31	46	15	45	27	40	9	45	16	40
T65	22	65	42	62	17	50	34	50	10	50	20	50
T80	27	80	51	75	22	65	40	60	13	65	24	60
T100	32	93	64	93	30	90	60	90	18	90	36	90
N125	36	105	72	105	34	100	69	100	20	100	40	100
N150	48	140	96	140	45	130	90	130	26	130	52	130
N180	62	180	124	180	62	180	124	180	36	180	72	180
N220	62	180	124	180	62	180	124	180	36	180	72	180
N300	84	245	169	245	80	230	160	230	46	230	92	230
N400	109	315	218	315	100	300	200	300	60	300	120	300
N600	159	461	319	461	150	430	300	430	86	430	172	430
N800	193	559	387	559	170	500	350	500	100	500	200	500

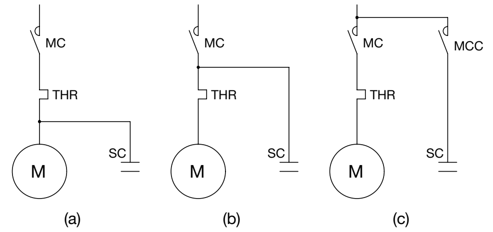
Note 1. Applicable in situations where the series reactor is not saturable, the electrical durability is the same as class AC-3 (see page 47) and there are parallel banks.

Note 2. The peak wave amplitude of the inrush current when close-circuited is within 20 times the capacitor's rated current (actual value) and the electrical durability is approximately 200,000 operations.

Note 3. The applicable capacity is reduced for parallel banks without series reactors as the averaged current (determined by parallel bank capacity and circuit impedance) will flow.

Motor Load and Simultaneous Switching

The capacitor connections are as per the figure to the right; however, for Fig. (a) on the right, the thermal overload relay set value may require lowering by the full-load current of the motor according to the power factor correction percentage. Furthermore, for Fig. (c) on the right, the motor starting/ stopping magnetic contactor coil and switching capacitor magnetic contactor coil should be connected in parallel and must be switched simultaneously to prevent becoming a leading power factor when stopped.
When 1 motor and capacitor magnetic contactor is being switched, as per Figs. (a) and (b) on the right, the switching lifetime will be reduced more than if switching a motor alone.



MC: Magnetic Contactor, MCC: Capacitor Switching Magnetic Contactor
THR: Thermal Overload Relay, M: Motor, SC: Phase Advanced Capacitor

Phase Advanced Capacitor Connection Location

2 Selection and Application

2.16 Application to PLCs

MS-T, MS-N and SD-Q series magnetic contactors have a operation coil with a small VA and no width-increasing rail attached; SD-Q types, in particular, can be directly driven by the output of DC24 V 0.1 A transistors.
Refer to the PLC manual for correct usage, magnetic contactor switching frequency and managing back-emfs from the operation coil (inductive load).
TH-T and TH-N series thermal overload relays adopt 1a1b independent contacts as output contacts. Differing voltages can also be used.
The below table shows whether direct driving from PLCs is applicable.

● S(D)-T/N, SD-Q Series Magnetic Contactor PLC Direct Drive

Applicable Models			MELSEC iQ-R Series						MELSEC-L Series								MELSEC-Q Series							
Classification			Output Units						Output Units							I/O Combination Units	Output Units							
	Model Name		Contact Output		Transistor Output			I/O Combination Units	ContactOutput		Transistor Output			Triac Output		Transistor Output	Contact Output		Triac Output		Transistor Output			
	(SR-T, SRD-T: Contactor Relays; S-T/N, SD-T/N: Magnetic Contactors; SD-Q: DC Interface Contactors)	Operation Coil Designation	RY10R2		RY41NT2P RY42NT2P	RY41PT1P RY42PT1P	RY40NT5P RY40PT5P	RH42C4NY2P	LY10R2		LY41NT1P LY42NT1P LY41PT1P LY42PT1P	L02CPU L26CPU-BT L02SCPU L02SCPU-P L02CPU-P L06CPU L06CPU-P L26CPU L26CPU-P L26CPU-PBT	LY40NT5P LY40PT5P	LY20S6 No Varistor		LH42C4NT1P LH42C4PT1P	QY10(-TS) QY18A		QY22 No Varistor		QY40P(-TS) QY41P QY42P QY81P QY82P	QY41H	QY50 QY80(-TS)	QY68A
AC Operated			AC100 V	AC200 V	Using UN-SY□/ UT-SY□ DC24 V				AC100 V	AC200 V	Using UN-SY□/ UT-SY□ DC24 V			AC100 V	AC200 V	Using UN-SY□/ UT-SY□ DC24 V	AC100 V	AC200 V	AC100 V	AC200 V	Using UN-SY□/ UT-SY□ DC24 V			
	SR-T5, T9	AC100V AC200V	○1 mil.	○1.5 mil.	○				○1 mil.	○1.5 mil.	○			○	○	○	○1 mil.	○2 mil.	○	○	○			
	S-T10, T12, T20		○1 mil.	○1.5 mil.	○				○1 mil.	○1.5 mil.	○			○	○	○	○1 mil.	○2 mil.	○	○	○			
	S-T21, T25		○1 mil.	○1.5 mil.	○				○1 mil.	○1.5 mil.	○			○	○	○	○1 mil.	○2 mil.	○	○	○			
	S-T32		○1.5 mil.	○2 mil.	○				○1.5 mil.	○2 mil.	○			○	○	○	○1.5 mil.	○2 mil.	○	○	○			
	S-T35/T50		○0.5 mil.	○1 mil.	○				○0.5 mil.	○1 mil.	○			○	○	○	○0.5 mil.	○1 mil.	○	○	○			
	S-T65/T80		○0.5 mil.	○1 mil.	○				○0.5 mil.	○1 mil.	○			○	x	○	○0.5 mil.	○1 mil.	○	x	○			
	S-T100		○0.5 mil.	○0.5 mil.	○				○0.5 mil.	○0.5 mil.	○			○	x	○	○0.5 mil.	○0.5 mil.	○	x	○			
	S-N125, N150		○0.5 mil.	○0.5 mil.	○				○0.5 mil.	○0.5 mil.	○			○	x	○	○0.5 mil.	○0.5 mil.	○	x	○			
	S-N180/N220		○0.3 mil.	○0.4 mil.	○				○0.3 mil.	○0.4 mil.	○			○	x	○	○0.3 mil.	○0.4 mil.	○	x	○			
	S-N300/N400		○0.2 mil.	○0.3 mil.	○				○0.2 mil.	○0.3 mil.	○			○	x	○	○0.2 mil.	○0.4 mil.	○	x	○			
	S-N600/N800		x	○0.2 mil.	x				x	○0.2 mil.	x			x	x	x	x	○0.2 mil.	x	x	x			
DC Operated	SD-Q□, QR□	DC24V	○1 mil.		○				○1 mil.		○	○	○			○	○1 mil.	○1 mil.			○	○	○	○
			DC24 V	DC110 V					DC24 V	DC110 V							DC24 V	DC110 V						
	SRD-T5, T9	DC 24V DC110V	○0.3 mil.	○0.3 mil.	○DC24 V	○DC24 V	○DC24 V	○DC24 V	○0.3 mil.	○0.3 mil.	○DC24 V	○DC24 V	○DC24 V			○DC24 V	○0.3 mil.	○0.3 mil.			○DC24 V	○DC24 V	○DC24 V	○DC24 V
	SD-T12/T20		○0.3 mil.	○0.3 mil.	○DC24 V	○DC24 V	○DC24 V	○DC24 V	○0.3 mil.	○0.3 mil.	○DC24 V	○DC24 V	○DC24 V			○DC24 V	○0.3 mil.	○0.3 mil.			○DC24 V	○DC24 V	○DC24 V	○DC24 V
	SD-T21/T32		○0.3 mil.	○0.3 mil.	○DC24 V	○DC24 V	○DC24 V	○DC24 V	○0.3 mil.	○0.3 mil.	○DC24 V	○DC24 V	○DC24 V			○DC24 V	○0.3 mil.	○0.3 mil.			○DC24 V	○DC24 V	○DC24 V	○DC24 V
	SD-T35/T50		x	x	x	x	○DC24 V	x	x	x	x	x	○DC24 V			x	x	x			x	x	○DC24 V	○DC24 V
	SD-T65/T80		x	x	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x	○DC24 V
	SD-T100		x	x	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x	○DC24 V
	SD-N125, N150		x	x	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x	○DC24 V
	SD-N220		x	x	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x	x
	SD-N300/N400		x	x	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x	x
	SD-N600/N800		x	x	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x	x
Mechanically Latched Type AC Operated			Closing	Tripping					Closing	Tripping				Closing	Tripping		Closing	Tripping	Closing	Tripping				
	SRL-T5	AC100 V AC200 V	○0.5 mil.	○0.5 mil.					○0.5 mil.	○0.5 mil.				○	○		○0.5 mil.	○0.5 mil.	○	○				
	SL-T21		○0.5 mil.	○0.5 mil.					○0.5 mil.	○0.5 mil.				○	○		○0.5 mil.	○0.5 mil.	○	○				
	SL-T35/T50		○0.5 mil.	○0.5 mil.					○0.5 mil.	○0.5 mil.				○	○		○0.5 mil.	○0.5 mil.	○	○				
	SL-T65/T80		○0.25 mil.	○0.25 mil.					○0.25 mil.	○0.25 mil.				○	○		○0.25 mil.	○0.25 mil.	○	○				
	SL-T100		○0.25 mil.	○0.25 mil.					○0.25 mil.	○0.25 mil.				○	○		○0.25 mil.	○0.25 mil.	○	○				
	SL-N125, N150		○0.25 mil.	○0.25 mil.					○0.25 mil.	○0.25 mil.				○	○		○0.25 mil.	○0.25 mil.	○	○				
	SL-N220		○0.25 mil.	○0.25 mil.					○0.25 mil.	○0.25 mil.				○	○		○0.25 mil.	○0.25 mil.	○	○				
	SL-N300/N400		○0.25 mil.	x					○0.25 mil.	x				○	x		○0.25 mil.	x	○	x				
	SL-N600/N800		x	x					x	x				x	○		x	x	x	○				

Note 1. ○: applicable (1 operation coil per output pole), x: not applicable.
Note 2. The contact output value shows the electrical durability of the output relay. The transistor output value shows the applicable control circuit voltage.
Note 3. UN-SY□ and UT-SY□ are interface units (optional parts).
Note 4. Mechanically latched DC operated types (SRLD, SLD) are not applicable with any model.

MELSEC-Q Series		MELSEC-FX Series				CC-Link IE				CC-Link									
I/O Combination Units		Output Units				Output Units				Output Units									
Transistor Output		Contact Output		Transistor Output		Contact Output		Transistor Output		Contact Output				Triac Output		Transistor Output			
QH42P QX41Y41P	QX48Y57	FX3S-□MR FX3U-□MR(-A) FX2N-□E(Y)R-ES(S)/UL FX2NC-16EYR-T-DS FX-16EYR-ES-TB/UL FX3G-□MR(-A) FX5U-□MR FX5-□E(Y)R		FX3S-□MT FX2N-□E(Y)T-ESS/UL FX-16EYT-ES-TB/UL FX3U-□MT(-A) FX3G-□MT(-A)	FX3GC-32MT FX2NC-□EYT-DSS FX3UC-□MT FX5U-□MT FX5UC-□MT FX5-□ET FX5-C□E(Y)T	NZ2GF2S2-16R NZ2GF2B2-16R		NZ2GFCE3-16T NZ2GFCE3-16TE NZ2GFCM1-16T NZ2GFCM1-16TE NZ2GF2S1-16T NZ2GF2S1-16TE NZ2GF2B1N1-16T NZ2GF2B1N1-16TE NZ2GF2B1-32T NZ2GF2B1-32TE	NZ2EX2B1-16T NZ2EX2B1-16TE NZ2EX2S1-16T NZ2EX2S1-16TE	AJ65SBTB2N-□R AJ65DBTB1-32R		AJ65BTB2-16R		AJ65SBTB2N-□S No Varistor		AJ65SBTB□-□T AJ65SBTB□-□T1 AJ65SBTB1B-16TE1 AJ65BTB□-16T AJ65DBTB1-32T1 AJ65BTB□-16T AJ65DBTB1-32T1 AJ65VBTS2-□T AJ65FBTA2-16T	AJ65SBTB1-□TE AJ65VBTCE2-□T AJ65VBTCU2-□T AJ65SBTC1-32T AJ65BTC1-32T AJ65VBTCE3-16TE	J65FBTA2-16TE	
Using UN-SY□/UT-SY□ DC24 V		AC100 V AC200 V		Using UN-SY□/UT-SY□ DC24 V		AC100 V	AC200 V	Using UN-SY□/UT-SY□ DC24 V		AC100 V	AC200 V	AC100 V	AC200 V	AC100 V	AC200 V	Using UN-SY□/UT-SY□ DC24 V			
○		○ 3 mil.		○		○ 1 mil.	○ 1.5 mil.	○		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	T5/9
○		○ 3 mil.		○		○ 1 mil.	○ 1.5 mil.	○		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	T10/12/20
○		○ 3 mil.		○		○ 1 mil.	○ 1.5 mil.	○		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	T21/25
○		○ 3 mil.		○		○ 1.5 mil.	○ 2 mil.	○		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	T32
○		○ 3 mil.		○		○ 0.5 mil.	○ 1 mil.	○		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	T35/50
○		○ 3 mil.		○		○ 0.5 mil.	○ 1 mil.	○		○ 1.5 mil.	○ 2 mil.	○ 1.5 mil.	○ 2 mil.	○	x	○	○	○	T65/80
○		○ 3 mil.		○		○ 0.5 mil.	○ 0.5 mil.	○		○ 1 mil.	○ 1.5 mil.	○ 1 mil.	○ 1.5 mil.	○	x	○	○	○	T100
○		○ 1 mil.		○		○ 0.5 mil.	○ 0.5 mil.	○		○ 1 mil.	○ 1.5 mil.	○ 1 mil.	○ 1.5 mil.	○	x	○	○	○	N125/150
○		○ 0.2 mil.		○		○ 0.3 mil.	○ 0.4 mil.	○		○ 0.5 mil.	○ 1 mil.	○ 0.5 mil.	○ 1 mil.	○	x	○	○	○	N180/220
○		○ 0.2 mil.		○		○ 0.2 mil.	○ 0.3 mil.	○		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○	x	○	○	○	N300/400
x		x		x		x	○ 0.2 mil.	x		x	○ 0.4 mil.	x	○ 0.4 mil.	x	x	x	x	x	N600/800
○	○	○ 1 mil.		○	○	○ 1 mil.		○	○	○ 2 mil.		○ 2 mil.				○ DC24 V	○ DC24 V	○ DC24 V	Q/QR
		DC24 V	DC110 V			DC24 V	DC110 V			○ DC24 V	○DC110 V	○ DC24 V	○ DC110 V						
○ DC24 V	○DC24 V	○ 0.15 mil.	x	○ DC24 V	○ DC24 V	○ 0.3 mil.	○ 0.3 mil.	○ DC24 V	○ DC24 V	○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.			○ DC24 V	○ DC24 V	○ DC24 V	T5/9
○ DC24 V	○ DC24 V	○ 0.15 mil.	x	○ DC24 V	○ DC24 V	○ 0.3 mil.	○ 0.3 mil.	○ DC24 V	○ DC24 V	○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.			○ DC24 V	○ DC24 V	○ DC24 V	T12/20
○ DC24 V	○ DC24 V	○ 0.1 mil.	x	○ DC24 V	○ DC24 V	○ 0.3 mil.	○ 0.3 mil.	○ DC24 V	○ DC24 V	○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.			○ DC24 V	○ DC24 V	○ DC24 V	T21/32
x	○ DC24 V	○ 0.1 mil.	x	○ DC24 V	x	x	x	○ DC24 V	○ DC24 V	○ 0.1 mil.	○ 0.3 mil.	○ 0.1 mil.	○ 0.3 mil.			○ DC24 V	x	○ DC24 V	T35/50
x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	T65/80
x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	T100
x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	N125/150
x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	N220
x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	N300/400
x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	N600/800
		Closing	Tripping			Closing	Tripping			Closing	Tripping	Closing	Tripping	Closing	Tripping				
		○ 0.5 mil.	○ 0.5 mil.			○ 0.5 mil.	○ 0.5 mil.			○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○	○				T5
		○ 0.5 mil.	○ 0.5 mil.			○ 0.5 mil.	○ 0.5 mil.			○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○	○				T21
		○ 0.5 mil.	○ 0.5 mil.			○ 0.5 mil.	○ 0.5 mil.			○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○	○				T35/T50
		○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○	○				T65/T80
		○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○	○				T100
		○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○	○				N125/150
		○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.			○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○	○				N220
		○ 0.25 mil.	x			○ 0.25 mil.	x			○ 0.25 mil.	x	○ 0.25 mil.	x	○	x				N300/400
		x	x			x	x			x	x	x	x	x	○				N600/800

● S(D)-T/N, SD-Q Series Magnetic Contactor PLC Direct Drive

Applicable Models			CC-Link									CC-Link Safety		CC-Link LT			
Classification	Model Name	Operation Coil Designation	I/O Combination Units									Output Units	I/O Combination Units	Output Units		I/O Combination Units	
	(SR-T, SRD-T: Contactor Relays; S-T/N, SD-T/N: Magnetic Contactors; SD-Q: DC Interface Contactors)		Contact Output				Transistor Output					Transistor Output	Transistor Output	Transistor Output		Transistor Output	
			AJ65SBTB32-16KDR AJ65SBTB32-16DR AJ65DBTB1-32DR		AJ65BTB2-16DR		AJ65SBTB32-8DT□ AJ65SBTB1-16DT□ AJ65SBTB32-16DT□ AJ65SBTB1-32DT□ AJ65SBTB1-32DTE1 AJ65SBTB1-32KDT2 AJ65VBTS32-16DT AJ65SBTC4-16DT AJ65SBTC4-16DT2 AJ65FBTA42-16DT	AJ65BTB□-16DT AJ65DBTB1-32DT1 AJ65VBTS32-32DT	AJ65VBTCE32-□DT AJ65SBTC1-32DT□ AJ65VBTCFJ1-32DT1 AJ65VBTCE3-16DTE AJ65VBTCE3-32DTE	AJ65SBTCF1-32DT AJ65VBTCFJ1-32DT1	AJ65FBTA42-16DTE	QS0J65BTS2-4T	QS0J65BTB2-12DT	CL1Y4-T1B2 CL2Y8-TP1B2 CL1Y4-T1S2 CL2Y8-TP1S2 CL2Y8-TPE1S2 CL2Y16-TPE1M1V	CL1Y4-T1C2 CL2Y8-TP1C2V CL2Y16-TP1C2V CL2Y16-TP1M1V CL2Y16-TP1MJ1V CL1Y2-T1D2S	CL1XY2-DT1D5S CL1XY4-DT1B2	CL1XY8-DT1B2 CL2XY16-DTP1C5V
AC Operated		AC100V AC200V	AC100V	AC200V	AC100V	AC200V	Using UN-SY□/UT-SY□ DC24 V					Using UN-SY□/UT-SY□ DC24 V (Note 5)	Using UN-SY□/UT-SY□ DC24 V (Note 5)	Using UN-SY□/UT-SY□ DC24 V			
	SR-T5,T9		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-T10,T12,T20		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-T21,T25		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-T32		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-T35/T50		○ 2 mil.	○ 2 mil.	○ 2 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-T65/T80		○1.5 mil.	○ 2 mil.	○1.5 mil.	○ 2 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-T100		○ 1 mil.	○1.5 mil.	○ 1 mil.	○1.5 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-N125,N150		○ 1 mil.	○1.5 mil.	○ 1 mil.	○1.5 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-N180/N220		○ 0.5 mil.	○ 1 mil.	○ 0.5 mil.	○ 1 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-N300/N400		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○	○	○	○	○	○	○	○	○	○	○
	S-N600/N800		x	○ 0.4 mil.	x	○ 0.4 mil.	x	x	x	x	x	x	x	x	x	x	x
DC Operated	SD-Q□,QR□	DC24V	○ 2 mil.		○ 2 mil.		○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V
		DC 24V DC110V	DC24V	DC110V	DC24V	DC110V											
	SRD-T5,T9		○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V
	SD-T12/T20		○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V
	SD-T21/T32		○ 0.4 mil.	○ 0.8 mil.	○ 0.4 mil.	○ 0.8 mil.	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V	○DC24V
	SD-T35/T50		○ 0.1 mil.	○ 0.3 mil.	○ 0.1 mil.	○ 0.3 mil.	○DC24V	○DC24V	x	x	○DC24V	○DC24V	○DC24V	x	x	x	x
	SD-T65/T80		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	SD-T100		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	SD-N125,N150		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	SD-N220		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	SD-N300/N400		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	SD-N600/N800		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mechanically Latched Type AC Operated		AC100V AC200V	Closing	Tripping	Closing	Tripping											
	SRL-T5		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.											
	SL-T21		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.											
	SL-T35/T50		○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.	○ 0.5 mil.											
	SL-T65/T80		○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											
	SL-T100		○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											
	SL-N125,N150		○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											
	SL-N220		○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.	○ 0.25 mil.											
	SL-N300/N400		○ 0.25 mil.	x	○ 0.25 mil.	x											
	SL-N600/N800		x	x	x	x											

Note 1. ○: applicable (1 operation coil per output pole), x: not applicable
Note 2. The contact output value shows the electrical durability of the output relay. The transistor output value shows the applicable control circuit voltage.
Note 3. UN-SY□ and UT-SY□ are interface units (optional parts).
Note 4. Mechanically latched DC operated types (SRLD, SLD) are not applicable with any model.
Note 5. Doesn't comply with safety category 3 or above (dual circuitry) so use a separate safety relay.

2.17 Application to Inverter Circuits

Select from the below items when using a magnetic contactor for input to a Mitsubishi inverter circuit.

Note 1. The motor capacity indicates the selection when using a 4-pole AC200 V/400 V 50 Hz standard Mitsubishi motor.
Note 2. Magnetic contactors are selected at Class AC-1. The electrical durability of magnetic contactors is 500,000 operations. When used for emergency stops while the motor is running, it is 25 operations.
If emergency stop operation or commercial operation is to be used, then a magnetic contactor with a Class AC-3 rated operation current should be selected to suit the motor rated current.
Note 3. 55K or less is the wire size for a maximum continuous allowable temperature of 75°C (HIV wire [600 V double-layer vinyl insulated wire]). This assumes that the ambient temperature is 50°C or less and the wiring distance 20 m or less.
75K or more is the wire size for a maximum continuous allowable temperature of 90°C (LMFC [Flame-Retardant, Flexible, Cross-Linked Polyethylene Insulated Electric Wire], etc.). This assumes interior control panel wiring and ambient temperature of 50°C or less.

(1) FR-A800 Series

Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter (ND Rating)	Input Magnetic Contactor (Note 2) Power Factor Correction (AC or DC) Reactor Connection		Recommended Wire Size (mm^2) (Note 3) R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection		Recommended Wire Size (mm^2) (Note 3) U, V, W
			No	Yes	No	Yes	
200 V Class	0.4	FR-A820-0.4K(00046)	S-T10	S-T10	2	2	2
	0.75	FR-A820-0.75K(00077)	S-T10	S-T10	2	2	2
	1.5	FR-A820-1.5K(00105)	S-T10	S-T10	2	2	2
	2.2	FR-A820-2.2K(00167)	S-T10	S-T10	2	2	2
	3.7	FR-A820-3.7K(00250)	S-T21	S-T10	3.5	3.5	3.5
	5.5	FR-A820-5.5K(00340)	S-T35	S-T21	5.5	5.5	5.5
	7.5	FR-A820-7.5K(00490)	S-T35	S-T35	14	14	8
	11	FR-A820-11K(00630)	S-T35	S-T35	14	14	14
	15	FR-A820-15K(00770)	S-T50	S-T50	22	22	22
	18.5	FR-A820-18.5K(00930)	S-T65	S-T50	38	22	22
	22	FR-A820-22K(01250)	S-T100	S-T65	38	38	38
	30	FR-A820-30K(01540)	S-T100	S-T100	60	60	60
	37	FR-A820-37K(01870)	S-N150	S-N125	80	60	60
	45	FR-A820-45K(02330)	S-N180	S-N150	100	100	100
	55	FR-A820-55K(03160)	S-N220	S-N180	100	100	100
	75	FR-A820-75K(03800)	—	S-N300	—	125	125
	90	FR-A820-90K(04750)	—	S-N300	—	150	150
400 V Class	0.4	FR-A840-0.4K(00023)	S-T10	S-T10	2	2	2
	0.75	FR-A840-0.75K(00038)	S-T10	S-T10	2	2	2
	1.5	FR-A840-1.5K(00052)	S-T10	S-T10	2	2	2
	2.2	FR-A840-2.2K(00083)	S-T10	S-T10	2	2	2
	3.7	FR-A840-3.7K(00126)	S-T10	S-T10	2	2	2
	5.5	FR-A840-5.5K(00170)	S-T21	S-T12	2	2	2
	7.5	FR-A840-7.5K(00250)	S-T21	S-T21	3.5	3.5	3.5
	11	FR-A840-11K(00310)	S-T21	S-T21	5.5	5.5	5.5
	15	FR-A840-15K(00380)	S-T35	S-T21	8	5.5	5.5
	18.5	FR-A840-18.5K(00470)	S-T35	S-T35	14	8	8
	22	FR-A840-22K(00620)	S-T35	S-T35	14	14	14
	30	FR-A840-30K(00770)	S-T50	S-T50	22	22	22
	37	FR-A840-37K(00930)	S-T65	S-T50	22	22	22
	45	FR-A840-45K(01160)	S-T100	S-T65	38	38	38
	55	FR-A840-55K(01800)	S-T100	S-T100	60	60	60
	75	FR-A840-75K(02160)	—	S-T100	—	60	60
	90	FR-A840-90K(02600)	—	S-N150	—	60	60
	110	FR-A840-110K(03250)	—	S-N180	—	80	80
	132	FR-A840-132K(03610)	—	S-N220	—	100	100
	150	FR-A840-160K(04320)	—	S-N300	—	125	125
	160	FR-A840-160K(04320)	—	S-N300	—	125	125
	185	FR-A840-185K(04810)	—	S-N300	—	150	150
	220	FR-A840-220K(05470)	—	S-N400	—	2×100	2×100
	250	FR-A840-250K(06100)	—	S-N600	—	2×100	2×100
	280	FR-A840-280K(06830)	—	S-N600	—	2×125	2×125

(2) FR-F800 Series

Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter (LD Rating)	Input Magnetic Contactor (Note 2) Power Factor Correction (AC or DC) Reactor Connection		Recommended Wire Size (mm^2) (Note 3) R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection		U, V, W
			No	Yes	No	Yes	
200 V Class	0.75	FR-F820-0.75K(00046)	S-T10	S-T10	2	2	2
	1.5	FR-F820-1.5K(00077)	S-T10	S-T10	2	2	2
	2.2	FR-F820-2.2K(00105)	S-T10	S-T10	2	2	2
	3.7	FR-F820-3.7K(00167)	S-T21	S-T10	3.5	3.5	3.5
	5.5	FR-F820-5.5K(00250)	S-T25	S-T21	5.5	5.5	5.5
	7.5	FR-F820-7.5K(00340)	S-T35	S-T25	8	5.5	5.5
	11	FR-F820-11K(00490)	S-T35	S-T35	14	14	14
	15	FR-F820-15K(00630)	S-T50	S-T50	22	22	22
	18.5	FR-F820-18.5K(00770)	S-T65	S-T50	38	22	22
	22	FR-F820-22K(00930)	S-T100	S-T65	38	38	38
	30	FR-F820-30K(01250)	S-T100	S-T100	60	60	60
	37	FR-F820-37K(01540)	S-N150	S-N125	80	60	60
	45	FR-F820-45K(01870)	S-N180	S-N150	100	100	100
	55	FR-F820-55K(02330)	S-N220	S-N180	100	100	100
	75	FR-F820-75K(03160)	—	S-N300	—	125	125
	90	FR-F820-90K(03800)	—	S-N300	—	150	150
	110	FR-F820-110K(04750)	—	S-N400	—	150	150
400 V Class	0.75	FR-F840-0.75K(00023)	S-T10	S-T10	2	2	2
	1.5	FR-F840-1.5K(00038)	S-T10	S-T10	2	2	2
	2.2	FR-F840-2.2K(00052)	S-T10	S-T10	2	2	2
	3.7	FR-F840-3.7K(00083)	S-T10	S-T10	2	2	2
	5.5	FR-F840-5.5K(00126)	S-T21	S-T12	2	2	2
	7.5	FR-F840-7.5K(00170)	S-T21	S-T21	3.5	3.5	3.5
	11	FR-F840-11K(00250)	S-T21	S-T21	5.5	5.5	5.5
	15	FR-F840-15K(00310)	S-T35	S-T21	8	5.5	5.5
	18.5	FR-F840-18.5K(00380)	S-T35	S-T35	14	8	8
	22	FR-F840-22K(00470)	S-T35	S-T35	14	14	14
	30	FR-F840-30K(00620)	S-T50	S-T50	22	22	22
	37	FR-F840-37K(00770)	S-T65	S-T50	22	22	22
	45	FR-F840-45K(00930)	S-T100	S-T65	38	38	38
	55	FR-F840-55K(01160)	S-T100	S-T100	60	60	60
	75	FR-F840-75K(01800)	—	S-T100	—	60	60
	90	FR-F840-90K(02160)	—	S-N150	—	60	60
	110	FR-F840-110K(02600)	—	S-N180	—	80	80
	132	FR-F840-132K(03250)	—	S-N220	—	100	100
	150	FR-F840-160K(03610)	—	S-N300	—	125	125
	160	FR-F840-160K(03610)	—	S-N300	—	125	125
	185	FR-F840-185K(04320)	—	S-N300	—	150	150
	220	FR-F840-220K(04810)	—	S-N400	—	2×100	2×100
	250	FR-F840-250K(05470)	—	S-N600	—	2×100	2×100
	280	FR-F840-280K(06100)	—	S-N600	—	2×125	2×125
	315	FR-F840-315K(06830)	—	S-N600	—	2×150	2×150

(3) FR-CC2 Series

Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter	Input Magnetic Contactor (Note 2) Power Factor Correction (AC or DC) Reactor Connection		Recommended Wire Size (mm^2) (Note 3) R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection		U, V, W
			No	Yes	No	Yes	
400 V	315	FR-CC2-H315K	—	S-N600	—	2×150	—
	355	FR-CC2-H355K	—	S-N600	—	2×200	—
	400	FR-CC2-H400K	—	S-N800	—	2×200	—

(4) FR-E700 Series

Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter	Input Magnetic Contactor (Note 2) Power Factor Correction (AC or DC) Reactor Connection		Recommended Wire Size (mm^2) (Note 3) R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection		U, V, W
			No	Yes	No	Yes	
200 V Class	0.1	FR-E720-0.1K	S-T10	S-T10	2	2	2
	0.2	FR-E720-0.2K	S-T10	S-T10	2	2	2
	0.4	FR-E720-0.4K	S-T10	S-T10	2	2	2
	0.75	FR-E720-0.75K	S-T10	S-T10	2	2	2
	1.5	FR-E720-1.5K	S-T10	S-T10	2	2	2
	2.2	FR-E720-2.2K	S-T10	S-T10	2	2	2
	3.7	FR-E720-3.7K	S-T21	S-T10	3.5	3.5	3.5
	5.5	FR-E720-5.5K	S-T35	S-T21	5.5	5.5	5.5
	7.5	FR-E720-7.5K	S-T35	S-T35	14	8	8
	11	FR-E720-11K	S-T35	S-T35	14	14	14
	15	FR-E720-15K	S-T50	S-T50	22	22	22
400 V Class	0.4	FR-E740-0.4K	S-T10	S-T10	2	2	2
	0.75	FR-E740-0.75K	S-T10	S-T10	2	2	2
	1.5	FR-E740-1.5K	S-T10	S-T10	2	2	2
	2.2	FR-E740-2.2K	S-T10	S-T10	2	2	2
	3.7	FR-E740-3.7K	S-T10	S-T10	2	2	2
	5.5	FR-E740-5.5K	S-T21	S-T12	3.5	2	2
	7.5	FR-E740-7.5K	S-T21	S-T21	3.5	3.5	3.5
	11	FR-E740-11K	S-T21	S-T21	5.5	5.5	5.5
	15	FR-E740-15K	S-T35	S-T21	8	5.5	5.5

(5) FR-D700 Series

Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter	Input Magnetic Contactor (Note 2) Power Factor Correction (AC or DC) Reactor Connection		Recommended Wire Size (mm^2) (Note 3) R/L1, S/L2, T/L3 Power Factor Correction (AC or DC) Reactor Connection		U, V, W
			No	Yes	No	Yes	
200 V Class	0.1	FR-D720-0.1K	S-T10	S-T10	2	2	2
	0.2	FR-D720-0.2K	S-T10	S-T10	2	2	2
	0.4	FR-D720-0.4K	S-T10	S-T10	2	2	2
	0.75	FR-D720-0.75K	S-T10	S-T10	2	2	2
	1.5	FR-D720-1.5K	S-T10	S-T10	2	2	2
	2.2	FR-D720-2.2K	S-T10	S-T10	2	2	2
	3.7	FR-D720-3.7K	S-T21	S-T10	3.5	3.5	3.5
	5.5	FR-D720-5.5K	S-T35	S-T21	5.5	5.5	5.5
	7.5	FR-D720-7.5K	S-T35	S-T35	14	8	8
	11	FR-D720-11K	S-T35	S-T35	14	14	14
	15	FR-D720-15K	S-T50	S-T50	22	22	22
400 V Class	0.4	FR-D740-0.4K	S-T10	S-T10	2	2	2
	0.75	FR-D740-0.75K	S-T10	S-T10	2	2	2
	1.5	FR-D740-1.5K	S-T10	S-T10	2	2	2
	2.2	FR-D740-2.2K	S-T10	S-T10	2	2	2
	3.7	FR-D740-3.7K	S-T10	S-T10	2	2	2
	5.5	FR-D740-5.5K	S-T21	S-T12	3.5	2	2
	7.5	FR-D740-7.5K	S-T21	S-T21	3.5	3.5	3.5
	11	FR-D740-11K	S-T21	S-T21	5.5	5.5	5.5
	15	FR-D740-15K	S-T35	S-T21	8	5.5	5.5

(6) FR-F700PJ Series

Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter	Input Magnetic Contactor (Note 2) Reactor or Filter Pack Connection		Recommended Wire Size (mm^2) (Note 3) R/L1, S/L2, T/L3 Reactor or Filter Pack Connection		U, V, W
			No	Yes	No	Yes	
200 V Class	0.4	FR-F720PJ-0.4K	S-T10	S-T10	2	2	2
	0.75	FR-F720PJ-0.75K	S-T10	S-T10	2	2	2
	1.5	FR-F720PJ-1.5K	S-T10	S-T10	2	2	2
	2.2	FR-F720PJ-2.2K	S-T10	S-T10	2	2	2
	3.7	FR-F720PJ-3.7K	S-T21	S-T10	3.5	3.5	3.5
	5.5	FR-F720PJ-5.5K	S-T35	S-T21	5.5	5.5	5.5
	7.5	FR-F720PJ-7.5K	S-T35	S-T35	14	8	8
	11	FR-F720PJ-11K	S-T35	S-T35	14	14	14
	15	FR-F720PJ-15K	S-T50	S-T50	22	22	22
400 V Class	0.4	FR-F740PJ-0.4K	S-T10	S-T10	2	2	2
	0.75	FR-F740PJ-0.75K	S-T10	S-T10	2	2	2
	1.5	FR-F740PJ-1.5K	S-T10	S-T10	2	2	2
	2.2	FR-F740PJ-2.2K	S-T10	S-T10	2	2	2
	3.7	FR-F740PJ-3.7K	S-T10	S-T10	2	2	2
	5.5	FR-F740PJ-5.5K	S-T21	S-T12	3.5	2	2
	7.5	FR-F740PJ-7.5K	S-T21	S-T21	3.5	3.5	3.5
	11	FR-F740PJ-11K	S-T21	S-T21	5.5	5.5	5.5
	15	FR-F740PJ-15K	S-T35	S-T21	8	5.5	5.5

2.18 Application to Servo Circuits

2.18.1 Selection Examples for MR-J4-GF/MR-J4-B/MR-J4-A

Selection examples when using 600 V double-layered vinyl insulated wire (HIV wires) are listed below.
The wire size for U, V, W, and ⏚ varies depending on the servo motor. For details about wires used for wiring to servo motors, refer to "Selection Example in HIV Wires for Servo Motors" in the catalog of "Mitsubishi Electric General Purpose AC Servo MELSERVO-J4" (L(NA)03056).

Servo Amplifier Model Name	Magnetic Contactor (Note 3, 6)	Wire Size [mm^2] (Note 5)			
		L1, L2, L3, ⏚	L11, L21	P+, C	U, V, W, ⏚
MR-J4-10GF(1)/B(1)/A(1)	S-T10	2 (AWG 14)	1.25 to 2 (AWG 16 to 14)	2 (AWG 14) (Note 1)	AWG 18 to 14 (Note 4)
MR-J4-20GF/B/A	S-T10				
MR-J4-20GF1/B1/A1	S-T10				
MR-J4-40GF/B/A	S-T10				
MR-J4-40GF1/B1/A1	S-T10				
MR-J4-60GF/B/A	S-T10				
MR-J4-70GF/B/A	S-T10				
MR-J4-100GF/B/A (Three-Phase Power Input)	S-T10				
MR-J4-100GF/B/A (Single-Phase Power Input)	S-T10				
MR-J4-200GF/B/A (Three-Phase Power Input)	S-T21				AWG 16 to 10 (Note 4)
MR-J4-200GF/B/A (Single-Phase Power Input)	S-T21	3.5 (AWG 12)			
MR-J4-350GF/B/A	S-T21				
MR-J4-500GF/B/A (Note 2)	S-T35	5.5 (AWG 10)			2 to 5.5 (AWG 14 to 10)
MR-J4-700GF/B/A (Note 2)	S-T50	8 (AWG 8)			2 to 8 (AWG 14 to 8)
MR-J4-11KGF/B/A (Note 2)	S-T50	14 (AWG 6)		3.5 (AWG 12) (Note 1)	5.5 (AWG 10), 8 (AWG 8), 14 (AWG 6)
MR-J4-15KGF/B/A (Note 2)	S-T65	22 (AWG 4)		5.5 (AWG 10) (Note 1)	8 (AWG 8), 22 (AWG 4)
MR-J4-22KGF/B/A (Note 2)	S-T100	38 (AWG 2)			38 (AWG 2)
MR-J4-60GF4/B4/A4	S-T10	2 (AWG 14)		2 (AWG 14) (Note 1)	AWG 16 to 14 (Note 4)
MR-J4-100GF4/B4/A4	S-T10	2 (AWG 14)			
MR-J4-200GF4/B4/A4	S-T10	2 (AWG 14)			
MR-J4-350GF4/B4/A4	S-T21	2 (AWG 14)			
MR-J4-500GF4/B4/A4 (Note 2)	S-T21	2 (AWG 14)			3.5 (AWG 12)
MR-J4-700GF4/B4/A4 (Note 2)	S-T21	3.5 (AWG 12)			5.5 (AWG 10)
MR-J4-11KGF4/B4/A4 (Note 2)	S-T35	5.5 (AWG 10)			8 (AWG 8)
MR-J4-15KGF4/B4/A4 (Note 2)	S-T35	8 (AWG 8)		3.5 (AWG 12) (Note 1)	
MR-J4-22KGF4/B4/A4 (Note 2)	S-T50	14 (AWG 6)			5.5 (AWG 10), 8 (AWG 8), 14 (AWG 6)

Note 1. Keep the wire length for the regenerative option within 5 m.
Note 2. When connecting to a terminal block, be sure to use the screws attached to the terminal block.
Note 3. Use a magnetic contactor with an operation delay time of 80 ms or less (the time from current application to the operation coil until the contact closes).
Note 4. The wire size indicates the applicable size for the servo amplifier connector.
Note 5. When complying with IEC/EN/UL/CSA standards, refer to "MELSERVO-J4 Instructions and Cautions for Safe Use of AC Servos" as enclosed with the servo amplifier.
Note 6. Install one no-fuse breaker and one magnetic contactor for each servo amplifier.

2.18.2 Selection Examples for MR-J4-DU

Selection examples when using 600 V double-layered vinyl insulated wire (HIV wires) are listed below.
The wire size for U, V, W, and ⏚ varies depending on the servo motor. For details about wires used for wiring to servo motors, refer to "Selection Example in HIV Wires for Servo Motors" in the catalog of "Mitsubishi Electric General Purpose AC Servo MELSERVO-J4" (L(NA)03056).

<table>
<tr><th rowspan="2">Converter Unit Model Name</th><th rowspan="2">Drive Unit Model Name</th><th rowspan="2">MagneticContactor (Note 1, 7)</th><th colspan="4">Wire Size [mm²] (Note 8)</th></tr>
<tr><th>L1, L2, L3, ⏚</th><th>L11, L21</th><th>P2, C</th><th>P1, P2</th></tr>
<tr><td>MR-CV11K</td><td rowspan="13"></td><td>S-T35</td><td>8 (AWG 8)</td><td rowspan="19">1.25 to 2
(AWG 16 to 14)</td><td rowspan="13"></td><td rowspan="13"></td></tr>
<tr><td>MR-CV18K</td><td>S-T65</td><td>22 (AWG 4)</td></tr>
<tr><td>MR-CV30K</td><td>S-N125</td><td>38 (AWG 2)</td></tr>
<tr><td>MR-CV37K</td><td>S-N125</td><td>60 (AWG 2/0)</td></tr>
<tr><td>MR-CV45K</td><td>S-N150</td><td>60 (AWG 2/0)</td></tr>
<tr><td>MR-CV55K</td><td>S-N220</td><td>80 (AWG 3/0)</td></tr>
<tr><td>MR-CV11K4</td><td>S-T21</td><td>5.5 (AWG 10)</td></tr>
<tr><td>MR-CV18K4</td><td>S-T35</td><td>8 (AWG 8)</td></tr>
<tr><td>MR-CV30K4</td><td>S-T65</td><td>14 (AWG 6)</td></tr>
<tr><td>MR-CV37K4</td><td>S-T80</td><td>22 (AWG 4)</td></tr>
<tr><td>MR-CV45K4</td><td>S-T100</td><td>22 (AWG 4)</td></tr>
<tr><td>MR-CV55K4</td><td>S-N125</td><td>38 (AWG 2)</td></tr>
<tr><td>MR-CV75K4</td><td>S-N150</td><td>60 (AWG 2/0)</td></tr>
<tr><td rowspan="2">MR-CR55K (Note 6)</td><td>Combined with MR-J4-DU30K_(-RJ)</td><td>S-N150</td><td>38 (AWG 2)</td><td rowspan="6">5.5 (AWG 10)</td><td>60 (AWG 2/0)</td></tr>
<tr><td>Combined with MR-J4-DU37K_(-RJ)</td><td>S-N180</td><td>60 (AWG 2/0)</td><td>60 (AWG 2/0)</td></tr>
<tr><td rowspan="4">MR-CR55K4 (Note 6)</td><td>Combined with MR-J4-DU30K_4(-RJ)</td><td>S-T65</td><td>22 (AWG 4)</td><td>22 (AWG 4)</td></tr>
<tr><td>Combined with MR-J4-DU37K_4(-RJ)</td><td>S-T80</td><td>22 (AWG 4)</td><td>38 (AWG 2)</td></tr>
<tr><td>Combined with MR-J4-DU45K_4(-RJ)</td><td>S-T100</td><td>38 (AWG 2)</td><td>38 (AWG 2)</td></tr>
<tr><td>Combined with MR-J4-DU55K_4(-RJ)</td><td>S-N150</td><td>38 (AWG 2)</td><td>38 (AWG 2)</td></tr>
</table>

<table>
<tr><th rowspan="2">Drive Unit Model Name</th><th colspan="2">Wire Size [mm²] (Note 8)</th></tr>
<tr><th>U, V, W ⏚</th><th>L11, L21</th></tr>
<tr><td>MR-J4-DU900B(-RJ)</td><td>14 (AWG 6)</td><td rowspan="14">1.25 to 2
(AWG 16 to 14)</td></tr>
<tr><td>MR-J4-DU11KB(-RJ)</td><td>14 (AWG 6)</td></tr>
<tr><td>MR-J4-DU15KB(-RJ)</td><td>22 (AWG 4)</td></tr>
<tr><td>MR-J4-DU22KB(-RJ)</td><td>38 (AWG 2)</td></tr>
<tr><td>MR-J4-DU30KB(-RJ)
MR-J4-DU30KA(-RJ)</td><td>60 (AWG 2/0)</td></tr>
<tr><td>MR-J4-DU37KB(-RJ)
MR-J4-DU37KA(-RJ)</td><td>60 (AWG 2/0)</td></tr>
<tr><td>MR-J4-DU900B4(-RJ)</td><td>8 (AWG 8)</td></tr>
<tr><td>MR-J4-DU11KB4(-RJ)</td><td>8 (AWG 8)</td></tr>
<tr><td>MR-J4-DU15KB4(-RJ)</td><td>8 (AWG 8)</td></tr>
<tr><td>MR-J4-DU22KB4(-RJ)</td><td>14 (AWG 6)</td></tr>
<tr><td>MR-J4-DU30KB4(-RJ)
MR-J4-DU30KA4(-RJ)</td><td>22 (AWG 4)</td></tr>
<tr><td>MR-J4-DU37KB4(-RJ)
MR-J4-DU37KA4(-RJ)</td><td>22 (AWG 4)</td></tr>
<tr><td>MR-J4-DU45KB4(-RJ)
MR-J4-DU45KA4(-RJ)</td><td>38 (AWG 2)</td></tr>
<tr><td>MR-J4-DU55KB4(-RJ)
MR-J4-DU55KA4(-RJ)</td><td>38 (AWG 2)</td></tr>
</table>

2.18.3 Selection Examples for MR-J4W2-B and MR-J4W3-B

Selection examples when using 600 V double-layered vinyl insulated wire (HIV wires) are listed below.
The wire size for U, V, W, and ⏚ varies depending on the servo motor. For details about wires used for wiring to servo motors, refer to "Selection Example in HIV Wires for Servo Motors" in the catalog of "Mitsubishi Electric General Purpose AC Servo MELSERVO-J4" (L(NA)03056).

<table>
<tr><th rowspan="2">Servo Amplifier Model Name</th><th rowspan="2">Magnetic Contactors</th><th colspan="4">Wire Size [mm²] (Note 3)</th></tr>
<tr><th>L1, L2, L3, ⏚</th><th>L11, L21</th><th>P+, C (Note 5)</th><th>U, V, W, ⏚</th></tr>
<tr><td>MR-J4W2-22B</td><td rowspan="6">Refer to the following table</td><td colspan="3" rowspan="6">2 (AWG 14)</td><td rowspan="6">AWG 18 to 14 (Note 2)</td></tr>
<tr><td>MR-J4W2-44B</td></tr>
<tr><td>MR-J4W2-77B</td></tr>
<tr><td>MR-J4W2-1010B</td></tr>
<tr><td>MR-J4W3-222B</td></tr>
<tr><td>MR-J4W3-444B</td></tr>
</table>

Selection Examples for MR-J4W2-B (Note 4)

Total Rotary Servo Motor Output	Total Linear Servo Motor Continuous Thrust	Total Direct Drive Motor Output	Magnetic Contactor (Note 1, 7)
300 W or less	—	—	S-T10
Over 300 W, 600 W or less	150 N or less	100 W or less	S-T10
Over 600 W, 1 kW or less	Over 150 N, 300 N or less	Over 100 W, 252 W or less	S-T10
Over 1 kW, 2 kW or less	Over 300 N, 720 N or less	Over 252 W, 838 W or less	S-T21

Selection Examples for MR-J4W3-B (Note 4)

Total Rotary Servo Motor Output	Total Linear Servo Motor Continuous Thrust	Total Direct Drive Motor Output	Magnetic Contactor (Note 1, 7)
450 W or less	150 N or less	—	S-T10
Over 450 W, 800 W or less	Over 150 N, 300 N or less	252 W or less	S-T10
Over 800 W, 1.5 kW or less	Over 300 N, 450 N or less	Over 252 W, 378 W or less	S-T21

Note 1. Use a magnetic contactor with an operation delay time of 80 ms or less (the time from current application to the operation coil until the contact closes).
Note 2. The wire size indicates the applicable size for the servo amplifier connector.
Note 3. When complying with IEC/EN/UL/CSA standards, refer to "MELSERVO-J4 Instructions and Cautions for Safe Use of AC Servos" as enclosed with the servo amplifier.
Note 4. For details on selection of no-fuse breakers and magnetic contactors used in combination with rotary servo motors, linear servo motors and direct drive motors, refer to "MR-J4W2-_BMR-J4W3-_BMR-J4W2-0303B6 Servo Amplifier Instruction Manual".
Note 5. Keep the wire length for the regenerative option within 5 m.
Note 6. When connecting to a terminal block, be sure to use the screws attached to the terminal block.
Note 7. Install one no-fuse breaker and one magnetic contactor for each servo amplifier or drive unit.
Note 8. When complying with IEC/EN/UL/CSA standards, refer to "MR-CV_/MR-CR_/MR-J4-DU_ Instructions and Cautions for Safe Use of AC Servos" as enclosed with the power regeneration converter unit, resistance regeneration converter unit, and drive unit.

2.19 Application to Primary Switching of Transformers

When connecting a transformer to the circuit, a significantly larger inrush current flows than usual.
This is due to the extremely large magnetizing current that flows, generating a maximum of 2 times the regular magnetic flux in order to saturate the iron core and induce the required voltages.

Frame	Single-Phase Transformer [kVA(A)]						Three-Phase Transformer [kVA(A)]					
	220 V		440 V		550 V		220 V		440 V		550 V	
T10	1.2	(5.5)	1.5	(3.5)	1.5	(3)	2	(5.5)	2.5	(3.5)	2.5	(3)
T12	1.5	(6.5)	2	(4.5)	2	(3.5)	2.5	(6.5)	3.5	(4.5)	4	(4.5)
T20	2	(9)	3	(6.5)	2.8	(5)	3.5	(9)	5	(6.5)	6	(6.5)
T21	2.2	(10)	3.3	(7.5)	3	(5.5)	4	(10)	7.5	(10)	8	(8.5)
T25	3	(13.5)	3.5	(8)	3.7	(6.5)	5.5	(15)	11	(15)	11	(12)
T32	3.5	(16)	4.5	(10)	3.7	(6.5)	5.5	(15)	13	(17)	11	(12)
T35	3.7	(17)	4.5	(10)	4	(7.5)	6	(17)	13	(17)	13	(14)
T50	5.5	(25)	7.5	(17.5)	7.5	(14)	9.5	(25)	19	(25)	19	(20)
T65	7	(32)	13	(30)	11	(20)	12	(32)	24	(32)	21	(22)
T80	7.5	(35)	14	(32)	14.5	(27)	15	(40)	30	(40)	30	(32)
T100	10	(46)	18.5	(42)	19	(35)	19	(50)	38	(50)	38	(40)
N125	11	(50)	20	(45)	20	(37)	23.5	(62)	40	(62)	50	(52)
N150	13.5	(62)	24	(55)	27	(50)	28.5	(75)	57	(75)	65	(70)
N180, N220	22	(100)	45	(100)	50	(90)	42	(110)	84	(110)	95	(100)
N300	30	(135)	55	(120)	65	(115)	57	(150)	110	(150)	140	(150)
N400	35	(165)	65	(150)	80	(150)	76	(200)	150	(200)	190	(200)
N600	65	(300)	132	(300)	160	(300)	110	(300)	220	(300)	280	(300)
N800	88	(400)	180	(400)	215	(400)	150	(400)	300	(400)	380	(400)

Note 1. Applicable for transformer peak inrush currents less than 20 times greater than the rated current value.
Note 2. If the transformer inrush current exceeds 20 times, select a class AC-3 magnetic contactor such that the current value is less than 10 times the rated operating current. Conversely, if the transformer inrush current is significantly less than 20 times then it can be used at a slightly higher capacity than listed in the table above.
Note 3. The transformer primary switching has an influence on the magnetizing inrush current of the transformer itself, meaning that repetitive switching 1 time per day etc. is not ideal for the transformer. The entire wiring system, including the transformer, should be checked to ensure there are no problem points with this kind of switching before using in an application.
Note 4. Electrical durability of 500,000 operations.

3

Handling (Precautions)

3 Handling (Precautions)

3.1 Usage Environment

(1) Ambient Temperature : -10°C to 40°C
(Applied to the outside of the control board environment) Average daily atmospheric temperature: 35°C (Max.), Average yearly atmospheric temperature: 25°C (Max.)

(2) Maximum temperature of the inside of the control board : 55°C However, the ambient temperature of boxed MS type is 40°C (Average yearly temperature of the inside of the control board is 40°C or less)
Please note that the operating characteristics of the Magnetic Contactors and Thermal Overload Relays may vary with the ambient temperature.

(3) Relative Humidity : 45% to 85% RH (However, dew condensation and freezing should be avoided.)

(4) Height above sea level : 2000 m or less

(5) Vibration : 10 to 55 Hz 19.6 m/s^2 or less

(6) Impact : 49 m/s^2 or less

(7) Atmosphere : Inclusion of dust, smoke, corrosive gas, moisture, salt content and the like in the atmosphere should be avoided as much as possible.
Please note that continuing to use the device in a closed condition for a long period may cause contact failure.
Never use the device under an atmosphere that contains flammable gas.

(8) Storage Temperature/ Relative Humidity : -30°C to 65°C/45% to 85% RH (However, dew condensation and freezing should be avoided.)
The storage temperature is ambient temperature during transportation or storage and should be within the usage temperature when starting to use the device.

3.2 Mounting

The following content applies to MS-T/N Series (including DU-N and B-T/N types). Please consult us regarding other models and special mounting procedures.

● Direct Mounting

(1) The device should be mounted in a dry location low in dust and vibration.

(2) The normal mounting direction is the direction shown in Fig. 1 on a vertical surface, but mounting the device at an inclination angle of up to 30 degrees in either direction is allowed. (Fig. 2)

(3) **Mounting the device on a floor or ceiling is not allowed. (Mounting the device on a floor or ceiling may affect the continuity performance, operation performance, and durability of the contact.)**

(4) If mounting the device in a horizontal orientation cannot be avoided, be sure to rotate the device by 90 degrees in a counterclockwise direction from the normal mounting direction as shown in Fig. 3 when mounting it.**If the device is mounted in a horizontal orientation, its characteristic is nearly unchanged but mechanical durability may be deteriorated. Horizontal mounting of reversible types, mechanically latched types, or S-N600 and N800 models is not allowed.**

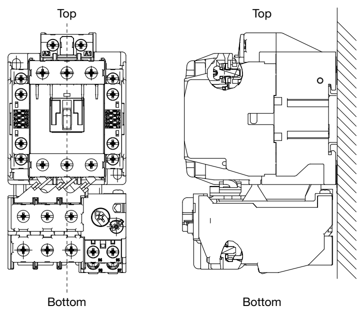


Fig. 1 Normal Mounting

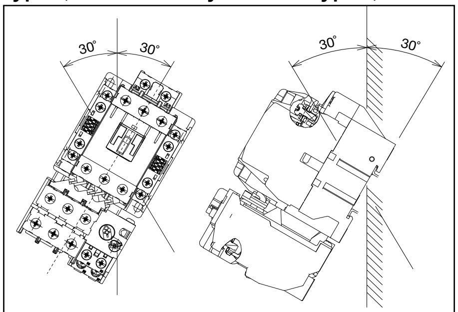


Fig. 2 Inclined Mounting

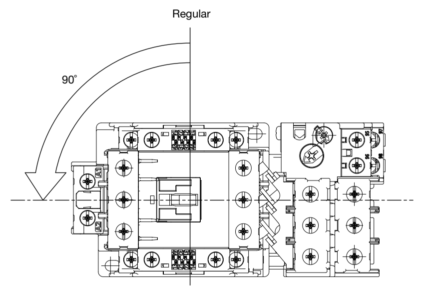


Fig. 3 Horizontal Mounting

● Mounting of Enclosed Types

Because the lid tightening screws for enclosed type models MS-T10 to T50 are tightened from below, an amount of space equivalent to that shown in Fig. 4 must be secured underneath.

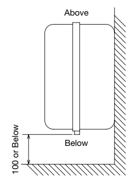


Fig. 4. Space Underneath Enclosed Type Models MS-T10 to T50

● Tightening torque of mounting screw (Common to all models)

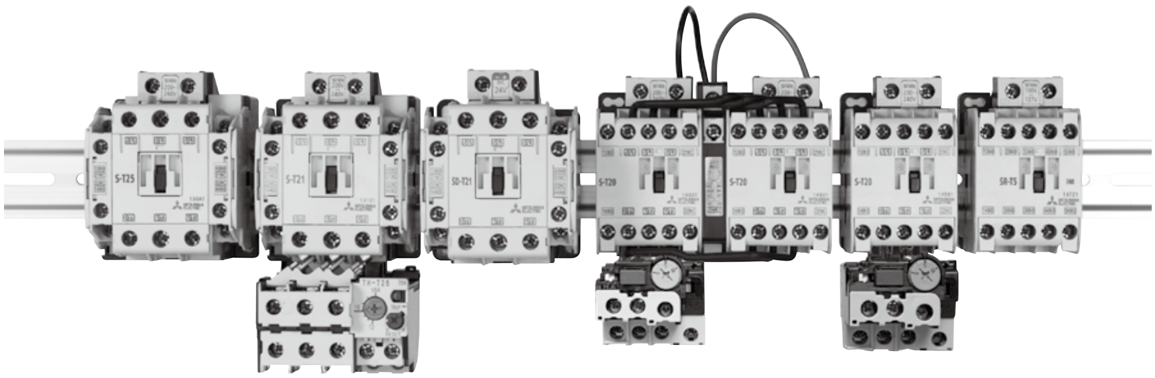
(1) The device should be mounted by force of tightening torques shown in the right table. (For data on the mounting screws of each model, please refer to the outline drawings.)

(2) If the product is to be installed onto a plastic surface, please use mounting screws with metal washers.

(3) Please use mounting screws with a length of M4x14 to M4x22 for MSO/S-T10 to T20 types (including reversible), SR-T5/T9 types, and SRL(D)-T5 types.

Screw Size	Tightening torque of mounting screw N·m Parentheses Show Standard Value
M4	1.2 to 1.9 (1.5)
M5	2 to 3.3 (2.5)
M6	3.5 to 5.8 (4.4)
M8	6.3 to 10.3 (7.8)
M10	12 to 19 (15)

Mounting of IEC 35mm wide rail



IEC 35 mm Rail Mounting

The normal mounting direction is the direction shown in the photo on a vertical surface. Horizontal mounting is not allowed.

(1) Names of Models Representative of Rail Mounted Applications

The T10 to T80 types and SR-T/K types can be mounted on the IEC 35mm wide rail as a standard. In the case of reversible types, rail mounting is possible when a mounting board is used. (MSO-2xT35 to T80, MSOD-2xT21 to T50, S-2xT35 to T80, SD-2xT21 to T50)

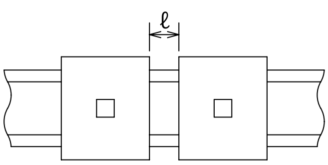
Magnetic Starters	Magnetic Contactors	Magnetic Starters	Magnetic Contactors	Contactor Relays
MSO-T10	S-T10	MSOD-T12	SD-T12	SR-T5, T9
MSO-T12	S-T12	MSOD-T20	SD-T20	SR-K100
MSO-T20	S-T20	MSOD-T21	SD-T21	SRD-T5
MSO-T21	S-T21	MSOD-T35	SD-T32	SRD-T9
MSO-T25	S-T25	MSOD-T50	SD-T35	SRD-K100
MSO-T35	S-T32		SD-T50	SRL(D)-T5
MSO-T50	S-T35		SL(D)-T21	SRL(D)-K100
MSO-T65	S-T50		SL(D)-T35	
MSO-T80	S-T65		SL(D)-T50	
	S-T80		SL(D)-T65	
			SL(D)-T80	
		Thermal Overload Relays		
		TH-T18+UT-HZ18		
		TH-T25+UN-RM20		

(2) Minimum Clearance ℓ (mm) of Product when Rail Mounted

Because of the effect on temperature rise of individual product parts and product life, make sure to ensure that the dimensions equal to that or above those shown in the table below are ensured between parts when performing rail mounting.

Frame	T10 T12 T20 T21	T25 T32 T35 T50	TH-T18 + UT-HZ18 TH-T25 + UN-RM20	SR(D)-T/K SRL(D)-T/K	T65 T80
Minimum Clearance ℓ	5			5	10
Close Mounting∗	OK			OK	OK

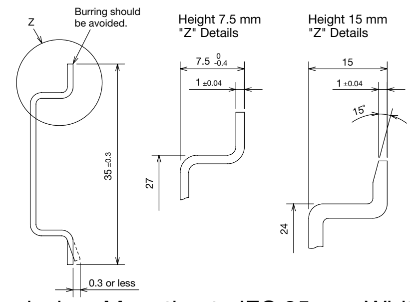
Note: ∗Although close mounting is allowed, when continuing to apply current to the device or when mounting products high in switching frequency or utilization on the same rail, the device life may be shortened in terms of temperature rise and shock, while attaching/detaching the auxiliary terminal cover will prove difficult if S-T21 to T50 and UT-AX11 are closely mounted.
Also, because the characteristics of thermal overload relays are also somewhat influenced by the space between device and heater, please keep the space between the devices over the minimum value shown in the above table as much as possible when mounting them.



(3) Applicable Rail

DIN, EN, IEC, and JIS C2812 standards-compliant 35mm wide rails come in two types: 7.5mm and 15mm in rail height. Their shapes and dimensions are as shown in the figure below.

	Rail	Rail Specifications
1	TH35-7.5	Rail Width 35 mm, Rail height 7.5 mm
2	TH35-15	Rail Width 35 mm, Rail height 15 mm



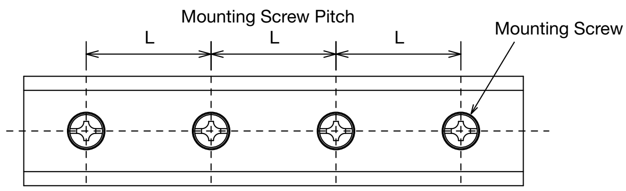
Method when Mounting to IEC 35 mm Width Rail

(4) Maximum Pitch of Rail Mounting Screw L (mm)

When mounting a rail on a surface of the board, be sure to keep the rail mounting screw pitch below the dimension shown in the following table in order to secure sufficient mechanical strength.

Frame / Rail	T10 T12 T20 T21	T25 T32	TH-T18 + UT-HZ18 SR(D)-T/K SRL(D)-T/K	T35 T50	T65 T80
TH35-7.5	250			200	(150) Note 2
TH35-15	500			500	500

Note 1. It is also recommended that a minimum pitch be selected when installing multiple devices on the same rail.
Note 2. Use of devices with extreme switching frequencies is not recommended for the dimension values in parentheses.



Mounting Space and Arc Space

When mounting the Magnetic Contactors side by side, be sure to keep the devices isolated by a distance longer than the dimension shown in the following table. Also, the Magnetic Contactors and adjacent grounding metal should be isolated by a distance longer than the dimension shown in the following table. The content indicated ( ) in is applied when additionally mounting auxiliary contacts.

Although an arc space is not required in front of the Magnetic Contactors, providing a space longer than the E dimension shown in the following table is recommended in consideration of variation in the Magnetic Contactor's depth dimension, and vibration caused when turning on or releasing the contactor.

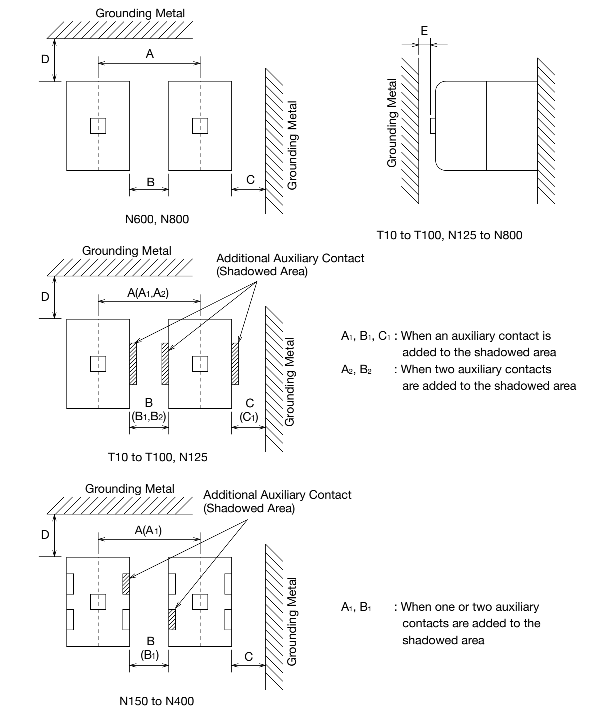


Fig. 6 Mounting Space and Arc Space

Minimal Mounting Space and Arc Space

Frame	Minimal Mounting Space: A (A_1, A_2) Dimension [mm]	B (B_1, B_2) Dimension [mm]	C (C_1) Dimension [mm]	D Dimension [mm]	Front Arc Space (Note 1)	Front Mounting Space E (Note 4)
T10	41(A_1 = 53, A_2 = 65)	5 (Note 3) (B_1 = 17, B_2 = 29)	10 (C_1 = 22)	15	0	5 (Note 5)
T12 / T20	49 (A_1 = 61, A_2 = 73)					
T21 / T25	68 (A_1 = 80, A_2 = 92)					
T32	48(A_1 = 60, A_2 = 72)					
T35 / T50	80 (A_1 = 93.5, A_2 = 107)	5 (Note 3) (B_1 = 18.5, B_2 = 32)	10 (C_1 = 23.5)			
T65 / T80	98 (A_1 = 111.5, A_2 = 125)	10 (Note 3) (B_1 = 23.5, B_2 = 37)	10 (C_1 = 23.5)	25		5
T100	110 (A_1 = 124, A_2 = 138)	10 (B_1 = 24, B_2 = 38)	16 (C_1 = 30)			10
T5	49 (A_1 = 61, A_2 = 73)	5 (Note 3) (B_1 = 17, B_2 = 29)	10 (C_1 = 22)	15	0	5 (Note 5)
T9	49	5 (Note 3)	10			3
N125	112 (A_1 = 126, A_2 = 140)	12 (B_1 = 26, B_2 = 40)	16 (C_1 = 30)	25	0	10
N150	132 (A_1 = 140)	12 (B_1 = 20)	16	30		
N180 / N220	150 (A_1 = 160)	12 (B_1 = 22)	16	50		
N300 / N400	175 (A_1 = 185)			90		
N600 / N800	305	15	20			

Note 1. The value of arc space is a value of IEC and JIS Standards-based shut-off capacity test.
Note 2. When using a UN-CZ model live part protection cover, because space for mounting and removing the live part protection cover is required, make sure to ensure that dimensions B and C are equal to or above those shown in the table left.
Note 3. Although the B dimension of T10 to T80, T5/T9 allows close mounting, when continuing to apply current to the device or when mounting products high in switching frequency or utilization on the same rail, the device life may be shortened in terms of temperature rise and shock. Additionally, because close mounting of S-T21 to T50 and UT-AX11 will make it difficult to attach or detach auxiliary terminal covers, make every effort to mount the devices at intervals of at least the minimum value shown in the above table.
Note 4. Always ensure a distance of 5 mm or more between mechanically latched type SL(D)-T21 to T80,SRL(D)-T5 models.
Note 5. A space of 3 mm must be insured when mounting UT-AX2 and UT-AX4 models.

Minimal Mounting Space when Attaching UN-CZ

Frame	B	C
T65 to 100, N125	*34	*32
N150 to N400	64	47

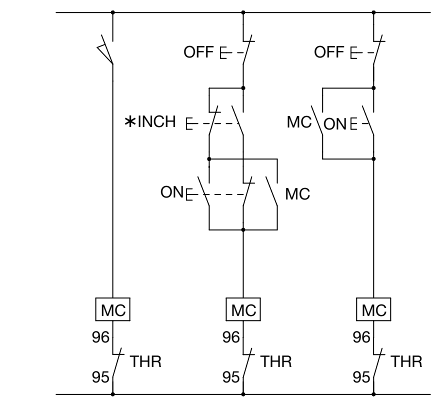
∗When UN-CZ1251 is used for MSO-N125, use B:43 and C:40.

3.3 Connection

Control Circuit Method and Connecting of Operating Switch

The following figure shows an example diagram for connecting control circuits when automatically or manually operating motors, etc., using an automatic switch and push-button switch.

(1) Non-Reversible Type



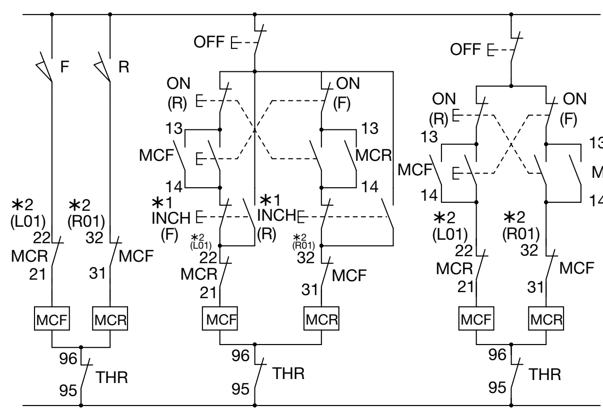
Automatic Switch

Temporary Contact Type Push-button with Inching Operation

Temporary Contact Type Push-button

Example of Connection Diagram for Non-Reversible Control Circuits

(2) Reversible Type



Note) 1. Do not connect automatic switches F and R simultaneously.
2. When using S-T65 to T100 and N125 to N400 types for the INCH of ∗1, the use of S-T65QM to T100QM or N125QM to N400QM types which feature quicker drop times is recommended. Also, the self-retaining function may activate depending on the timing when the INCH button is operated at high speeds.
3. The value in ( ) of ∗2 shows terminal numbers for MSO(S)-2xT10/T12/T20 types.

Example of Connection Diagram for Reversible Control Circuits

Applicable electric wire size and tightening torque and terminal dimension of terminal screw [Screw terminal]

⚠ **There may cause overheating or fire. Be sure to properly keep the tightening torque and periodically re-tighten the screw. However, please note that tightening the screw under the status where oil is adhered to the terminal portion may damage the terminal screw even within the existing tightening torque.**
Electric wires should be properly connected according to the electric wiring diagram. Tightening the terminal screw should be properly conducted within the tightening torque shown in the table below. Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to drop off. Excessive tightening torque may damage the terminal screw.
Adhesion of rock paint, thermo-labels, etc. to electric wire connection or contact may cause heat generation due to defective continuity: this is very dangerous.
The main circuit terminals of T10 to T50 and TH-T18 to T50 types may be wired connected by single wire, stranded wire, and crimp lug. The main circuit terminals and operating circuit terminals of T10 to T32 and TH-T18/T25 types are self-lifting terminals that are easy to connect.

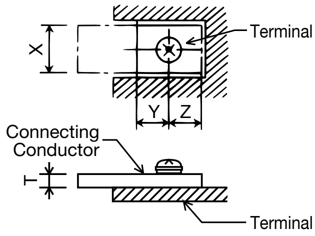
Model: Standard type Contactor Relays, Magnetic Contactors, Thermal Overload Relays (Note 1)	Terminal dimension and size/type of screw – Main circuit: Dimension of terminal portion X x Y x Z [mm] (Note 2)	Main circuit: Screw size	Main circuit: Screw type	Operating circuit: Cross slot screw with pressure plate	Applicable electric wire size [ømm, mm^2] – Main circuit	Applicable electric wire size – Operating circuit	Applicable Crimp Lug Size – Main circuit	Applicable Crimp Lug Size – Operating circuit	Connection conductor thickness(T) – Main circuit (Note 2)	Tightening torque of terminal screw [N·m] Parentheses Show Standard Value – Main circuit	Tightening torque – Operating circuit
SR-T5, T9	—	—		M3.5x7.6	—	ø1.6 0.75 to 2.5	—	1.25-3.5 to 2-3.5	—	—	0.9 to 1.5
S-T10, T12, T20	7.5 x 3.7 x 4.5	M3.5x7.6	Self-Lifting Cross-slot Screw	M3.5x7.6	ø1.6 0.75 to 2.5		1.25-3.5 to 2-3.5 5.5-S3 (Notes 7, 9, 10)		1.6	0.9 to 1.5	
S-T21, T25, T32	10.5 x 5.2 x 5.5	M4x10.5		M3.5x7.6	ø1.6 to 2.6 1.25 to 6		1.25-4 to 5.5-4		3	1.2 to 1.9	
S-T35, T50	13.3 x 5.5 x 6.9	M5x14.8		M3.5x7.6	ø1.6 to 3.6 1.25 to 16		1.25-5 to 14-5 22-S5 (Note 10)		6	2.0 to 3.3	
S-T65, T80 (Note 11)	15 x 7 x 8.5	M6x12	Plus-minus Screw	M4x10	2 to 22 (Note 3)		1.25-6 to 22-6 38-S6 (Note 10) 60-S6 (Note 10)	1.25-4 to 2-4 5.5-S4	3.7	3.5 to 5.7	1.2 to 1.9
S-T100	15 x 7.5 x 11.5				2 to 38 (Note 3)		1.25-6 to 60-6		4		
SR-K100	—	—	—	M3.5x7.5	—	ø1.6 1.25 to 2	—	1.25-3.5 to 2-3.5	—	—	0.94 to 1.51 (1.17)
S-N125	15 x 8.5 x 14	M8x20	Hex Bolt (With Cross)	M4x10	—		5.5-8 to 60-8	1.25-4 to 2-4 5.5-S4	10.5	6.28 to 10.29 (7.84)	1.18 to 1.86 (1.47)
S-N150	20 x 10 x 15	M8x20			—		8-8 to 100-8		10.5	6.28 to 10.29 (7.84)	
S-N180, N220	25 x 12.5 x 18	M10x25	Hex Bolt		—		14-10 to 150-10		13.5	11.8 to 19.1 (14.7)	
S-N300, N400	30 x 15 x 22.5	M12x30			—		22-12 to 200-12		15.5	19.6 to 31.3 (24.5)	
S-N600, N800	40 x 15 x 28	M16x45			—		80-16 to 325-16		25	62.8 to 98 (78.4)	
SD-Q11, Q12	7.5 x 5.5 x 4	M3.5x7.6	Self-Lifting Cross-slot Screw	M3.5x7.6	ø1.6 1.25 to 2	ø1.6 1.25 to 2	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.6	0.94 to 1.17 (1.0)	0.94 to 1.17 (1.0)
TH-T18 (Load Side)	7.5 x 4 x 4	M3.5x7.6		M3.5x7.6	ø1.6 0.75 to 2.5	ø1.6 0.75 to 2.5	1.25-3.5 to 2-3.5 5.5-S3 (Notes 7, 9, 10)		2	0.9 to 1.5	0.9 to 1.5
TH-T25 (Power Side/Load Side)	10.2 x 6.8 x 5/ 10.2 x 5.7 x 5	M4x10.5/ M4x10.5			ø1.6 to 2.6 1.25 to 6		1.25-4 to 5.5-4		2.5	1.2 to 1.9	
TH-T50 (Load Side)	13.3 x 5.8 x 6.9	M5x14.8			ø2 to 3.6 4 to 14		5.5-5 to 14-5		8	2.0 to 3.3	
TH-T65	17 x 7.5 x 8.5	M6x12	Plus-minus Screw	M4x10	2 to 22 (Note 3)	ø1.6 1.25 to 2	5.5-6 to 22-6	1.25-4 to 2-4 5.5-S4	4	3.5 to 5.7	1.2 to 1.9
TH-T100 (Load Side)	15 x 7.5 x 10	M6x12			8 to 38 (Note 3)		14-6 to 22-6 38-S6 (Note 10)		3.7	3.5 to 5.7	
TH-N120	15 x 10 x 12	M8x20	Hex Bolt (With Cross)	M4x10	—	ø1.6 1.25 to 2	8-8 to 38-8	1.25-4 to 2-4 5.5-S4	11.5	6.28 to 10.29 (7.84)	1.18 to 1.86 (1.47)
TH-N120TA (Load Side) TH-N120TAHZ	20 x 10 x 15	M8x20			—		38-8 to 100-8		11.5	6.28 to 10.29 (7.84)	
TH-N220RH (Load Side) TH-N220HZ TH-N220TAHZ	25 x 12.5 x 20	M10x25	Hex Bolt		—		22-10 to 150-10		14.5	11.8 to 19.1 (14.7)	
TH-N400RH (Load Side) TH-N400HZ	30 x 15 x 22.5	M12x30			—		22-12 to 200-12		17.5	19.6 to 31.3 (24.5)	
TH-N600	—	—	—		—		—		—	—	

Please read the notes on the following page.

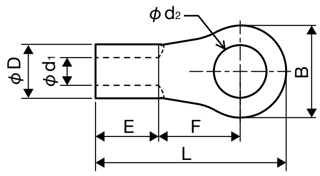
(Continued on Next Page)

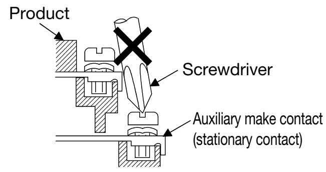
Note 1. SD, SL, and SLD-T/N types are the same.
Note 2. The dimension of the main circuit terminal is a dimension for board conductor wiring. (See the right diagram) The board conductor thickness (T dimension) must be below the allowable connection conductor thickness indicated on page 67, because of the length of the terminal screw. In case of wiring with two boards used, the total value of two boards must be below the value (T dimension) shown in the table.
Note 3. If wiring to terminals is performed with the insulation coating peeled, please use the designated wire press. In this case, the value between parentheses is the size of electrical wire that can be connected.
- MS-T65 to T100 types include a pressure plate for the main circuit.
- MSO, S-T65 to T100 types do not include a pressure plate for the main circuit.
- MS, MSO, S-N125 to 800 types are dedicated for crimp lug wiring.

Note 4. Control circuits are auxiliary contact terminals or coil terminals of magnetic contactors and control circuit terminals of thermal overload relays.
Note 5. In each terminal, two wires or two crimp lugs may be connected. (One crimp lug and one wire can also be connected)
Note 6. The cross slot screws with pressure plate of T Series and those of N Series are the same in size but different in pressure plate dimension, so please avoid the mixed use of such screws. This may break the insulation barrier or make the wire likely to fall out.
Note 7. When using the IEC60529 finger-safe specification for MSO/S-T10(BC) - T50(BC), T65CW, T80CW, and SR-T5/T9(BC), be sure to insulate the crimping part of the crimp lug. However, please insulate 5.5-S3 by a method other than insulated crimp terminal.
Note 8. Tightening the terminal screw excessively without wiring may break the screw and consequently disable the tightening, so please avoid such excessive tightening.
Note 9. When wiring two crimp lugs for T10 to T20BC and TH-T18BC, use crimp lugs with an F dimension of 6 mm or more.
Note 10. J.S.T. Mfg. Co., Ltd. model numbers are shown as typical applicable crimp lugs.
Note 11. Ring crimp lugs cannot be used for connection when wiring to T65CW, T80CW auxiliary contact terminals.
Note 12. Do not bring the screwdriver handle close to the product while tightening the terminal screw to secure the auxiliary make contact (stationary contact) of T21 to T50. Doing so may cause the auxiliary make contact (stationary contact) to come off.
Note 13. If there is a difficulty in wiring the product to the panel, the lower terminal can be used for power supply connection. Even in such a case, install the product in either of the directions shown in Section 3.2 on page 64.



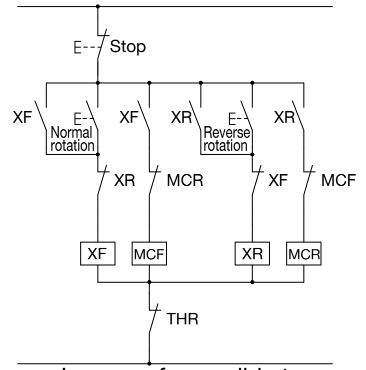
Crimp Lug Dimensions





Application to Circuits Exceeding 380 V

(1) When applying MS/MSO/S-T10, T12, T20, SR-T□/K□, and TH-T18 types to a circuit exceeding 380 V to set crimp lug wiring, be sure to insulate the crimping part. However, please insulate 5.5-S3 by a method other than insulated crimp terminal.
(2) When applying such parts to a Reversing type circuit exceeding 500V, please use an SR-T type Contactor Relays (XF, XR) as shown in the right figure to set the switching time allowance.
(3) For application to a circuit exceeding 380 V for crimp lug 22-S5 with MS/ MSO/S-T35, T50 or crimp lug 60-S6 with MS/MSO/S-T65, T80, use the insulation cap attachment.



In case of reversible type circuit exceeding 500 V

Break Contact Terminals

When removing break contact terminals for the auxiliary contacts and contactor relays of magnetic contactors during wiring or when reinstalling after inspection, make sure to do so after ensuring that the Connectable Carrier (Crossbar) is pushed in. (If reinstallation is performed without the cross bar pushed in, the movable terminal contact of the break contact may come off inside, malfunction, or suffer contact failure).

Applicable wires and ferrules [Spring clamp terminals]

(1) Applicable wire size

Wire Ferrule	Terminals	Size × 1	Size × 2	Length of peeled	Maximum coated diameter
Solid wire	Main Accessory Control terminals	φ0.8 - φ2.0 AWG20 - AWG14	φ0.8 - φ2.0 AWG20 - AWG14	13mm *3	Max φ4.1 *5
Stranded wire, Flexible stranded wire (Not UL Certified)		$0.5mm^2$ - $4mm^2$ AWG20 - AWG12	$0.5mm^2$ - $4mm^2$ AWG20 - AWG12		
Ferrule with insulating cover		$0.25mm^2$ - $2.5mm^2$ AWG24 - AWG14	$0.25mm^2$ - $2mm^2$ AWG24 - AWG14 *2	*4	Max φ4.2 *6
Ferrule without insulating cover		$0.5mm^2$ - $2.5mm^2$ AWG20 - AWG14	$0.5mm^2$ - $2.5mm^2$ AWG20 - AWG14		Max φ4.1 *5

*1. Put one of wire in one of insertion hole.
*2. If you use two wires of $2mm^2$ or AWG14 at one terminal, apply only the ferrule 216-205(FE-2.08-8N-YE) made by WAGO.
*3. In case of the coated diameter of the wire is lower than φ3.4, length of peeled is 9mm.
*4. Follow a rule of each manufacturer's catalog.
*5. When the coated diameter is below the φ4.6 beyond φ4.1, even 1 wire is applied.
*6. Maximum outside diameter of sleeve. When the wire size 2.1-$2.5mm^2$, maximum sleeve outside diameter is φ4.8.
*7. Contact us if you might use other type of wires.
*8. Refer to wire strip gauge on top of product.
*9. Do not put the Wire cover and insulating cover in the spring terminal.
*10. If there is a difficulty in wiring the product to the panel, the lower terminal can be used for power supply connection. Even in such a case, install the product in either of the directions shown in Section 3.2 on page 64.

(2) Applicable ferrule size

	Main, Accessory Control terminals	
L1	8mm	10mm
L2	12.5 - 15 mm	14.5 - 17 mm
φ	2.5 - 4.8 mm	2.5 - 4.8 mm
D	≦ 2.3 mm	≦ 2.3 mm

*1. Take the tip of the wire out of the ferrule a little.

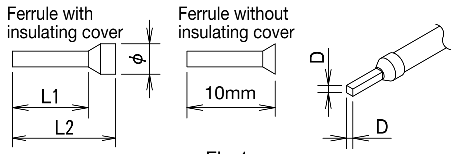


Fig.1

● The ferrules and tools

(1) WAGO Kontakttechnik GMBH & CO.KG

Wire size		Ferrule with insulating cover		Ferrule without insulating cover		Crimping tool	Operating tools
mm^2	AWG	Model Number	Product Description	Model Number	Product Description		
0.25	24	216-301	(FE-0.25-8N-YE)	-	-	Variocrimp4	210-719 210-647 210-648 210-119SB
0.34	24-22	216-302	(FE-0.34-8N-TQ)	-	-		
0.5	22-20	216-201 216-241	(FE-0.5-8N-WH) (FE-0.5-10N-WH)	216-141	(F-0.5-10)		
0.75	20-18	216-202 216-242	(FE-0.75-8N-GY) (FE-0.75-10N-GY)	216-142	(F-0.75-10)		
1.0	18	216-203 216-243	(FE-1.0-8N-RD) (FE-1.0-10N-RD)	216-143	(F-1.0-10)		
1.5	16	216-204 216-244	(FE-1.5-8N-BK) (FE-1.5-10N-BK)	216-144	(F-1.5-10)		
2.08	14	216-205	(FE-2.08-8N-YE)	216-105	(F-2.08-10)		
2.5	14	216-206 216-246	(FE-2.5-8N-BU) (FE-2.5-10N-BU)	216-106	(F-2.5-10)		

(2) Weidmuller Interface GMBH & CO.KG

Wire size		Ferrule with insulating cover		Ferrule without insulating cover		Crimping tool	Operating tools
mm^2	AWG	Part Number	Type	Part Number	Type		
0.25	24	9025760000	(H0.25/12 HBL)	-	-	PZ 10 SQR	SDI 0.4x2.5x75 SDS 0.4x2.5x75
0.34	22	9025770000	(H0.34/12 TK)	-	-		
0.5	20	0690700000 9025870000	(H0.5/14 OR) (H0.5/16 OR)	9004050000	(H0.5/10)		
0.75	18	0462900000 9025860000	(H0.75/14 W) (H0.75/16 W)	0542500000	(H0.75/10)		
1.0	17	0463000000 9025950000	(H1.0/14 GE) (H1.0/16 GE)	0282800000	(H1.0/10)		
1.5	16	0463100000 0635100000	(H1.5/14 R) (H1.5/16 R)	0186500000	(H1.5/10)		
2.5	14	9019160000	(H2.5/15D BL)	9004080000	(H2.5/10)		

(3) Phoenix Contact GMBH & CO.KG

Wire size		Ferrule with insulating cover		Ferrule without insulating cover		Crimping tool	Operating tools
mm^2	AWG	Part Number	Type	Part Number	Type		
0.25	24	3203037 3241128	(AI 0.25-8 YE) (AI 0.25-10 YE)	-	-	CRIMPFOX CENTRUS 6S CRIMPFOX CENTRUS 10S	SZF 0-0.4x2.5 SZS 0.4x2.5
0.3 0.34	22	3203066 3241129	(AI 0.34-8 TQ) (AI 0.34-10 TQ)	-	-		
0.5	20	3200014 3201275	(AI 0.5-8 WH) (AI 0.5-10 WH)	3202494	(A 0.5-10)		
0.75	18	3200519 3201288	(AI 0.75-8 GY) (AI 0.75-10 GY)	3200234	(A 0.75-10)		
1.0	18	3200030 3200182	(AI 1-8 RD) (AI 1-10 RD)	3200250	(A 1-10)		
1.25 1.5	16	3200043 3200195	(AI 1.5-8 BK) (AI 1.5-10 BK)	3200276	(A 1.5-10)		
2.0 2.5	14	3200522 3202533	(AI 2.5-8 BU) (AI 2.5-10 BU)	-	-		

*1. We recommend the ferrules and the tools based upon the standard.
· Ferrule with insulating cover : DIN 46228-4/09.90
· Ferrule without insulating cover : DIN 46228-1/08.92
· Operating tool : DIN 5264
*2. Follow the applicable wire rule of each manufacturer's catalog.

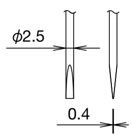


Fig.2

3 Handling (Precautions)

Wiring, remove method

(1) Wiring remove method

	Wiring	Removing
Solid wire, Ferrule	II or I → II → IV	I → III → IV
Stranded wire, Flexible stranded wire	I → II → IV	

*1. When the wire is difficult to remove, the operating tool is tilted to the wire side a little, max.5°.
*2. Do not remove while turning the wire.
*3. Do not push probe hard.
*4. Operate the wire after completely inserting operating tool.

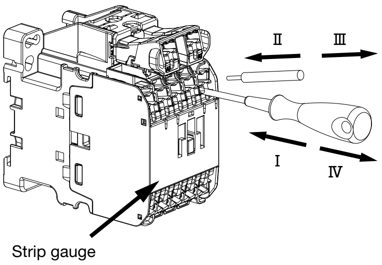


Fig.3

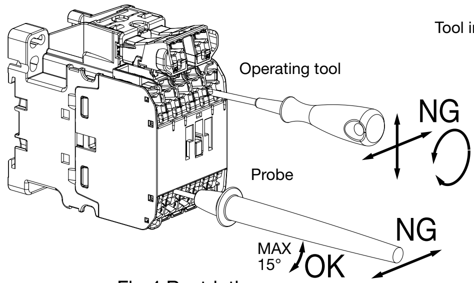


Fig.4 Restriction

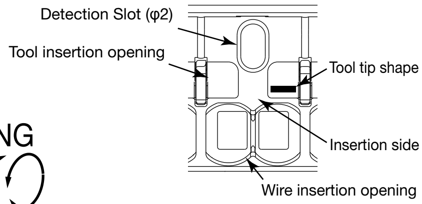


Fig.5 Constitution

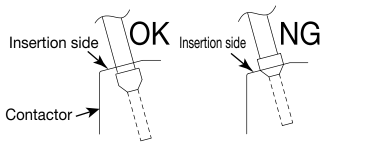


Fig.6 Judgment of ferrule with insulating cover

Wire holders

- The wire holder restrains disconnection of the wire and maintain the mark tube.
- Push the wire into the direction of the arrow, Fig.7.
- Do not spread the wire holder too much.
- Do not bend wires at an acute angle when inserting them from the wire insertion slots into the wire holders. For information on the permissible bending radius of wires, follow the directions provided by the wire manufacturer.
- May put the cable tie in the hole of * Fig. 8 if you do not adding the strong power. We may use the hole of * Fig. 8 with other products and parts.

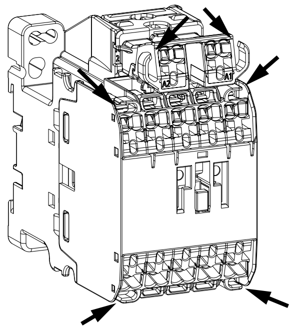


Fig. 7. Location of wire holders and wire insertion direction

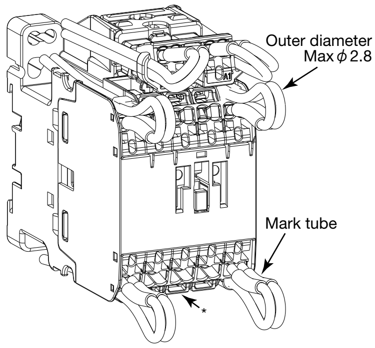


Fig.8

3.4 Operating Circuits

⚠ **Applying a low voltage that does not operate the Magnetic Contactors to the operating circuit may cause overcurrent to the coil, which may cause the coil to be burned in a short time.**

⚠ **If the operating circuit wiring is too long, when the coil's instantaneous current flows, the wiring impedance may cause a reduction in the coil voltage, so that the operating circuit may fail to be activated. Also, the stray capacitance of the wired line may cause the coil's excitation not to be released even when releasing the excitation.**

⚠ **Use in a circuit (inverter) with high harmonics and high frequency levels can cause buzzing of electromagnetic parts or burn the operation coil or surge absorber with CR.**

3

● Power Supply Voltage Fluctuation Range for Operating Circuit

(1) Closing Voltage

When the rated voltage and frequency are applied to the coil at an ambient temperature of 40°C (Inside temperature of the board: 55°C), the device operates without any problem at 85 to 110% of the rated voltage of the coil after the temperature increases and becomes saturated.

(2) Voltage/Frequency and Coil Rating of Operating Circuit

The rated voltage/frequency of the operating circuit and that of the control coil must be matched.

Applying a voltage exceeding 100% of the rated voltage to the control circuit when using the coil may acceleratedly deteriorate of the coil insulation and consequently reduced mechanical durability, so set the coil's average voltage to 95 to 100% of the rated voltage when using the coil.

● Selection of Operating Transformer Capacity

Please refer to the following page for operating transformer capacities for magnetic contactors.

S-T/N Type Magnetic Contactors: Page 45
SL(D)-T/N Type Magnetic Contactors: Page 103

● Driving Magnetic Contactor with Triac Control

The electromagnet in the S-T65 to T100, N125 to N800 type Magnetic Contactor incorporates the capacitor-drop type AC operated DC excited method using the capacitor drop. Thus, a Triac with voltage resistance that is 2·2-fold the circuit voltage must be selected. If the Triac voltage resistance is low, use of a varistor in parallel with the Triac is recommended.

● Using with Square Wave Power Supply

The electromagnet in the S-T65 to T100, N125 to N800 type Magnetic Contactor incorporates the AC operated DC exciting method using the capacitor drop. It cannot be used with a square wave as the coil's exciting current will increase greatly.

● Precautions for DC Contactor Use

As shown in Fig. A to the right, if the area of the DC circuit where the minus side of the coil opens and closes at the control contact is high in humidity and is at a location where condensation forms easily, the coil may become disconnected due to electrical corrosion*.

As shown in Fig. B, it is recommended that the control contact open and close on the plus side of the coil.

*Electrical Corrosion: A phenomenon where the surface of metals chemically undergoes corrosive wear due to the surrounding environment or electrochemical reactions

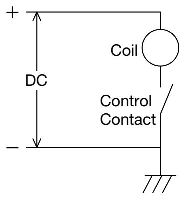


Fig. A

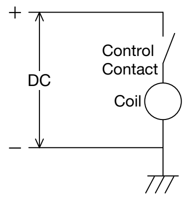
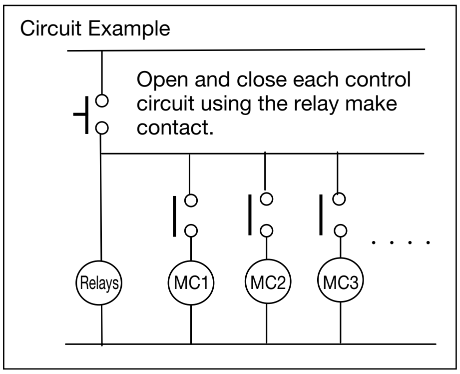


Fig. B

● Connecting Multiple Units in Row

If using with multiple S-T65 to T100 and N125 to N800 type magnetic contactor control circuits connected in a row, the open time may be roughly doubled due to influence from the built-in capacitor.

In the case of failure, please arrange the circuit as shown to the right.



3.5 Application to Special Environments

⚠ **Please note that the operation characteristics of Magnetic Contactor and Thermal Overload Relay may vary with the ambient temperature.**

● High Temperatures

When using Magnetic Starters or Magnetic Contactors at high ambient temperature, the temperature may mainly affect the insulation life (continuous electric conduction life) of the operation coil and the aging variation of the molding component.

MS-T/N types, open MSO and S-T/N types without a box are standard products available even at the inside temperature of 55°C.

● Low Temperatures

Although the Magnetic Contactors may be transported to a cold region or used in such a cold region or under cold conditions such as those found in a refrigerator with the contactor incorporated in a switchboard the S-T type Magnetic Contactors is applicable as a standard product. The S-N type magnetic contactor series feature the low-temperature specification S-N ☐ LT type. Except for those shown below, we do not manufacture low-temperature specification magnetic starters, magnetic contactors, or thermal overload relays.

Low-temperature-based products: S-N ☐ LT, S-2×N ☐ LT Types

Applicable temperature range of low-temperature product: Operating temperature -50 to 55°C
Storage Temperature -60 to 65°C

Corrosive Gas

Corrosive gases that exist in an environment with Magnetic Starters or Magnetic Contactors used are gases such as sulfurous acid (SO_2), hydrogen sulfide (H_2S), chlorine (Cl_2), and ammonia (NH_3), and conductive portions can be protected by plating a metal resistant to such gases on the portion. However, because there is no adequate corrosion prevention method for the contact, such gases may increase the contact resistance, resulting in increased temperature.
Additionally, if the environment contains some corrosive gas but is under dry conditions, this may delay the progression of corrosion, so using the switchboard with the inside kept as dry as possible is also one of the corrosion prevention methods.
In the Magnetic Starters and Thermal Overload Relays, corrosion-prevented products (MS-T/N☐YS, MSO(D)-T/N☐YS, S(D)-T/N ☐ YS, TH-T/N☐YS types) of the specification with increased corrosion resistance to such corrosive gases are also manufactured.
Additionally, S-T10 to T32 and SD-T12 to T32 type Magnetic Contactors is of corrosion resistance-increased specification as a standard product.

Dust

Magnetic Starters and Magnetic Contactors used in an iron foundry, construction site, or powder conveying machine tend to be subject to a relatively large amount of dust. When using the control board in such locations, the board must be dust-prevention-structured. **Also, using the board under hermetically-sealed condition for a long period may cause contact failure.**

Export of the Products to Tropical Regions

The environment of exported products which pass through tropical regions tends to be of high temperature and high humidity, and humidity is the environmental factor that affects the Magnetic Starters and Magnetic Contactors most severely. Humidity is the biggest rust-generating factor and the exported products must be in a structure resistant to humidity.
Although the standard products have sufficient mold resistance, for exports that pass through the tropics, it is recommended to add a moisture absorbent (silica gel) in an amount of 3 kg or more per 1 m^3, so as to lower the humidity and conform to JIS Z1402 export-use packing stipulations.

3.6 Precautions for Use

⚠ Be sure to periodically check the Magnetic Starters and apply danger prevention measures on the sequence of important circuits.
(The Magnetic Starters contacts may suffer from defective continuity, welding, and burning.)
⚠ When performing installation, wiring, and maintenance & inspection, be sure to disconnect the Magnetic Starters from the power supply. It may cause electric shock. In addition, the malfunction attributable to vibration, impact, and false wiring may exert serious results (machine malfunction, short-circuiting of power supply, etc.) on the Magnetic Contactors.

Performance

The performance described in this catalog is based on the result of a test conducted under the conditions specified in the Standard (JEM1038 "Magnetic Contactors", JISC8201-4-1 "Low Voltage Switching Devices and Control Devices", etc.). If actual use condition is different from this test condition, the user must evaluate the condition (by using an actual device).

Use Conditions

Although the device can operate without any problem when under the conditions described in this chapter, be careful regarding the following.

(1) Ambient Temperature
Even under normal usage, deterioration of the insulation will progress.
In particular, as the ambient temperature rises, the insulation life is shortened. In general, it is said that every time the ambient temperature rises by 6 to 10°C, the insulation life decreases by half (Arrhenius' law). In a case where the ambient temperature is high and voltage exceeding the rated voltage is continuously applied to coil, the coil temperature rises and life may be shortened dramatically.

(2) Vibration/Shock
Although vibration of 19.6 m/s^2 and shock of 49 m/s^2 do not cause contact malfunction, there may be trouble due to fatigue damage etc. when the vibration and shock are below these values but are applied continuously.
In particular, please note that the resonance of an installed board may exert a large vibration on the product.

3.7 Maintenance, Inspection and Part Replacement

Please refer to the operation manual or maintenance manual for information on the correct maintenance and inspection, as well as part replacement (coils, contacts).
Because the following parts cannot be replaced, never perform disassembly.

(1) MS-T Series Magnetic Contactors and Contactor Relays
(S(D)-T10 to T32, SR(D)-T5/T9)
(2) Mechanically Latched Contactors, Contactor Relays
(SL(D)-☐, SRL(D)-☐)
(3) Delay Open Type Magnetic Contactors and Relays
(S-T/N☐DL, SR-T☐DL)
(4) DC Interface Contactors (SD-Q☐/QR☐)
(5) Because heat-resistant magnetic contactors and contactor relays (Classes 1 and 2), as well as MS-T/N☐ type enclosed magnetic starters are products for the Electrical Appliance and Material Safety Law in Japan, please do not modify them.

4

MS-T/N Series Magnetic Starters/Magnetic Contactors

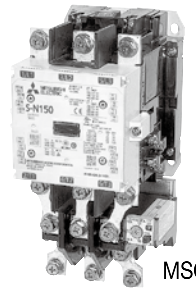
4 MS-T/N Series Magnetic Starters/Magnetic Contactors

4.1 MS/MSO/S-□Standard (AC Operated) Magnetic Starters/Magnetic Contactors

A high quality product that supports the various needs of our customers on a global scale.

- ●Usable in general applications such as motor starting, stopping, and burnout protection.
- ●Adopts twin contacts for the auxiliary contacts across all series for high reliability.
- ●Our standard products comply with the domestic standards as well as various overseas standards and are certified as meeting all standards. (Refer to page 266 for details.)

S-T10



MSO-N150KP

● Ratings/Specifications (Standard Applicability)

Magnetic Contactors	Magnetic Starters (Note 12)	Rated Capacity [kW] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Resistive Load (Category AC-1)		Conventional Free Air Thermal Current	Auxiliary Contact		Compatible Thermal Overload Relays	
		AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	AC100 to 240 V	AC380 to 440 V	Ith [A]	Standard (Special)	Additional Unit Model Names x Pieces	Model Name	Heater Designation Range [A]
S-T10(BC)	MSO-T10(BC)KP	2.5[2.2]	4[2.7]	4[2.7]	4	11[11]	9[7]	7[6]	5	20	11	20	1a(1b)	UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2	TH-T18(BC)KP	0.12 to 9
S-T12(BC)	MSO-T12(BC)KP	3.5[2.7]	5.5[4]	5.5[5.5]	5.5	13[13]	12[9]	9[9]	7	20	13	20	1a1b (2a, 2b)			0.12 to 11
S-T20(BC)	MSO-T20(BC)KP	4.5[3.7]	7.5[7.5]	7.5[7.5]	7.5	18[18]	18[18]	17[17]	9	20	18	20				0.12 to 15
S-T21(BC)	MSO-T21(BC)KP	5.5[4] (Note 3)	11[7.5]	11[7.5]	7.5	25[20]	23[20]	17[17]	9	32	32	32	2a2b		TH-T25(BC)KP	0.24 to 22
S-T25(BC)	MSO-T25(BC)KP	7.5 [5.5]	15[11]	15[11]	11	30(26)[26] (Note 1)	30(26)[25] (Note 1)	24[20]	12	32	32	32	2a2b			0.24 to 22
S-T32(BC)	—	7.5 [7.5]	15[15]	15[11]	11	32[32]	32[32]	24[20]	12	32	32	32	—		—	—
S-T35(BC)	MSO-T35(BC)KP	11[7.5]	18.5[15]	18.5[15]	15	40[35]	40[32]	32[26]	17	60	60	60	2a2b		TH-T25(BC)KP TH-T50(BC)KP	0.24 to 22 29
S-T50(BC)	MSO-T50(BC)KP	15[11]	22[22]	25[22]	22	55(50)[50] (Note 1)	50[48]	38[38]	26	80	80	80			TH-T25(BC)KP TH-T50(BC)KP	0.24 to 22 29 to 42
S-T65(CW)	MSO-T65(CW)KP	18.5[15]	30[30]	37[30]	30	65[65]	65[65]	60[45]	38	100	100	100		UN-AX2, 4 x 1 or UN-AX11 x 2	TH-T65KP	15 to 54
S-T80(CW)	MSO-T80(CW)KP (Note 10)	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52	120	120	120			TH-T100KP (Note 4)	67
S-T100	MSO-T100KP	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65	150	150	150		UN-AX80 x 2	TH-T65KP TH-T100KP	15 to 54 67, 82
S-N125	MSO-N125KP	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70	150	150	150			TH-N120KP (TA)	42 to 105
S-N150	MSO-N150KP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200		UN-AX150 x 2		42 to 125
S-N180	MSO-N180KP	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120	260	260	260			TH-N220KPRH	82 to 150
S-N220	MSO-N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260				82 to 180
S-N300	MSO-N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350			TH-N400KPRH	105 to 250
S-N400	MSO-N400KP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450				105 to 330
S-N600	—	190[160]	330[300]	330[300]	330	630[630]	630[630]	500[500]	420	660	660	660		UN-AX600 x 1	TH-N600KP (Note 5)	250 to 500
S-N800	—	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800				250 to 660

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
Note 2. Enclosed type magnetic starters are of MS-□ type. T20, T25, T32 and N600, N800 types are outside production range. It should be noted that auxiliary contact units cannot be additionally installed to enclosed types. MS-T□DP is for single-phase motors. Refer to page 267 article 10.3 for details about production range or applicable capacities.
Note 3. MS-T21 type with 200 to 220 V ratings are 3.7 kW, in accordance with the Electrical Appliance and Material Safety Law.
Note 4. Enclosed type heater designation 67A uses a thermal overload relay dedicated for enclosed types.
Note 5. Please use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-□).
Note 6. Refer to page 51 for information regarding application to resistive loads and capacitive loads.
Note 7. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Refer to page 42 for details.
Note 8. "BC" in the model name refers to "wiring streamlining terminal".
Note 9. T65 to T100 and N125 to N800 are AC operated, DC energizing types, which may become unusable or undergo property alteration depending on the control circuit conditions. Carefully read page 71 before use.
Note 10. MSO-T80CW heater designation 67A is not manufactured.
Note 11. MSO-T□ and MSO-N□ types can also be manufactured.
Note 12. S-T12 and S-T20 with spring clamp terminals (SQ) can also be manufactured.

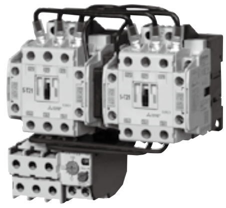
Related Reference Page

Item	Reference Page	Remarks
· Main Contact Rating	Page 39	–
· Auxiliary Contact Rating	Page 41	–
· Operation Coil	Page 43	–
· Properties	Page 45	–
· Performance	Page 46	–
· Outline Drawings/Contact Arrangements	Page 77	–
· How to Order	Page 130	–
· Combining with Optional Units	Page 194	–

4.2 MS/MSO/S-2x☐ Reversible Magnetic Starters/ Magnetic Contactors

Ideal for forward/reverse operation of AC motors

- Ideal for forward rotation, reverse rotation, or plugging, as well as for the switching of normal and emergency power supplies.
- A highly reliable mechanical interlock is equipped as standard.



MSO-2×T21KP

4

Ratings/Specifications (Standard Applicability)

Magnetic Contactors	Magnetic Starters (Note 12)	Rated Capacity [kW] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Resistive Load (Category AC-1)		Conventional Free Air Thermal Current	Auxiliary Contact		Compatible Thermal Overload Relays	
		AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	AC100 to 240 V	AC380 to 440 V	Ith [A]	Standard (Special)	Additional Unit Model Names x Pieces	Model Name	Heater Designation Range [A]
S-2×T10(BC)	MSO-2×T10(BC)KP	2.5[2.2]	4[2.7]	4[2.7]	4	11[11]	9[7]	7[6]	5	20	11	20	1a x 2 + 2b (1b x 2 + 2b)	UT-AX2, 4(BC) x 2 or UT-AX11(BC) x 2	TH-T18(BC)KP	0.12 to 9
S-2×T12(BC)	MSO-2×T12(BC)KP	3.5[2.7]	5.5[4]	5.5[5.5]	5.5	13[13]	12[9]	9[9]	7	20	13	20	1a1b x 2 + 2b (2a x 2 + 2b)			0.12 to 11
S-2×T20(BC)	MSO-2×T20(BC)KP	4.5[3.7]	7.5[7.5]	7.5[7.5]	7.5	18[18]	18[18]	17[17]	9	20	18	20	1a1b x 2 + 2b (2a x 2 + 2b)			0.12 to 15
S-2×T21(BC)	MSO-2×T21(BC)KP	5.5[4] (Note 3)	11[7.5]	11[7.5]	7.5	25[20]	23[20]	17[17]	9	32	32	32	2a2b x 2		TH-T25(BC)KP	0.24 to 22
S-2×T25(BC)	MSO-2×T25(BC)KP	7.5[5.5]	15[11]	15[11]	11	30(26)[26] (Note 1)	30(26)[25] (Note 1)	24[20]	12	32	32	32				0.24 to 22
S-2×T32(BC)	–	7.5[7.5]	15[15]	15[11]	11	32[32]	32[32]	24[20]	12	32	32	32		–	–	–
S-2×T35(BC)	MSO-2×T35(BC)KP	11[7.5]	18.5[15]	18.5[15]	15	40[35]	40[32]	32[26]	17	60	60	60		UT-AX2, 4(BC) x 2 or UT-AX11(BC) x 2	TH-T25(BC)KP TH-T50(BC)KP	0.24 to 22 29
S-2×T50(BC)	MSO-2×T50(BC)KP	15[11]	22[22]	25[22]	22	55(50)[50] (Note 1)	50[48]	38[38]	26	80	80	80			TH-T25(BC)KP TH-T50(BC)KP	0.24 to 22 29 to 42
S-2×T65(CW)	MSO-2×T65(CW)KP	18.5[15]	30[30]	37[30]	30	65[65]	65[65]	60[45]	38	100	100	100		UN-AX2, 4 x 2 or UN-AX11 x 2	TH-T65KP	15 to 54
S-2×T80(CW)	MSO-2×T80(CW)KP (Note 11)	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52	120	120	120			TH-T100KP	67
S-2×T100	MSO-2×T100KP	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65	150	150	150		UN-AX80 x 2	TH-T65KP TH-T100KP	15 to 54 67, 82
S-2×N125	MSO-2×N125KP	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70	150	150	150			TH-N120KP	42 to 105
S-2×N150	MSO-2×N150KP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200	3a3b x 2	–	(TA)	42 to 125
S-2×N180	MSO-2×N180KP	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120	260	260	260			TH-N220KPRH	82 to 150
S-2×N220	MSO-2×N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260				82 to 180
S-2×N300	MSO-2×N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350			TH-N400KPRH	105 to 250
S-2×N400	MSO-2×N400KP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450				105 to 330
S-2×N600	–	190[160]	330[300]	330[300]	330	630[630]	630[630]	500[500]	420	660	660	660	4a4b x 2	–	TH-N600KP (Note 5)	250 to 500
S-2×N800	–	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800				250 to 660

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
Note 2. Enclosed type magnetic starters are of MS-2x☐ type. T10, T12, T20, T25, T32 and N600, N800 types are outside production range. It should be noted that auxiliary contact units cannot be additionally installed to enclosed types.
Note 3. MS-2 x T21 types with 200 to 220 V ratings are 3.7 kW, in accordance with the Electrical Appliance and Material Safety Law.
Note 4. Enclosed type heater designation 67A uses a thermal overload relay dedicated for enclosed types.
Note 5. Please use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-☐).
Note 6. Refer to page 51 for information regarding application to resistive loads and capacitive loads.
Note 7. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Refer to page 42 for details.
Note 8. The +2b on the auxiliary contact arrangement of reversible T10, T12 and T20 types indicates the break contact of the integrated UT-ML20 interlock unit. There is no need to specify when ordering.
Note 9. Auxiliary contact arrangements are displayed by twos, in a contact arrangement combined with two magnetic contactors. For standard contact arrangements there is no need to specify when ordering; however, please specify a matching contact arrangement for 2 units if for a special configuration. <Example> 1b × 2 + 2b: 2B, 2a×2 + 2b: 4A
Note 10. "BC" in the model name refers to "wiring streamlining terminal".
Note 11. MSO-2xT80CW heater designation 67A is not manufactured.
Note 12. MSO-2xT☐ and MSO-2xN☐ types can also be manufactured.

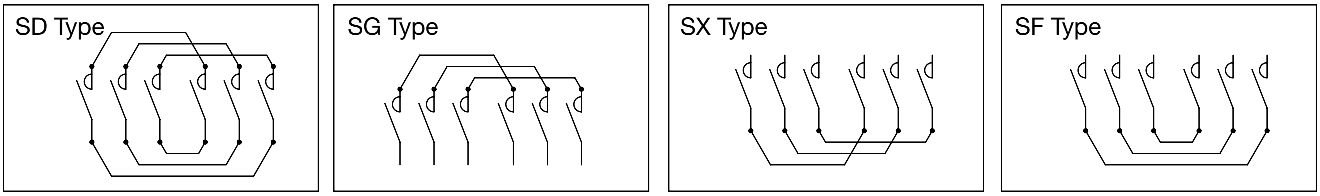
Connecting Conductor Included

Standard reversible magnetic contactors do not have a connecting conductor installed on the main circuit; however, products with connecting conductors (3-pole) on the main circuit can be manufactured. The 4 types below are available. (For information on whether an additional thermal overload relay can be connected, refer to page 216.)

(1) Mountable on Both Power/Load Side ... For Reversing Operation : S-2xT☐SD, S-2xN☐SD
(2) Mountable Only on Power Side (3-Pole In-Phase) ... For 2 Load Circuits : S-2xT☐SG, S-2xN☐SG
(3) Mountable Only on Load Side (3-Pole In-Phase) ... For 2 Power Systems : S-2xT☐SX, S-2xN☐SX
(4) Mountable Only on Load Side (Reverse Phase Switchable) : S-2xT☐SF, S-2xN☐SF

Note 1. If a connecting conductor is required, refer to page 216 to order a main circuit conductor kit.

Connecting Conductor Wiring Diagram



Structure/Operation

Structure

(1) MSO-2 × T☐, S-2 × T☐ and MSO-2 × N☐ types have the same mounting pitch as S-2 × N☐ types.
(2) Reversible MSO/S-2xT10 to T25 types can be mounted to IEC 35 mm rails as-is, while T35 to T80 types can be mounted by removing the mounting plate.

Operation

(1) Open State (Fig. 1, 2(a), 3(a))
When both the left and right contactors are in the OFF state, the lever tip is retained in the open state via the return spring.

(2) Closed State (Fig. 2(b) and Fig. 3(b))
When the contactor of one side is energized (closed), the cross bar causes the lever pin (or lever system) to be pushed downward, rotating the interlock lever so that the lever tips cross each other.
When this happens, even if an energizing operation is attempted on the other contactor, as the lever tips are crossed over the operation will be prevented.

(3) Opening
When the energizing current to a contact on one side is halted, the cross bar returns to its original state via the contactor tripping spring.
This action of the cross bar raises the interlock lever with the help of the return spring, returning the interlock lever to its correct position.

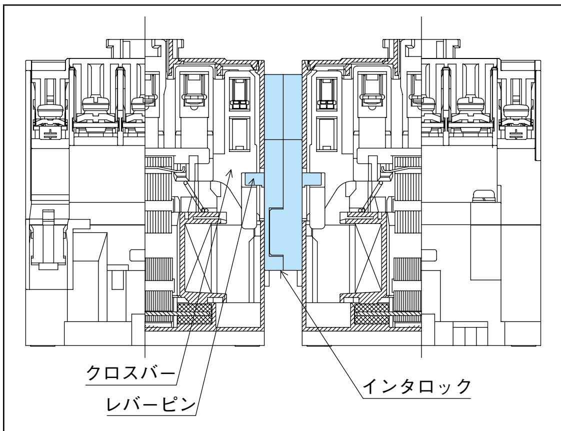


Fig. 1. Structural and Operational Diagram (T10 to T80)

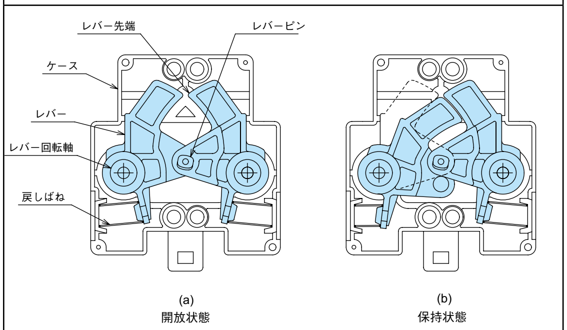


Fig. 2. Interlock Internal Structure (T10 to T80)

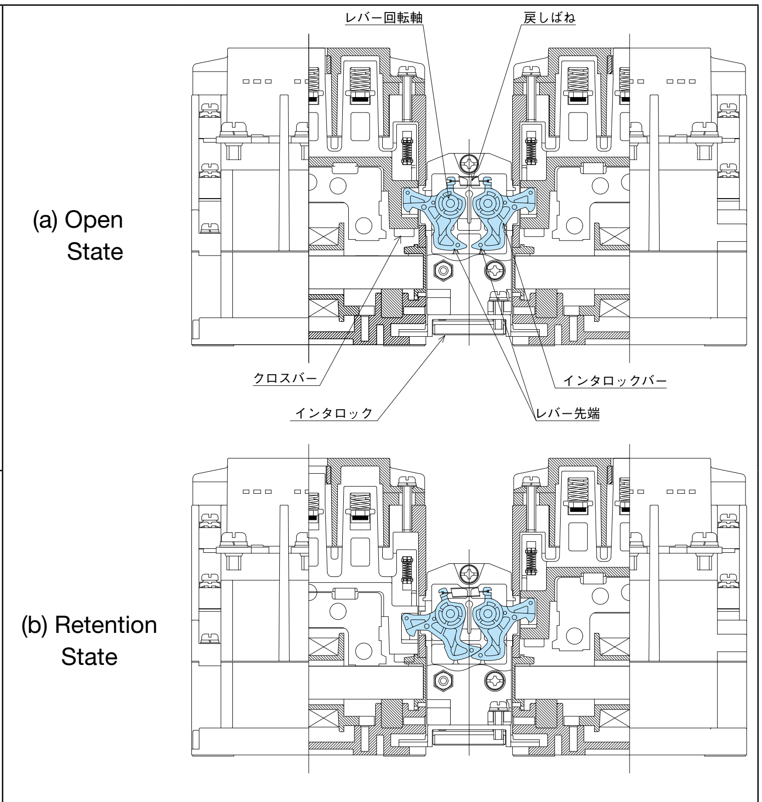


Fig. 3. Structural and Operational Diagram (T100, N125 to N400)

Handling

(1) Be sure to release the electrical interlock via the break contact of the left and right magnetic contactors.
(2) The electrical interlock uses the break contact on the inner side (the mechanical interlock side).
(3) Horizontal mounting of the product is not available.

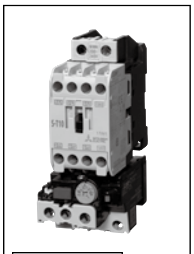
	Item	Reference Page	Remarks
Related Reference Page	· Main Contact Rating	Page 39	—
	· Auxiliary Contact Rating	Page 41	—
	· Operation Coil	Page 43	—
	· Properties	Page 45	—
	· Performance	Page 46	—
	· Outline Drawings/Contact Arrangements	Page 77	—
	· How to Order	Page 130	—
	· Combining with Optional Units	Page 194	—

● Outline Drawings/Contact Arrangements (AC Operated Magnetic Starters/Magnetic Contactors)

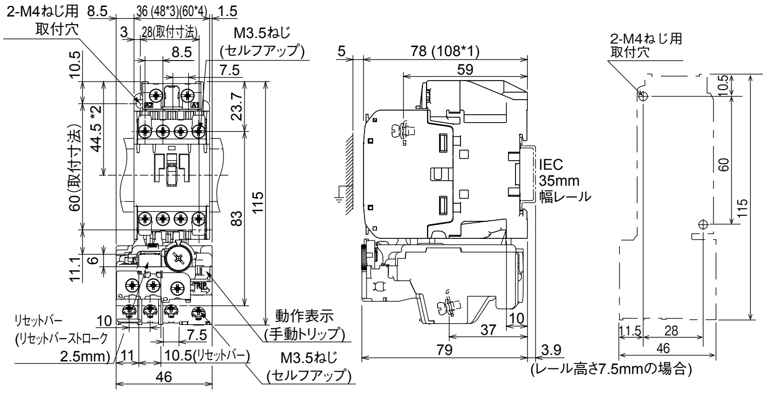
■ T10 (The diagrams show models without "BC".)

Non-Reversing

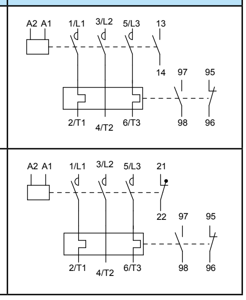
MSO-T10(BC)KP



0.36kg



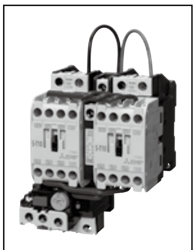
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Auxiliary Contact	Contact Arrangement
1a	
1b	

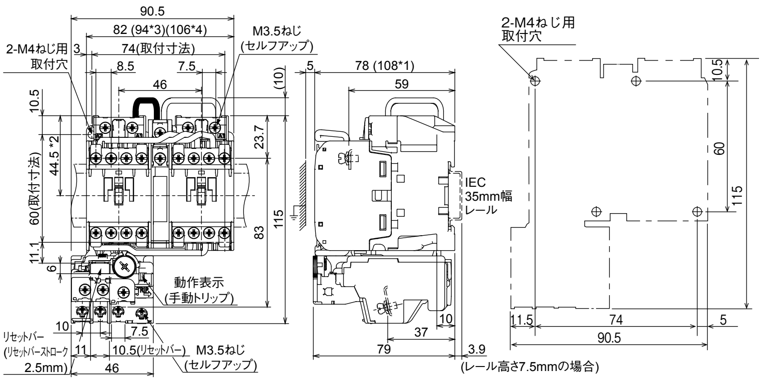
Model Name	Model Name
MSO-T10KP	MSO-T10BCKP

Reversing

MSO-2 x T10(BC)KP

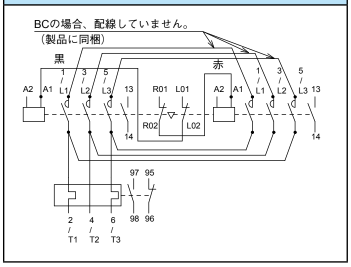


0.66kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

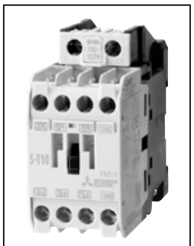
Connection Diagram



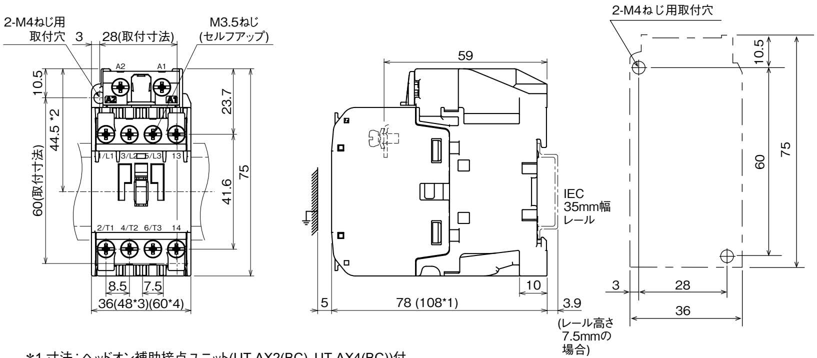
Model Name	Model Name
MSO-2xT10KP	MSO-2xT10BCKP

Non-Reversing

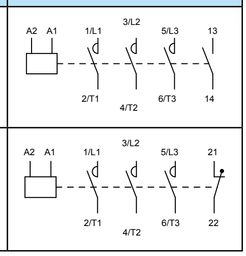
S-T10(BC)



0.25kg



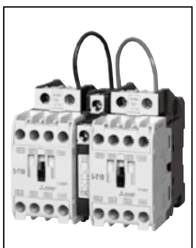
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Auxiliary Contact	Contact Arrangement
1a	
1b	

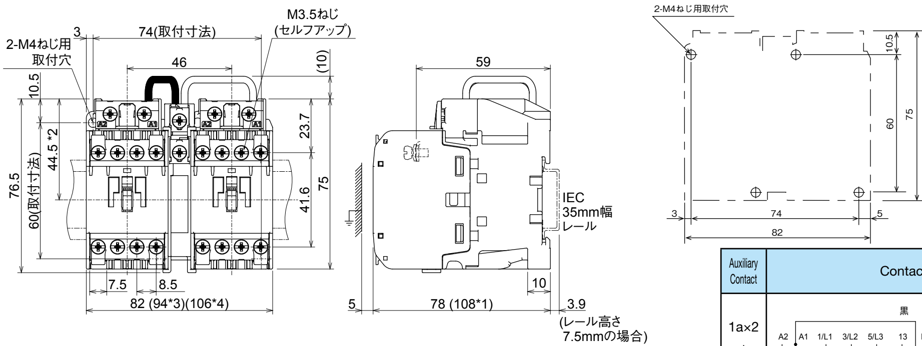
Model Name	Model Name
S-T10	S-T10BC

Reversing

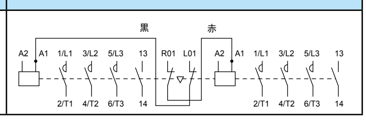
S-2 × T10(BC)



0.55kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

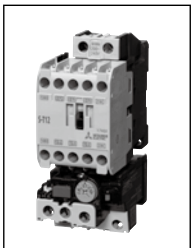
Auxiliary Contact	Contact Arrangement
1a×2 + 2b	

Model Name	Model Name
S-2xT10	S-2xT10BC

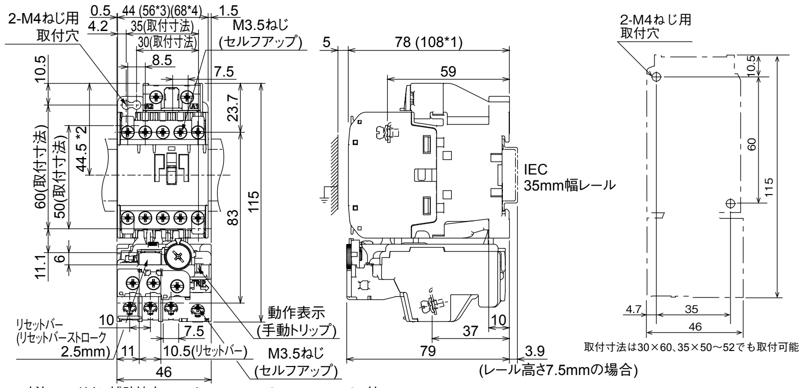
T12/T20 (The diagrams show models without "BC".)

Non-Reversing

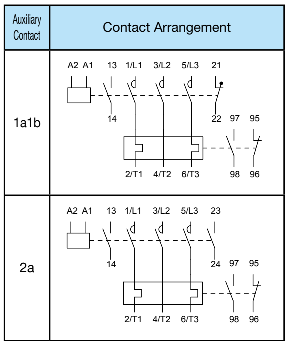
MSO-T12(BC)KP
MSO-T20(BC)KP



0.38kg



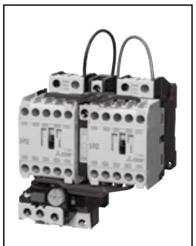
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付



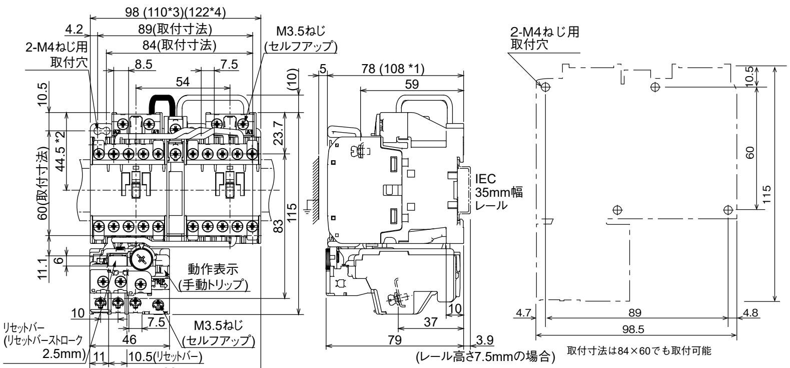
Model Name	Model Name
MSO-T12KP	MSO-T12BCKP
MSO-T20KP	MSO-T20BCKP

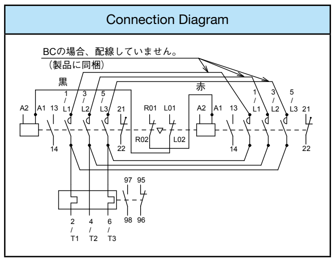
Reversing

MSO-2xT12(BC)KP
MSO-2xT20(BC)KP



0.7kg



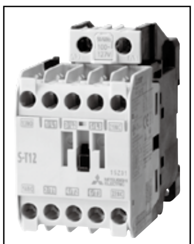


*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

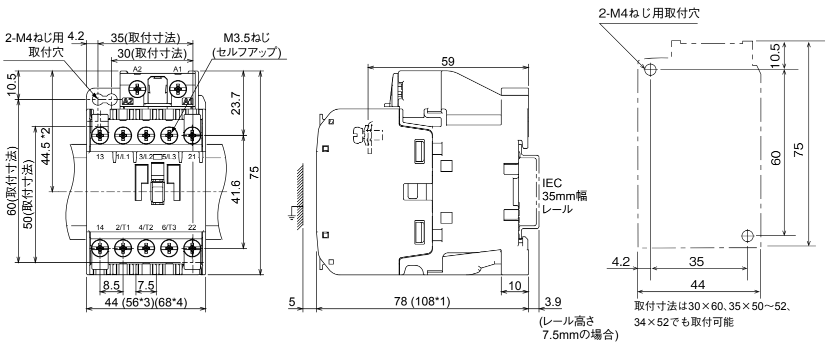
Model Name	Model Name
MSO-2xT12KP	MSO-2xT12BCKP
MSO-2xT20KP	MSO-2xT20BCKP

Non-Reversing

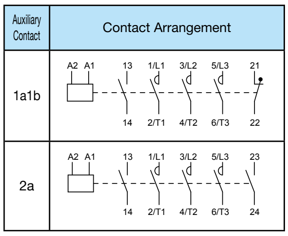
S-T12(BC)
S-T20(BC)



0.27kg



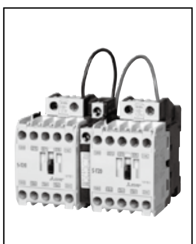
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付



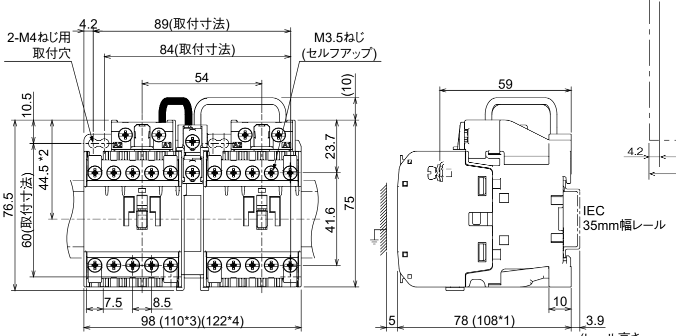
Model Name	Model Name
S-T12	S-T12BC
S-T20	S-T20BC

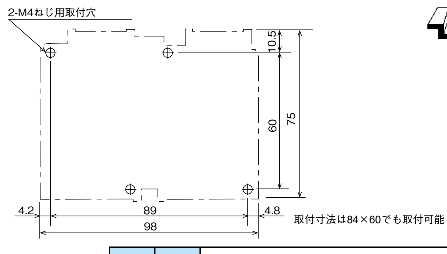
Reversing

S-2×T12(BC)
S-2×T20(BC)

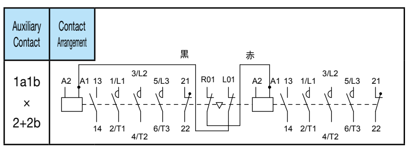


0.59kg





*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

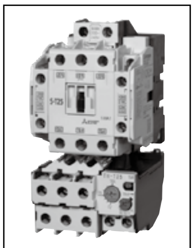


Model Name	Model Name
S-2xT12	S-2xT12BC
S-2xT20	S-2xT20BC

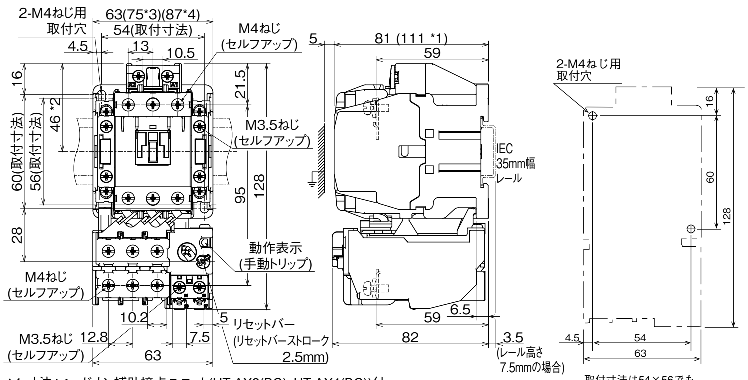
T21/T25 (The diagrams show models without "BC".)

Non-Reversing

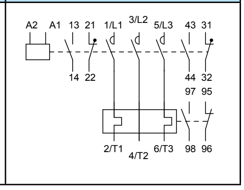
MSO-T21(BC)KP
MSO-T25(BC)KP



0.58 kg



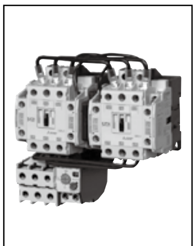
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Auxiliary Contact	Contact Arrangement
2a2b	

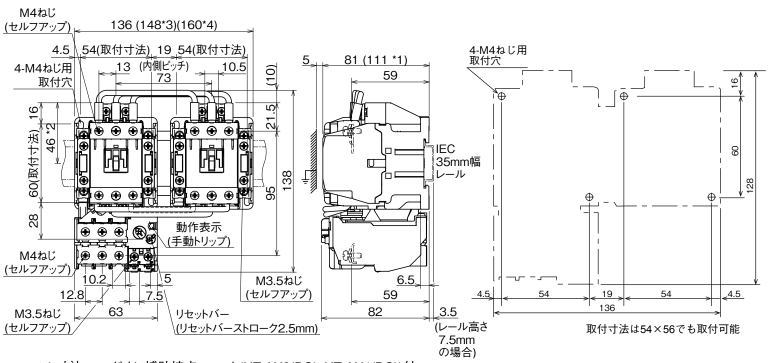
Model Name	Model Name
MSO-T21KP	MSO-T21BCKP
MSO-T25KP	MSO-T25BCKP

Reversing

MSO-2xT21(BC)KP
MSO-2xT25(BC)KP

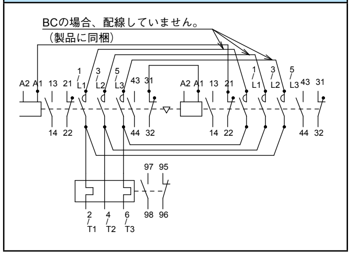


1.03 kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

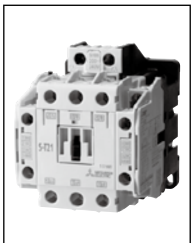
Connection Diagram



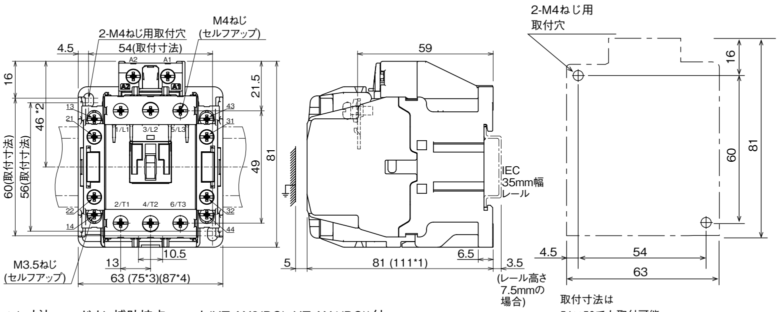
Model Name	Model Name
MSO-2xT21KP	MSO-2xT21BCKP
MSO-2xT25KP	MSO-2xT25BCKP

Non-Reversing

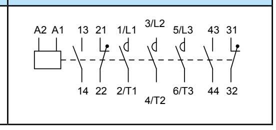
S-T21(BC)
S-T25(BC)



0.41 kg



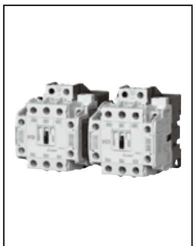
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Auxiliary Contact	Contact Arrangement
2a2b	

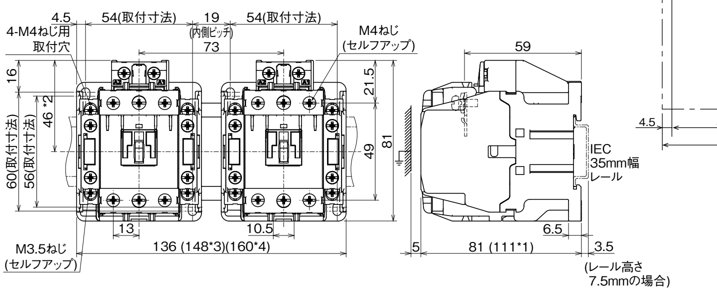
Model Name	Model Name
S-T21	S-T21BC
S-T25	S-T25BC

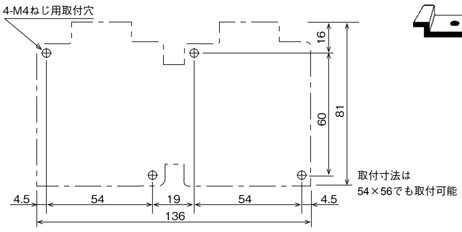
Reversing

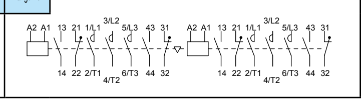
S-2 × T21(BC)
S-2 × T25(BC)



0.86 kg





Auxiliary Contact	Contact Arrangement
2a2b ×2	

*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

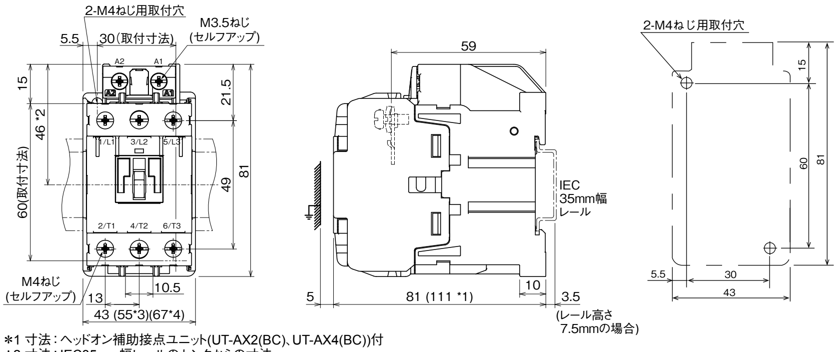
Model Name	Model Name
S-2xT21	S-2xT21BC
S-2xT25	S-2xT25BC

T32 (The diagrams show models without "BC".)

Non-Reversing

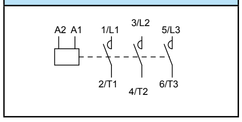
S-T32(BC)

0.36 kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Contact Arrangement

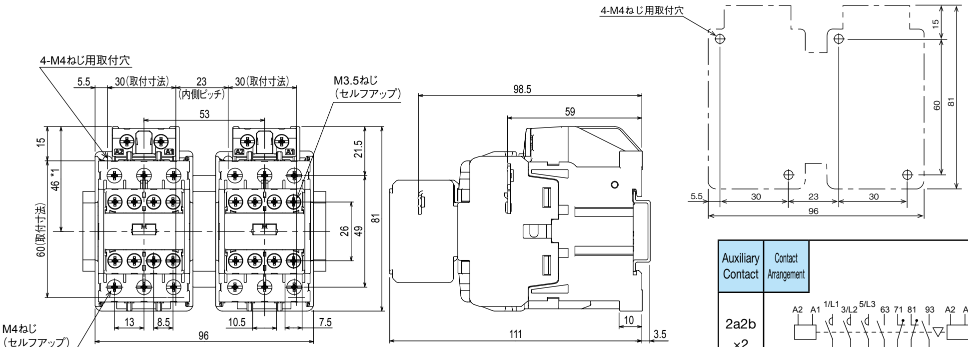


Model Name
S-T32
S-T32BC

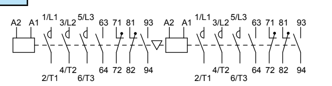
Reversing

S-2 × T32(BC)

0.84 kg



*1 寸法：IEC35mm幅レールのセンタからの寸法

Auxiliary Contact	Contact Arrangement
2a2b ×2	

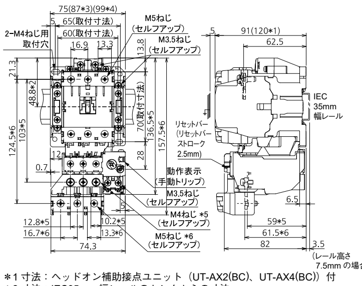
Model Name
S-2xT32
S-2xT32BC

T35/T50 (The diagrams show models without "BC".)

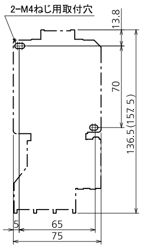
Non-Reversing

MSO-T35(BC)KP
MSO-T50(BC)KP

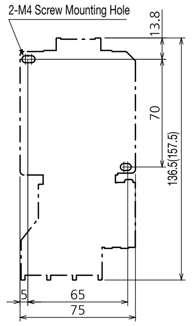
0.79 kg



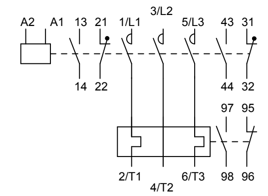
＊1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
＊2 寸法：IEC35mm 幅レールのセンタからの寸法
＊3、＊4 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
＊3 は 1 個、＊4 は 2 個（両側）付
＊5 寸法：ヒータ呼び 22A 以下、＊6 寸法：ヒータ呼び 29A 以上



取付寸法は
60×70 でも取付可能



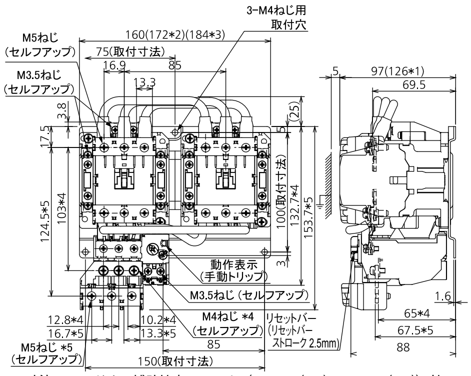
Mounting Dimensions Also Allow
For 60 x 70 Mounting

Auxiliary Contact	Contact Arrangement
2a2b	

Model Name	Model Name
MSO-T35KP	MSO-T35BCKP
MSO-T50KP	MSO-T50BCKP

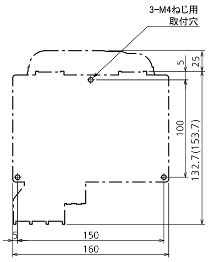
Reversing

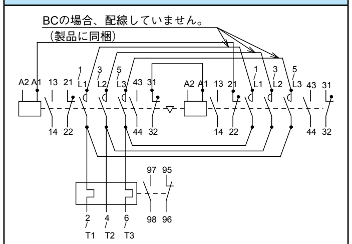
MSO-2 x T35(BC)KP
MSO-2 x T50(BC)KP



＊1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
＊2、＊3 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
＊2 は 1 個、＊3 は 2 個（両側）付
＊4 寸法：ヒータ呼び 22A 以下、＊5 寸法：ヒータ呼び 29A 以上

1.54 kg

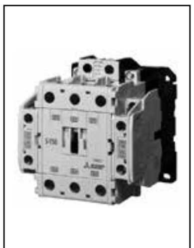


Connection Diagram


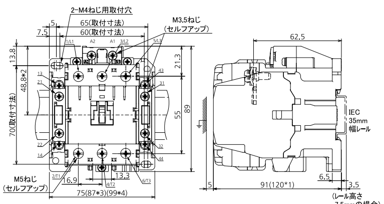
Model Name	Model Name
MSO-2xT35KP	MSO-2xT35BCKP
MSO-2xT50KP	MSO-2xT50BCKP

Non-Reversing

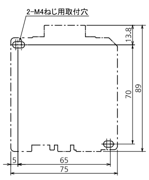
S-T35(BC)
S-T50(BC)



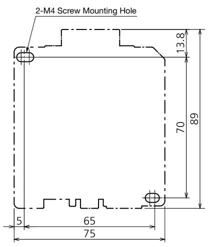
0.55 kg



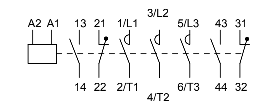
＊1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
＊2 寸法：IEC35mm 幅レールのセンタからの寸法
＊3、＊4 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
＊3 は 1 個、＊4 は 2 個（両側）付



取付寸法は
60×70 でも取付可能



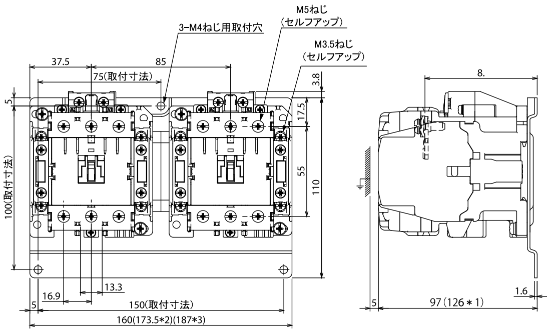
Mounting Dimensions Also Allow
For 60 x 70 Mounting

Auxiliary Contact	Contact Arrangement
2a2b	

Model Name	Model Name
S-T35	S-T35BC
S-T50	S-T50BC

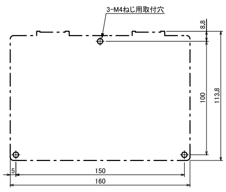
Reversing

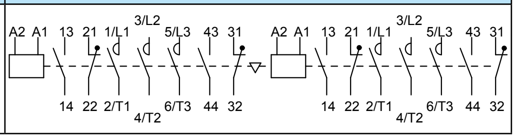
S-2 × T35(BC)
S-2 × T50(BC)



＊1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
＊2、＊3 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
＊2 は 1 個、＊3 は 2 個（両側）付

1.3 kg



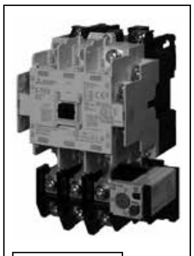
Auxiliary Contact	Contact Arrangement
2a2bx2	

Model Name	Model Name
S-2xT35	S-2xT35BC
S-2xT50	S-2xT50BC

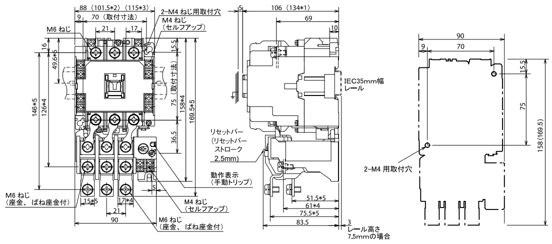
T65/T80 (The diagrams show models without "CW".)

Non-Reversing

MSO-T65(CW)KP
MSO-T80(CW)KP

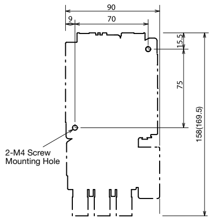


1.1 kg



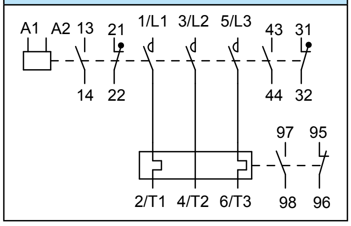
*1 寸法：ヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付
*2、*3 寸法：サイドオン補助接点ユニット（UN-AX11）付
*2 は 1 個、*3 は 2 個（両側）付
*4 寸法：ヒータ呼び 54A 以下の寸法
*5 寸法：ヒータ呼び 67A の寸法（MSO-T80CW 67A は製作不可）
*6 寸法：IEC35mm幅レールのセンタからの寸法

取付寸法は 77×82（M5 ねじ）
でも取付可能



Mounting Dimensions Also Allow
For 77 x 82 (M5 Screw) Mounting

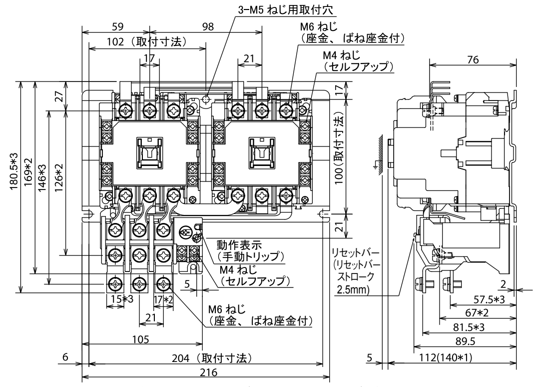
Contact Arrangement



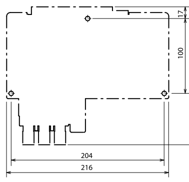
Model Name
MSO-T65KP
MSO-T80KP

Reversing

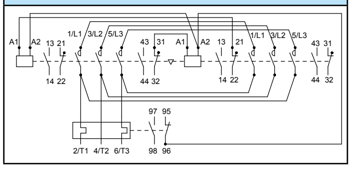
MSO-2 x T65(CW)KP
MSO-2 x T80(CW)KP



*1 寸法：ヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付
*2 寸法：ヒータ呼び 54A 以下の寸法
*3 寸法：ヒータ呼び 67A の寸法（MSO-2×T80CW 67A は製作不可）



Connection Diagram

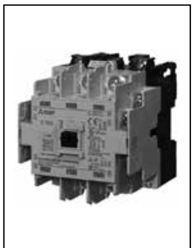


2.2 kg

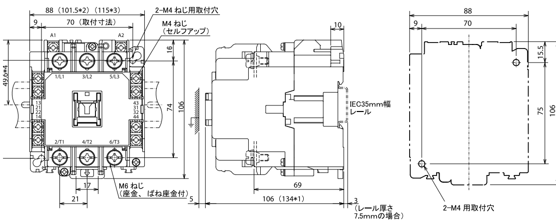
Model Name
MSO-2xT65KP
MSO-2xT80KP

Non-Reversing

S-T65(CW)
S-T80(CW)

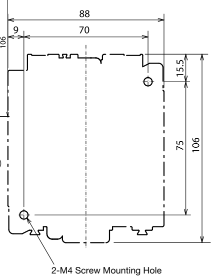


0.75 kg



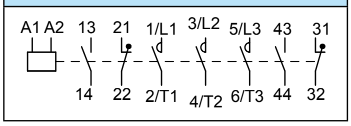
寸法：ヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付
、*3 寸法：サイドオン補助接点ユニット（UN-AX11）付
*2 は 1 個、*3 は 2 個（両側）付
寸法：IEC35mm幅レールのセンタからの寸法

取付寸法は 77×82（M5 ねじ）
でも取付可能



Mounting Dimensions Also Allow
For 77 x 82 (M5 Screw) Mounting

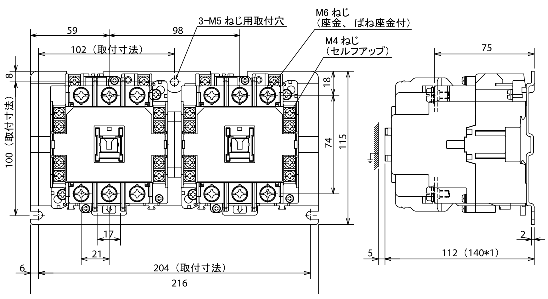
Contact Arrangement



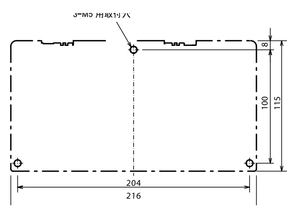
Model Name
S-T65
S-T80

Reversing

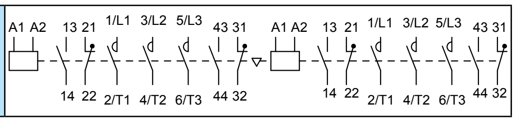
S-2 × T65(CW)
S-2 × T80(CW)



*1 寸法：ヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付



Contact Arrangement



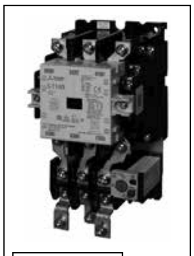
1.9 kg

Model Name
S-2xT65
S-2xT80

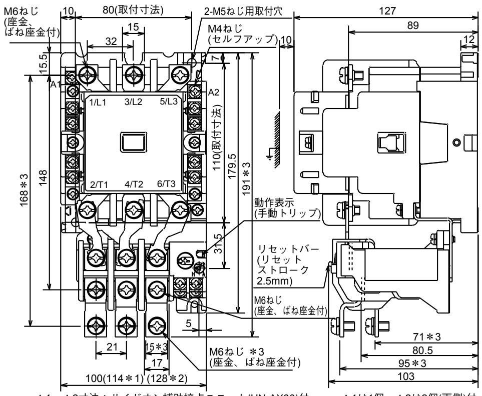
T100

Non-Reversing

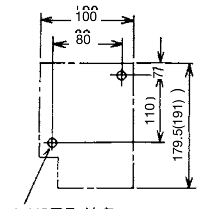
MSO-T100KP

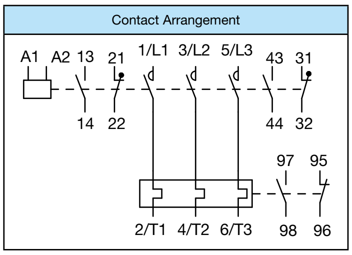


2.2 kg



＊1、＊2寸法：サイドオン補助接点ユニット(UN-AX80)付・・・＊1は1個、＊2は2個(両側)付
＊3寸法：ヒータ呼び67A、82Aの場合



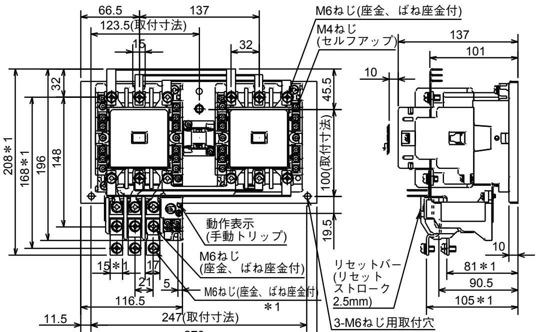


Model Name
MSO-T100KP

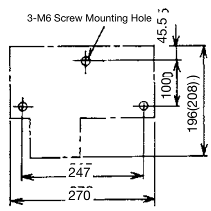
Reversing

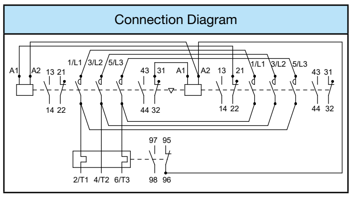
MSO-2 x T100KP

4.6 kg



＊1寸法：ヒータ呼びが67A、82Aの場合



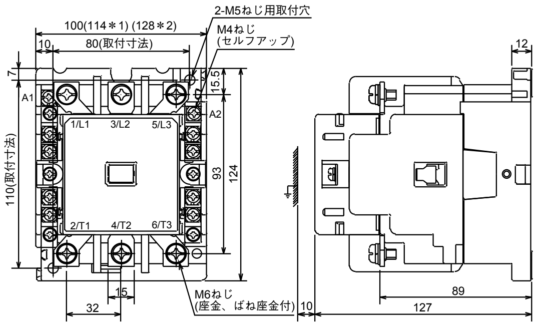


Model Name
MSO-2xT100KP

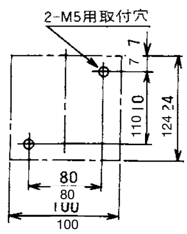
Non-Reversing

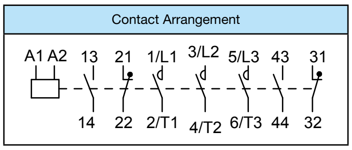
S-T100

1.7 kg



＊1、＊2寸法：サイドオン補助接点ユニット(UN-AX80)付・・・＊1は1個、＊2は2個(両側)付

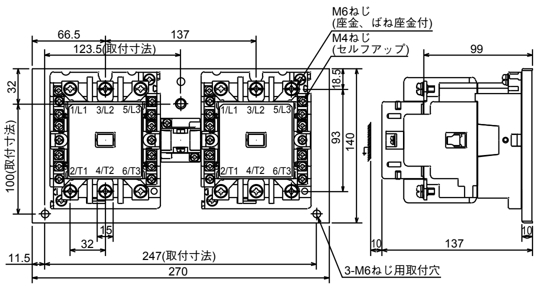




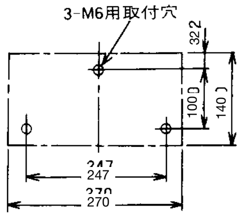
Model Name
S-T100

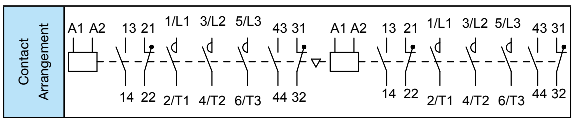
Reversing

S-2 x T100



4.3 kg





Model Name
S-2xT100

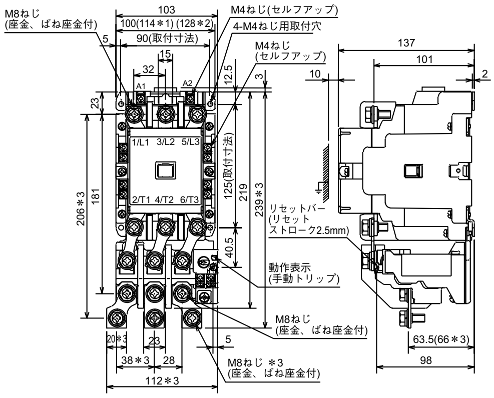
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

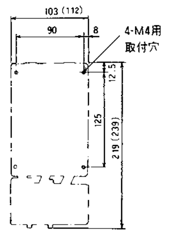
N125

Non-Reversing

MSO-N125KP

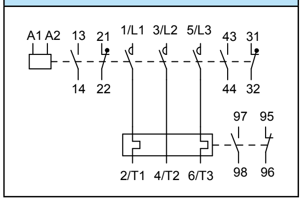
3.5 kg





注：( )内の数値はヒータ呼び105Aの場合

Contact Arrangement

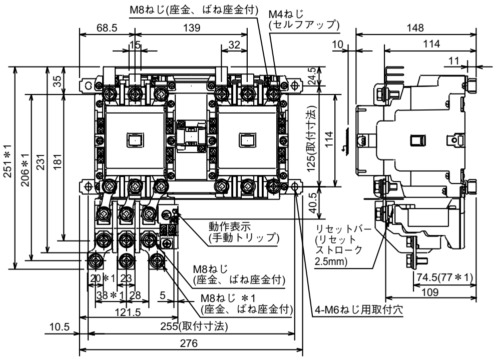


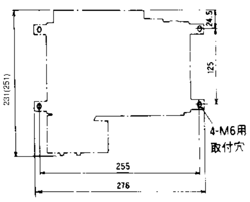
＊1、＊2寸法：サイドオン補助接点ユニット(UN-AX80)付・・・＊1は1個、＊2は2個(両側)付
＊3寸法：ヒータ呼びが105Aの場合

Model Name
MSO-N125KP

Reversing

MSO-2xN125KP



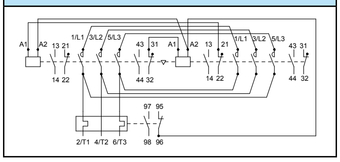


注：( )内の数値はヒータ呼び105Aの場合

7.0 kg

＊1寸法：ヒータ呼びが105Aの場合

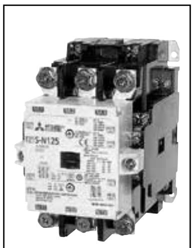
Connection Diagram



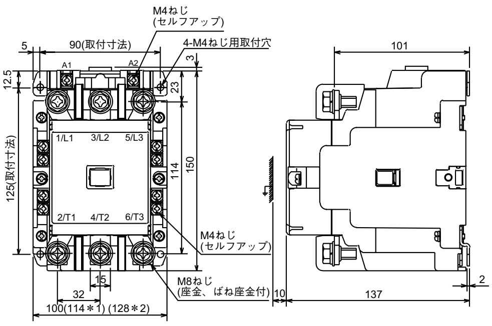
Model Name
MSO-2xN125KP

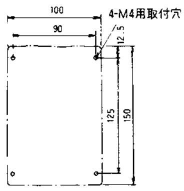
Non-Reversing

S-N125

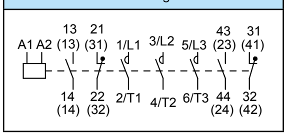


2.7 kg





Contact Arrangement

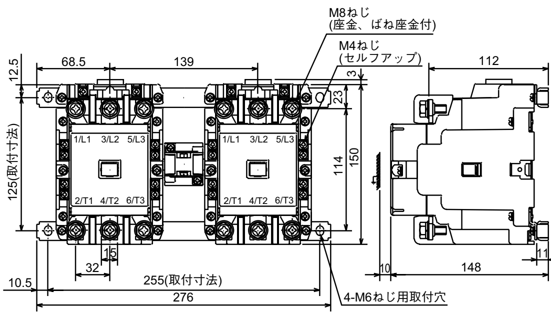


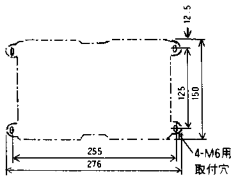
＊1、＊2寸法：サイドオン補助接点ユニット(UN-AX80)付・・・＊1は1個、＊2は2個(両側)付

Model Name
S-N125

Reversing

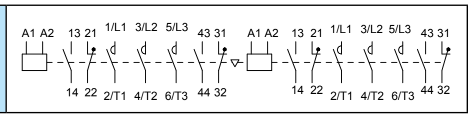
S-2×N125





6.0 kg

Contact Arrangement



Model Name
S-2xN125

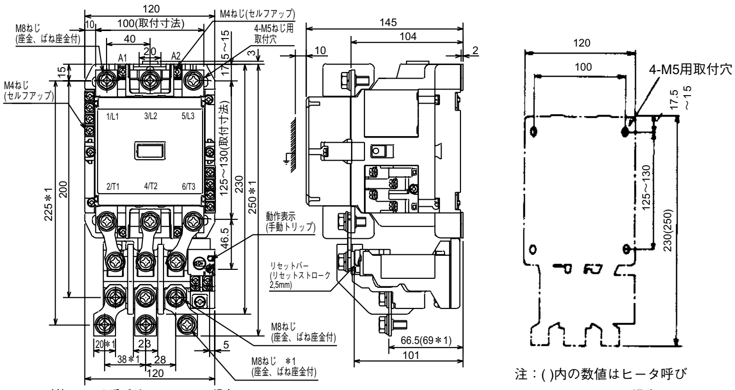
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

N150

Non-Reversing

MSO-N150KP

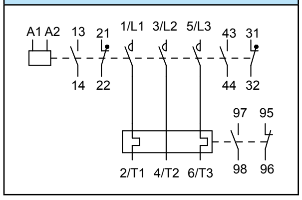
4.6 kg



＊1寸法：ヒータ呼びが105A、125Aの場合

注：( )内の数値はヒータ呼び105A、125Aの場合

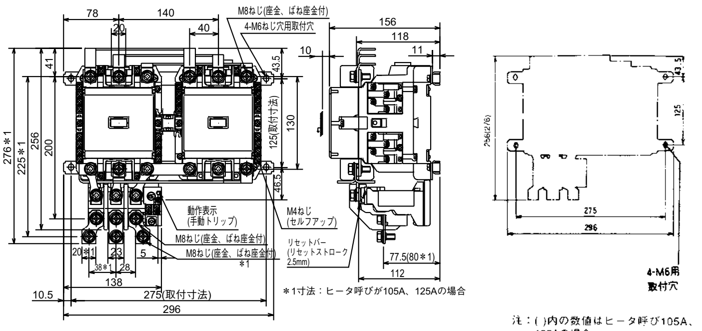
Contact Arrangement



Model Name
MSO-N150KP

Reversing

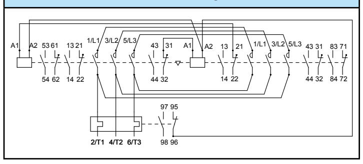
MSO-2×N150KP



＊1寸法：ヒータ呼びが105A、125Aの場合

注：( )内の数値はヒータ呼び105A、125Aの場合

Connection Diagram

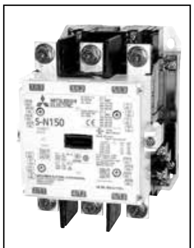


8.3 kg

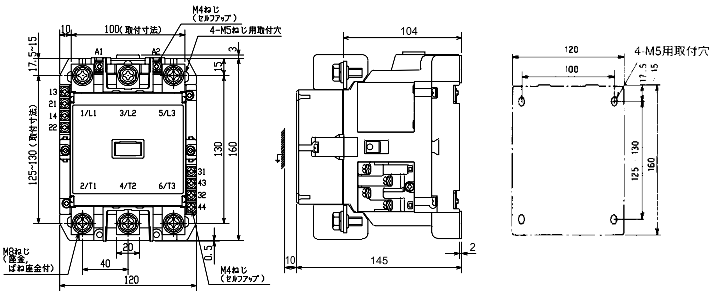
Model Name
MSO-2xN150KP

Non-Reversing

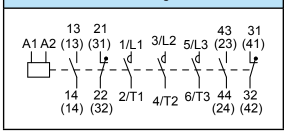
S-N150



3.3 kg



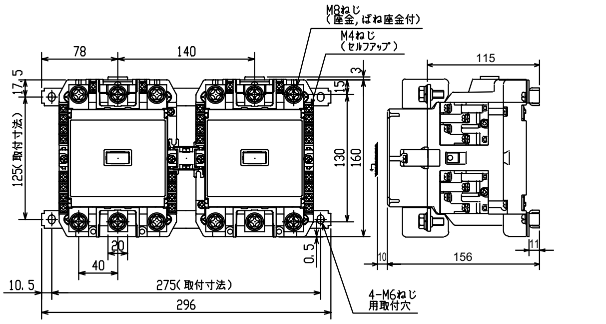
Contact Arrangement

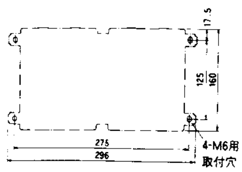


Model Name
S-N150

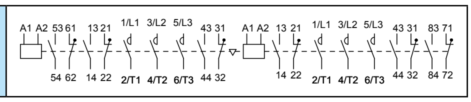
Reversing

S-2×N150





Contact Arrangement



7.0 kg

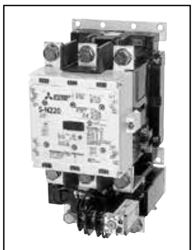
Model Name
S-2xN150

Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

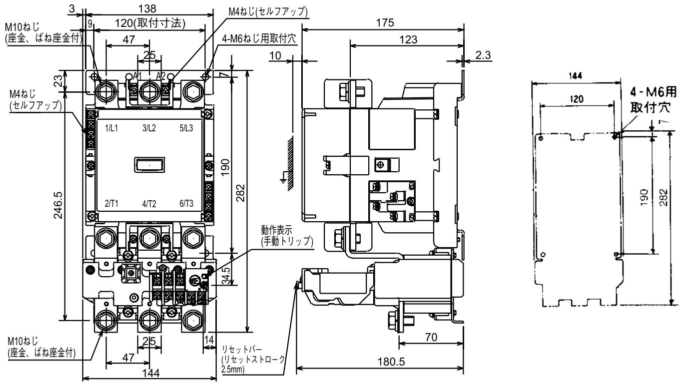
N180/N220

Non-Reversing

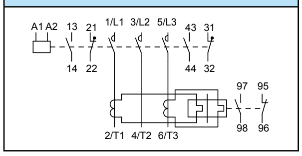
MSO-N180KP
MSO-N220KP



8.0 kg



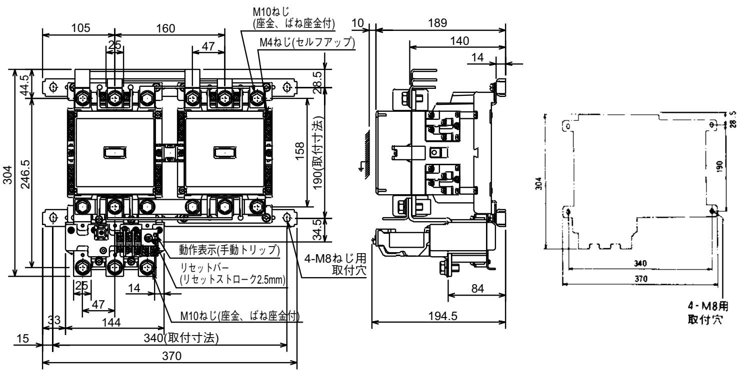
Contact Arrangement



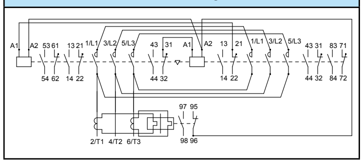
Model Name
MSO-N180KP
MSO-N220KP

Reversing

MSO-2×N180KP
MSO-2×N220KP



Connection Diagram



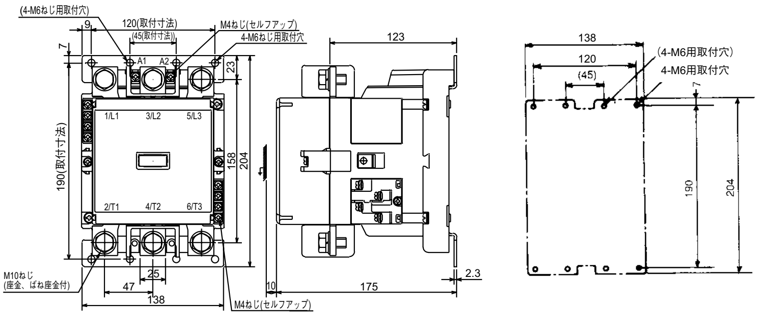
17 kg

Model Name
MSO-2xN180KP
MSO-2xN220KP

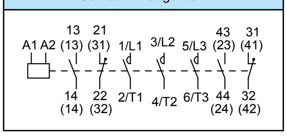
Non-Reversing

S-N180
S-N220

5.5 kg



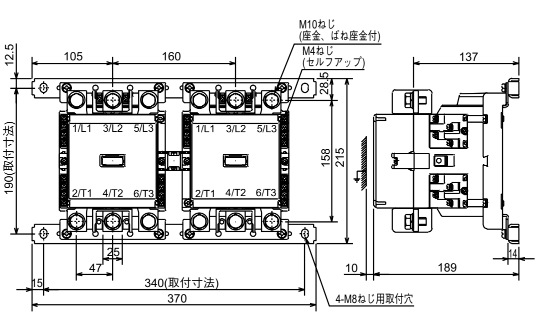
Contact Arrangement

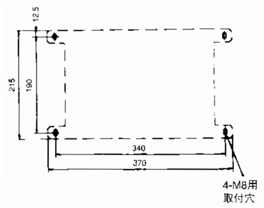


Model Name
S-N180
S-N220

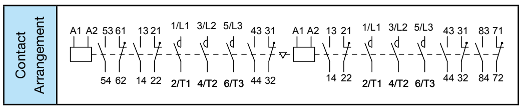
Reversing

S-2×N180
S-2×N220





Contact Arrangement



12.8 kg

Model Name
S-2xN180
S-2xN220

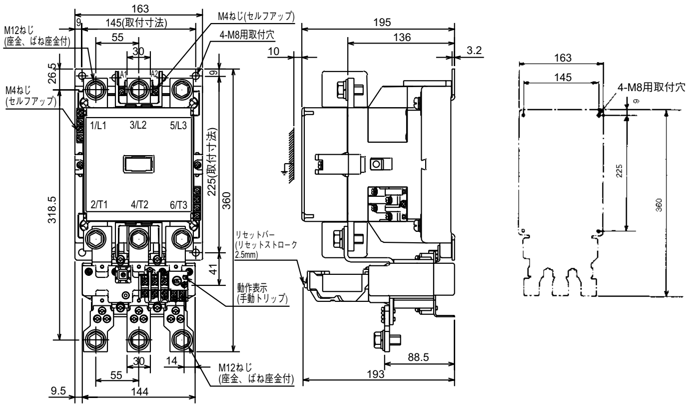
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

N300/N400

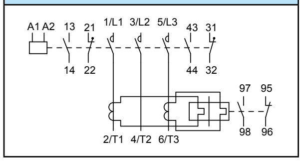
Non-Reversing

MSO-N300KP
MSO-N400KP

11.5 kg
12 kg



Contact Arrangement

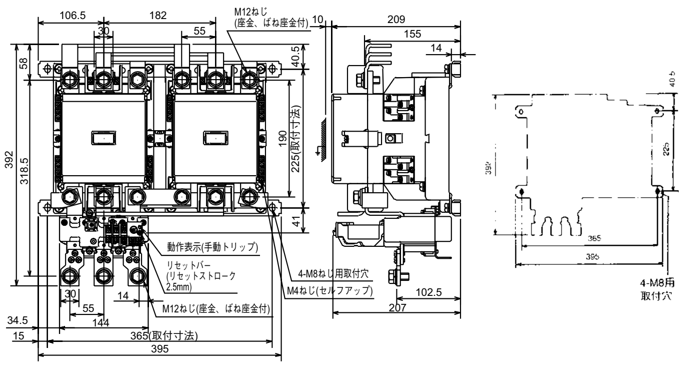


Model Name
MSO-N300KP
MSO-N400KP

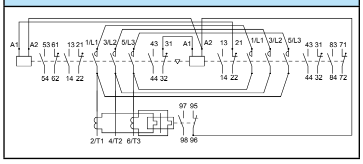
Reversing

MSO-2×N300KP
MSO-2×N400KP

25 kg
26 kg



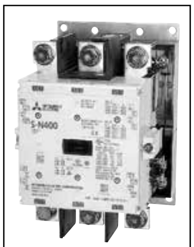
Connection Diagram



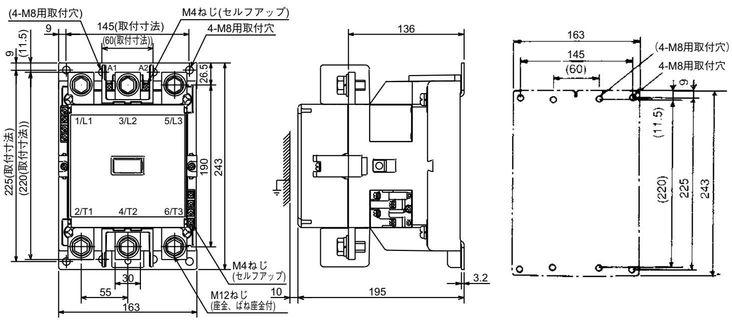
Model Name
MSO-2xN300KP
MSO-2xN400KP

Non-Reversing

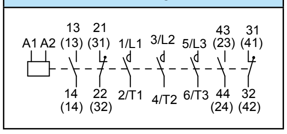
S-N300
S-N400



9.0 kg
9.5 kg



Contact Arrangement

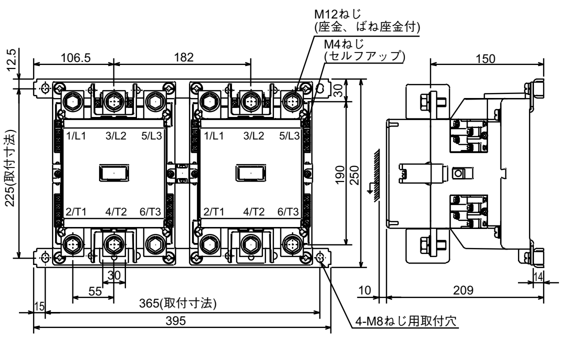


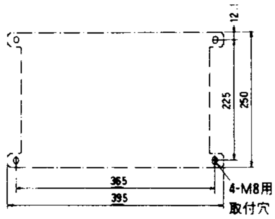
Model Name
S-N300
S-N400

Reversing

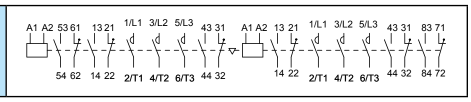
S-2×N300
S-2×N400

20 kg
21 kg





Contact Arrangement



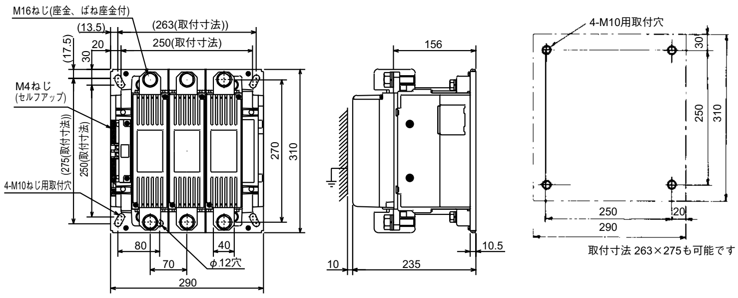
Model Name
S-2xN300
S-2xN400

N600/N800

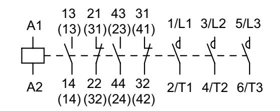
Non-Reversing

S-N600
S-N800

24 kg



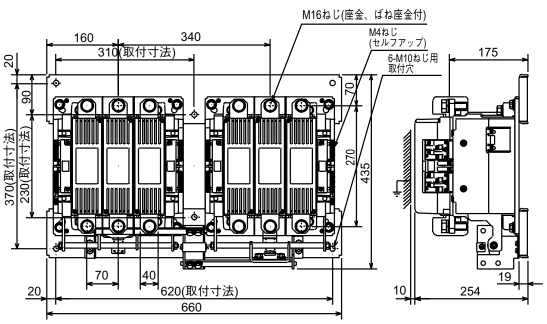
Contact Arrangement

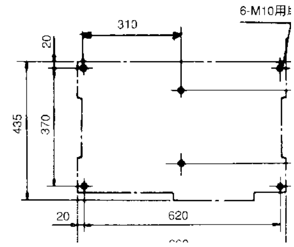


Model Name
S-N600
S-N800

Reversing

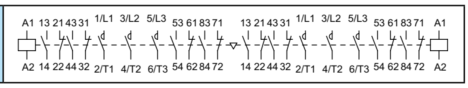
S-2 × N600
S-2 × N800





54 kg

Contact Arrangement



Model Name
S-2xN600
S-2xN800

Non-Reversing Magnetic Starter (Enclosed)

Enclosure (Case): Steel
Paint Color: Munsell 5Y7/1
Protective Structure: IP20

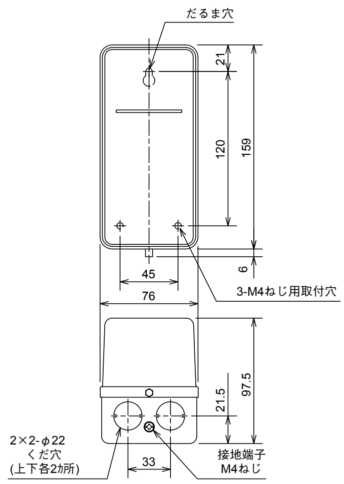


Fig 4. MS-T10KP (0.74 kg)
MS-T12KP (0.76 kg)

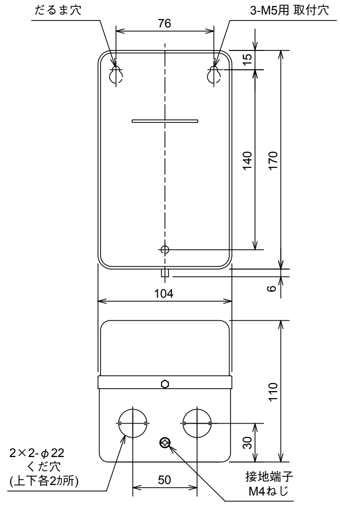


Fig 5. MS-T21KP (1.12 kg)

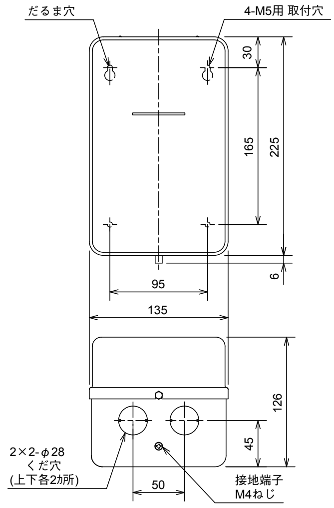


Fig 6. MS-T35KP/T50KP (1.9 kg)

Note 1. Leave 100 mm space at the bottom of the enclosure when mounting MS-T10KP to T50KP types.
Note 2. 3 rubber bushings are included for MS-T10KP to T50KP types.
Note 3. MS-T □ and MS-N □ types can also be manufactured.

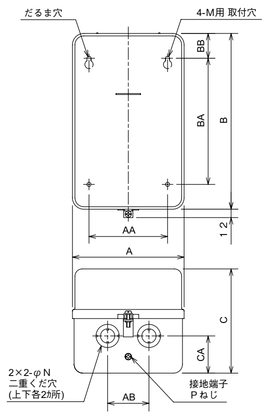


Fig. 7. MS-T65KP to T100KP
MS-N125KP to N220KP

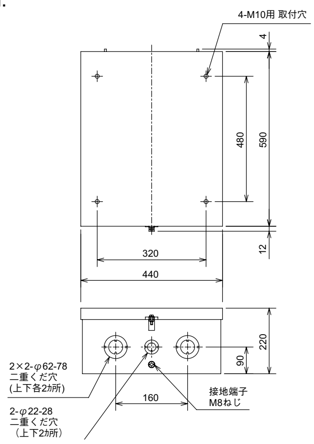
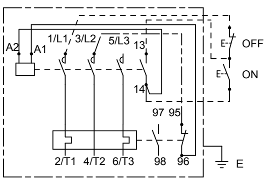
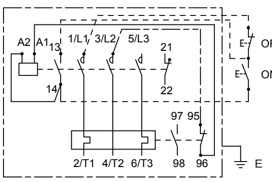


Fig. 8. MS-N300KP/N400KP (27.5 kg/28 kg)

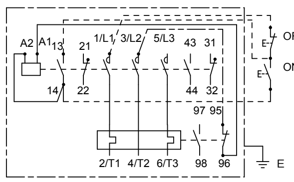
Model	Dimensions											Weight [kg]
	A	AA	AB	B	BA	BB	C	CA	M	N	P	
MS-T65KP/T80KP	160	120	80	270	220	25	145	45	M5	22 to 35	M4	2.9
MS-T100KP	190	150	100	305	260	25	163	67	M6	22 to 35	M4	4.0
MS-N125KP	230	170	90	384	330	29	190	80	M8	44 to 50	M6	8.0
MS-N150KP/N180KP/N220KP	270	200	120	484	400	44	209	85	M8	44 to 50	M6	12.8/16.2/16.2



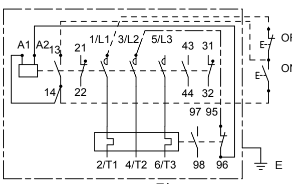
MS-T10形



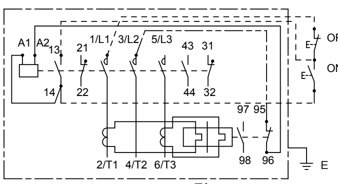
MS-T12形



MS-T21、T35、T50形



MS-T65～T100形
MS-N125～N150形



MS-N180～N400形

Note 1) The figure above shows the same power supply for both the main circuit and control circuit.
The solid lines show completed wiring while the broken lines and double-dashed lines are still in need of wiring. (For the double-dashed lines, use the power supply attached to the unit)
Note 2) If the power supplies for the main circuit and control circuit differ, power wiring between the 1/L1-OFF button broken lines and the 3/L2-TH95 double-dashed lines is unnecessary, but the OFF button and TH95 terminal should be wired from the separate control circuit power supply.

Model Name	Model Name	Model Name	Model Name
MS-T10KP	MS-T65KP	MS-N125KP	MS-N400KP
MS-T12KP	MS-T80KP	MS-N150KP	
MS-T21KP	MS-T100KP	MS-N180KP	
MS-T35KP		MS-N220KP	
MS-T50KP		MS-N300KP	

Reversing Magnetic Starters (Enclosed Type)

Enclosure (Case): Steel
Paint Color: Munsell 5Y7/1
Protective Structure: IP20

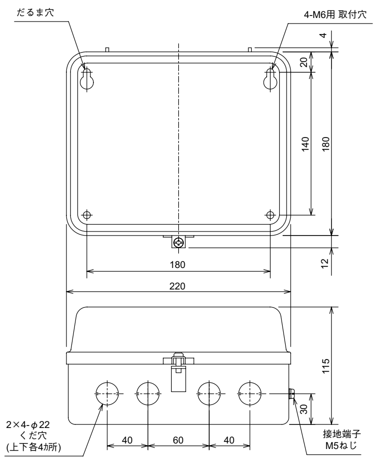


Fig. 9. MS-2xT21KP (2.0 kg)

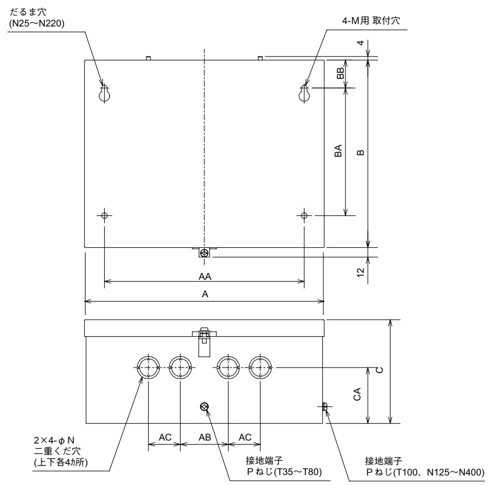
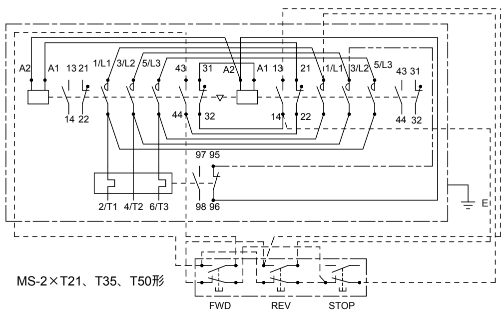
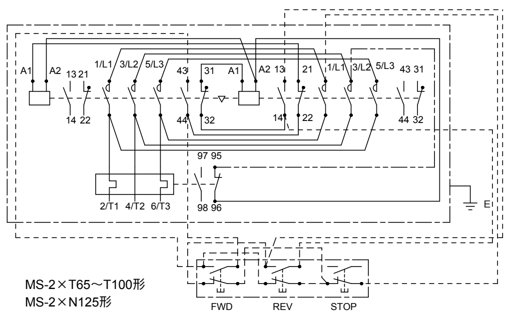


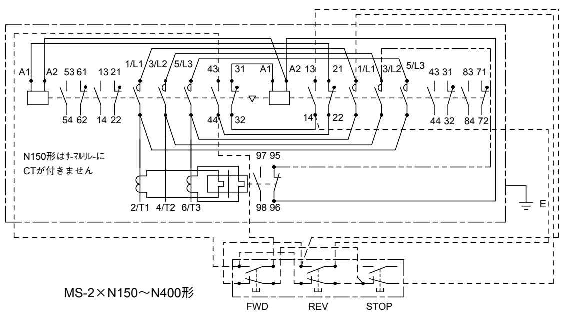
Fig. 10. MS-2xT35KP to T100KP, MS-2xN125KP to N400KP

Note 1. 3 rubber bushings are included for MS-2xT21 to T50.
Note 2. MS-2xT □ and MS-2xN □ types can also be manufactured.

Model	Dimensions													Weight [kg]
	A	AA	AB	AC	B	BA	BB	C	CA	M	N	O	P	
MS-2xT35KP, T50KP	300	250	60	40	235	160	35	130	70	M6	22 to 28	4	M5	4.7
MS-2xT65KP/T80KP	320	270	100	60	270	240	15	140	70	M6	22 to 35	4	M6	6.6
MS-2xT100KP	410	350	140	60	330	270	35	154	87	M6	22 to 35	4	M6	10
MS-2xN125KP	440	370	120	80	424	350	39	170	94	M8	44 to 50	4	M6	15.5
MS-2xN150KP/N180KP/N220KP	520	440	160	80	524	440	44	209	90	M8	44 to 50	4	M6	20.5/28.5/28.5
MS-2xN300KP/N400KP	600	500	130	120	604	500	54	230	100	M10	62 to 78	4	M8	46/47







Note 1) The figure above shows the same power supply for both the main circuit and control circuit.
The solid lines show completed wiring while the broken lines and double-dashed lines are still in need of wiring. (For the double-dashed lines, use the power supply attached to the unit)
Note 2) If the power supplies for the main circuit and control circuit differ, power wiring between the 1/L1-STOP button broken lines and the 3/L2-TH95 double-dashed lines is unnecessary, but the STOP button and TH95 terminal should be wired from the separate control circuit power supply.

Model Name	Model Name	Model Name	Model Name
MS-2xT21KP	MS-2xT80KP	MS-2xN125KP	MS-2xN300KP
MS-2xT35KP	MS-2xT100KP	MS-2xN150KP	MS-2xN400KP
MS-2xT50KP		MS-2xN180KP	
MS-2xT65KP		MS-2xN220KP	

4.3 MSOD/SD-□ DC Operated Magnetic Starters/Magnetic Contactors

The operation coil is dedicated for DC

- The operation coil can be used with a separate power supply for DC operation.
  (Main circuit can use both AC and DC)
- Electromagnet buzzing does not occur.
- The coil doesn't use saving resistance so there is no inrush current.
  (Excluding N600, N800)
- SD-T12 to T32 and SD-N600, N800 type operation coil terminals have polarity.
  Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.

SD-N220

Ratings/Specifications (Standard Applicability)

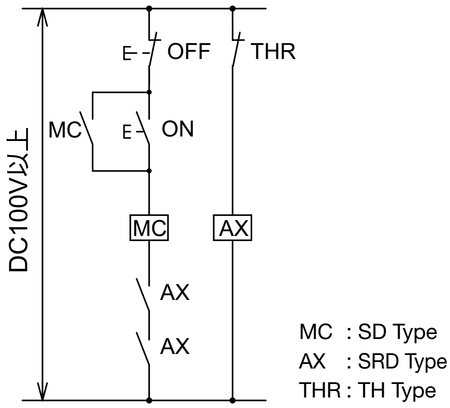
<table>
<tr><th rowspan="3">Magnetic Contactors</th><th rowspan="3">Magnetic Starters (Note 10)</th><th colspan="4">Rated Capacity [kW]</th><th colspan="6">Rated Operating Current [A]</th><th rowspan="2">Conventional Free Air Thermal Current</th><th colspan="2" rowspan="2">Auxiliary Contact</th><th colspan="2" rowspan="2">Compatible Thermal Overload Relays</th></tr>
<tr><th colspan="4">Three-Phase Squirrel-cage Motor (Category AC-3)</th><th colspan="4">Three-Phase Squirrel-cage Motor (Category AC-3)</th><th colspan="2">Resistive Load (Category AC-1)</th></tr>
<tr><th>AC220 to 240 V</th><th>AC380 to 440 V</th><th>AC500 V</th><th>AC690 V</th><th>AC220 to 240 V</th><th>AC380 to 440 V</th><th>AC500 V</th><th>AC690 V</th><th>AC100 to 240 V</th><th>AC380 to 440 V</th><th>Ith [A]</th><th>Standard (Special)</th><th>Additional Unit Model Names x Pieces</th><th>Model Name</th><th>Heater Designation Range [A]</th></tr>
<tr><td>SD-T12(BC)</td><td>MSOD-T12(BC)KP</td><td>3.5[2.7]</td><td>5.5[4]</td><td>5.5[5.5]</td><td>5.5</td><td>13[13]</td><td>12[9]</td><td>9[9]</td><td>7</td><td>20</td><td>13</td><td>20</td><td rowspan="2">1a1b(2a)</td><td rowspan="8">UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2</td><td rowspan="2">TH-T18(BC)KP</td><td>0.12 to 11</td></tr>
<tr><td>SD-T20(BC)</td><td>MSOD-T20(BC)KP</td><td>4.5[3.7]</td><td>7.5[7.5]</td><td>7.5[7.5]</td><td>7.5</td><td>18[18]</td><td>18[18]</td><td>17[17]</td><td>9</td><td>20</td><td>18</td><td>20</td><td>0.12 to 15</td></tr>
<tr><td>SD-T21(BC)</td><td>MSOD-T21(BC)KP</td><td>5.5[4]</td><td>11[7.5]</td><td>11[7.5]</td><td>7.5</td><td>25[20]</td><td>23[20]</td><td>17[17]</td><td>9</td><td>32</td><td>32</td><td>32</td><td>2a2b</td><td>TH-T25(BC)KP</td><td>0.24 to 22</td></tr>
<tr><td>SD-T32(BC)</td><td>—</td><td>7.5[7.5]</td><td>15[15]</td><td>15[11]</td><td>11</td><td>32[32]</td><td>32[32]</td><td>24[20]</td><td>12</td><td>32</td><td>32</td><td>32</td><td>—</td><td>—</td><td>—</td></tr>
<tr><td rowspan="2">SD-T35(BC)</td><td rowspan="2">MSOD-T35(BC)KP</td><td rowspan="2">11[7.5]</td><td rowspan="2">18.5[15]</td><td rowspan="2">18.5[15]</td><td rowspan="2">15</td><td rowspan="2">40[35]</td><td rowspan="2">40[32]</td><td rowspan="2">32[26]</td><td rowspan="2">17</td><td rowspan="2">60</td><td rowspan="2">60</td><td rowspan="2">60</td><td rowspan="9">2a2b</td><td>TH-T25(BC)KP</td><td>0.24 to 22</td></tr>
<tr><td>TH-T50(BC)KP</td><td>29</td></tr>
<tr><td rowspan="2">SD-T50(BC)</td><td rowspan="2">MSOD-T50(BC)KP</td><td rowspan="2">15[11]</td><td rowspan="2">22[22]</td><td rowspan="2">25[22]</td><td rowspan="2">22</td><td rowspan="2">55(50)[50] (Note 1)</td><td rowspan="2">50[48]</td><td rowspan="2">38[38]</td><td rowspan="2">26</td><td rowspan="2">80</td><td rowspan="2">80</td><td rowspan="2">80</td><td>TH-T25(BC)KP</td><td>0.24 to 22</td></tr>
<tr><td>TH-T50(BC)KP</td><td>29 to 42</td></tr>
<tr><td>SD-T65(CW)</td><td>MSOD-T65(CW)KP</td><td>18.5[15]</td><td>30[30]</td><td>37[30]</td><td>30</td><td>65[65]</td><td>65[65]</td><td>60[45]</td><td>38</td><td>100</td><td>100</td><td>100</td><td rowspan="3">UN-AX2, 4 x 1 or UN-AX11 x 2</td><td rowspan="2">TH-T65KP</td><td rowspan="2">15 to 54</td></tr>
<tr><td rowspan="2">SD-T80(CW)</td><td rowspan="2">MSOD-T80(CW)KP (Note 8)</td><td rowspan="2">22[19]</td><td rowspan="2">45[37]</td><td rowspan="2">45[45]</td><td rowspan="2">45</td><td rowspan="2">85[80]</td><td rowspan="2">85[80]</td><td rowspan="2">75[75]</td><td rowspan="2">52</td><td rowspan="2">120</td><td rowspan="2">120</td><td rowspan="2">120</td></tr>
<tr><td>TH-T100KP</td><td>67</td></tr>
<tr><td rowspan="2">SD-T100</td><td rowspan="2">MSOD-T100KP</td><td rowspan="2">30[22]</td><td rowspan="2">55[45]</td><td rowspan="2">55[45]</td><td rowspan="2">55</td><td rowspan="2">105[100]</td><td rowspan="2">105[93]</td><td rowspan="2">85[75]</td><td rowspan="2">65</td><td rowspan="2">150</td><td rowspan="2">150</td><td rowspan="2">150</td><td rowspan="3">UN-AX80 x 2</td><td>TH-T65KP</td><td>15 to 54</td></tr>
<tr><td>TH-T100KP</td><td>67, 82</td></tr>
<tr><td>SD-N125</td><td>MSOD-N125KP</td><td>37[30]</td><td>60[60]</td><td>60[60]</td><td>60</td><td>125[125]</td><td>120[120]</td><td>90[90]</td><td>70</td><td>150</td><td>150</td><td>150</td><td rowspan="8">2a2b</td><td rowspan="2">TH-N120KP (TA)</td><td>42 to 105</td></tr>
<tr><td>SD-N150</td><td>MSOD-N150KP</td><td>45[37]</td><td>75[75]</td><td>90[90]</td><td>90</td><td>150[150]</td><td>150[150]</td><td>140[140]</td><td>100</td><td>200</td><td>200</td><td>200</td><td rowspan="5">UN-AX150 x 2</td><td>42 to 125</td></tr>
<tr><td>SD-N180</td><td>MSOD-N180KP</td><td>55[45]</td><td>90[90]</td><td>110[110]</td><td>110</td><td>180[180]</td><td>180[180]</td><td>180[180]</td><td>120</td><td>260</td><td>260</td><td>260</td><td rowspan="2">TH-N220KPRH</td><td>82 to 150</td></tr>
<tr><td>SD-N220</td><td>MSOD-N220KP</td><td>75[55]</td><td>132[110]</td><td>132[132]</td><td>132</td><td>250[220]</td><td>250[220]</td><td>200[200]</td><td>150</td><td>260</td><td>260</td><td>260</td><td>82 to 180</td></tr>
<tr><td>SD-N300</td><td>MSOD-N300KP</td><td>90[75]</td><td>160[150]</td><td>160[160]</td><td>200</td><td>300[300]</td><td>300[300]</td><td>250[250]</td><td>220</td><td>350</td><td>350</td><td>350</td><td rowspan="2">TH-N400KPRH</td><td>105 to 250</td></tr>
<tr><td>SD-N400</td><td>MSOD-N400KP</td><td>125[110]</td><td>220[200]</td><td>225[200]</td><td>250</td><td>400[400]</td><td>400[400]</td><td>350[350]</td><td>300</td><td>450</td><td>450</td><td>450</td><td>105 to 330</td></tr>
<tr><td>SD-N600</td><td>—</td><td>190[160]</td><td>330[300]</td><td>330[300]</td><td>330</td><td>630[630]</td><td>630[630]</td><td>500[500]</td><td>420</td><td>660</td><td>660</td><td>660</td><td rowspan="2">UN-AX600 x 1</td><td rowspan="2">TH-N600KP (Note 4)</td><td>250 to 500</td></tr>
<tr><td>SD-N800</td><td>—</td><td>220[200]</td><td>440[400]</td><td>500[400]</td><td>500</td><td>800[800]</td><td>800[800]</td><td>720[720]</td><td>630</td><td>800</td><td>800</td><td>800</td><td>250 to 600</td></tr>
</table>

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
Note 2. Enclosed types are not manufactured.
Note 3. Also manufactured as reversible types (MSOD-2x□ types excluding SD-2x□, T32 and N600/N800).
Note 4. Use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-□).
Note 5. The magnetic starters listed below are also manufactured.
- Models with 2E Thermal Overload Relay: MSOD-T12KP to T100KP, MSOD-N125KP to N400KP
- Models with Quick Trip Thermal Overload Relay: MSOD-T12FSKP to T100FSKP, MSOD-T21FS to T100FS
- Models with Delayed Trip Thermal Overload Relay: MSOD-T12SR to T100SR, MSOD-T21KPSR to T100KPSR, MSOD-N125SR to N400SR, MSOD-N125KPSR to N400KPSR

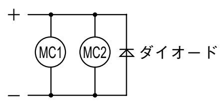
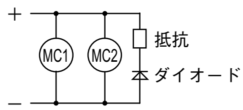
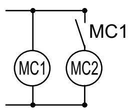
Note 6. Refer to page 51 for information regarding application to resistive loads and capacitive loads.
Note 7. The main contact minimum operating Voltage and current differ depending on the allowable fault rate. Refer to page 42 for details.
Note 8. MSOD-T80CW heater designation 67A is not manufactured.
Note 9. MSOD-T□ and MSOD-N□ types can also be manufactured.
Note 10. SD-T12 and SD-T20 with spring clamp terminals (SQ) can also be manufactured.

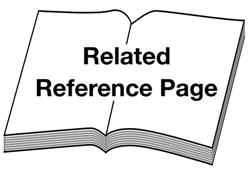
Handling

(1) T65 to T100 type and N125 to N800 type coils of DC100V or more cannot be switched by the auxiliary contacts of thermal overload relays (TH- ☐ types). Switch using the contactor relay (SR or SRD type) contacts as per the figure below.



(2) Connecting differing DC operated magnetic contactor control circuits in parallel and simultaneously switching OFF can cause flip-flopping. As such, use one of the circuits listed below.
(MC1: Small Frame, MC2: Large Frame)

Circuit	Effect of Changing Circuit
Circuit Example 1 	· It is necessary to restrict the polarity of the control circuit power supply. · The open time of MC2 increases.
Circuit Example 2 	· It is necessary to restrict the polarity of the control circuit power supply. · The open time of MC2 increases.
Circuit Example 3 	· The time until MC2 is activated increases.



Item	Reference Page	Remarks
· Main Contact Rating	Page 39	—
· Auxiliary Contact Rating	Page 41	—
· Operation Coil	Page 44	—
· Properties	Page 45	—
· Performance	Page 46	—
· Outline Drawings/Contact Arrangements	Page 93	—
· How to Order	Page 130	—
· Combining with Optional Units	Page 194	—

● Outline Drawings/Contact Arrangements (DC Operated Magnetic Starters/Magnetic Contactors)

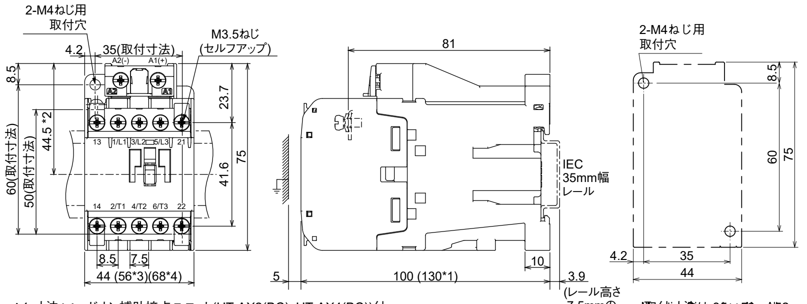
■ T12/T20 (The diagrams show models without "BC".)

4

Non-Reversing

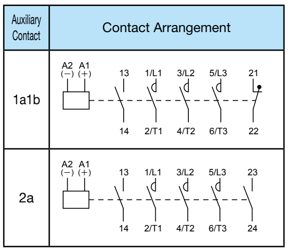
SD-T12(BC)
SD-T20(BC)

0.42 kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Mounting Dimensions Also Allow For 35 x 50 to 52, 34 x 52 Mounting

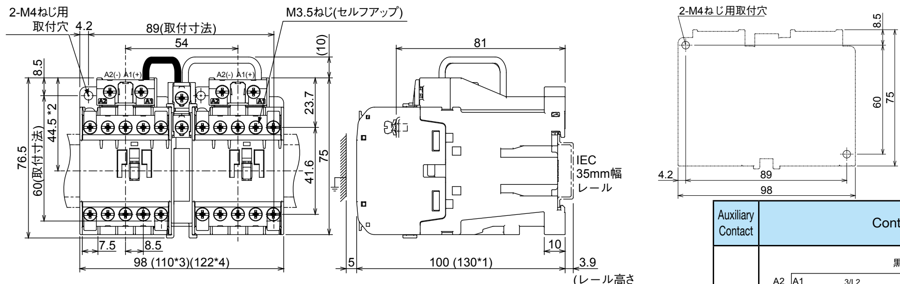


Model Name	Model Name
SD-T12	SD-T12BC
SD-T20	SD-T20BC

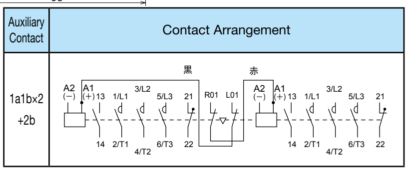
Reversing

SD-2 × T12(BC)
SD-2 × T20(BC)

0.88 kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

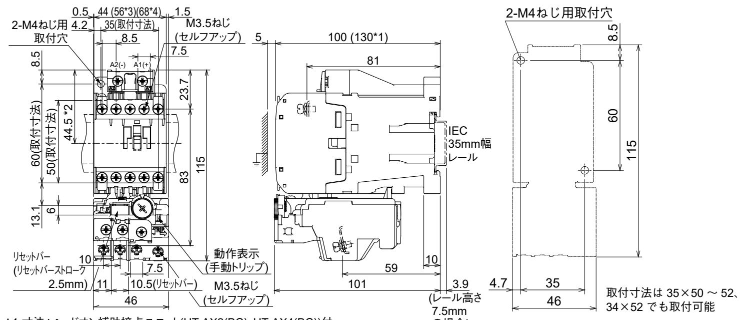


Model Name	Model Name
SD-2xT12	SD-2xT12BC
SD-2xT20	SD-2xT20BC

Non-Reversing

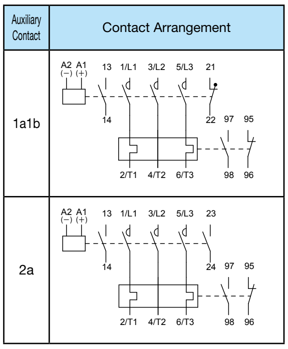
MSOD-T12(BC)KP
MSOD-T20(BC)KP

0.53 kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Mounting Dimensions Also Allow
For 35 x 50 to 52, 34 x 52 Mounting

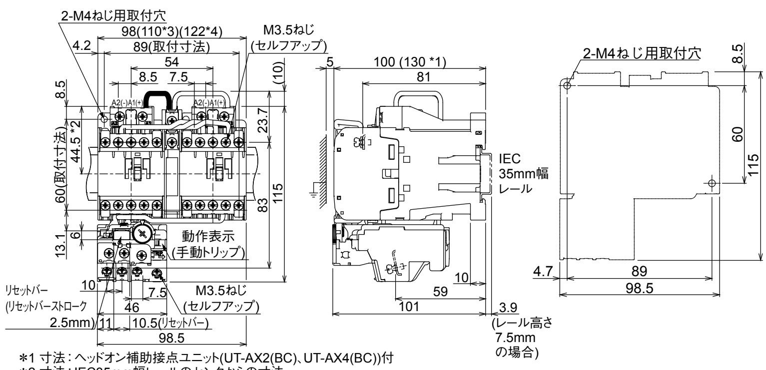


Model Name	Model Name
MSOD-T12KP	MSOD-T12BCKP
MSOD-T20KP	MSOD-T20BCKP

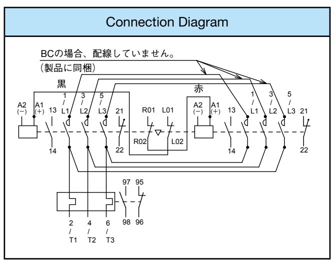
Reversing

MSOD-2 x T12(BC)KP
MSOD-2 x T20(BC)KP

1.0 kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

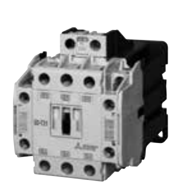


Model Name	Model Name
MSOD-2xT12KP	MSOD-2xT12BCKP
MSOD-2xT20KP	MSOD-2xT20BCKP

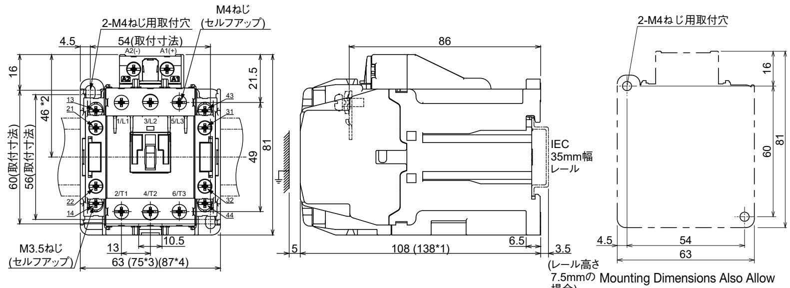
T21 (The diagrams show models without "BC".)

Non-Reversing

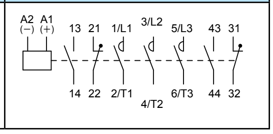
SD-T21(BC)



0.59 kg



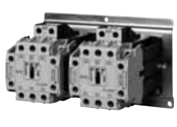
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Auxiliary Contact	Contact Arrangement
2a2b	

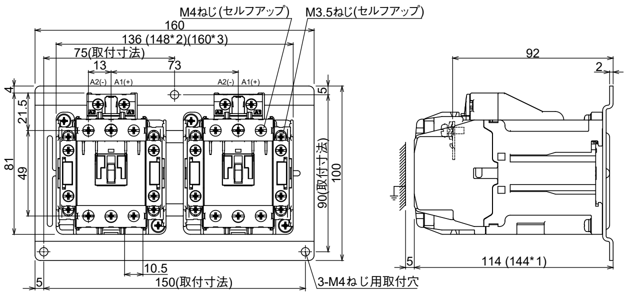
Model Name
SD-T21
SD-T21BC

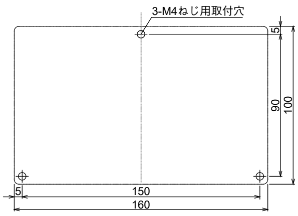
Reversing

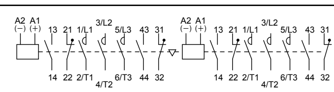
SD-2 × T21(BC)



1.44 kg





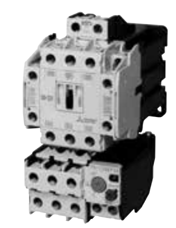
Auxiliary Contact	Contact Arrangement
2a2b ×2	

*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2、*3 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*2は1個、*3は2個(両側)付

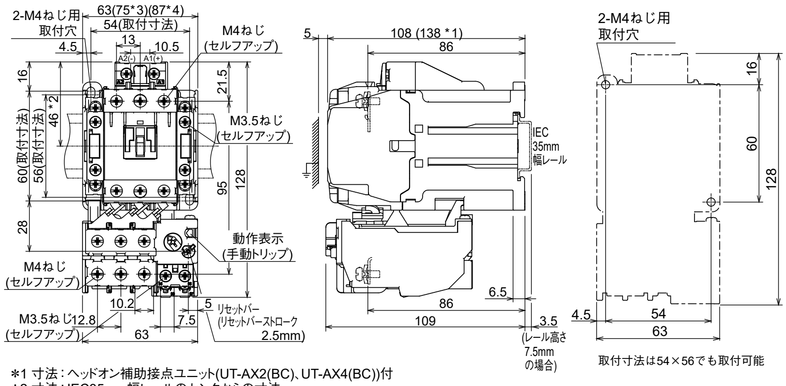
Model Name
SD-2xT21
SD-2xT21BC

Non-Reversing

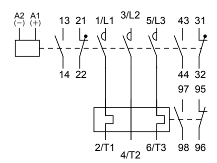
MSOD-T21(BC)KP



0.77 kg



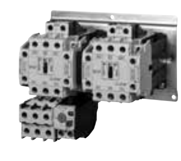
*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個(両側)付

Auxiliary Contact	Contact Arrangement
2a2b	

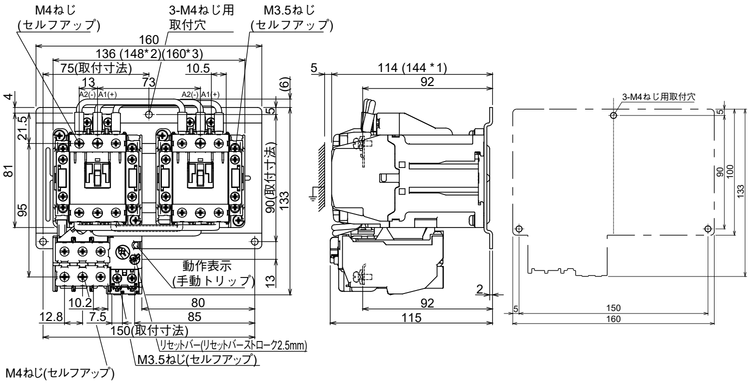
Model Name
MSOD-T21KP
MSOD-T21BCKP

Reversing

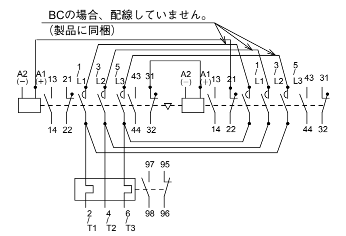
MSOD-2 × T21(BC)KP



1.64 kg



Connection Diagram



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2、*3 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*2は1個、*3は2個(両側)付

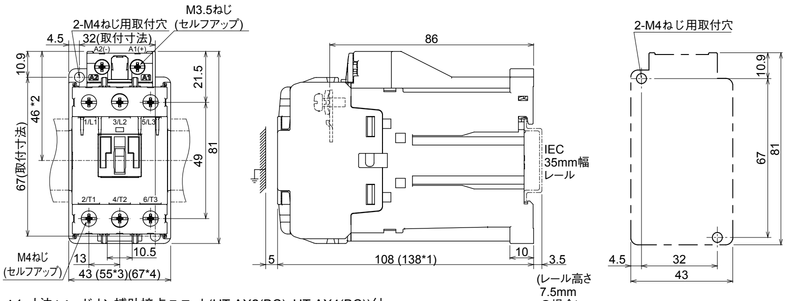
Model Name
MSOD-2xT21KP
MSOD-2xT21BCKP

■ T32 (The diagrams show models without "BC".)

Non-Reversing

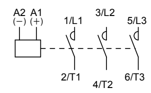
SD-T32(BC)

0.55 kg



*1 寸法：ヘッドオン補助接点ユニット(UT-AX2(BC)、UT-AX4(BC))付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット(UT-AX11(BC))付…*3は1個、*4は2個（両側）付

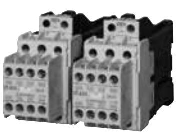
Contact Arrangement



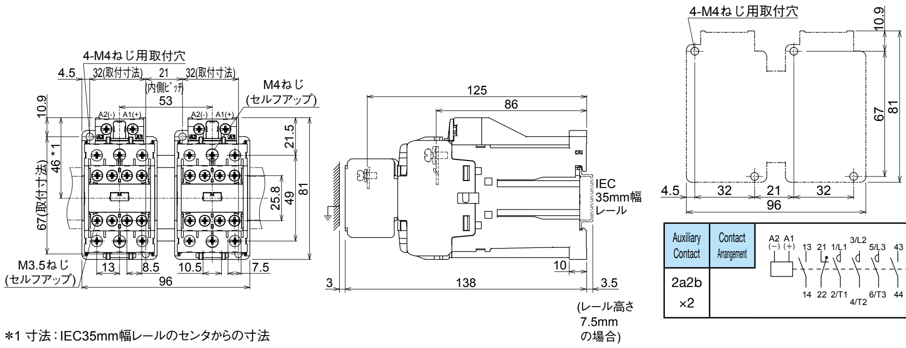
Model Name
SD-T32
SD-T32BC

Reversing

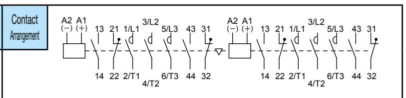
SD-2 × T32(BC)



1.22 kg



*1 寸法：IEC35mm幅レールのセンタからの寸法

Auxiliary Contact	Contact Arrangement
2a2b ×2	

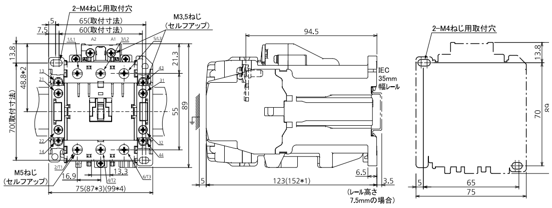
Model Name
SD-2xT32
SD-2xT32BC

T35/T50 (The diagrams show models without "BC".)

Non-Reversing

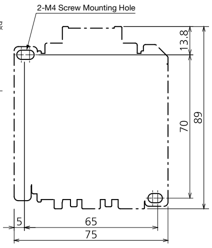
SD-T35(BC)
SD-T50(BC)

0.85 kg

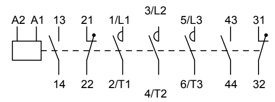


*1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
*3 は 1 個、*4 は 2 個（両側）付

取付寸法は 60×70
でも取付可能



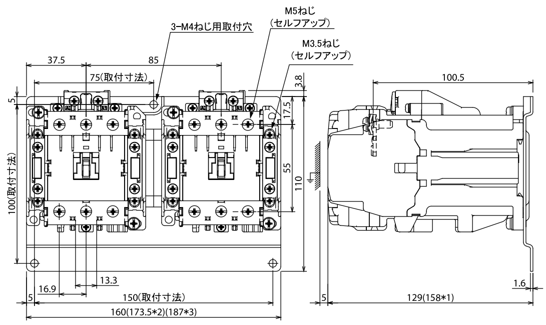
Mounting Dimensions Also Allow
For 60 x 70 Mounting

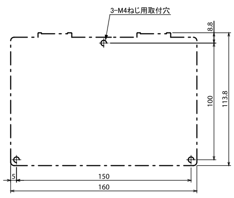
Auxiliary Contact	Contact Arrangement
2a2b	

Model Name	Model Name
SD-T35	SD-T35BC
SD-T50	SD-T50BC

Reversing

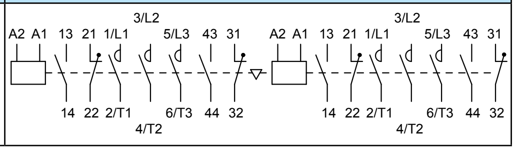
SD-2 × T35(BC)
SD-2 × T50(BC)





*1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
*2、*3 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
*2 は 1 個、*3 は 2 個（両側）付

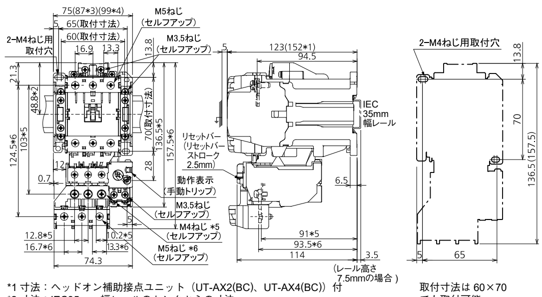
1.96 kg

Auxiliary Contact	Contact Arrangement
2a2b×2	

Model Name	Model Name
SD-2xT35	SD-2xT35BC
SD-2xT50	SD-2xT50BC

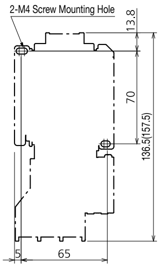
Non-Reversing

MSOD-T35(BC)KP
MSOD-T50(BC)KP



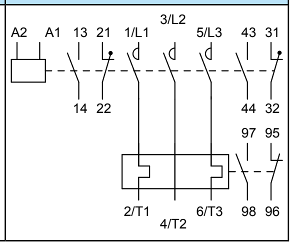
*1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
*2 寸法：IEC35mm幅レールのセンタからの寸法
*3、*4 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
*3 は 1 個、*4 は 2 個（両側）付
*5 寸法：ヒータ呼び 22A 以下、*6 寸法：ヒータ呼び 29A 以上

取付寸法は 60×70
でも取付可能



Mounting Dimensions Also Allow
For 60 x 70 Mounting

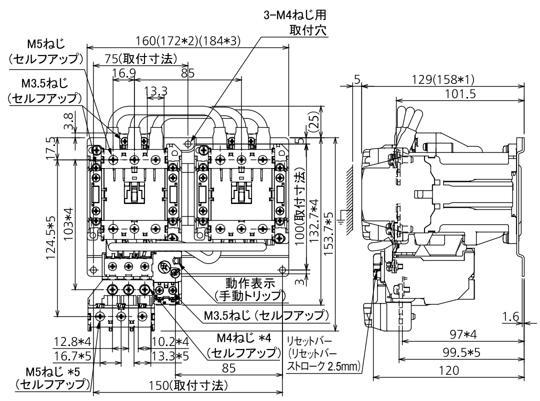
1.09 kg

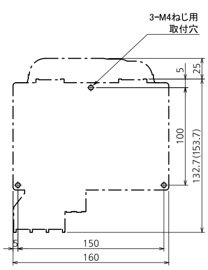
Auxiliary Contact	Contact Arrangement
2a2b	

Model Name	Model Name
MSOD-T35KP	MSOD-T35BCKP
MSOD-T50KP	MSOD-T50BCKP

Reversing

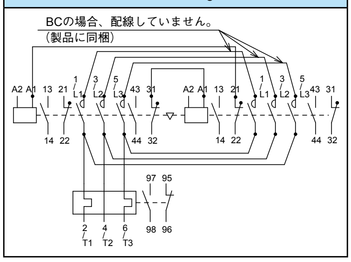
MSOD-2 × T35(BC)KP
MSOD-2 × T50(BC)KP





*1 寸法：ヘッドオン補助接点ユニット（UT-AX2(BC)、UT-AX4(BC)）付
*2、*3 寸法：サイドオン補助接点ユニット（UT-AX11(BC)）付
*2 は 1 個、*3 は 2 個（両側）付

2.2 kg

Connection Diagram


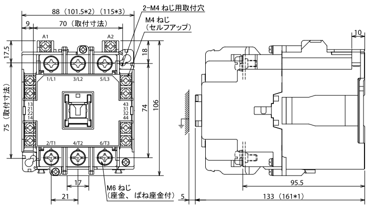
Model Name	Model Name
MSOD-2xT35KP	MSOD-2xT35BCKP
MSOD-2xT50KP	MSOD-2xT50BCKP

T65/T80 (The diagrams show models without "CW".)

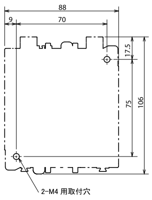
Non-Reversing

SD-T65(CW)
SD-T80(CW)

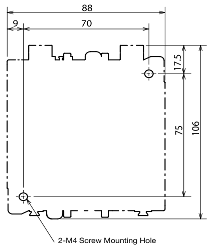
2.1 kg



*1 寸法：ヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付
*2、*3 寸法：サイドオン補助接点ユニット（UN-AX11）付
*2 は 1 個、*3 は 2 個（両側）付

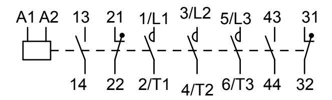


取付寸法は 77×82（M5 ねじ）でも取付可能



Mounting Dimensions Also Allow For 77 x 82 (M5 Screw) Mounting

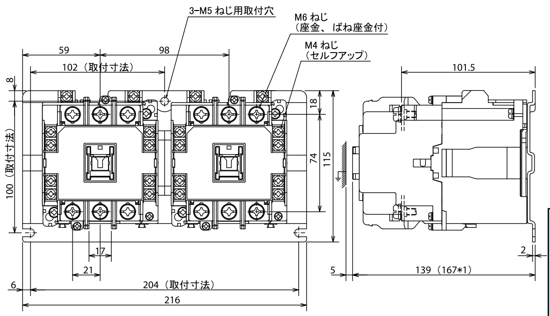
Contact Arrangement



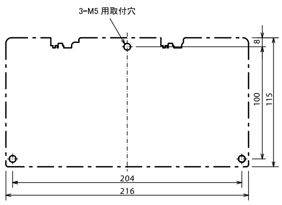
Model Name
SD-T65
SD-T80

Reversing

SD-2 × T65(CW)
SD-2 × T80(CW)

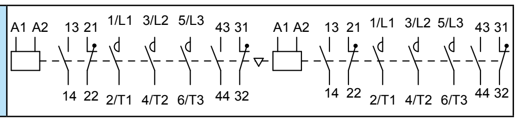


*1 寸法：ヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付



4.6 kg

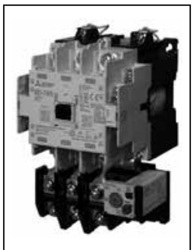
Contact Arrangement



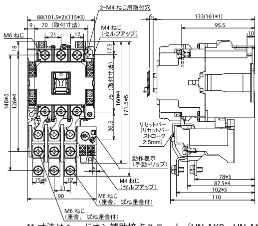
Model Name
SD-2xT65
SD-2xT80

Non-Reversing

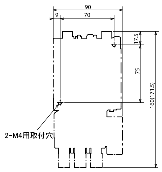
MSOD-T65(CW)KP
MSOD-T80(CW)KP



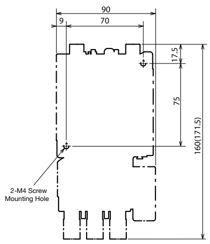
2.4 kg



*1 寸法はヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付を示します。
*2、*3 寸法はサイドオン補助接点ユニット（UN-AX11）付を示し、*2 は 1 個付、
*3 は 2 個（両側）付を示します。
*4 寸法はヒータ呼び 54A 以下の寸法を示します。
*5 寸法はヒータ呼び 67A の寸法を示します。（MSOD-T80CW 67A は製作不可）

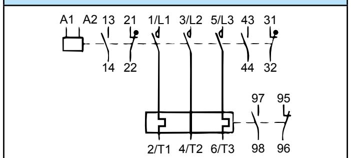


取付寸法は 77×82（M5 ねじ）でも取付可能



Mounting Dimensions Also Allow For 77 x 82 (M5 Screw) Mounting

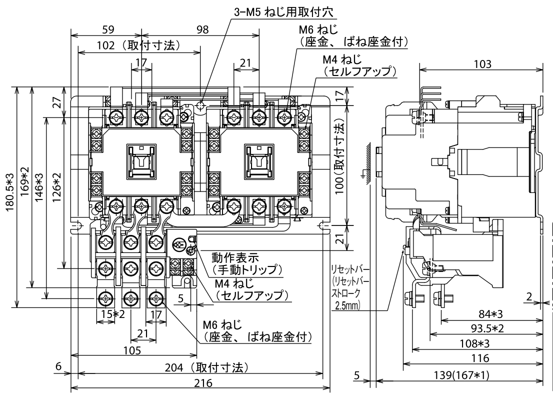
Contact Arrangement

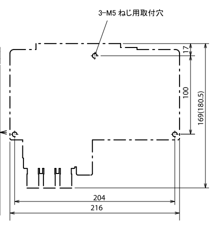


Model Name
MSOD-T65KP
MSOD-T80KP

Reversing

MSOD-2 x T65(CW)KP
MSOD-2 x T80(CW)KP

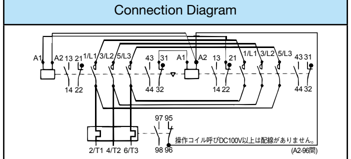




4.9 kg

*1 寸法はヘッドオン補助接点ユニット（UN-AX2、UN-AX4）付を示します。
*2 寸法はヒータ呼び 54A 以下の寸法を示します。
*3 寸法はヒータ呼び 67A の寸法を示します。（MSOD-2×T80CW 67A は製作不可）

Connection Diagram



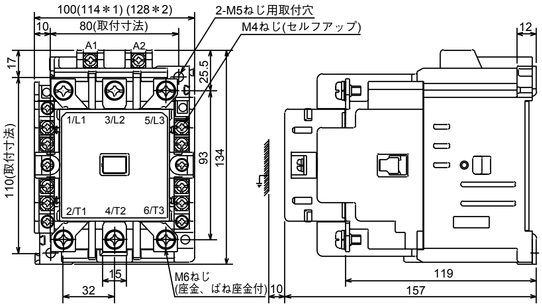
Model Name
MSOD-2xT65KP
MSOD-2xT80KP

T100

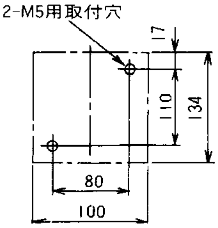
Non-Reversing

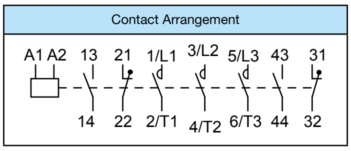
SD-T100

3.0 kg



＊1、＊2寸法：サイドオン補助接点ユニット(UN-AX80)付・・・＊1は1個、＊2は2個(両側)付

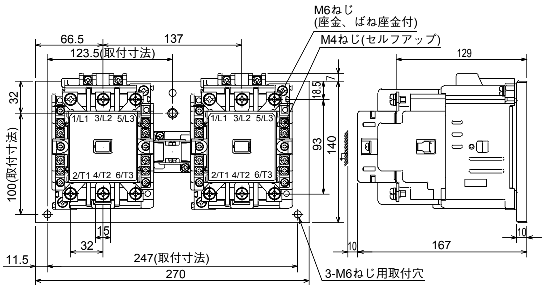




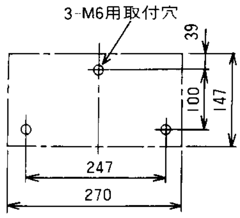
Model Name
SD-T100

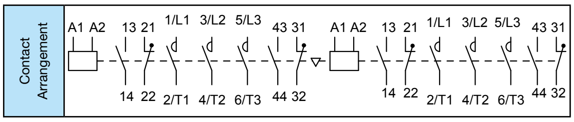
Reversing

SD-2xT100



6.9 kg

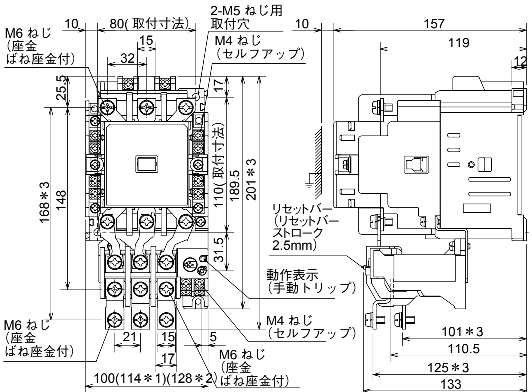




Model Name
SD-2xT100

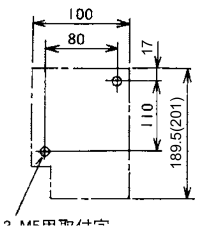
Non-Reversing

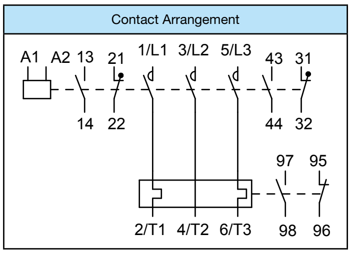
MSOD-T100



＊1、＊2 寸法はサイドオン補助接点ユニット（UN-AX80）付を示し、
＊1 は 1 個付、＊2 は 2 個両側付を示します。
＊3 はヒータ呼び 67A,82A の場合を示します。

3.5 kg

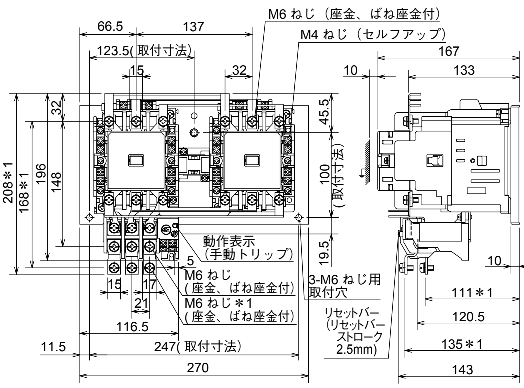




Model Name
MSOD-T100KP

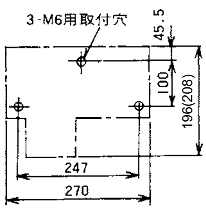
Reversing

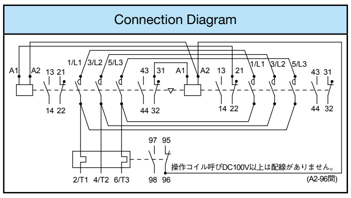
MSOD-2×T100



＊1 はヒータ呼び 67A、82A の場合を示します。

7.2 kg





Model Name
MSOD-2xT100KP

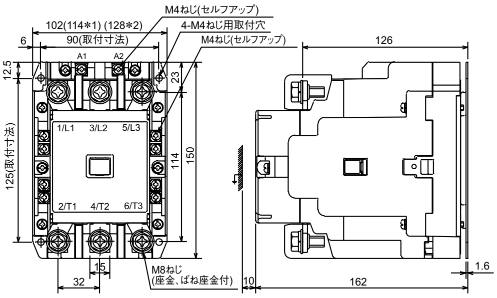
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

N125

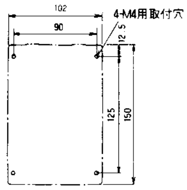
Non-Reversing

SD-N125

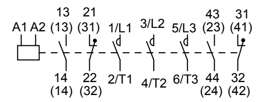
4.3 kg



*1、*2寸法:サイドオン補助接点ユニット(UN-AX80)付…*1は1個、*2は2個(両側)付



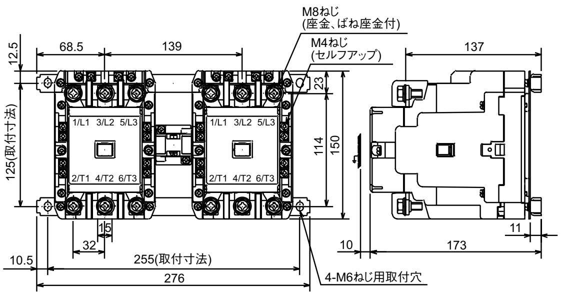
Contact Arrangement

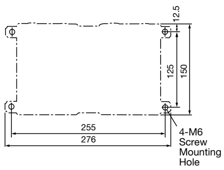


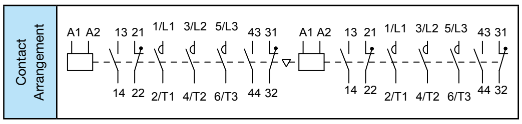
Model Name
SD-N125

Reversing

SD-2xN125







9.2 kg

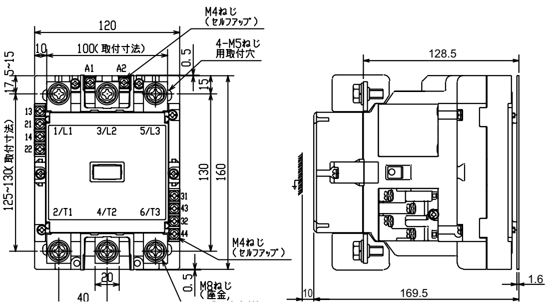
Model Name
SD-2xN125

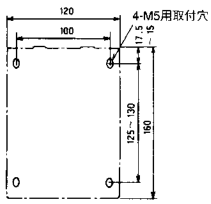
N150

Non-Reversing

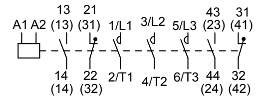
SD-N150

4.8 kg





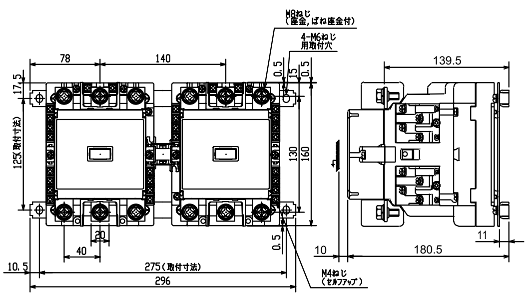
Contact Arrangement

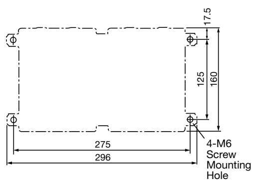


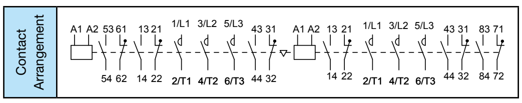
Model Name	Model Number
SD-N150	SN2971

Reversing

SD-2xN150







10 kg

Model Name
SD-2xN150

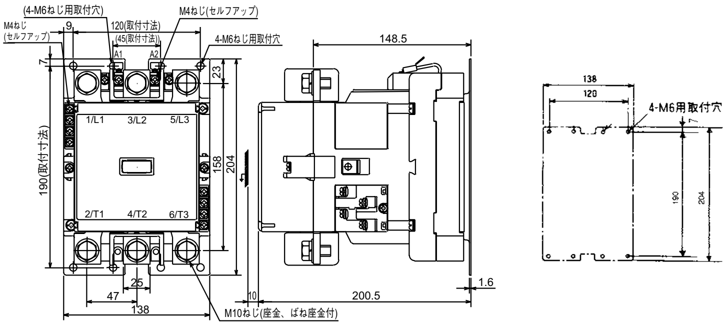
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

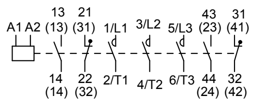
N220

Non-Reversing

SD-N220

7.5 kg

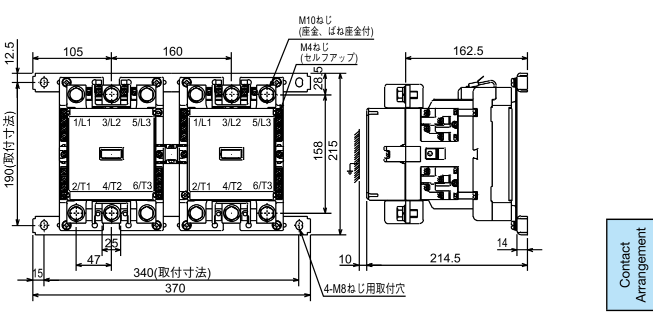


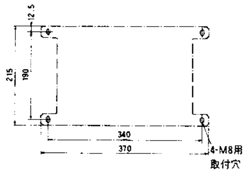
Contact Arrangement


Model Name	Model Number
SD-N220	SN2981

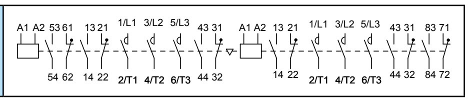
Reversing

SD-2×N220





17 kg

Contact Arrangement


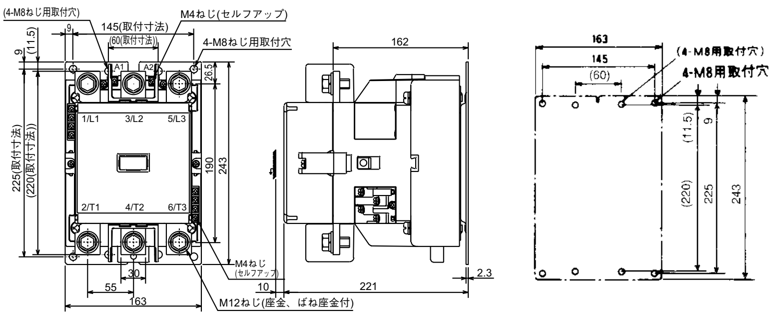
Model Name
SD-2xN220

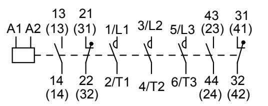
N300/N400

Non-Reversing

SD-N300
SD-N400

13 kg
13.5 kg

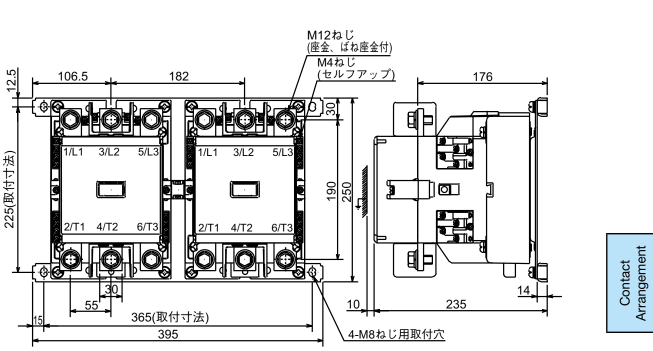


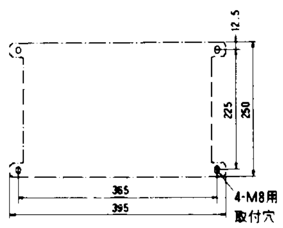
Contact Arrangement


Model Name	Model Number
SD-N300	SN2991
SD-N400	SN3001

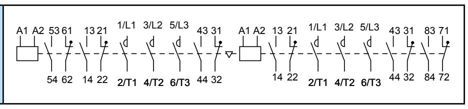
Reversing

SD-2×N300
SD-2×N400





28 kg
29 kg

Contact Arrangement


Model Name
SD-2xN300
SD-2xN400

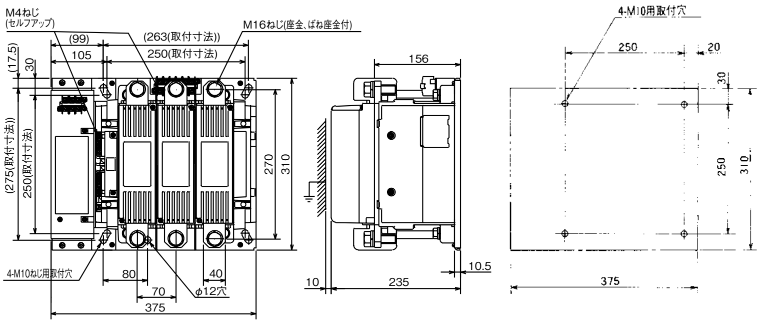
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

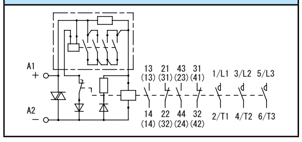
■ N600/N800

Non-Reversing

SD-N600
SD-N800

29 kg

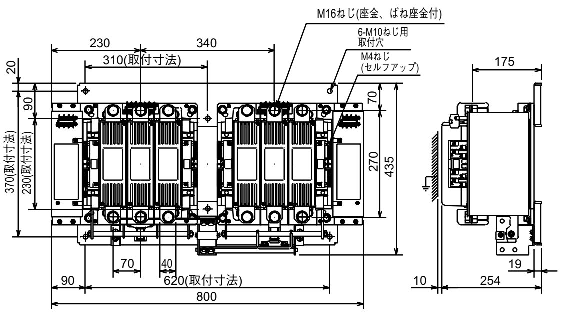


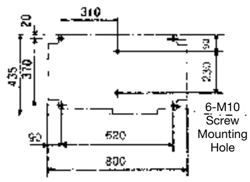


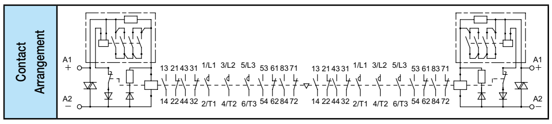
Model Name
SD-N600
SD-N800

Reversing

SD-2 × N600
SD-2 × N800





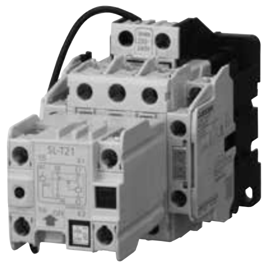


Model Name
SD-2xN600
SD-2xN800

64 kg

4.4 MSOL(D)/SL(D)-☐ Mechanically Latched Magnetic Starters/ Magnetic Contactors

Contact doesn't open when power failures or voltage drops occur



SL-T21

- Installing a reliable mechanical latch mechanism to magnetic contactors and using the equipped closing and opening coils allows mechanical retention in the closed state. (Can also be operated manually)
- The magnetic contactor will not release due to power failures, momentary power failures or voltage drops.
- Power saving and no noise type as the coil is only momentarily energized and doesn't consume power in the regular state.
- Suitable for distribution panels, street lights, important facilities within buildings or the memory circuits of plants and more.
- Suitable for AC/DC power supply switching and power purchasing/self-generated power supply switching, with 2 units combined.
  (Applicable with MSOL(D)/SL(D)-2x ☐ types that have a mechanical interlock equipped as standard)

Ratings/Specifications (Standard Applicability)

Magnetic Contactors	Magnetic Starters (Note 8)	Rated Capacity [kW] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Resistive Load (Category AC-1)		Conventional Free Air Thermal Current Ith [A]	Auxiliary Contact (for Reversing)			Compatible Thermal Overload Relays	
		220 to 240 V	380 to 440 V	500 V	690 V	220 to 240 V	380 to 440 V	500 V	690 V	200 to 240 V	380 to 440 V		Valid	For Self-Demagnetization (Built-in)	Additional Unit Model Names × Pieces	Model Name	Heater Designation Range [A]
SL-T21(BC)	MSOL-T21(BC)KP	5.5 [4]	11 [7.5]	11 [7.5]	7.5	25 [20]	23 [20]	17 [17]	9	32	32	32	2a2b (2a2b × 2)	1a1b (1a1b × 2)	UT-AX11(BC) x2	TH-T25(BC)KP	0.24 to 22
SL-T35(BC)	MSOL-T35(BC)KP	11 [7.5]	18.5 [15]	18.5 [15]	15	40 [35]	40 [32]	32 [26]	17	60	60	60				TH-T25(BC)KP TH-T50(BC)KP	0.24 to 22 29
SL-T50(BC)	MSOL-T50(BC)KP	15 [11]	22 [22]	25 [22]	22	55 (50)[50]	50 [48]	38 [38]	26	80	80	80				TH-T25(BC)KP TH-T50(BC)KP	0.24 to 22 29 to 42
SL-T65	MSOL-T65KP	18.5 [15]	30 [30]	37 [30]	30	65 [65]	65 [65]	60 [45]	38	100	100	100			UN-AX11x2	TH-T65KP	15 to 54
SL-T80	MSOL-T80KP	22 [19]	45 [37]	45 [45]	45	85 [80]	85 [80]	75 [75]	52	120	120	120				TH-T100KP	67
SL-T100	MSOL-T100KP	30 [22]	55 [45]	55 [45]	55	105 [100]	105 [93]	85 [75]	65	150	150	150	1a2b (1a2b × 2)		UN-AX80x2 (UN-AX80x2)	TH-T65KP TH-T100KP	15 to 54 67, 82
SL-N125	MSOL-N125KP	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70	150	150	150	1a2b (1a2b × 2)			TH-N120KP(TA)	42 to 105
SL-N150	MSOL-N150KP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200	1a2b (2a3b × 2)		UN-AX150x2 (-)		42 to 125
SL-N220	MSOL-N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260				TH-N220KPRH	82 to 180
SL-N300	MSOL-N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350				TH-N400KPRH	105 to 250
SL-N400	MSOL-N400KP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450					105 to 330
SL-N600	—	190[160]	330[300]	330[300]	330	630[630]	630[630]	500[500]	420	660	660	660	1a2b (3a4b × 2)		UN-AX600x1 (-)	TH-N600KP (Note 3)	250 to 500
SL-N800	—	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800					250 to 660

Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
Note 2. Use model names SLD-T☐, SLD-N☐ or MSOLD-T☐, MSOLD-N☐ for DC closing coils.
Note 3. Use TH-N600 in combination with a separately sold current transformer (Mitsubishi CW-☐).
Note 4. Reversing (SL(D)-2 × T☐, SL(D)-2 × N☐ or MSOL(D)-2 × T☐, MSOL(D)-2 × N☐ types) can also be manufactured.
Note 5. Refer to page 51 for information regarding application to resistive loads and capacitive loads.
Note 6. The main contact minimum operating voltage and current differ depending on the allowable fault rate. Please refer to page 42 for details.
Note 7. No specification needs to be made for contact arrangements that are valid and self-demagnetizing.
Note 8. MSOL(D)-T☐ and MSOL(D)-N☐ types can also be manufactured.

Operating Transformer Capacity, Capacitive Tripping

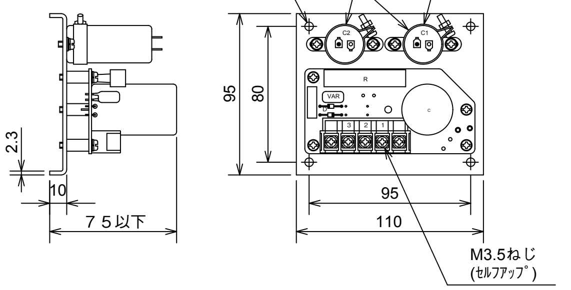
Frame	Operating Transformer Capacity (For AC Operation) (VA)	Minimum Capacitance For Capacitive Tripping (For AC200 V) (μ F) Note 1	Capacitive Tripping Device Model Name Note 2	
			AC100V	AC200V
T21	75 to 100	40	CTU-A1	CTU-A2
T35	75 to 100	40		
T50	75 to 100	40		
T65	75 to 100	150	CTU-B1	CTU-B2
T80	75 to 100	150		
T100	100 to 150	150		
N125	100 to 150	150		
N150	100 to 150	150		
N220	150 to 200	150		
N300	200 to 300	150		
N400	200 to 300	150		
N600	300 to 400	600	CTU-C1	CTU-C2
N800	300 to 400	600		

Note 1. The minimum capacitance for capacitive tripping is the value required to trip the circuit within 5 seconds of a power failure.

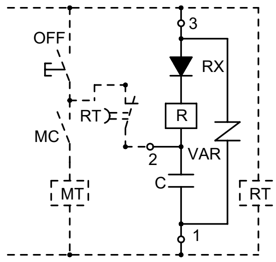
Note 2. CTU type capacitive tripping device specifications.
- · Charging for at least 10 seconds at the rated voltage allows for tripping up to 30 seconds after a power failure.
- · Tripping Coil Rated Voltage/Frequency
  For AC100 V: 100 to 110 V, 50/60 Hz
  For AC200 V: 200 to 220 V, 50/60 Hz
- · Uses an electrolytic capacitor, so the capacity should be checked periodically.

Note 3. An electrolytic capacitor is used. Touching the conductive portion may cause an electric shock even if the rated voltage is OFF. Check if the product has been completely discharged by using methods such as shorting terminals 1 and 2 through the resistor before starting maintenance.

Weight: 0.4 kg



Capacitive Tripping Device CTU- □□ Outline Drawings



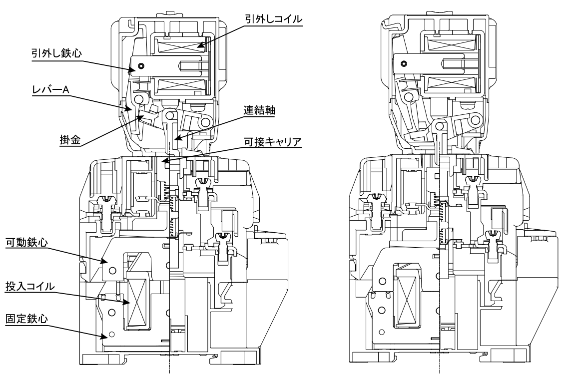
The solid lines indicate CTU type.
MC :SL Type Self-Demagnetizing Make Contact
MT :SL Type Tripping Coil
RX :Rectifier
C :Capacitor
R :Limit Resistor
RT :Off Delay Timer

Capacitive Tripping Circuit Example

Structure/Operation

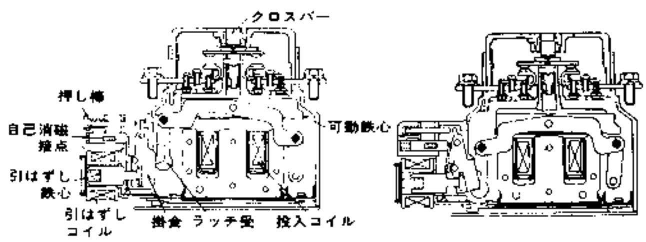
● Structure

The latch is installed above the unit for T21 to T80 types and beneath the power supply side the unit for T100 and N125 to N800 types. The figure below shows a typical application.



a. Open State b. Retention State

Latched Type Structure (SL-T21)



a. Open State b. Retention State

Latched Type Structure (SL-N150)

● Operation

Closing

(1) Energizing the closing coil attracts the movable core, engaging lever A or the latch receiver to the latch while simultaneously close-circuiting the main contact.

(2) When the latch engages the self-demagnetizing contact is open-circuited, stopping current to the closing coil and completing the close.

Tripping

(1) Energizing the tripping coil attracts the movable core, freeing lever A or the latch receiver from the latch.

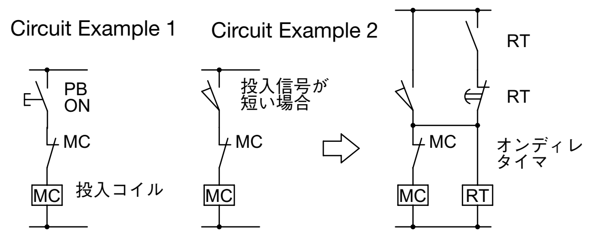
(2) When the latch is released the movable core returns to its original position and the main contact is opened.

● Manual Operation

The contactors can be manually operated for the purpose of sequence checking. Manually close or trip the contactor using a screwdriver as per figures 2 to 5. However, do not operate manually if a current is flowing through the main circuit, as there is a risk of electric shock due to arcing.

● Control Command Duration (Minimum Energize Time)

The command duration of external switches that direct the closing coil or tripping coil must be 0.3 seconds or more for T21 to T100 and N125 to N220 types and 0.5 seconds or more for N300 to N800 types.



Press PB until the closing operation is confirmed (0.5 seconds or more).

If the closing signal is too short, use a timer such as those listed above to convert the signal to a signal of 0.5 seconds or more.

Fig. 1. Circuit Example

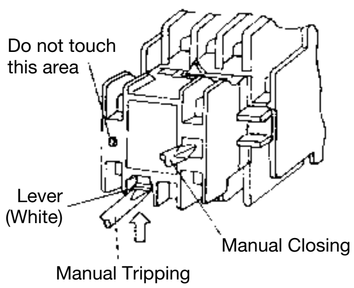


Fig. 2. Manual Operation (SL(D)-T21 to T50)

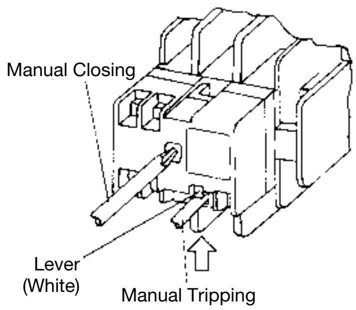


Fig. 3. Manual Operation (SL(D)-T65/T80)

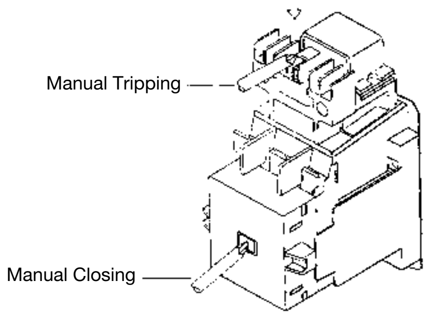
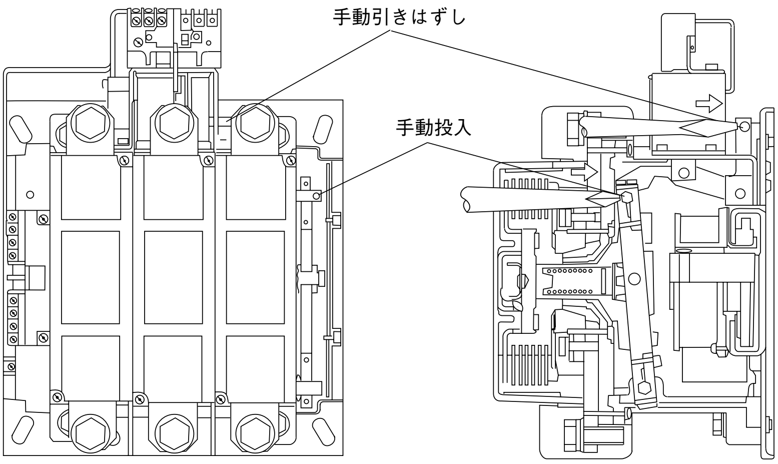


Fig. 4. Manual Operation (SL(D)-T100, SL(D)-N125 to N400)



注. 図は右側のカバーを外した状態で
部分的に断面にしたものです。

Fig. 5. Manual Operation (SL(D)-N600/N800)

Handling

● Model Name

An SL in the model name indicates an AC closing coil while SLD indicates a DC closing coil. Magnetic starter (with thermal overload relay) model names are either MSOL type or MSOLD type.

● Operation Coils

S and SD types have different coil rated operational voltage ranges for both closing and tripping coils. The closing and tripping coils are both short-rated for 15 second operation, so be sure to connect a self-demagnetizing contact in series with the coil.The allowable range of the applied voltage is 85 to 110% of the rated voltage.

● Operating Switch Contact Capacity

Caution is required as the coil input to SL and SLD types is greater than that for S and SD types. Coil breaking in regular operation is done by the self-demagnetizing contact, so operation is possible using a closing relay or operating switch with making capacity equivalent to the coil input. However, in some cases the command duration is too short (approx. 0.5 seconds required), or breaking may be triggered by external shocks, so a contact with breaking capacity should be used.

● Closing and Tripping Commands

Configure your system such that the closing switch and tripping switch command signals never overlap (simultaneous contact).

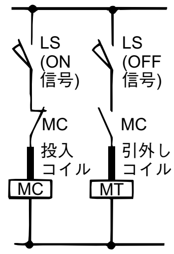
● Power Supply Capacity

Caution is required as the momentary input to the operation coil is greater than that for S and SD types.

● Control Circuit Wiring

Do not remove the wiring for the operation coil and self-demagnetizing contact (bold lines in figure below) but wire according to the caution nameplate attached to the unit.

The standard product is wired between the control coil and self-demagnetizing contact. (Bold Line Parts)



Circuit Example

● Disassembly

Mechanically latched magnetic contactors are calibrated assembled products, so the coil cannot be replaced or disassembled. (Do not disassemble.)

Application Example

Fig. 6. shows an example using a latched type for both regular and backup use with switched power supplies. Fig. 7. shows an example using a latched type for regular operation and a standard type (without latch) for backup use. When switching with a timer use periods of 0.2 seconds or more.

MC1 : Regular Power Supply Magnetic Contactor SL-T/N
MC2 : Backup Power Supply Magnetic Contactor SL-T/N
VSR : Voltage Relay SRE
RT1 : Regular/Backup Period Timer (Off Delay)
RT2 : Backup/Regular Timer (Off Delay)
F : Fuse

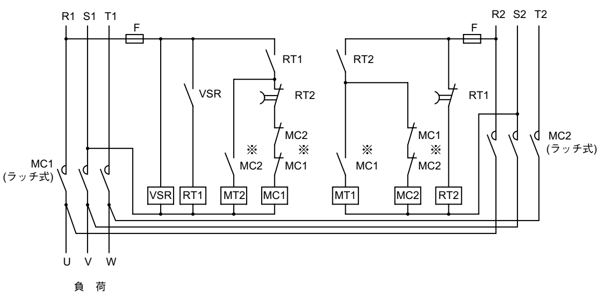


Fig. 6. Application Example (Latched Type For Both Regular And Backup)

MC1 : Regular Power Supply Magnetic Contactor SL-T/N
MC2 : Backup Power Supply Magnetic Contactor S-T/N
VSR : Voltage Relay SRE
RT1 : Regular/Backup Period Timer (Off Delay)
RT2 : Backup/Regular Timer (Off Delay)
F : Fuse

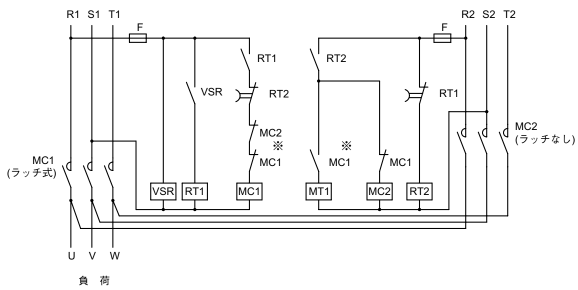
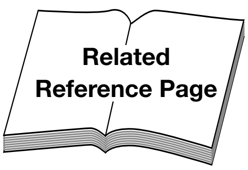


Fig. 7. Application Example (Latched Type For Regular, Standard Type For Backup)

Note. ∗ contacts are self-demagnetizing contacts wired to the closing coil (MC1, MC2) or tripping coil (MT1, MT2).



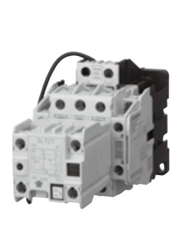
Item	Reference Page	Remarks
· Main Contact Rating	Page 39	—
· Auxiliary Contact Rating	Page 41	—
· Operation Coil	Page 44	—
· Properties	Page 46	—
· Performance	Page 46	—
· Outline Drawings/Contact Arrangements	Page 106	—
· How to Order	Page 130	—
· Combining with Optional Units	Page 194	—

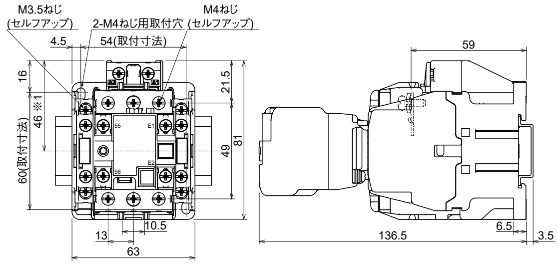
Outline Drawings/Contact Arrangements (Mechanically Latched Magnetic Starters/Magnetic Contactors)

T21 (The diagrams show models without "BC".)

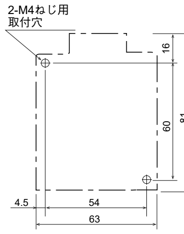
Non-Reversing

SL(D)-T21(BC)

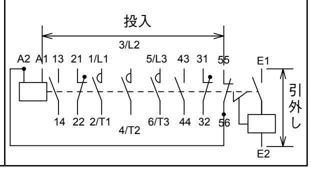




※1寸法：IEC35mm幅レールのセンタからの寸法



取付寸法は54×56でも
取付可能

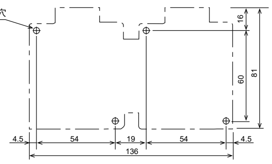
Auxiliary Contact	Contact Arrangement
2a2b	

0.55 kg

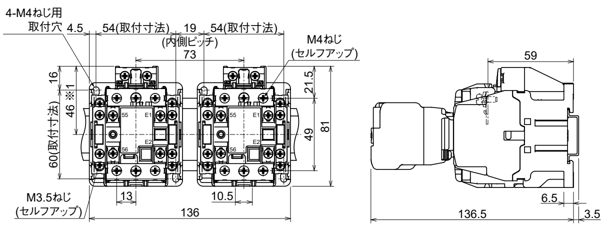
Model Name	Model Name
SL-T21	SL-T21BC
SLD-T21	SLD-T21BC

Reversing

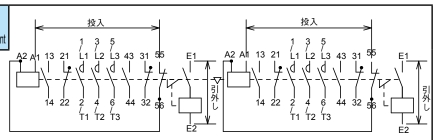
SL(D)-2 x T21(BC)



取付寸法は54×56でも
取付可能



※1寸法：IEC35mm幅レールのセンタからの寸法

Auxiliary Contact	Contact Arrangement
2a2b×2	

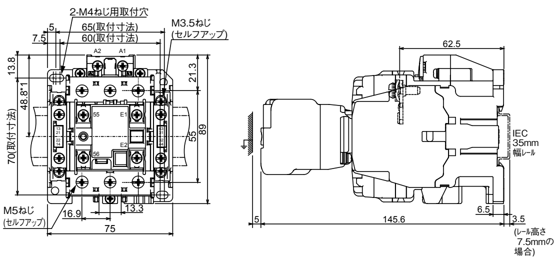
1.15 kg

Model Name	Model Name
SL-2xT21	SL-2xT21BC
SLD-2xT21	SLD-2xT21BC

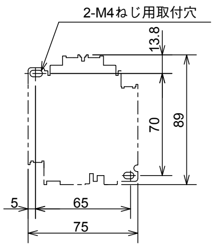
T35/T50 (The diagrams show models without "BC".)

Non-Reversing

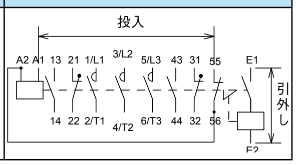
SL(D)-T35(BC)
SL(D)-T50(BC)



*1 Dimension: Width Dimension from Center of IEC 35 mm Rail



取付寸法は、60×70
でも取付可能

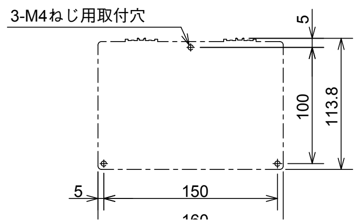
Auxiliary Contact	Contact Arrangement
2a2b	

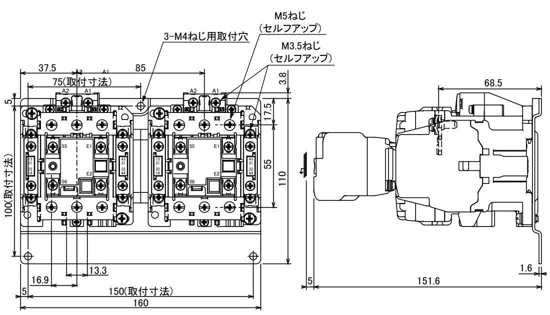
0.68 kg

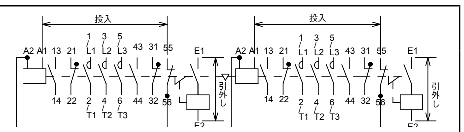
Model Name	Model Name
SL-T35	SLD-T35
SL-T50	SLD-T50

Reversing

SL(D)-2 x T35(BC)
SL(D)-2 x T50(BC)





Auxiliary Contact	Contact Arrangement
2a2b×2	

1.9 kg

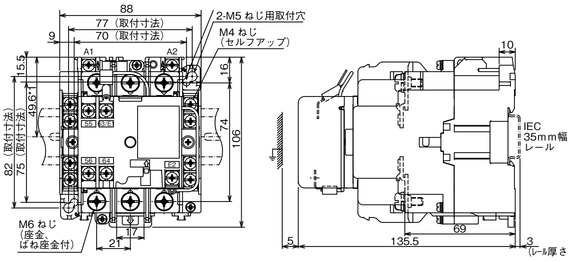
Model Name	Model Name
SL-2xT35	SLD-2xT35
SL-2xT50	SLD-2xT50

■ T65/T80

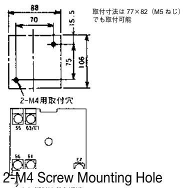
Non-Reversing

SL(D)-T65
SL(D)-T80

1.0 kg



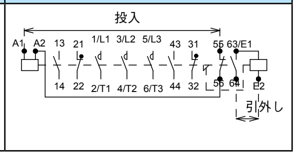
∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail



2-M4 Screw Mounting Hole

Terminal Arrangement in Latch Mechanism

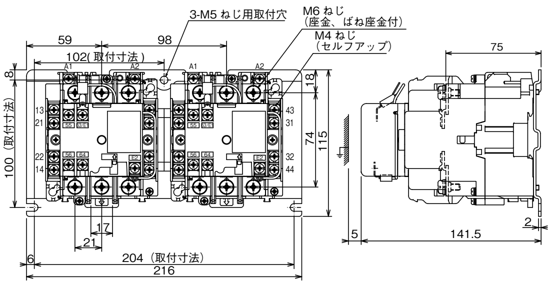
Mounting Dimensions Also Allow For 77 x 82 (M5 Screw) Mounting

Auxiliary Contact	Contact Arrangement
2a2b	

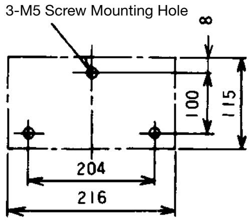
Model Name	Model Name
SL-T65	SLD-T65
SL-T80	SLD-T80

Reversing

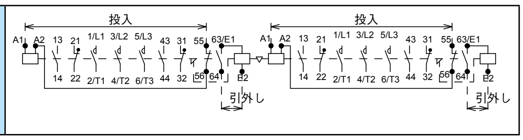
SL(D)-2xT65
SL(D)-2xT80



3-M5 Screw Mounting Hole



2.3 kg

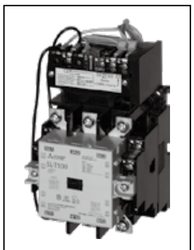
Contact Arrangement


Model Name	Model Name
SL-2×T65	SLD-2×T65
SL-2×T80	SLD-2×T80

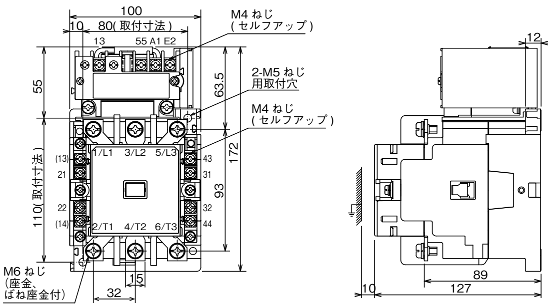
■ T100

Non-Reversing

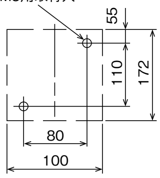
SL(D)-T100

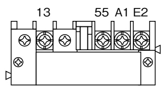


2.1 kg

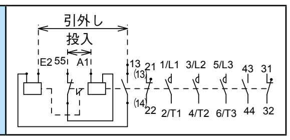


2-M5用取付穴





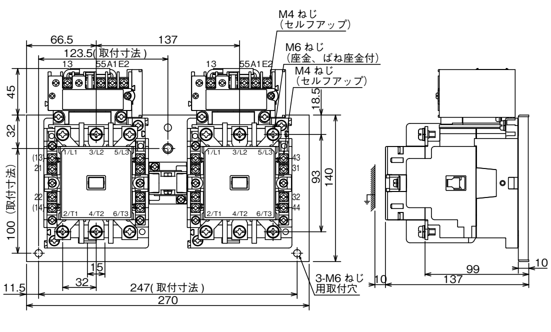
ラッチ機構部端子配置

Contact Arrangement


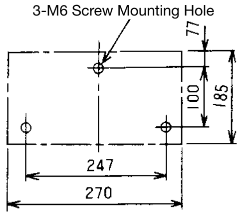
Model Name	Model Name
SL-T100	SLD-T100

Reversing

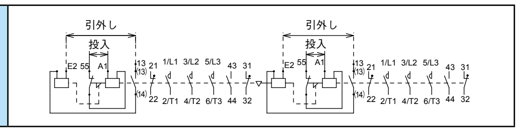
SL(D)-2xT100



3-M6 Screw Mounting Hole



4.9 kg

Contact Arrangement


Model Name	Model Name
SL-2×T100	SLD-2×T100

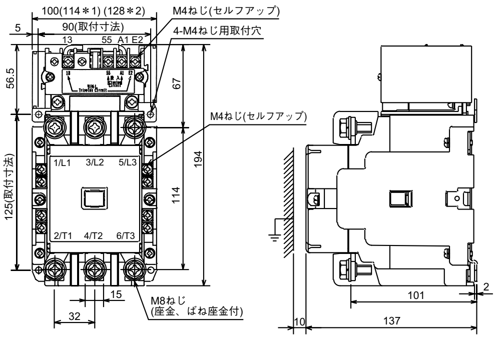
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

■ N125

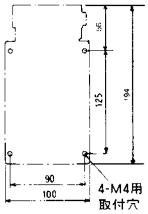
Non-Reversing

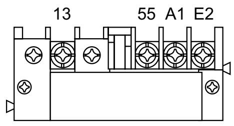
SL(D)-N125

3.1 kg



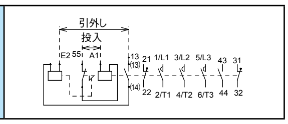
＊1、＊2寸法：サイドオン補助接点ユニット(UN-AX80)付・・・＊1は1個、＊2は2個(両側)付





ラッチ機構部端子配置

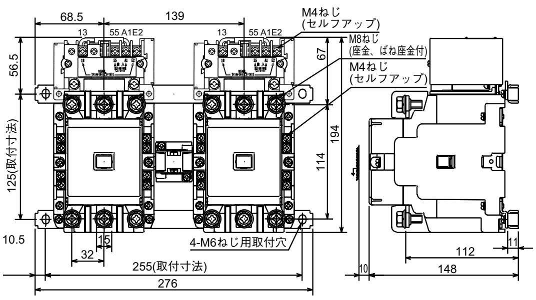
Contact Arrangement

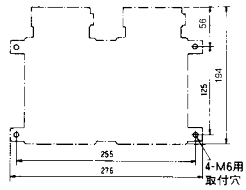


Model Name	Model Number	Model Name	Model Number
SL-N125	SLN05 □□	SLD-N125	SLN3541

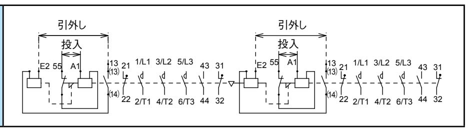
Reversing

SL(D)-2xN125





Contact Arrangement



7.0 kg

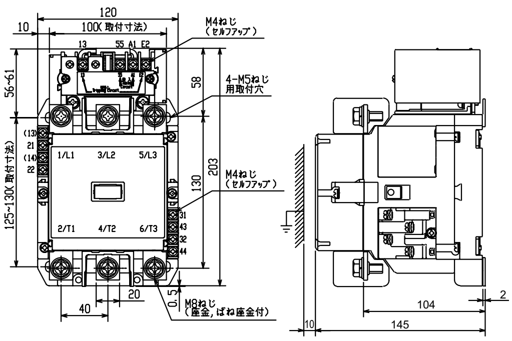
Model Name	Model Name
SL-2xN125	SLD-2xN125

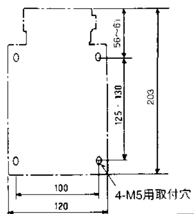
■ N150

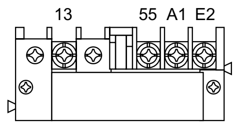
Non-Reversing

SL(D)-N150

3.7 kg

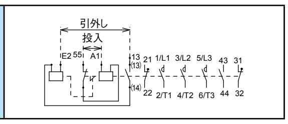






ラッチ機構部端子配置

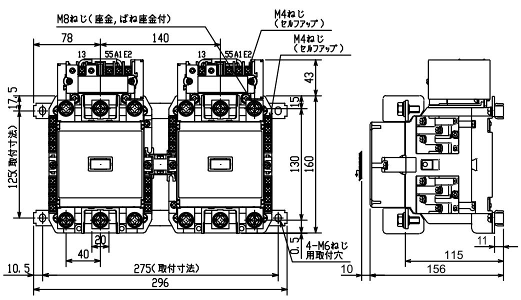
Contact Arrangement

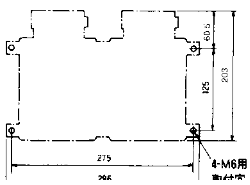


Model Name	Model Number
SL-N150	SLN06□□
SLD-N150	SLN355

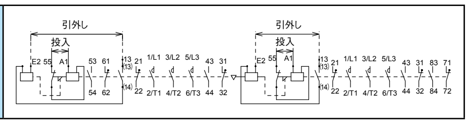
Reversing

SL(D)-2xN150





Contact Arrangement



8.0 kg

Model Name	Model Number
SL-2xN150	SLN1 □□□
SLD-2xN150	

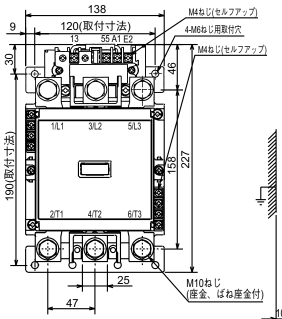
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

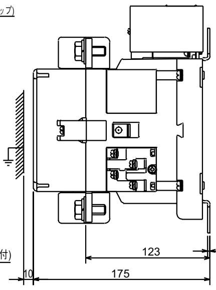
N220

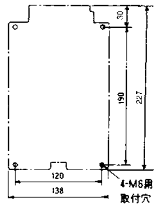
Non-Reversing

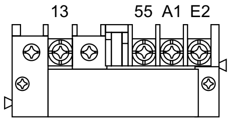
SL(D)-N220

6.0 kg



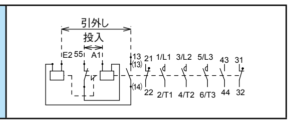






ラッチ機構部端子配置

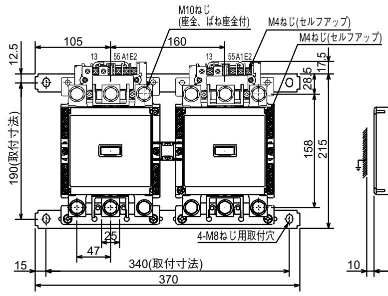
Contact Arrangement

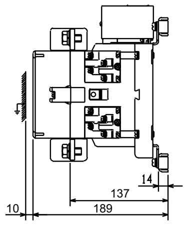


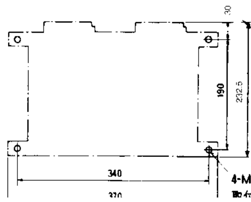
Model Name	Model Number
SL-N220	SLN06 ☐☐
SLD-N220	SLN3561

Reversing

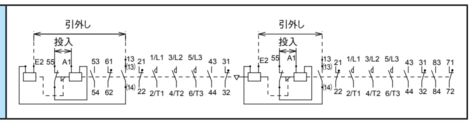
SL(D)-2xN220







Contact Arrangement



14 kg

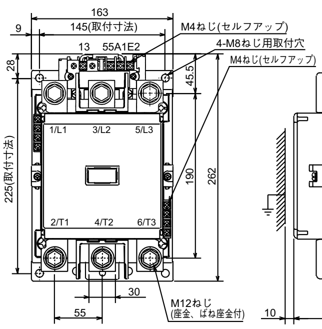
Model Name	Model Number
SL-2xN220	SLN19 ☐☐
SLD-2xN220	

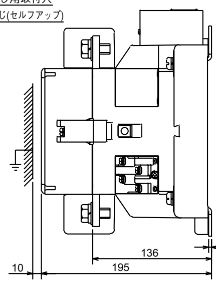
N300/N400

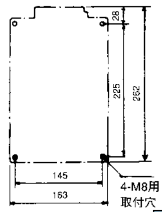
Non-Reversing

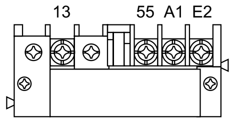
SL(D)-N300
SL(D)-N400

9.5 kg
10 kg



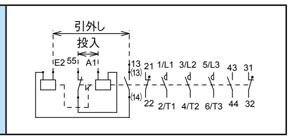






ラッチ機構部端子配置

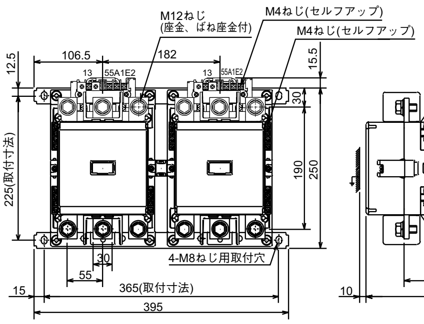
Contact Arrangement

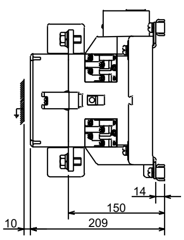


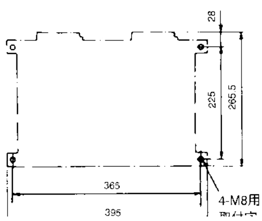
Model Name	Model Number	Model Name	Model Number
SL-N300	SLN06 ☐☐	SLD-N300	SLN3571
SL-N400	SLN06 ☐☐	SLD-N400	SLN3581

Reversing

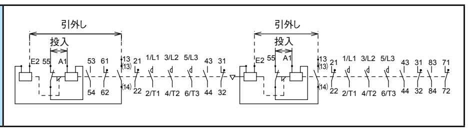
SL(D)-2 × N300
SL(D)-2 × N400







Contact Arrangement



21 kg
22 kg

Model Name	Model Number	Model Name
SL-2xN300	SLN19 ☐☐	SLD-2xN300
SL-2xN400	SLN19 ☐☐	SLD-2xN400

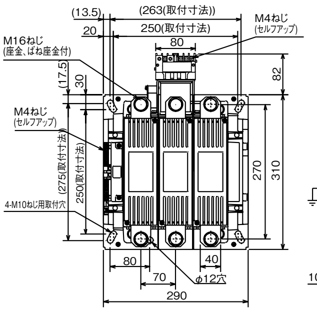
Note 1. The terminal numbers in parentheses for the S, SD, SL(D) auxiliary contacts in the center contact arrangement example are indicated along with the product, and represent the numbers of the old version (A Series).

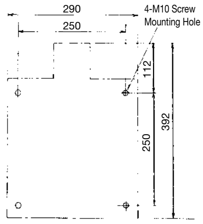
N600/N800

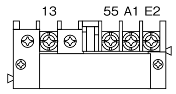
Non-Reversing

SL(D)-N600
SL(D)-N800

27 kg

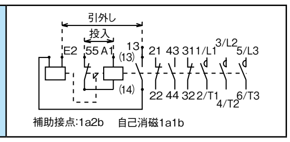






Terminal Arrangement in Latch Mechanism

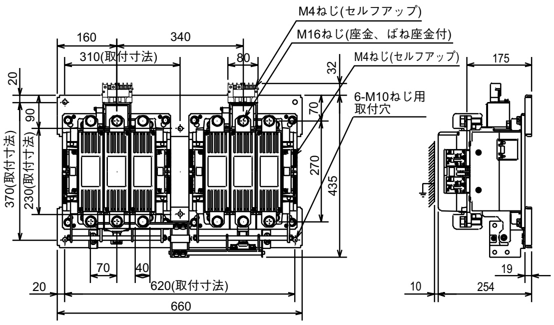
Contact Arrangement

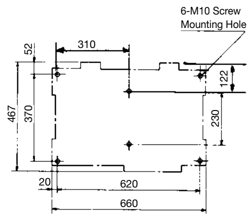


Model Name	Model Number	Model Name	Model Number
SL-N600	SNL0681	SLD-N600	
SL-N800		SLD-N800	

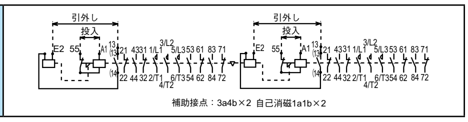
Reversing

SL(D)-2 × N600
SL(D)-2 × N800





Contact Arrangement

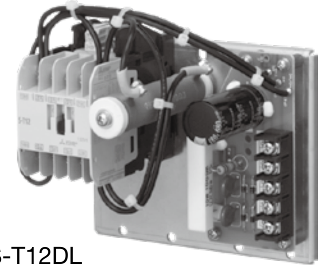


60 kg

Model Name	Model Name
SL-2xN600	SLD-2xN600
SL-2xN800	SLD-2xN800

4.5 MSO/S-□DL Delay Open Magnetic Starters/Magnetic Contactors

Retains the closed state for 2^{+2}_{-1} seconds during a momentary power failure



S-T12DL

- In cases of momentary power failures or momentary voltage drops due to lightning strikes on wiring etc., the discharge from a capacitor allows the closed state to be retained for 2^{+2}_{-1} seconds.
- No re-closing operations for magnetic contactors are required when power is restored, which makes continuous load operation possible.
- Suitable for temporary storage circuitry in illumination equipment or automatic control devices.

4

● Ratings/Specifications (Standard Applicability)

Magnetic Contactors	Magnetic Starters (Note 8)	Rated Capacity [kW] Three-Phase Squirrel-cage Motor (Category AC-3) 220 to 240 V	380 to 440 V	500 V	690 V	Rated Operating Current [A] Three-Phase Squirrel-cage Motor (Category AC-3) 220 to 240 V	380 to 440 V	500 V	690 V	Resistive Load (Category AC-1) 200 to 240 V	380 to 440 V	Conventional Free Air Thermal Current Ith [A]	Auxiliary Contact Valid	Auxiliary Contact Additional Unit Model Names x Pieces	Compatible Thermal Overload Relays Model Name	Heater Designation Range [A]
S-T12DL	MSO-T12DLKP	3.5 [2.7]	5.5 [4]	5.5 [5.5]	5.5	13 [13]	12 [9]	9 [9]	7	20	13	20	—	— Note 3	TH-T18KP	0.12 to 11
S-T21DL	MSO-T21DLKP	5.5 [4]	11 [7.5]	11 [7.5]	7.5	25 [20]	23 [20]	17 [17]	9	32	32	32	1a1b		TH-T25KP	0.24 to 22
S-T35DL	MSO-T35DLKP	11 [7.5]	18.5 [15]	18.5 [15]	15	40 [35]	40 [32]	32 [26]	17	60	60	60	1a1b		TH-T25KP TH-T50KP	0.24 to 22 29
S-T50DL	MSO-T50DLKP	15 [11]	22 [22]	25 [22]	22	55 (50) [50] (Note 1)	50 [48]	38 [38]	26	80	80	80			TH-T25KP TH-T50KP	0.24 to 22 29 to 42
S-T65DL	MSO-T65DLKP	18.5 [15]	30 [30]	37 [30]	30	65 [65]	65 [65]	60 [45]	38	100	100	100			TH-T65KP	15 to 54
S-T80DL	MSO-T80DLKP	22 [19]	45 [37]	45 [45]	45	85 [80]	85 [80]	75 [75]	52	120	120	120			TH-T65KP (Note 8)	15 to 54 67
S-T100DL	MSO-T100DLKP	30 [22]	55 [45]	55 [45]	55	105 [100]	105 [93]	85 [75]	65	150	150	150			TH-T65KP TH-T100KP	15 to 54 67, 82
S-N150DL	MSO-N150DLKP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200	1a1b	UN-AX150x1 Note 3	TH-N120KP(TA)	42 to 125
S-N220DL	MSO-N220DLKP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260			TH-N220KPRH	82 to 180
S-N300DL	MSO-N300DLKP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350			TH-N400KPRH	105 to 250
S-N400DL	MSO-N400DLKP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450				105 to 330

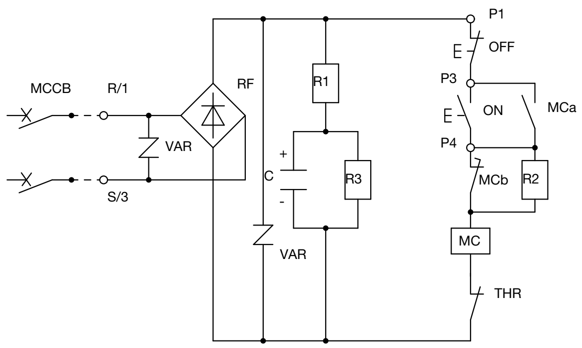
Note 1. The value in parentheses for the rated operating current is applicable in the case of magnetic contactors.
Note 2. The combining magnetic contactor is dedicated for use with T50 or less AC operated type (S type), or T65 to 100 and N125 or greater DC operated type (SD type), and cannot be replaced alone.
Note 3. Auxiliary contact units UN-AX150 can be installed on the left side for N150DL to N400DL types; however, T12DL to T100DL types cannot be used to mount additional auxiliary contact units.
Note 4. Magnetic starters can be manufactured to have 3-element (2E) thermal overload relays (MSO- □ DLKP) included.
Note 5. MSO-T12 to T100DL(KP)SR (with saturable reactors and thermal overload relays) cannot be manufactured.
Note 6. Instantaneous stop/restart relays (UA-DL2) are also available as related products. Refer to page 346.
Note 7. Cannot be used with live part protection covers. Furthermore, types with wiring streamlining terminals (BC) cannot be manufactured.
Note 8. Thermal overload relay dedicated for MSO-T80DL 67 A. S-T80DL and the standard TH-T100 67A cannot be combined for use as a magnetic starter.
Note 9. MSO-T□DL and MSO-N□DL types can also be manufactured.

● Properties/Performance/Operation Coil

Frame	Input [VA] Inrush	Input [VA] Normal	Operating Voltage [V] Close	Operating Voltage [V] Open	Operating Time [ms] Operating Power ON →Main Contact ON	Operating Time [ms] Operating Power OFF →Main Contact OFF	Operation Coils Designation	Operation Coils Rated Voltage	Making and Breaking Current Capacities	Switching Frequency	Switching Durability [x 10000] Mechanical	Switching Durability [x 10000] Electrical (Category AC-3)	Delay Time
T12DL	70	13	85% or Less of Operation Coil Rated Voltage	10% or More of Operation Coil Rated Voltage	7 to 100	10 to 100	AC100V AC200V	100 to 110V 50/60 Hz 200 to 220V 50/60 Hz	10 Times Class AC-3 Rated Operating Current 8 Times Class AC-3 Rated Operating Current	1200 Times/ Hour	100	100	2^{+2}_{-1} Seconds (Fixed)
T21DL	100	15											
T35DL	113	24			7 to 100						200		
T50DL	113	24											
T65DL	55	26			30 to 100						500		
T80DL	55	26											
T100DL	66	27											
N150DL	76	55											
N220DL	100	66											
N300DL	140	85											
N400DL	140	85										50	

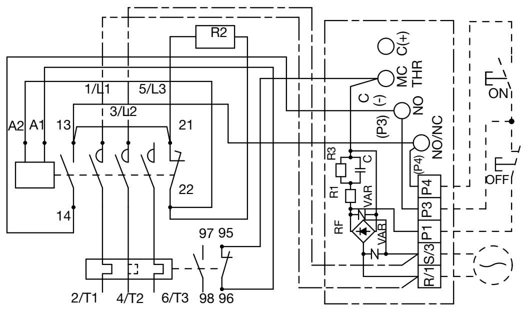
Note 1. The above indicates rough property indices for AC200V coils.
Note 2. The input is the average when applying 220 V at 60 Hz. Values for AC100V coils are approximately the same.
Note 3. The operating time is the value when applying 200 V at 60 Hz. Values for AC100V coils are approximately the same.
Note 4. Operation coils are only AC100V or AC200V.

Connecting

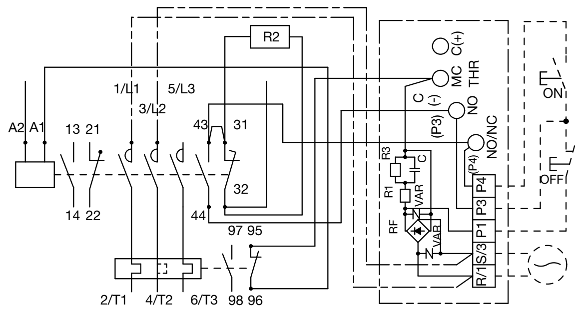


Deployment Connection Diagram

Note 1. The figure to the left is for MSO-☐DL.
Note 2. The MCCB, ON and OFF buttons in the figure to the left are not provided.
Note 3. If connecting an external magnetic coil or indicator lamp, connect between the R/1 and S/3 terminals.



MSO-T12DL(KP) Actual Wiring Diagram



MSO-T21DL(KP) Actual Wiring Diagram

The connections shown with single-dashed lines between the L1-R/1 and L2-S/3 terminals are not wired if the control circuit voltage is AC100 V or if the main circuit and control circuit voltages differ.

Operation Description (Deployment Connection Diagram)

●Power Supply Closing

Closing the power supply with MCCB causes C to charge via RF and R_1

●Closing Magnetic Contactors

Pressing the ON button causes MC to energize via MCb, closing the contactor.
When MC has completed closing, MCb opens and, in the order of MCa → R_2 → MC, the current flows to retain the contactor.

●Opening Magnetic Contactors

Pressing the OFF button cuts off current to MC, instantly opening the magnetic contactor.

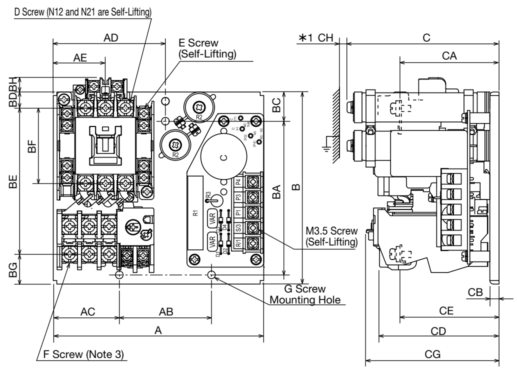
●When Power Supply Voltage Drops and Momentary Power Failures Occur

Charge accumulated in C discharges via R_1 → R_2 → MC circuits, opening MC after a predetermined time (after the delay time).

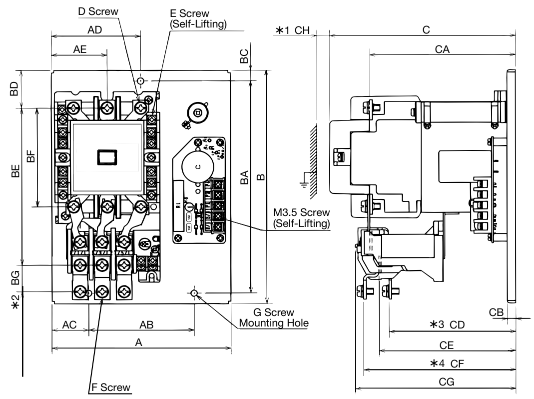
Handling (Deployment Connection Diagram)

- If ON and OFF for MCCB are repeated at short intervals (or when momentary power failures occur several times in quick succession) the following may occur
  - (1) The inrush current to RF and R_1 repeatedly flows, causing overloading.
  - (2) Sufficient charge is not provided to C, causing damage to components or insufficient retention time.
- Even when the power is OFF (MCCB is OFF), charge may still reside within C, so necessary precautions should be taken to avoid electric shocks.
- ON and OFF operations should be conducted using the push-button switch located as in the figure above. The magnetic contactor may flip-flop when the power is switched ON or OFF. Also, when switching the power to perform sequence checks etc., the operator should allow at least 5 seconds for the capacitor to charge.
- Uses an electrolytic capacitor so the delay time should be checked periodically.

Outline Drawings



MSO/S-T12, T21, T35, T50DL



MSO/S-T65 to T100DL
MSO/S-N125 to N400DL

◆Caution Do not install wiring or other equipment in the vicinity of the resistor (refer to the figure above) as it reaches high temperatures (approx. 100°C temperature rise).

Variable Dimensions Table

Variable Dimensions / Frame	A	AB	AC	AD	AE	B	BA	BC	BD	BE	BF	BG	BH	C	CA	CB	CD	CE	CF	CG	CH	D	E	F	G
T12DL	132	40	49	69	29.8	110	100	5	11.2	83	41.6	—	12.5	113	65	6	—	43	—	85	5	M3.5	M3.5	—	3-M4
T21DL	137	60	43	73	34	125	100	19	10.5	94.5	49	—	11	113	65	6	—	65	—	88	5	M4	M3.5	—	3-M4
T35/T50DL	134	50	42	67	38.5	162	150	6	23	103	55	21.5	—	114	70.5	8	69.5	67	—	89	5	M5	M3.5	M5	3-M4
T65/T80DL	150	50	56	81	50	168	150	9	27	126	74	—	—	141	103.5	8	—	95.5	—	118	5	M6	M4	M6	3-M5
T100DL	170	100	35	85	53	220	200	10	35.5	148	93	20	—	165	127	8	109	118.5	133	141	10	M6	M4	M6	3-M6
N150DL	210	140	26	105	80	270	250	10	33	200	130	25	—	177.5	136.5	8	—	99.5	102	133.5	10	M8	M4	M8	3-M8
N220DL	230	140	20	90	90	290	250	12	31	246.5	158	—	—	208.5	156.5	8	—	103.5	—	214	10	M10	M4	—	3-M8
N300/N400DL	300	200	10	—	110	363.5	200	25	30	318.5	190	—	—	229	170	8	—	122.5	—	227	10	M12	M4	—	4-M8

Weight Table [kg]

	S-	MSO-
T12DL	0.73	0.84
T21DL	0.98	1.2
T35/T50DL	1.20	1.44
T65/T80DL	2.8	3.1
T100DL	3.9	4.4
N150DL	6.3	7.6
N220DL	9.1	11.6
N300/N400DL	15/15.5	17.5/18

Note 1. ∗1: "CH" is the arc space.
Note 2. Below indicates the case when using TH-T50/T100 and TH-N□TA thermal overload relays.
∗2: "BG" has extended terminal pitch, "F Screw" has a terminal screw on the load side
∗3: "CD" has load side 4/T2 terminal height
∗4: "CF" has load side 2/T1, 6/T3 terminal height
Note 3. The F screw for MSO-T35/T50DL is M4 with heater designations of 22A or below.
Note 4. The maximum outline drawings (A x B x C) of S-□DL and MSO-□DL are the same. However, S-N300/N400DL has a "B" dimension of 250.
Note 5. The power connector protrudes from the product on the power supply side by approximately 15 mm.

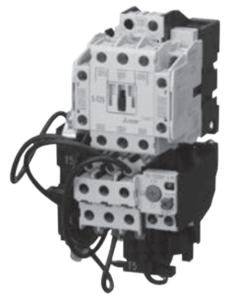
Related Reference Page

Item	Reference Page	Remarks
· Main Contact Rating	Page 39	—
· Auxiliary Contact Rating	Page 41	—
· How to Order	Page 133	Be sure to specify main circuit specifications and operation coil designation as both MSO-□DL and S-□DL may or may not require wiring from the main circuit.
· Combining with Optional Units	Page 194	—

4.6 MSO-☐(KP)SR Magnetic Starters with Saturable Reactors and Thermal Overload Relays

Capable of protecting motors with a long starting time from burnout

- Thermal overload relays with saturable reactors and magnetic contactors can be used in combination.
- Prevents motor overload or restriction when starting time is long or starting current is especially large, as well as preventing unnecessary thermal overload relay operation.
- Can be used to protect motors that are run intermittently.

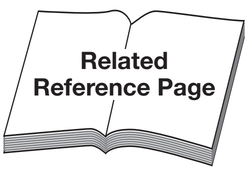


MSO-T25KPSR

Ratings/Specifications (Standard Applicability)

Magnetic Starters		Rated Capacity [kW] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Three-Phase Squirrel-cage Motor (Category AC-3)				Auxiliary Contact		Compatible Thermal Overload Relays		
Thermal Overload Relay with 3 Elements (2E)	Thermal Overload Relay with 2 Elements	AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	Standard (Special)	Additional Unit Model Names x Pieces	Model Name With 3-Element (2E)	Model Name With 2-Element	Heater Designation Range [A]
—	MSO-T10SR	2.5[2.2]	4[2.7]	4[2.7]	4	11[11]	9[7]	7[6]	5	1a(1b)	UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2	—	TH-T18SR	0.12 to 9
—	MSO-T12SR	3.5[2.7]	5.5[4]	5.5[5.5]	5.5	13[13]	12[9]	9[9]	7	1a1b(2a)				0.12 to 11
—	MSO-T20SR	4.5[3.7]	7.5[7.5]	7.5[7.5]	7.5	18[18]	18[18]	17[17]	9					0.12 to 15
MSO-T21KPSR	MSO-T21SR	5.5[4]	11[7.5]	11[7.5]	7.5	25[20]	23[20]	17[17]	9	2a2b		TH-T25KPSR	TH-T25SR	0.24 to 22
MSO-T25KPSR	MSO-T25SR	7.5[5.5]	15[11]	15[11]	11	30(26)[26]	30(26)[25]	24[20]	12					0.24 to 22
MSO-T35KPSR	MSO-T35SR	11[7.5]	18.5[15]	18.5[15]	15	40[35]	40[32]	32[26]	17			TH-T25PSR	TH-T25SR	0.24 to 22
												TH-T50PSR	TH-T50SR	29
MSO-T50KPSR	MSO-T50SR	15[11]	22[22]	25[22]	22	55(50)[50]	48[48]	38[38]	26			TH-T25PSR	TH-T25SR	0.24 to 22
												TH-T50PSR	TH-T50SR	29 to 42
MSO-T65KPSR	MSO-T65SR	18.5[15]	30[30]	37[30]	30	65[65]	65[65]	60[45]	38		UN-AX2, 4 x 1 or UN-AX11 x 2	TH-T65PSR	TH-T65SR	15 to 54
MSO-T80KPSR	MSO-T80SR	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52			TH-T100PSR	TH-T100SR	67
MSO-T100KPSR	MSO-T100SR	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65		UN-AX80 x 2	TH-T65PSR	TH-T65SR	15 to 54
												TH-T100PSR	TH-T100SR	67, 82
MSO-N125KPSR	MSO-N125SR	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70			TH-N120 (TA)KPSR	TH-N120 (TA)SR	42 to 105
MSO-N150KPSR	MSO-N150SR	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100		UN-AX150 x 2			42 to 125
MSO-N180KPSR	MSO-N180SR	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120			TH-N220 RHKPSR	TH-N220 RHSR	82 to 150
MSO-N220KPSR	MSO-N220SR	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150					82 to 180
MSO-N300KPSR	MSO-N300SR	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220			TH-N400 RHKPSR	TH-N400 RHSR	105 to 250
MSO-N400KPSR	MSO-N400SR	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300					105 to 330

Note 1. Enclosed magnetic starters are not manufactured.
Note 2. Reversible types can also be manufactured for MSO-2x ☐ SR, T21, N125 or greater, as well as for MSO-2x ☐ KPSR types. MSO-2XT10 to T20SR use a thermal overload relay TH-T18HZSR.
Note 3. Only 1 UT-AX11 type unit can be installed on the right side of MSO-T21 to T50KPSR types.
Note 4. Cannot be used with live part protection covers (UT-CW, UN-CZ).
Note 5. MSO-T10SR to T50(KP)SR can also be manufactured to have wiring streamlining terminals (BC).
Note 6. MSO-T10 to T20BCSR have no screw holder attached to the main circuit terminal (3-pole) on the magnetic contactor load side.
Note 7. MSO-T35, T50BC(KP)SR with heater designation of 29 A or more and MSO-2xT21 to T50BC(KP)SR have no screw holder in the main circuit terminal (3-pole) on the thermal relay power supply side.



Item	Reference Page	Remarks
· Main Contact Rating	Page 39	—
· Auxiliary Contact Rating	Page 41	—
· Operation Coil	Page 43	Same as MSO/S-☐ types.
· Properties	Page 45	Same as MSO/S-☐ types. Refer to pages 136, 145 for information about thermal overload relays.
· Performance	Page 46	Same as MSO/S-☐ types. However, the switching frequency of MSO-T10SR to T50(KP)SR types is 1200 times/hour, with a mechanical durability of 2.5 million operations. Refer to pages 136, 145 for information about thermal overload relays
· How to Order	Page 133	—
· Combining with Optional Units	Page 194	—

Application

●Protecting Motors with Long Starting Time

Prevents starting malfunctions when running with a load with large inertia. Use with motors that have a starting current of 5 to 8 times the full-load current and a starting time of 10 to 25 seconds.

●Protecting Motors with Large Starting Current

Use with motors that have a starting current greater than 8 times but no more than 20 times the full-load current. Capable of starting the motor without causing the heater of the thermal overload relay to melt. However, the magnetic starter should be selected such that the motor starting current is no more than 6 times the rated operating current of the class AC-3 magnetic starter.

●Protecting Motors Running Intermittently

Capable of protecting motors without sacrificing overload protection functionality when periodically running motors intermittently or when wanting to make use of the maximum motor output over short periods.

Note 1. In either case, consideration is required to find a balance between the motor and protection to suit the desired motor properties.

4

Outline Drawings

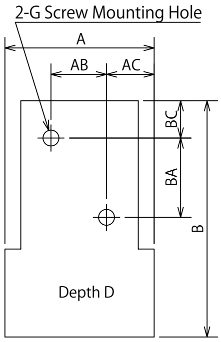


Fig. a. MSO-T10 to T50(KP)SR Types

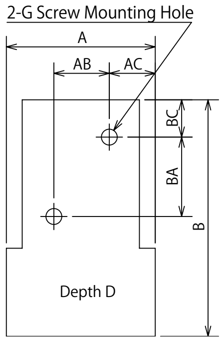


Fig. b. MSO-T65 to T100(KP)SR Types

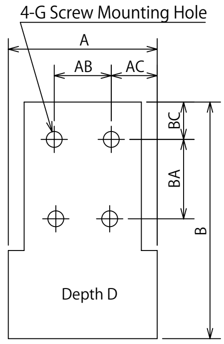


Fig. c. MSO-N125 to N400(KP)SR Type

Frame	No. Thermal Elements	A	AB	AC	B	BA	BC	D	G	Weight [kg]	Reference Diagram (Above Figure)
T10SR	2	94	28	30.5	150	60	10.5	79	M4	0.54	Fig. a
T12/T20SR		94	35	30.3	150	60	10.5	79	M4	0.56	
T21/T25SR		97.5	54	4.5	162.5	60	16	82	M4	0.78	
T35/T50SR		97.5	65	5	170.5	70	13.8	91	M4	0.99	
T65/T80SR		140	70	26	189.5	75	15.5	106	M4	1.25	Fig. b
T100SR		140	80	25	211	110	7	127	M5	2.5	
N125SR		164	90	30	239	125	12.5	137	M4	3.9	Fig. c
N150SR		164	100	32	250	130	15	145	M5	5	
N180/N220SR		144	120	12	282	190	7	180.5	M6	8.2	
N300/N400SR		163	145	9	360	225	9	195	M8	11.7/12.2	
T21/T25KPSR	3	97.5	54	4.5	162.5	60	16	82	M4	0.86	Fig. a
T35/T50KPSR		97.5	65	5	170.5	70	13.8	91	M4	1.07	
T65/T80KPSR		140	70	26	189.5	75	15.5	120.5	M4	1.35	Fig. b
T100KPSR		140	80	25	211	110	7	145	M5	2.6	
N125KPSR		164	90	30	269	125	12.5	137	M4	4.1	Fig. c
N150KPSR		164	100	34	273	130	15	145	M5	5.2	
N180/N220KPSR		168	120	36	282	190	7	180.5	M6	8.5	
N300/N400KPSR		178	145	24	360	225	9	195	M8	11.8/12.3	

4.7 MSO-☐FS(KP) Magnetic Starters with Quick-acting Characteristics Thermal Overload Relays

Capable of protecting motors with small heat capacity

- Quick-acting characteristics thermal overload relays and magnetic contactors can be used in combination with each other.
- Suitable for protecting motors such as submersible motors or compressors that have short allowable time during constraint.

MSO-T25FSKP

Ratings/Specifications (Standard Applicability)

<table>
<tr><th colspan="2" rowspan="2">Magnetic Starters</th><th colspan="4">Rated Capacity [kW]</th><th colspan="4">Rated Operating Current [A]</th><th colspan="2" rowspan="2">Auxiliary Contact</th><th colspan="3" rowspan="2">Combinable Thermal Overload Relays</th></tr>
<tr><th colspan="4">Three-Phase Squirrel-cage Motor (Category AC-3)</th><th colspan="4">Three-Phase Squirrel-cage Motor (Category AC-3)</th></tr>
<tr><th rowspan="2">Thermal Overload Relays With 3-Element (2E)</th><th rowspan="2">Thermal Overload Relays With 2-Element</th><th rowspan="2">AC220 to 240 V</th><th rowspan="2">AC380 to 440 V</th><th rowspan="2">AC500 V</th><th rowspan="2">AC690 V</th><th rowspan="2">AC220 to 240 V</th><th rowspan="2">AC380 to 440 V</th><th rowspan="2">AC500 V</th><th rowspan="2">AC690 V</th><th rowspan="2">Standard (Special)</th><th rowspan="2">Additional Unit Model Name x Pieces</th><th colspan="2">Model Name</th><th rowspan="2">Heater Designation Applicable Range [A]</th></tr>
<tr><th>With 3-Element (2E)</th><th>With 2-Element</th></tr>
<tr><td>MSO-T10FSKP</td><td>—</td><td>2.5[2.2]</td><td>4[2.7]</td><td>4[2.7]</td><td>4</td><td>11[11]</td><td>9[7]</td><td>7[6]</td><td>5</td><td>1a(1b)</td><td rowspan="9">UT-AX2, 4(BC) x 1
or
UT-AX11(BC) x 2</td><td rowspan="3">TH-T18FSKP</td><td rowspan="3">—</td><td>2.1 to 9</td></tr>
<tr><td>MSO-T12FSKP</td><td>—</td><td>3.5[2.7]</td><td>5.5[4]</td><td>5.5[5.5]</td><td>5.5</td><td>13[13]</td><td>12[9]</td><td>9[9]</td><td>7</td><td rowspan="2">1a1b(2a)</td><td>2.1 to 11</td></tr>
<tr><td>MSO-T20FSKP</td><td>—</td><td>4.5[3.7]</td><td>7.5[7.5]</td><td>7.5[7.5]</td><td>7.5</td><td>18[18]</td><td>18[18]</td><td>17[17]</td><td>9</td><td>2.1 to 15</td></tr>
<tr><td>MSO-T21FSKP</td><td>MSO-T21FS</td><td>5.5[4]</td><td>11[7.5]</td><td>11[7.5]</td><td>7.5</td><td>25[20]</td><td>23[20]</td><td>17[17]</td><td>9</td><td rowspan="11">2a2b</td><td rowspan="2">TH-T25FSKP</td><td rowspan="2">TH-T25FS</td><td>2.1 to 15</td></tr>
<tr><td>MSO-T25FSKP</td><td>MSO-T25FS</td><td>7.5[5.5]</td><td>15[11]</td><td>15[11]</td><td>11</td><td>30(26)[26]</td><td>30(26)[25]</td><td>24[20]</td><td>12</td><td>2.1 to 22</td></tr>
<tr><td rowspan="2">MSO-T35FSKP</td><td rowspan="2">MSO-T35FS</td><td rowspan="2">11[7.5]</td><td rowspan="2">18.5[15]</td><td rowspan="2">18.5[15]</td><td rowspan="2">15</td><td rowspan="2">40[35]</td><td rowspan="2">40[32]</td><td rowspan="2">32[26]</td><td rowspan="2">17</td><td>TH-T25FSKP</td><td>TH-T25FS</td><td>2.1 to 22</td></tr>
<tr><td>TH-T50FSKP</td><td>TH-T50FS</td><td>29</td></tr>
<tr><td rowspan="2">MSO-T50FSKP</td><td rowspan="2">MSO-T50FS</td><td rowspan="2">15[11]</td><td rowspan="2">22[22]</td><td rowspan="2">25[22]</td><td rowspan="2">22</td><td rowspan="2">55(50)[50]</td><td rowspan="2">50[48]</td><td rowspan="2">38[38]</td><td rowspan="2">26</td><td>TH-T25FSKP</td><td>TH-T25FS</td><td>22</td></tr>
<tr><td>TH-T50FSKP</td><td>TH-T50FS</td><td>29 to 42</td></tr>
<tr><td>MSO-T65FSKP</td><td>MSO-T65FS</td><td>18.5[15]</td><td>30[30]</td><td>37[30]</td><td>30</td><td>65[65]</td><td>65[65]</td><td>60[45]</td><td>38</td><td rowspan="3">UN-AX2, 4 x 1
or
UN-AX11 x 2</td><td rowspan="2">TH-T65FSKP</td><td rowspan="2">TH-T65FS</td><td rowspan="2">42, 54</td></tr>
<tr><td rowspan="2">MSO-T80FSKP</td><td rowspan="2">MSO-T80FS</td><td rowspan="2">22[19]</td><td rowspan="2">45[37]</td><td rowspan="2">45[45]</td><td rowspan="2">45</td><td rowspan="2">85[80]</td><td rowspan="2">85[80]</td><td rowspan="2">75[75]</td><td rowspan="2">52</td></tr>
<tr><td>(Note 5)</td><td>(Note 5)</td><td>67</td></tr>
<tr><td rowspan="2">MSO-T100FSKP</td><td rowspan="2">MSO-T100FS</td><td rowspan="2">30[22]</td><td rowspan="2">55[45]</td><td rowspan="2">55[45]</td><td rowspan="2">55</td><td rowspan="2">105[100]</td><td rowspan="2">105[93]</td><td rowspan="2">85[75]</td><td rowspan="2">65</td><td rowspan="2">UN-AX80 x 2</td><td>TH-T65FSKP</td><td>TH-T65FS</td><td>42, 54</td></tr>
<tr><td>TH-T100FSKP</td><td>TH-T100FS</td><td>67, 82</td></tr>
</table>

Note 1. Thermal overload relays are manufactured for the 1.7 A to 93 A (heater designation 2.1A to 82A) range.
Note 2. Reversible types can also be manufactured for MSO-T21 to T100FS and for MSO-T10 to T100FSKP types.
Note 3. T10 to T50 can also be manufactured to have wiring streamlining terminals (BC).
Note 4. Enclosed MS-T☐FS/FSKP types can also be manufactured.
Note 5. Enclosed type heater designation 67A uses a thermal overload relay dedicated for enclosed types.

Related Reference Page

Item	Reference Page	Remarks
· Main Contact Rating	Page 39	—
· Auxiliary Contact Rating	Page 41	—
· Operation Coil	Page 43	Same as MSO/S-☐ types.
· Properties	Page 45	Same as MSO/S-☐ types. Refer to pages 136, 147 for information about thermal overload relays.
· Performance	Page 46	Same as MSO/S-☐ types. Refer to pages 136, 147 for information about thermal overload relays.
· Outline Drawings/Contact Arrangements	Page 77	Same as MSO-☐ type.
· How to Order	Page 131	—
· Combining with Optional Units	Page 194	—

4.8 MS-☐PM Magnetic Starters with Push-Buttons

ON and OFF control is possible with the power supply and load connections alone

- The ON and OFF push-button switch is mounted to the surface of the enclosure.
- MS-T10PM and MS-T12PM have a reset button, while MS-T21PM and greater have an OFF button that also resets the thermal overload relay.

MS-T10PM

4

Ratings/Specifications (Standard Applicability)

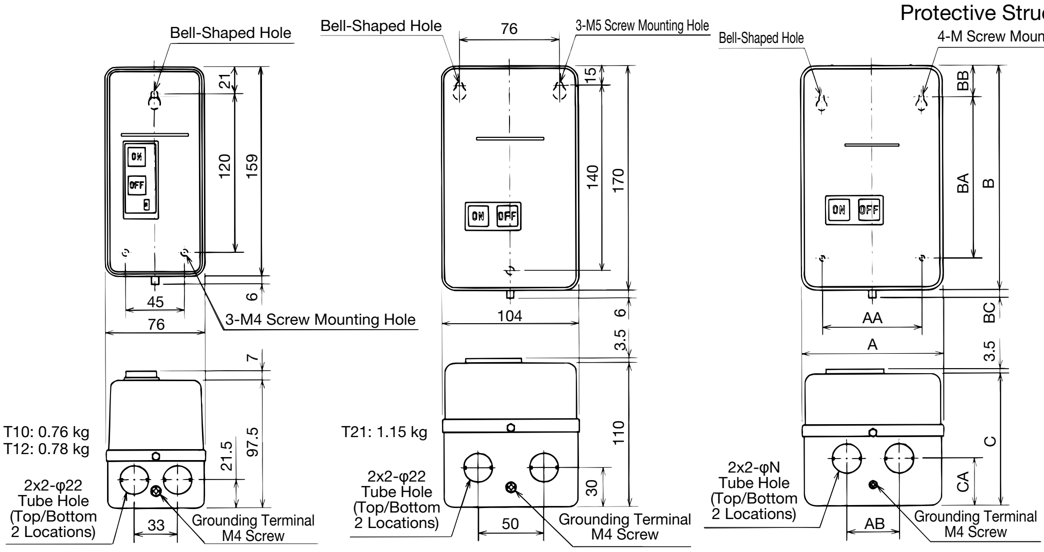
Magnetic Starters	Rated Capacity [kW] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Three-Phase Squirrel-cage Motor (Category AC-3)				Auxiliary Contact (Note 5)	Combinable Thermal Overload Relays	
With ON, OFF and Reset Buttons (Note 8)	AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	AC220 to 240 V	AC380 to 440 V	AC500 V	AC690 V	Standard (Special)	Model Name	Heater Designation Range [A]
MS-T10KPPM	2.5[2.2]	4[2.7]	4[2.7]	4	11[11]	9[7]	7[6]	5	1a(1b)	TH-T18KP	0.12 to 9
MS-T12KPPM	3.5[2.7]	5.5[4]	5.5[5.5]	5.5	13[13]	12[9]	9[9]	7	1a1b(2a)		0.12 to 11
MS-T21KPPM	5.5[4](Note 4)	11[7.5]	11[7.5]	7.5	25[20]	23[20]	17[17]	9	2a2b	TH-T25KP	0.24 to 15
MS-T35KPPM	11[7.5]	18.5[15]	18.5[15]	15	40[35]	40[15]	32[26]	17		TH-T25KP	0.24 to 22
										TH-T50KP	29
MS-T50KPPM	15[11]	22[22]	25[22]	22	55(50)[50]	50[48]	38[38]	26		TH-T25KP	0.24 to 22
										TH-T50KP	29 to 42
MS-T65KPPM	18.5[15]	30[30]	37[30]	30	65[65]	65[65]	60[45]	38		TH-T65KP	15 to 54
MS-T80KPPM	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52		(Note 7)	67
MS-T100KPPM	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65		TH-T65KP	15 to 54
										TH-T100KP	67, 82

Note 1. Auxiliary contact units cannot be installed.
Note 2. Can be manufactured to have 3-element (2E) thermal overload relays (MS-☐KPPM) included.
Note 3. Can be manufactured to have thermal overload relays that cannot be reset at the surface of the enclosure (MS-☐PS).
Note 4. MS-T21PM types with 200 to 220 V ratings are 3.7 kW, in accordance with the Electrical Appliance and Material Safety Law.
Note 5. Among the auxiliary contacts of MS-T21PM or greater, 1a is internally wired as a self-retaining contact.
Note 6. MS-T☐DPPM(PS) is for single-phase motors. Refer to page 267 article 10.2 for details about production scope and applicable capacities.
Note 7. Heater designation 67A uses a thermal overload relay dedicated for enclosed types.
Note 8. MS-T☐PM and MS-N☐PM types can also be manufactured.

Related Reference Page	Item	Reference Page	Remarks
	· Main Contact Rating	Page 39	—
	· Auxiliary Contact Rating	Page 41	—
	· Operation Coil	Page 43	Same as MS/MSO/S-☐ types.
	· Properties	Page 45	Same as MS/MSO/S-☐ types. Refer to pages 136, 145 for information about thermal overload relays.
	· Performance	Page 46	Same As Above
	· How to Order	Page 131	—

Outline Drawings

Enclosure (Case): Steel
Paint Color: Munsell 5Y7/1
Protective Structure: IP20

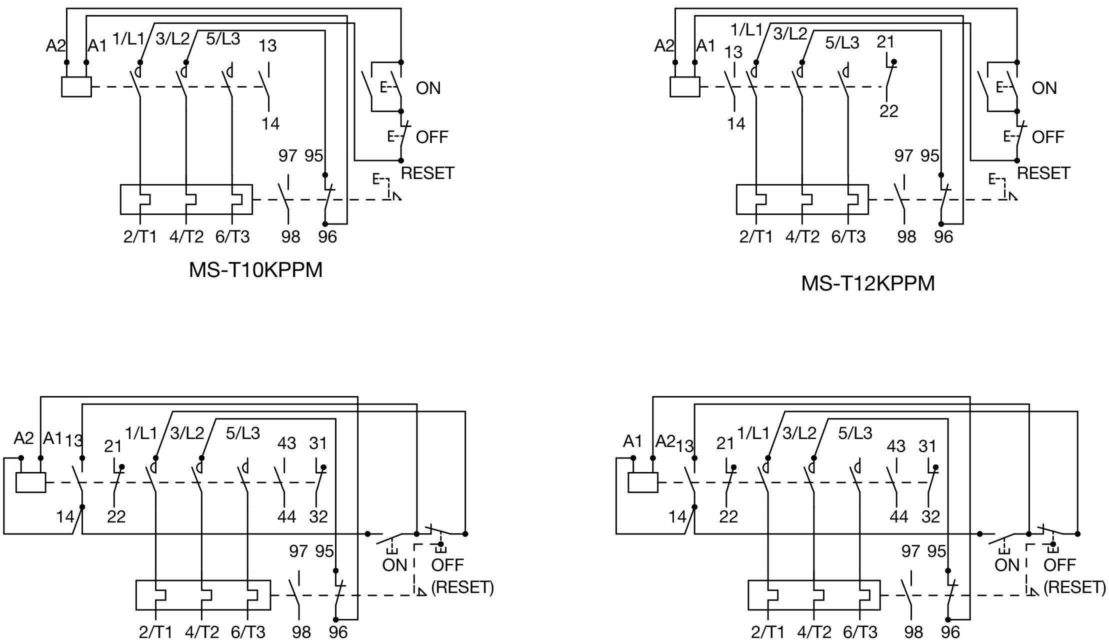


MS-T10/T12KPPM MS-T21KPPM MS-T35 to T100KPPM

Note 1. Leave 100 mm space at the bottom of the enclosure when mounting MS-T10KP to T50KP types.
Note 2. 3 rubber bushings are included for MS-T10KP to T50KP types.
Note 3. MS-T □ and MS-N □ types can also be manufactured.

Frame	Variable Dimensions											Weight [kg]
	A	AA	AB	B	BA	BB	BC	C	CA	M	N	
T35, T50	135	95	50	225	165	30	6	126	45	M5	28	1.9
T65, T80	160	120	80	270	220	25	12	145	45	M5	35	2.9
T100	190	150	100	300	260	20	12	163	67	M6	35	4.0

Connection Diagram



MS-T10KPPM MS-T12KPPM

MS-T21, T35, T50KPPM MS-T65 to T100KPPM

Note 1. The connections in the figure above differ if the main circuit voltage and control circuit voltage differ.

4.9 MSO/S-T☐BC Magnetic Starters/Magnetic Contactors with Wiring Streamlining Terminals

Equipped with wiring streamlining terminal function and finger safe specifications compliant with DIN EN 50274/ VDE 0660 Teil 514.

●Improved Smart Wiring

Wiring is possible without having to remove the terminal cover, which leads to further improvements in wiring efficiency, workability, and hence productivity.

●Abundant Model Range

Both non-reversible and reversible type magnetic starters/magnetic contactors are available for frames up to 10 A to 50 A.

MSO-T10BCKP

● Manufacturing Range List

Model / Frame	Non-Reversing: Magnetic Contactors Model Name	Auxiliary Contact	Non-Reversing: Magnetic Starters Model Name (Note 4)	Auxiliary Contact	Reversing: Magnetic Contactors Model Name	Auxiliary Contact	Reversing: Magnetic Starters Model Name (Note 4)	Auxiliary Contact	Terminal Cover Types
T10	S-T10BC	1a	MSO-T10BCKP	1a	S-2xT10BC	1a x 2 + 2b	MSO-2xT10BCKP	1a x 2 + 2b	
		1b		1b		1b x 2 + 2b		1b x 2 + 2b	
T12	S-T12BC	1a1b	MSO-T12BCKP	1a1b	S-2xT12BC	1a1b x 2 + 2b	MSO-2xT12BCKP	1a1b x 2 + 2b	
		2a, 2b		2a, 2b		2a x 2 + 2b		2a x 2 + 2b	
T20	S-T20BC	1a1b	MSO-T20BCKP	1a1b	S-2xT20BC	1a1b x 2 + 2b	MSO-2xT20BCKP	1a1b x 2 + 2b	Wiring Streamlining Terminal
		2a		2a		2a x 2 + 2b		2a x 2 + 2b	
T21	S-T21BC	2a2b	MSO-T21BCKP	2a2b	S-2xT21BC	2a2b x 2	MSO-2xT21BCKP	2a2b x 2	
T25	S-T25BC	2a2b	MSO-T25BCKP	2a2b	S-2xT25BC	2a2b x 2	MSO-2xT25BCKP	2a2b x 2	
T32	S-T32BC	—	—	—	S-2xT32BC	2a2b x 2	—	—	
T35	S-T35BC	2a2b	MSO-T35BCKP	2a2b	S-2xT35BC	2a2b x 2	MSO-2xT35BCKP	2a2b x 2	
T50	S-T50BC	2a2b	MSO-T50BCKP	2a2b	S-2xT50BC	2a2b x 2	MSO-2xT50BCKP	2a2b x 2	

Note 1. Terminal numbers are compliant with EN standards (EN50005 and EN50012).
Note 2. The 2 auxiliary break contacts of reversible magnetic starters are wired as an electrical interlock.
Note 3. S/SD-2 x T32BC type has auxiliary contact unit 2a2b (UT-AX4BC) x 2 included as standard.
Note 4. Magnetic starters model names indicate when 3-element (2E) thermal overload relays are included. Remove KP from the model name for 2-element types.
Note 5. DC operated types (SD, MSOD) can also be manufactured. However, T10 and T25 types are not manufactured.
Note 6. Mechanically latched types (SL, SLD) can only be manufactured for T21, T35 and T50.
Note 7. The +2b on the auxiliary contact arrangement of reversible T10, T12 and T20 types indicates the break contact of the integrated UT-ML20BC interlock unit. There is no need to specify when ordering.

● Applicable Thermal Overload Relays

Magnetic Starter Frame	Thermal Overload Relay Model Name
T10, T12, T20	TH-T18BC(KP)
T21, T25	TH-T25BC(KP) ∗1
T35, T50	TH-T25BC(KP) ∗2 TH-T50BC(KP) ∗2

∗1: Separately arrange a UN-TH21 connecting conductor kit.
∗2: Separately arrange a UT-TH50 connecting conductor kit.

● Precautions When Using Crimp Lugs

To comply with DIN EN 50274/VDE 0660 Teil 514 finger safe specifications, be sure to completely cover the entire crimp portion of the crimp lug with an insulating sleeve.

● Connection Diagram/Contact Arrangement Diagram

●Terminal numbers are compliant with EN50005 and JIS C8201-4-1 standards.
●MSO type connection is the same as the standard type.

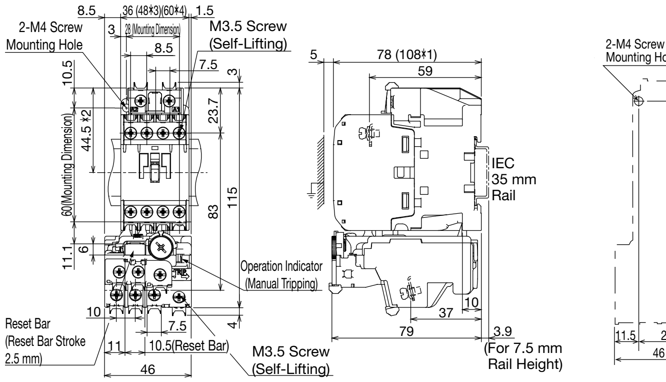
	Item	Reference Page	Remarks
Related Reference Page	· Main Contact Rating	Page 39	—
	· Auxiliary Contact Rating	Page 41	—
	· Operation Coil	Page 43	Same as MSO/S-☐types.
	· Properties	Page 45	Same as MSO/S-☐types. Refer to pages 136, 145 for information about thermal overload relays.
	· Performance	Page 46	Same As Above
	· How to Order	Page 131	—
	· Combining with Optional Units	Page 194	Auxiliary contact units, interface units, front clip-on timer units and surge absorber units can be mounted.

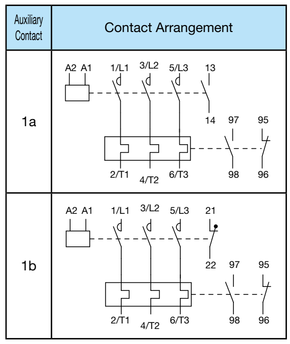
Outline Drawings/Contact Arrangements (AC Operated Magnetic Starters/Magnetic Contactors)

T10BC

Non-Reversing

MSO-T10BCKP





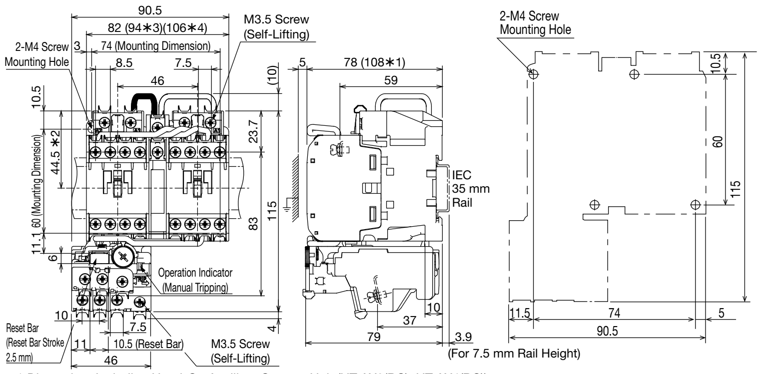
0.36kg

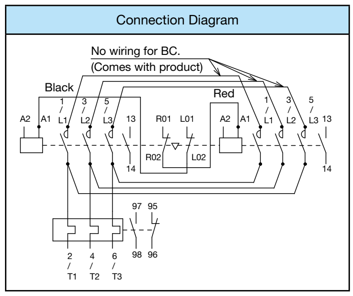
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

Model Name
MSO-T10BCKP

Reversing

MSO-2 × T10BCKP





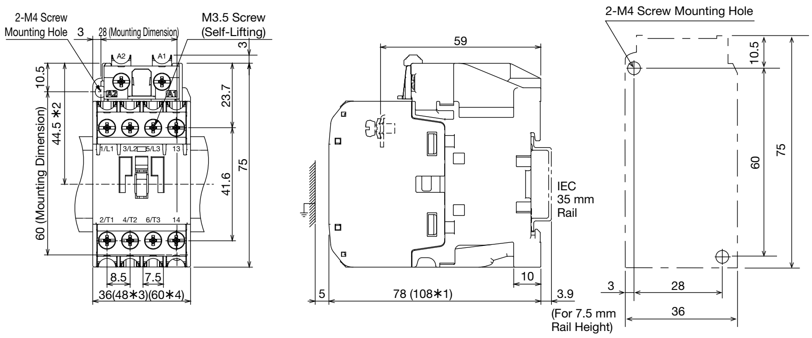
0.66kg

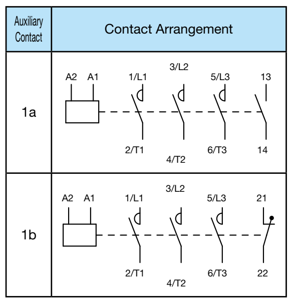
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

Model Name
MSO-2xT10BCKP

Non-Reversing

S-T10BC





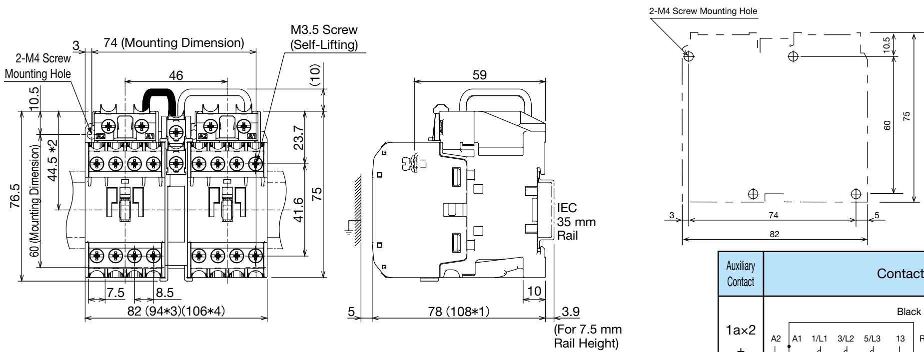
0.25kg

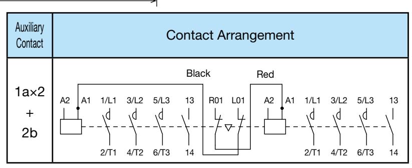
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

Model Name
S-T10BC

Reversing

S-2 × T10BC





∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

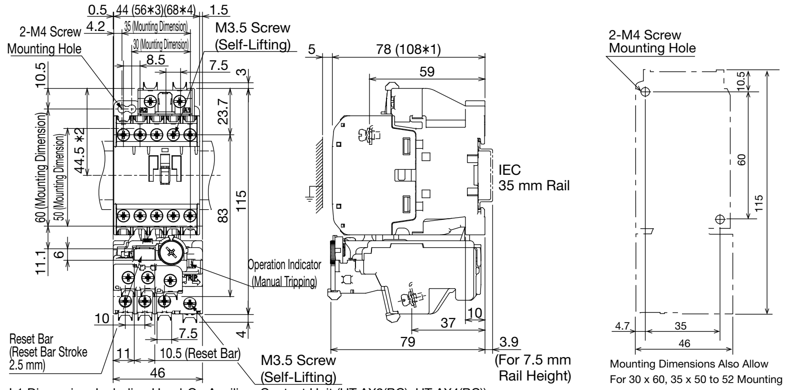
0.55kg

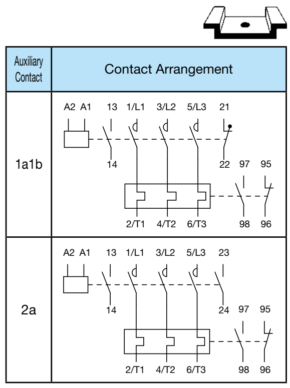
Model Name
S-2xT10BC

T12/T20BC

Non-Reversing

MSO-T12BCKP
MSO-T20BCKP





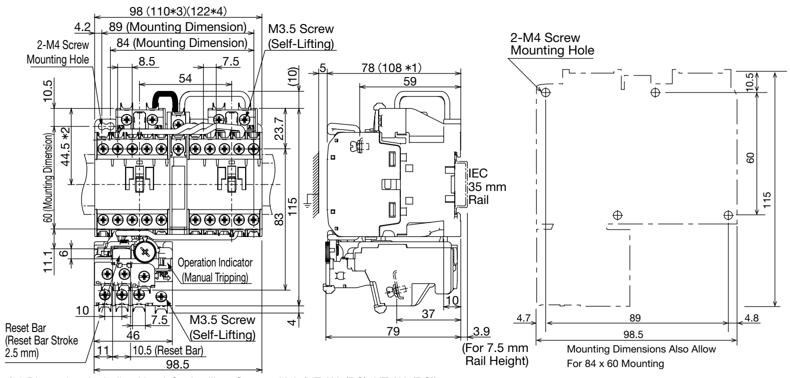
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

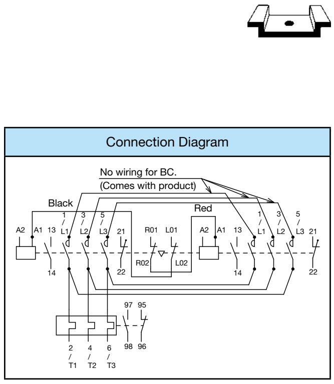
0.38kg

Model Name
MSO-T12BCKP
MSO-T20BCKP

Reversing

MSO-2×T12BCKP
MSO-2×T20BCKP





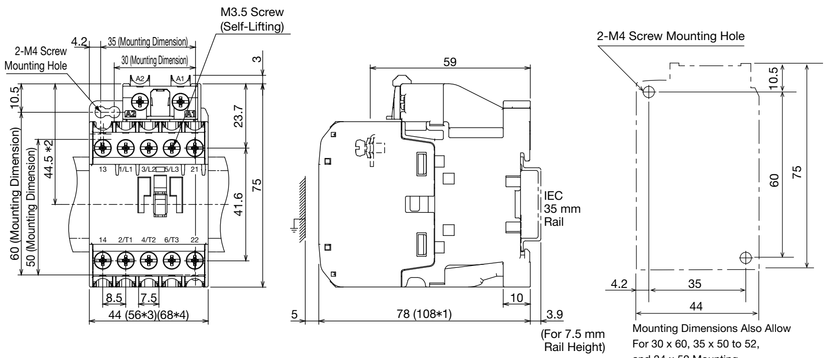
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

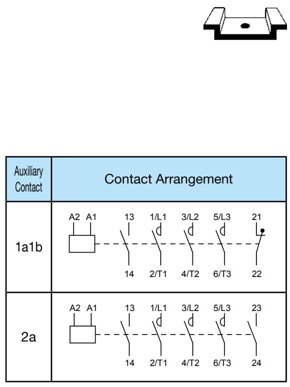
0.7kg

Model Name
MSO-2xT12BCKP
MSO-2xT20BCKP

Non-Reversing

S-T12BC
S-T20BC





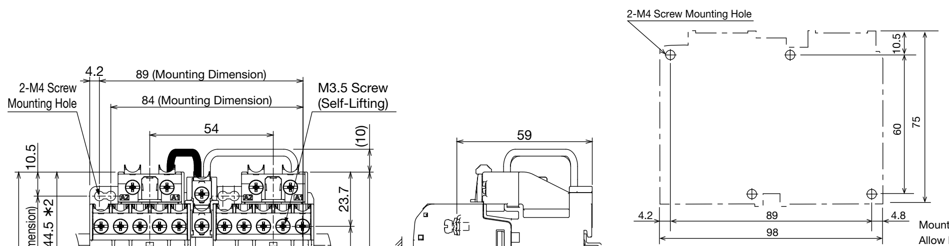
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

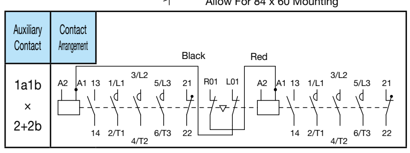
0.27kg

Model Name
S-T12BC
S-T20BC

Reversing

S-2×T12BC
S-2×T20BC





∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

0.59kg

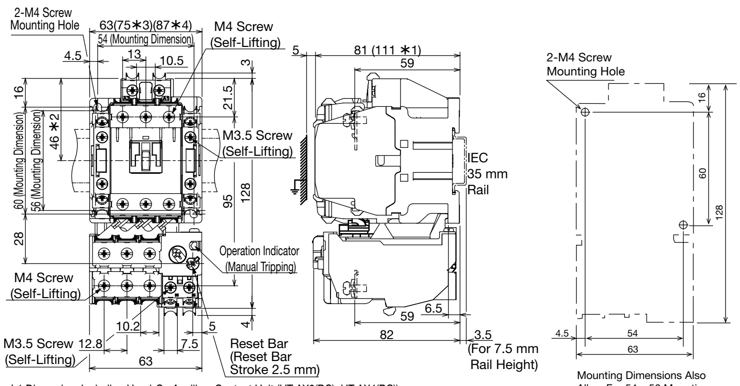
Model Name
S-2xT12BC
S-2xT20BC

4

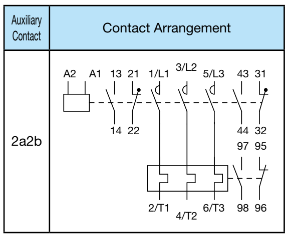
T21/T25BC

Non-Reversing

MSO-T21BCKP
MSO-T25BCKP



∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, 4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

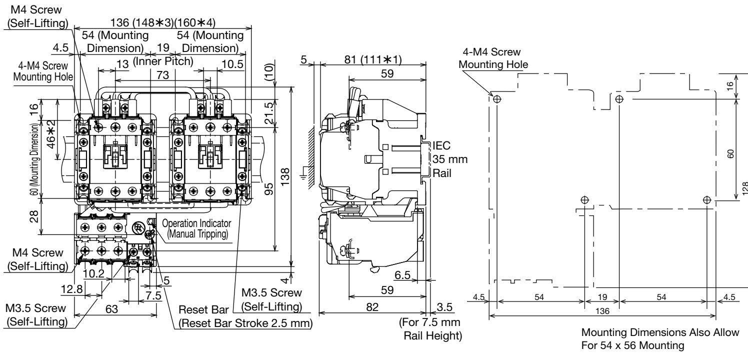


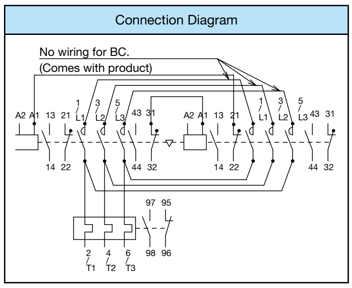
Model Name
MSO-T21BCKP
MSO-T25BCKP

0.58 kg

Reversing

MSO-2 × T21BCKP
MSO-2 × T25BCKP





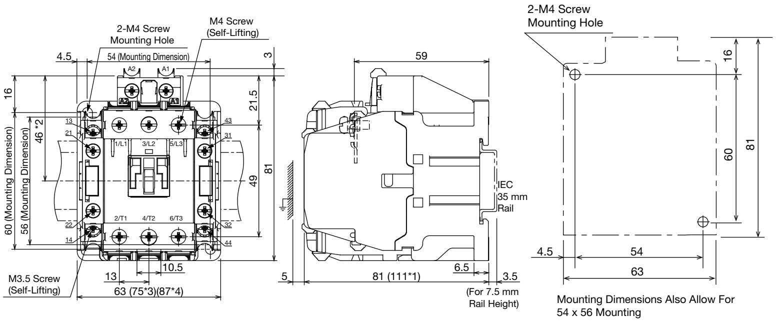
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

Model Name
MSO-2xT21BCKP
MSO-2xT25BCKP

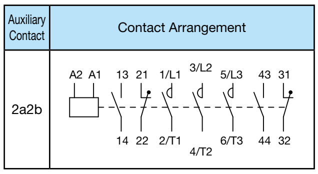
1.03 kg

Non-Reversing

S-T21BC
S-T25BC



∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

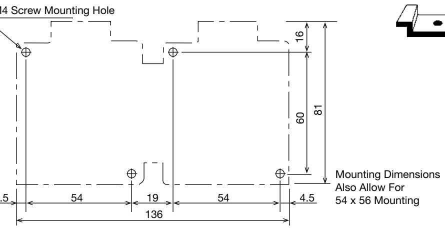


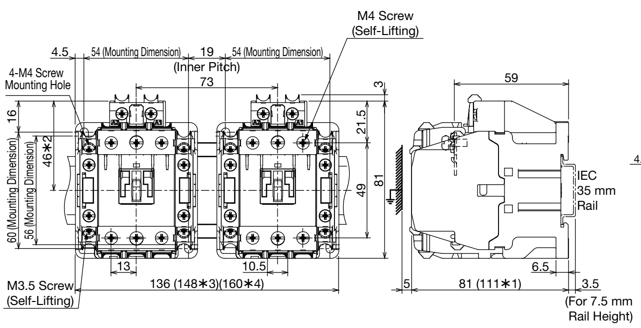
Model Name
S-T21BC
S-T25BC

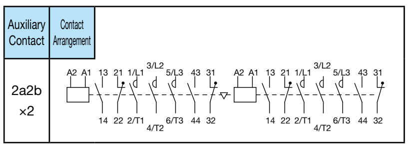
0.41 kg

Reversing

S-2 × T21BC
S-2 × T25BC







∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

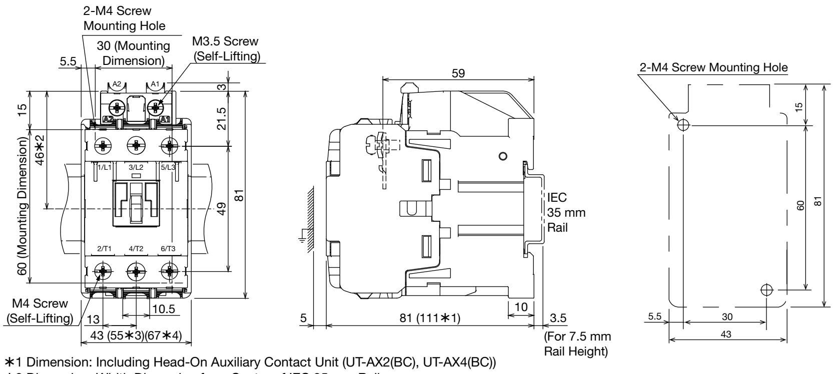
Model Name
S-2xT21BC
S-2xT25BC

0.86 kg

T32BC

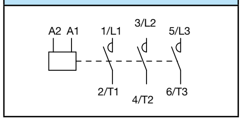
Non-Reversing

S-T32BC



∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

Contact Arrangement

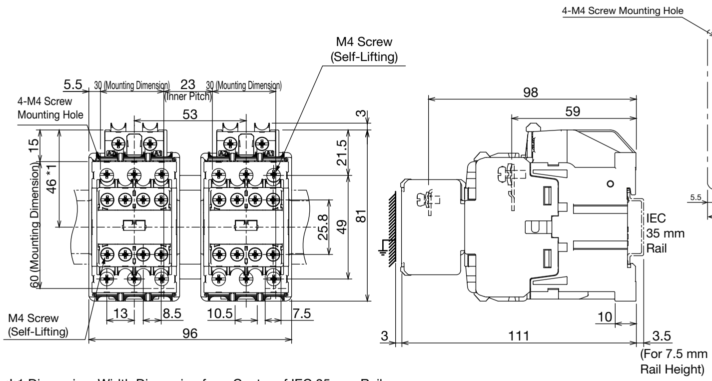


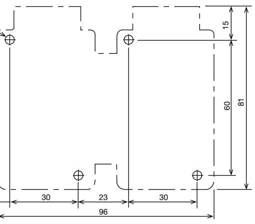
Model Name
S-T32BC

0.36 kg

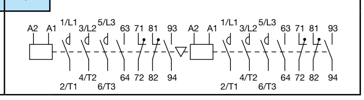
Reversing

S-2 × T32BC





∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Auxiliary Contact	Contact Arrangement
2a2b ×2	

Model Name
S-2xT32BC

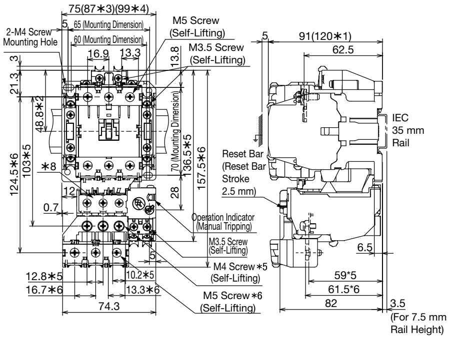
0.84 kg

4

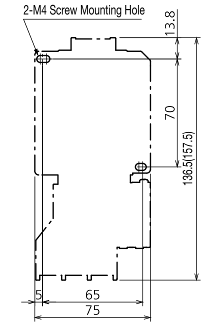
T35/T50BC

Non-Reversing

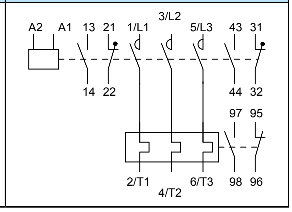
MSO-T35BCKP
MSO-T50BCKP



∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
∗5 Dimension: Heater Designations 22A or Less, ∗6 Dimension: Heater Designations 29A or More
Note 1. Products with a heater designation of 29A do not have fast wiring terminals on the power side terminal cover of the thermal overload relay.



Mounting Dimensions Also Allow For 60 x 70 Mounting

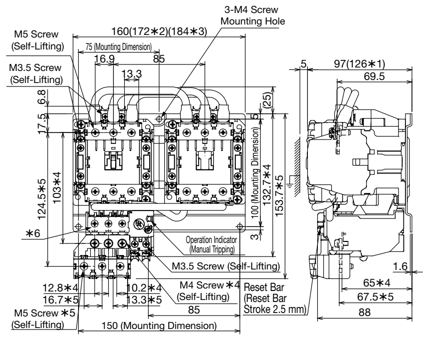
Auxiliary Contact	Contact Arrangement
2a2b	

0.79 kg

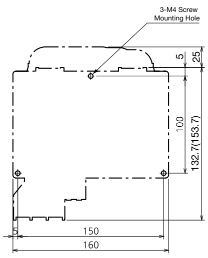
Model Name
MSO-T35BCKP
MSO-T50BCKP

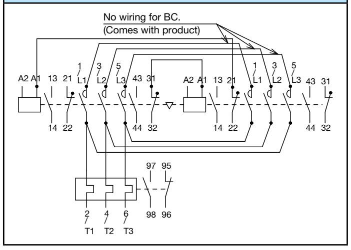
Reversing

MSO-2 × T35BCKP
MSO-2 × T50BCKP



∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2,∗3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
-∗2 Has 1 Piece, ∗3 Has 2 Pieces (Both Sides)
∗4 Dimension: Heater Designations 22A or Less, ∗5 Dimension: Heater Designations 29A or More
Note 1. Products with a heater designation of 29A do not have fast wiring terminals on the power side terminal cover of the thermal overload relay.



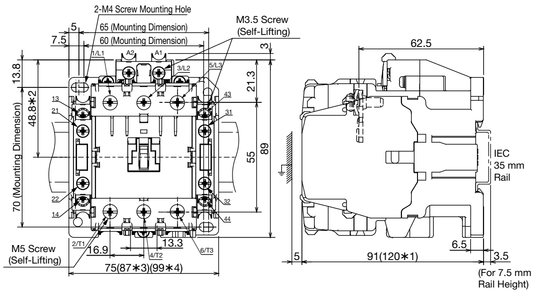
Connection Diagram


1.54 kg

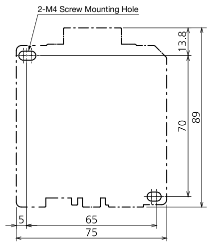
Model Name
MSO-2xT35BCKP
MSO-2xT50BCKP

Non-Reversing

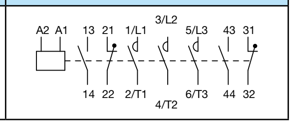
S-T35BC
S-T50BC



∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
- ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.



Mounting Dimensions Also Allow For 60 x 70 Mounting

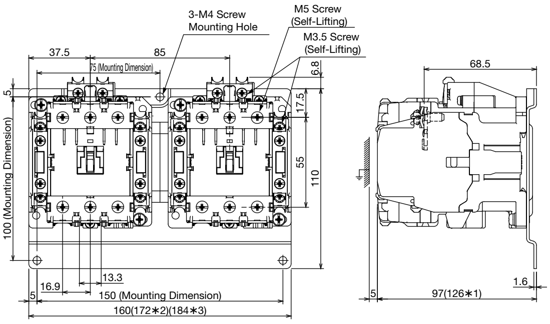
Auxiliary Contact	Contact Arrangement
2a2b	

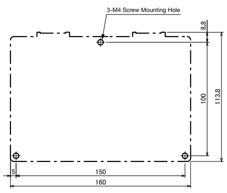
0.55 kg

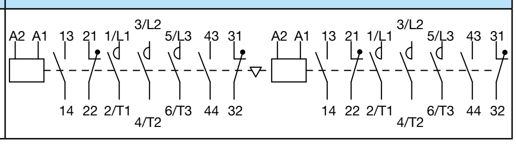
Model Name
S-T35BC
S-T50BC

Reversing

S-2 × T35BC
S-2 × T50BC





Auxiliary Contact	Contact Arrangement
2a2b×2	

∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2,∗3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC))
-∗2 Has 1 Piece,∗3 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

1.3 kg

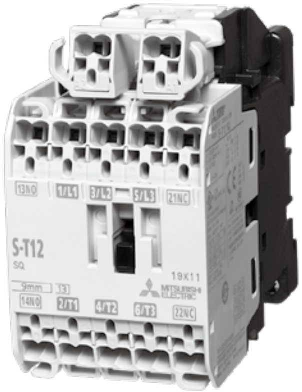
Model Name
S-2xT35BC
S-2xT50BC

4.10 S-T□SQ, SD-T□SQ Magnetic Contactors with Spring Clamp Terminals

Just insert solid wires or ferrules into terminals. No terminal screws are required, which makes wiring quicker and easier.

●Shorter Wiring Time
Wiring time becomes shorter than the time required for tightening screws.
No worry about loss of screws.
Solid wires, stranded wires, and ferrules can be connected to the terminals.

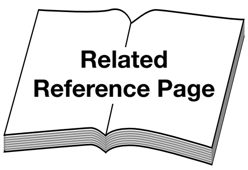
●Easier Maintenance
No worry about loose screws. Conventionally, terminal screws come loose due to vibrations, impacts, or long-time use, and must be tightened when products come in or during inspection.


S-T12SQ

● Manufacturing Range List

Model / Frame	Non-Reversing Magnetic Contactors		Terminal
	Model Name	Auxiliary Contact	
T12	S-T12SQ	1a1b, 2a, 2b	Spring Clamp Terminals
	SD-T12SQ	1a1b, 2a	
T20	S-T20SQ	1a1b, 2a, 2b	
	SD-T20SQ	1a1b, 2a	

Note 1. Terminal numbers are compliant with EN standards (EN50005 and EN50012).

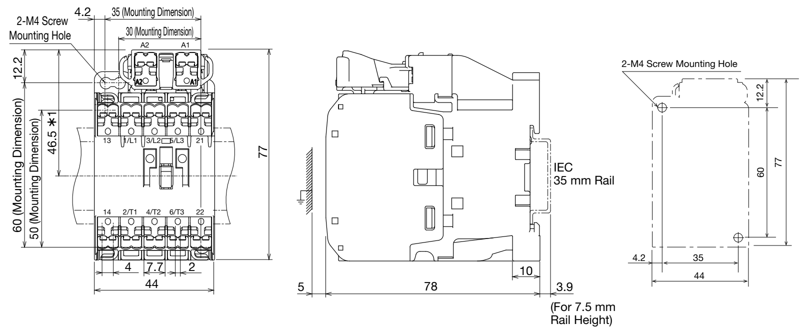


Item	Reference Page	Remarks
· Main Contact Rating	Page 39	—
· Auxiliary Contact Rating	Page 41	—
· Operation Coil	Page 43	
· Properties	Page 45	—
· Performance	Page 46	—
· Applicable wires	Page 68	—
· How to Order	Page 131	—
· Combining with Optional Units	Page 194	Devices such as coil surge absorbers and manual operation prevention covers can be installed.

Outline Drawings/Contact Arrangements

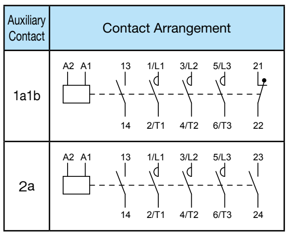
S-T12SQ
S-T20SQ

0.28kg



∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

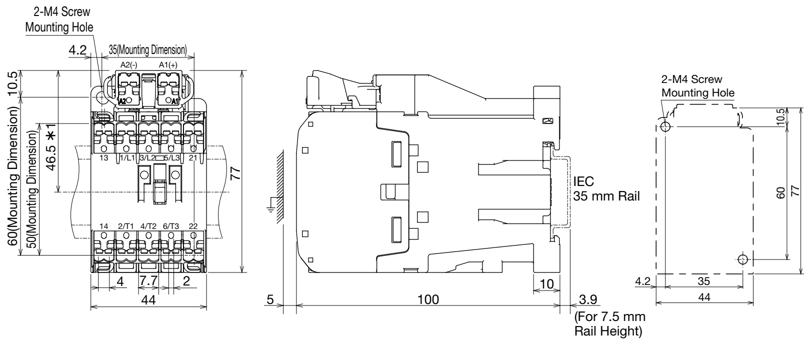
Mounting Dimensions Also Allow
For 35 x 60, 35 x 50 to 52, 34 x 52 Mounting



Model Name
S-T12SQ
S-T20SQ

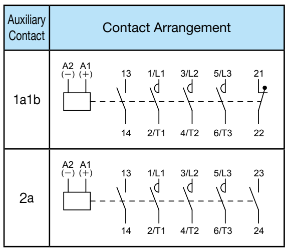
SD-T12SQ
SD-T20SQ

0.43kg



∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Mounting Dimensions Also Allow
For 35 x 60, 35 x 50 to 52, 34 x 52 Mounting



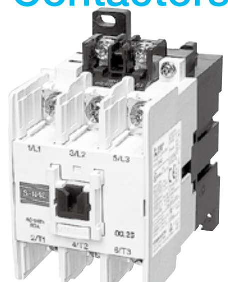
Model Name
SD-T12SQ
SD-T20SQ

4.11 S(D)-T32, S-N□8 Main Circuit 3-Pole Magnetic Contactors

Dramatically reduces panel installation area required

- A space-saving type without auxiliary contacts equipped and just 3-pole main contacts.
- If auxiliary contacts are required, auxiliary contact units can be installed. (Reversing types have 2a2b x 2 installed)

S-T32



S-N48

Ratings/Specifications (Standard Applicability)

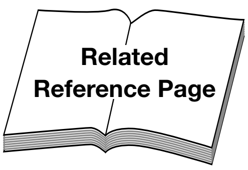
Magnetic Contactors		Rated Capacity [kW] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Three-Phase Squirrel-cage Motor (Category AC-3)				Rated Operating Current [A] Resistive Load (Category AC-1)		Conventional Free Air Thermal Current Ith [A]	Additional Auxiliary Contact Unit Model Name x Pieces (Note 2)	Terminal Screw Size (Standard Tightening Torque N·m, Parentheses Show Standard Value) Main Circuit	Terminal Screw Size Control Circuit	Recommended Crimp Lug Size Compatible with Terminal Main Circuit	Recommended Crimp Lug Size Compatible with Terminal Control Circuit
Non-Reversing	Reversing	220 to 240 V	380 to 440 V	500 V	690 V	220 to 240 V	380 to 440 V	500 V	690 V	200 to 220 V	380 to 440 V						
S-T32(BC) SD-T32(BC)	S-2 x T32(BC) SD-2 x T32(BC)	7.5	15	15	11	32	32	24	12	32	32	32	UT-AX2, 4 x 1 UT-AX11 x 2	M4 1.18 - 1.86 (1.47)	M3.5 0.94 - 1.51 (1.17)	1.25-4 to 5.5-4	1.25-3.5 to 2-3.5
S-N38(CX)	S-2 x N38(CX)	7.5	15	15		35	32	24		60	60	60	UN-AX2, 4 x 1 (Front Clip-on)	M5 2.06 - 3.33 (2.55)	M3.5 0.94 - 1.51 (1.17)	1.25-5 to 14-5	1.25-3.5 to 2-3.5
S-N48(CX)	S-2 x N48(CX)	11	15	15		50	35	24		80	80	80					

Note 1. The M4 main circuit terminal screw size for T32 types makes it unsuitable for applications exceeding 20 A in accordance with the Electrical Appliance and Material Safety Law.
Note 2. Reversing types already have 2 UT/UN-AX4 units installed so no more can be mounted. Furthermore, all side clip-on units (UT/UN-AX11) are not applicable.
Note 3. Types including thermal overload relays (MSO) are not manufactured.
Note 4. A "BC" in the model name indicates a wiring streamlining terminal, "CX" indicates a CAN terminal.
Note 5. Please note that SD-T32 type operation coil terminals have polarity. A1 (+), A2 (-)

Properties/Performance

Model Name	Input [VA] Momentary	Input [VA] Regular	Power Consumption [W]	Coil Current [mA]	Operating Voltage [V] Close	Operating Voltage [V] Open	Operating Time [ms] Coil ON→ Main Contact ON	Operating Time [ms] Coil OFF→ Main Contact OFF	Making Current Capacity [A] (Peak 0.5 ms)	Switching Frequency	Switching Durability [x 10000] Mechanical	Switching Durability [x 10000] Electrical (Category AC-3)
SD-T32	—	—	3.3 (2.2)	0.033	60 to 75	10 to 30	70 (95)	20	400	1800 Times/Hour	1000	200
S-T32	55	4.5	1.8	20	125 to 155	80 to 115	15 to 22	5 to 15	400			
S-N38	110	13	4.3	80	120 to 145	90 to 115	10 to 20	5 to 14	500		500	100
S-N48	110	13	4.3	80	120 to 145	90 to 115	10 to 20	5 to 14	670	1200 Times/Hour		

Note 1. The above table indicates rough property indices for DC100V coils for DC operated types and AC200V coils for AC operated types. The values in the parentheses for SD-T32 indicate rough property indices for DC12V or DC24V coils.
Note 2. The operating voltage is that at a 20°C cold state. (AC operated type values are for 60 Hz)
Note 3. The coil current is the average regular value with DC100V (DC operated type) or AC220 V at 60 Hz (AC operated type) applied.
Note 4. The operating time is the value with DC100V (DC operated type) or AC220 V at 60 Hz (AC operated type) applied.
Note 5. The coil input and power consumption are the average values.
Note 6. The electrical durability at the making current capacity lasts 100,000 operations.

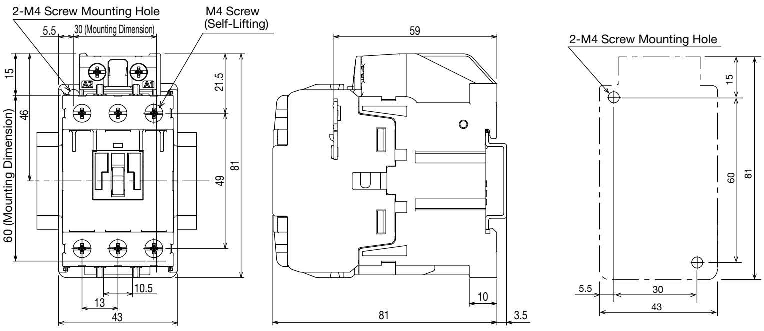


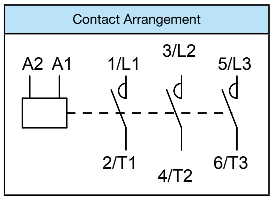
Item	Reference Page	Remarks
· Main Contact Rating	Page 39	—
· Operation Coil	Page 43	—
· How to Order	Pages 131,133	—
· Combining with Optional Units	Page 194	—

Outline Drawings/Contact Arrangements (The diagrams show models without "BC" or "CX".)

S-T32(BC)

0.36kg

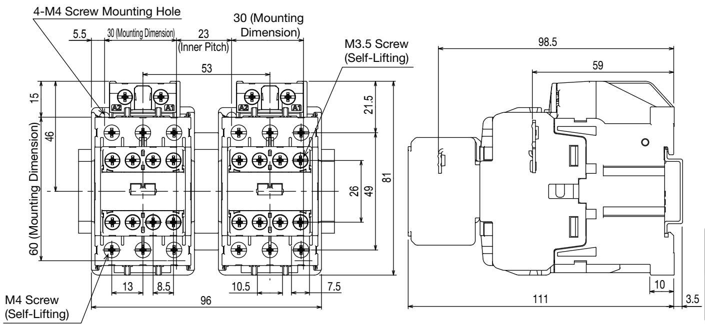


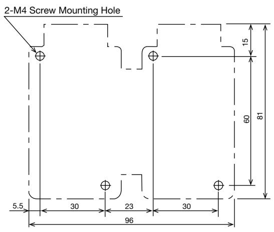


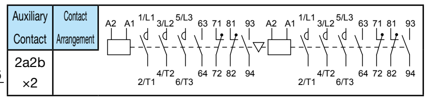
Model Name
S-T32
S-T32BC

S-2×T32(BC)

0.84kg

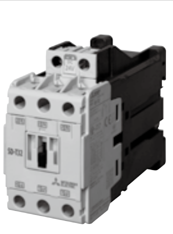




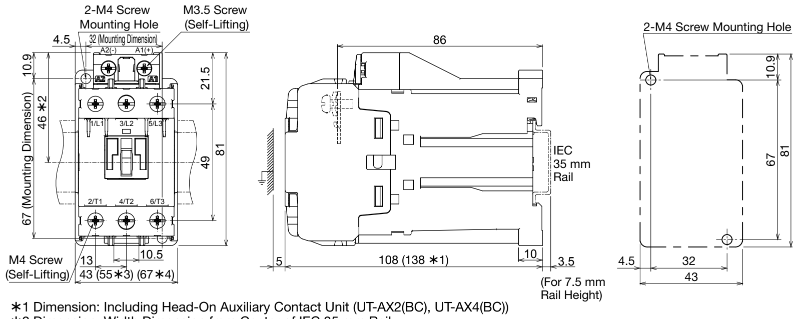


Model Name	Model Name
S-2×T32	S-2×T32BC

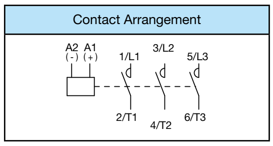
SD-T32(BC)



0.55kg

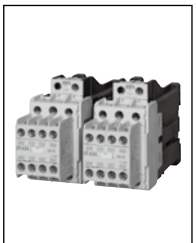


∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC), UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)

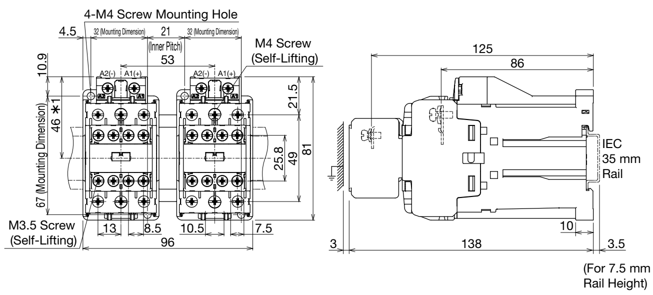


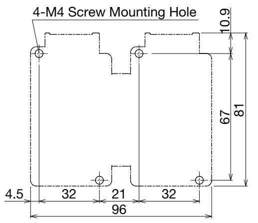
Model Name
SD-T32
SD-T32BC

SD-2×T32(BC)

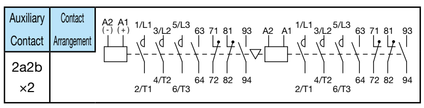


1.22kg





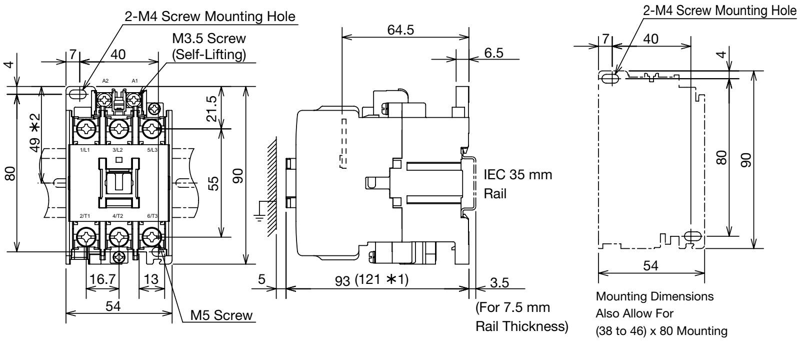
∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

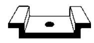


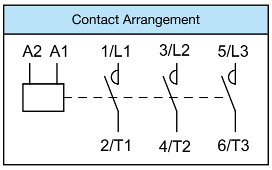
Model Name
SD-2×T32
SD-2×T32BC

S-N38(CX)
S-N48(CX)

0.45kg



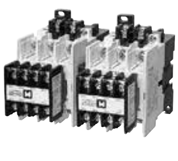




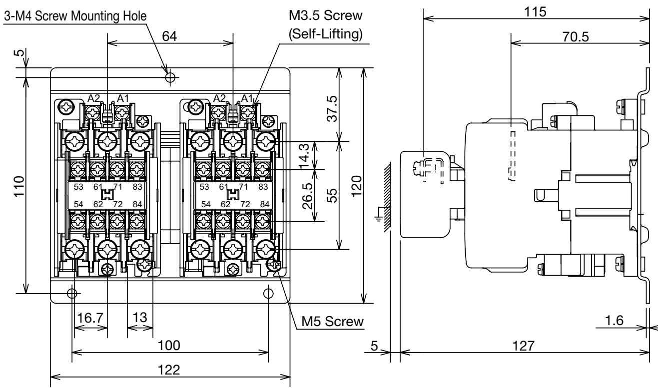
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UN-AX2(CX), UN-AX4(CX))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail.
Not Applicable With Side-On Auxiliary Contact Unit (UN-AX11(CX))

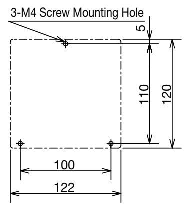
Model Name	Model Number	Model Name	Model Number
S-N38	SN03□□	S-N38CX	SN53□□
S-N48	SN03□□	S-N48CX	SN53□□

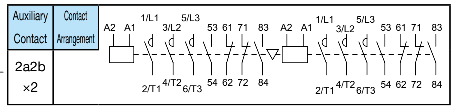
S-2×N38(CX)
S-2×N48(CX)



1.0kg







Model Name	Model Name
S-2×N38	S-2×N38CX
S-2×N48	S-2×N48CX

Side-On Auxiliary Contact Units (UN-AX11(CX)) Not Applicable

4.12 How to Order

Precautions

Follow the steps below when ordering. Enter a space in ▲.
If there are multiple 2 letter symbols (SA, BC, KP etc.) appended to the model name frame size (T10 etc.) then specify them in alphabetical order.
(E.g.: MSO-T10BCKPSA)
(If not in alphabetical order, the model name displayed will change automatically.)

● MS-T Series

1. Standard (AC Operated) Magnetic Starters

■MS-(2x)T (Enclosed Type)

Model Name	Motor Capacity	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MS-T21KP	▲ 3.7kW	▲ 200V	▲ AC200V	▲
MS-T10KP		▲ 200V	▲ AC200V	▲ 1B
Refer to pages 74 and 75.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage)	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

■MSO-(2x)T (Open Type)

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MSO-T10KP	▲ 9A	▲ 200V	▲ AC200V	▲ 1B
Refer to pages 74 and 75.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage)	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

2. Standard (AC Operated) Magnetic Contactors

■S-T Type, S-2xT Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency	(Note) Auxiliary Contact
S-T20	▲ AC200V	▲ 2A
S-T20	▲ AC100V50Hz	
Refer to pages 74 and 75.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

3. DC Operated Magnetic Starters/Contactors

■MSOD-T Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation	(Note) Auxiliary Contact
MSOD-T21KP	▲ 3.7kW	▲ 200V	▲ DC100V	▲
Refer to page 91.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit.	Select the coil designation from page 44.	Specify if using a special contact arrangement. Refer to page 41.

■SD-T Type

Model Name	Operation Coil Designation	(Note) Auxiliary Contact
SD-T21	▲ DC110V	▲
Refer to page 91. SD-2 x T21 is a reversing type.	Select the coil designation from page 44.	Specify if using a special contact arrangement. Refer to page 41.

4. Mechanically Latched Magnetic Starters/Contactors

■MSOL-T Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Closing Coil	Tripping Coil
MSOL-T21KP	▲ 3.7KW	▲ 200V	▲ MC-AC200V	▲ MT-AC200V
Specify "MSOLD" if using a DC operated closing coil. Refer to page 102.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage)	Select the coil designation from page 44.	

■SL-T Type, SLD-T Type

Model Name	Closing Coil Designation	Tripping Coil Designation
SL-T21	▲ MC-AC100V	▲ MT-AC100V
Refer to page 102. · The model name is SLD if using a DC operated closing coil.	Select the coil designation from page 44.	

■SL-2xT Type, SLD-2xT Type

Specify using the SL-T type listed above if the left and right closing coils or tripping coils have the same ratings.
However, specify using the following if the left and right coils have different ratings.

Model Name	Closing Coil Designation (Left Side)	Tripping Coil Designation (Left Side)	Closing Coil Designation (Right Side)	Tripping Coil Designation (Right Side)
SL-2xT21	▲ MC1-AC100V	▲ MT1-AC100V	▲ MC2-AC100V	▲ MT2-DC100V
Refer to page 102. · The model name is SLD if using a DC operated closing coil.	Select the coil designation from page 44.			

5. Delay Open Magnetic Starters/Contactors

■MSO-T□DL, S-T□DL Type

Model Name	Main Circuit Specifications	Operation Coil
MSO-T21DLKP	▲ 15A ▲ 200V	▲ AC200V
S-T12DL	▲ 200V	▲ AC200V
Specify from page 111.	Specify the rated voltages of the thermal overload relay heater designation and main circuit. Be sure to specify the rated voltage as there are strict criteria for the internal wiring of magnetic contactors.	The operation coil designation is available in AC100V and AC200V.

6. Magnetic Starters with Delay Trip Thermal Overload Relays

■MSO-T ☐ SR Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MSO-T12SR ▲	2.2kW ▲	200V ▲	AC200V ▲	
Specify from page 114.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

7. Magnetic Starters with Quick Trip Thermal Overload Relays

■MSO-T ☐ FS/FSKP Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MSO-T12FSKP ▲	2.2kW ▲	200V ▲	AC200V ▲	
Specify from page 116.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

8. Magnetic Starters with Push-Buttons

■MS-T ☐ KPPM Type

Model Name	Motor Capacity	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MS-T21KPPM ▲	3.7kW ▲	200V ▲	AC200V ▲	
Specify from page 117.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage)	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

9. Magnetic Starters/Magnetic Contactors with Wiring Streamlining Terminals

■MSO-T ☐ BC Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MSO-T12BCKP ▲	2.2kW ▲	200V ▲	AC200V ▲	
Specify from page 119.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

■S-T ☐ BC Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency	(Note) Auxiliary Contact
S-T12BC ▲	AC200V ▲	
Specify from page 119.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

10. Magnetic Contactors with Spring Clamp Terminals

■S-T ☐ SQ Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency
S-T12SQ ▲	AC200V
Specify from page 125.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.

■SD-T ☐ SQ Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency
SD-T12SQ ▲	DC100V
Specify from page 125.	Select the coil designation from page 44 or specify the control circuit voltage and frequency used.

11. Main Circuit 3-Pole Magnetic Contactors

■S-T Type, S-2xT Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency
S-T32 ▲	AC200V
Specify from page 127.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.

■SD-T Type, SD-2xT Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency
SD-T32 ▲	DC100V
Specify from page 127.	Select the coil designation from page 44 or specify the control circuit voltage and frequency used.

MS-N Series

1. Standard (AC Operated) Magnetic Starters

MS-(2x)N Type (Enclosed Type)

Model Name	Motor Capacity	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MS-N125KP ▲	30kW ▲	200V ▲	AC200V ▲	
Refer to pages 74 and 75.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage)	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

MSO-(2x)N Type (Open Type)

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency	(Note) Auxiliary Contact
MSO-N125KP ▲	105A ▲	200V ▲	AC200V ▲	
Refer to pages 74 and 75.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage)	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

2. Standard (AC Operated) Magnetic Contactors

S-N Type, S-2xN Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency	(Note) Auxiliary Contact
S-N125 ▲	AC200V ▲	
S-N125 ▲	AC110V 50Hz	
Refer to pages 74 and 75.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

3. DC Operated Magnetic Starters/Contactors

MSOD-N Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation	(Note) Auxiliary Contact
MSOD-N125KP ▲	30kW ▲	200V ▲	DC100V ▲	
Refer to page 91.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit.	Select the coil designation from page 44.	Specify if using a special contact arrangement. Refer to page 41.

SD-N Type

Model Name	Operation Coil Designation	(Note) Auxiliary Contact
SD-N125 ▲	DC110V ▲	
Refer to page 91. SD-2 x N50 is a reversing type.	Select the coil designation from page 44.	Specify if using a special contact arrangement. Refer to page 41.

4. Mechanically Latched Magnetic Starters/Contactors

MSOL-N Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Closing Coil	Tripping Coil
MSOL-N125KP ▲	30KW ▲	200V ▲	MC-AC200V ▲	MT-AC200V
MSOLD-N125KP ▲	105A ▲	200V ▲	MC-DC100V ▲	MT-DC200V
Specify "MSOLD" if using a DC operated closing coil. Refer to page 102.	Select from page 48 or 139.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage)	Select the coil designation from page 44.	

SL-N Type, SLD-N Type

Model Name	Closing Coil Designation	Tripping Coil Designation
SL-N125 ▲	MC-AC100V ▲	MT-AC100V
SLD-N125 ▲	MC-DC100V ▲	MT-DC100V
Refer to page 102. · The model name is SLD if using a DC operated closing coil.	Select the coil designation from page 44.	

SL-2xN Type, SLD-2xN Type

Specify using the SL-N or SL-D-N type listed above if the left and right closing coils or tripping coils have the same ratings.
However, specify using the following if the left and right coils have different ratings.

Model Name	Closing Coil Designation (Left Side)	Tripping Coil Designation (Left Side)	Closing Coil Designation (Right Side)	Tripping Coil Designation (Right Side)
SLD-2xN125 ▲	MC1-DC100V ▲	MT1-AC100V ▲	MC2-AC100V ▲	MT2-DC100V
Refer to page 102. · The model name is SLD if using a DC operated closing coil.	Select the coil designation from page 44.			

5. Capacitive Tripping Device

CTU-☐☐Type

Model Name	Operating Voltage Symbol
CTU-A	2
Refer to page 103. Combinable Mechanically Latched Magnetic Starters · Model names differ depending on contactor frame.	Operating Voltage is AC100V or AC200V 1: AC100V 2: AC200V

6. Delay Open Magnetic Starters/Contactors

■MSO-N ☐ DLKP, S-N ☐ DL Type

Model Name		Main Circuit Specifications		Operation Coils
MSO-N150DLKP	▲	125A ▲ 200V	▲	AC200V
S-N400DL	▲	200V	▲	AC200V
Specify from page 111.		Specify the rated voltages of the thermal overload relay heater designation and main circuit. Be sure to specify the rated voltage as there are strict criteria for the internal wiring of magnetic contactors.		The operation coil designation is available in AC100V and AC200V.

7. Magnetic Starters with Delay Trip Thermal Overload Relays

■MSO-N ☐ KPSR Type

Model Name		Motor Capacity or Heater Designation (Knob Setpoint)		Main Circuit Voltage		Operation Coil Designation or Control Circuit Voltage/Frequency		(Note) Auxiliary Contact
MSO-N125KPSR	▲	30kW	▲	200V	▲	AC200V	▲	
Specify from page 114.		Select from page 48 or 139.		Do not apply AC voltage to the main circuit.		Select the coil designation from page 43 or specify the control circuit voltage and frequency used.		Specify if using a special contact arrangement. Refer to page 41.

8. Main Circuit 3-Pole Magnetic Contactors

■S-N Type, S-2xN Type

Model Name		Operation Coil Designation or Control Circuit Voltage and Frequency
S-N48	▲	AC200V
Specify from page 127		Select the coil designation from page 43 or specify the control circuit voltage and frequency used.

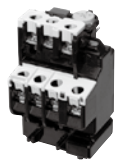
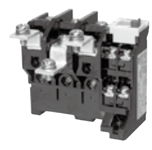
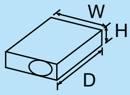
4

MEMO

5

TH-T/N Type Thermal Overload Relays

5.1 Model List

		T18	T25	T50	T65	T100
Frame		T18	T25	T50	T65	T100
Appearance						
Model Name – Standard with 2-Element	For Magnetic Starters	TH-T18	TH-T25	TH-T50	TH-T65	TH-T100
Model Name – Standard with 2-Element	For Independent Mounting	UT-HZ18 + TH-T18		—		—
Model Name – With 3-Element (2E)	For Magnetic Starters	TH-T18KP	TH-T25KP	TH-T50KP	TH-T65KP	TH-T100KP
Model Name – With 3-Element (2E)	For Independent Mounting	UT-HZ18 + TH-T18KP		—		—
 Outline Drawing [mm] W x H x D	For Magnetic Starters	46 x 55 x 76.5	63 x 53 x 80	74.3 x 74 x 88	89 x 57 x 83.5	89 x 68.5 x 83.5
Outline Drawing [mm] W x H x D	For Independent Mounting	46 x 63 x 82.7		—		—
Applicable Standard		JIS C8201-4-1, IEC60947-4-1, EN60947-4-1, GB14048.4				
Use Conditions	Ambient Temperature [°C]	-10 to +40 (Standard is 20°C, Inner Panel Maximum Temperature is 55°C)				
Use Conditions	Frequency [Hz]	0 (DC) to 400				
Specifications of the Main Circuit – Rated Insulation Voltage [V]		690				
Specifications of the Main Circuit – Rated Impulse Withstand Voltage [kV]		6				
Specifications of the Main Circuit – Pollution Degree		3				
Specifications of the Main Circuit – Heater Designation (Adjustment Range of Settling Current) [A] (The --- line in the table on the right represents the correspondence between the magnetic contactor and frame to be combined) (Refer to the relevant text regarding the heater designation of the applied products)		0.12 (0.1 to 0.16) 0.17 (0.14 to 0.22) 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) --- 11 (9 to 13) --- 15 (12 to 18)	0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) 22 (18 to 26)	29 (24 to 34) --- 35 (30 to 40) 42 (34 to 50)	15 (12 to 18) 22 (18 to 26) 29 (24 to 34) 35 (30 to 40) 42 (34 to 50) 54 (43 to 65)	67 (54 to 80) --- 82 (65 to 100) 95 (85 to 105)
Specifications of the Main Circuit – Power Consumption [VA/Element] Minimum/Maximum Settling		0.8/1.8	1.0/2.1	1.6/3.2	2.4/5.5	2.5/6.0
Specifications of the Main Circuit – Terminal Screw Size		M3.5	M4	M5	M6	M6
Specifications of the Main Circuit – Terminal-Compatible	Wire Size [mm^2]	φ1.6, 0.75 to 2.5	φ1.6 to 2.6, 1.25 to 6	φ2 to 3.6, 4 to 14	—	—
Specifications of the Main Circuit – Terminal-Compatible	Crimp Lug Size	1.25-3.5 to 2-3.5, 5.5-S3	1.25-4 to 5.5-4	5.5-5 to 14-5	5.5-6 to 22-6	14-6 to 22-6, 38-S6
Specifications of the Control Circuit (Contact) – Contact Arrangement		1a1b	1a1b	1a1b	1a1b	1a1b
Specifications of the Control Circuit (Contact) – Conventional Free Air Thermal Current Ith [A]		2	5	5	5	5
Rating Use Current [A] – Category AC-15 (AC Contactors Coil Switching) Make Contact/Break Contact The value in parentheses is the rating during auto reset	AC24 V	2 (0.5)/2 (0.5)	2 (0.5)/3 (0.5)	2 (0.5)/3 (0.5)	2 (0.5)/3 (0.5)	2 (0.5)/3 (0.5)
	AC120 V	2 (0.5)/2 (0.5)	2 (0.5)/3 (0.5)	2 (0.5)/3 (0.5)	2 (0.5)/3 (0.5)	2 (0.5)/3 (0.5)
	AC240 V	1 (0.5)/1 (0.5)	1 (0.5)/2 (0.5)	1 (0.5)/2 (0.5)	1 (0.5)/2 (0.5)	1 (0.5)/2 (0.5)
	AC550 V	0.3 (0.3)/0.3 (0.3)	0.3 (0.3)/0.3 (0.3)	0.3 (0.3)/0.3 (0.3)	0.5 (0.5)/1 (0.5)	0.5 (0.5)/1 (0.5)
Rating Use Current [A] – Category DC-13 (DC Contactors Coil Switching) The value in parentheses is the rating during auto reset	DC24 V	0.5 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)
	DC110 V	0.2 (0.2)	0.2 (0.2)	0.2 (0.2)	0.2 (0.2)	0.2 (0.2)
	DC220 V	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)
Rating Use Current [A] – Minimum Applicable Load Level		20 V 5 mA	20 V 5 mA	20 V 5 mA	20 V 5 mA	20 V 5 mA
Specifications of the Control Circuit (Contact) – Terminal Screw Size		M3.5	M3.5	M3.5	M4	M4
Specifications of the Control Circuit (Contact) – Terminal-Compatible	Wire Size [mm^2]	φ1.6, 0.75 to 2.5	φ1.6, 0.75 to 2.5	φ1.6, 1.25 to 2	φ1.6, 1.25 to 2	φ1.6, 1.25 to 2
Specifications of the Control Circuit (Contact) – Terminal-Compatible	Crimp Lug Size	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.25-4 to 2-4,5.5-S4	1.25-4 to 2-4,5.5-S4
Properties/Functions – Operating Characteristic Curve Page		153				
Properties/Functions – Vibration Resistance (Vibration and Malfunction Resistance Performance)		10 to 55Hz 19.6m/s^2				
Properties/Functions – Trip Free		◎	◎	◎	◎	◎
Properties/Functions – Reset Method		Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable
Properties/Functions – Operation Indicator (Lever Display)		◎	◎	◎	◎	◎
Properties/Functions – Manual Tripping Check		◎	◎	◎	◎	◎
Frame of the Combined Magnetic Contactor		T10, T12, T20 --- T12, T20 --- T20	T21, T25, T35, T50	T35, T50 --- T50	T65, T80, T100	T80, T100 --- T100
Applied Products – With Saturable Reactor [See Page 146]	With 2-Element (TH-□SR)	○ (TH-T18SR)	○ (TH-T25SR)	○ (TH-T50SR)	○ (TH-T65SR)	○ (TH-T100SR)
Applied Products – With Saturable Reactor [See Page 146]	With 3-Element (2E) (TH-□KPSR)	—	○ (TH-T25KPSR)	○ (TH-T50KPSR)	○ (TH-T65KPSR)	○ (TH-T100KPSR)
Applied Products – Quick Trip Type [See Page 147]	With 2-Element (TH-□FS)	—	△ (TH-T25FS)	△ (TH-T50FS)	△ (TH-T65FS)	△ (TH-T100FS)
Applied Products – Quick Trip Type [See Page 147]	With 3-Element (2E) (TH-□FSKP, KF)	△ (TH-T18FSKP)	△ (TH-T25FSKP)	△ (TH-T50FSKP)	△ (TH-T65FSKP)	△ (TH-T100FSKP)
Optional – Live Part Protection Cover		(Standard Equipment)	(Standard Equipment)	(Standard Equipment)	◎ (UN-CZ605)	—
Optional – Reset Release		◎ (UT-RR□5)	◎ (UN-RR□0)	◎ (UN-RR□0)	◎ (UN-RR□6)	◎ (UN-RR□6)
Optional – Operation Indicator Lamp		◎ (UN-TL12)	◎ (UN-TL20)	◎ (UN-TL20)	◎ (UN-TL60)	◎ (UN-TL60)
Optional – Independent/IEC 35 mm Rail Mounting Unit		◎ (UT-HZ18)	◎ (UN-RM20)	—	—	—
Optional – Misoperation Prevention Cover		—	◎ (UN-CV203)	◎ (UN-CV203)	◎ (UN-CV603)	◎ (UN-CV603)

Note 1. All model names come with ambient temperature compensation device.
Note 2. ◎ indicates standard type (standard equipment), ○ indicates semi-standard type, △ indicates special products and - indicates products outside production range.

N120	N120TA	N220	N400	N600
				
TH-N120	TH-N120TA	TH-N220RH	TH-N400RH	—
	TH-N120TAHZ	TH-N220HZ	TH-N400HZ	TH-N600(Note 3)
TH-N120KP	TH-N120TAKP	TH-N220RHKP	TH-N400RHKP	—
	TH-N120TAHZKP	TH-N220HZKP	TH-N400HZKP	TH-N600KP(Note 3)
103 x 67 x 105	112 x 87 x 105	144 x 114 x 179	144 x 160 x 193	—
	112 x 103 x 105	144 x 104 x 166.5	144 x 173 x 166.5	63 x 42 x 83.5
JIS, JEM, IEC, VDE, BS, UL, GB				
-10 to +40 (Standard is 20°C, Inner Panel Maximum Temperature is 55°C)				
0 (DC) to 400		50 to 60		
690				
6				
3				
42 (34 to 50) 54 (43 to 65) 67 (54 to 80) 82 (65 to 100)	105 (85 to 125) 125 (100 to 150)	82 (65 to 100) 105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 210 (170 to 250)	105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 250 (200 to 300) 330 (260 to 400) *The thermal overload relay with the heater designation of 180A or less is the same as the N220 frame.	250 (200 to 300) (Current Transformer Ratio: 400/5 A) 330 (260 to 400) (Current Transformer Ratio: 500/5 A) 500 (400 to 600) (Current Transformer Ratio: 750/5 A) 660 (520 to 800) (Current Transformer Ratio: 1000/5 A)
3.0/7.1	3.8/8.6	1.0/2.3 (Note 4)	1.0/2.3 (Note 4)	1.0/2.3 (Note 4)
M8	M8	M10	M12	—
—	—	—	—	—
8-8 to 38-8	38-8 to 100-8	22-10 to 150-10	22-12 to 200-12	—
1a1b	1a1b	1a1b	1a1b	1a1b
5	5	5	5	5
2(0.5)/3(0.5)	2(0.5)/3(0.5)	2(0.5)/3(0.5)	2(0.5)/3(0.5)	2(0.5)/3(0.5)
2(0.5)/3(0.5)	2(0.5)/3(0.5)	2(0.5)/3(0.5)	2(0.5)/3(0.5)	2(0.5)/3(0.5)
1(0.5)/2(0.5)	1(0.5)/2(0.5)	1(0.5)/2(0.5)	1(0.5)/2(0.5)	1(0.5)/2(0.5)
0.5(0.5)/1(0.5)	0.5(0.5)/1(0.5)	0.5(0.5)/1(0.5)	0.5(0.5)/1(0.5)	0.5(0.5)/1(0.5)
1(0.3)	1(0.3)	1(0.3)	1(0.3)	1(0.3)
0.2(0.2)	0.2(0.2)	0.2(0.2)	0.2(0.2)	0.2(0.2)
0.1(0.1)	0.1(0.1)	0.1(0.1)	0.1(0.1)	0.1(0.1)
20V 5mA	20V 5mA	20V 5mA	20V 5mA	20V 5mA
M4	M4	M4	M4	M4
φ1.6, 1.25 to 2	φ1.6, 1.25 to 2	φ1.6, 1.25 to 2	φ1.6, 1.25 to 2	φ1.6, 1.25 to 2
1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4	1.25-4 to 2-4, 5.5-S4
156		156		156
10 to 55Hz 19.6m/s²				
◎	◎	◎	◎	◎
Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable
◎	◎	◎	◎	◎
◎	◎	◎	◎	◎
N125, N150	N125, N150	N180, N220	N300, N400	N600, N800
	N150	N220	N400	
○ (TH-N120SR)	○ (TH-N120TASR)	○ (TH-N220□SR)	○ (TH-N400□SR)	○ (TH-N600SR)
○ (TH-N120KPSR)	○ (TH-N120TAKPSR)	○ (TH-N220□KPSR)	○ (TH-N400□KPSR)	○ (TH-N600KPSR)
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
◎ (UN-RR□6)	◎ (UN-RR□6)	◎ (UN-RR□6)	◎ (UN-RR□6)	◎ (UN-RR□6)
◎ (UN-TL60)	◎ (UN-TL60)	◎ (UN-TL60)	◎ (UN-TL60)	◎ (UN-TL60)
—	—	—	—	—
◎ (UN-CV603)	◎ (UN-CV603)	◎ (UN-CV603)	◎ (UN-CV603)	◎ (UN-CV603)

Note 3. Use TH-N600(KP) in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more). The recommended model names are CW-15LM or CW-15L for 250, 330 and 500 A, and CW-40LM for 660 A. The ratio of current transformation is as shown in the heater designation field in the table.

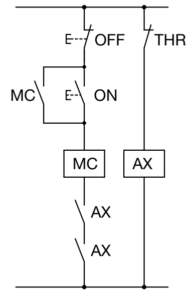
Note 4. The power consumption indicates the amount consumed by the heater element only. (The current transformer consumption amounts of the N220 to N600 frames are not included.)

5

5.2 Contact Rating

● Main circuit specifications... as shown on page136 ● Specifications of the control circuit (contact) ● The contact rating is as shown in the following table

Frame		T18		T25,T50		T65,T100,N120 to N600	
Contact		Break Contact	Make Contact	Break Contact	Make Contact	Break Contact	Make Contact
Conventional Free Air Thermal Current Ith [A]		2	2	5	5	5	5
Class AC-15 Rated Operating Current [A]	AC24V	2 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)
	AC120V	2 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)
	AC240V	1 (0.5)	1 (0.5)	2 (0.5)	1 (0.5)	2 (0.5)	1 (0.5)
	AC550V	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	1 (0.5)	0.5 (0.5)
Class DC-13 Rated Operating Current [A]	DC24V	0.5 (0.3)	0.5 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)
	DC110V	0.2 (0.2)	0.2 (0.2)	0.2 (0.2)	0.2 (0.2)	0.2 (0.2)	0.2 (0.2)
	DC220V	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)



MC : SD Type
AX : SRD Type
THR : TH Type

Note 1. The withstand voltage is AC2500 V for 1 minute.
Note 2. The contact arrangement is 1a1b.
Note 3. If the coil current of the DC operated magnetic contactor (SD) exceeds 0.2 A at DC110 V or 0.1 A at DC220 V (SD-N125 or higher), conduct through the SR or SRD contactor relay. (Refer to the figure on the right)
Note 4. The minimum available voltage and current level in a clean atmosphere is 20 V 5 mA.
Note 5. The value in parentheses is the rating during auto reset.

5.3 Operating Properties (Standard Value)

The operating properties of the thermal overload relays are specified as shown in the table below according to the standards.

Standard	Conditions	Operation in Balanced Circuit				Operation in Unbalanced Circuit		Ambient Temperature
		Limit Operations		Operation During Overload	Operation During Constraint	Non-Operation	Operation	
		A (Cold Start)	B (Continued From A)	C (Hot Start)	D (Cold Start)	A (Cold Start)	B (Continued From A)	
JIS C8201-4-1	Multiple of Settling Current	1.05	1.2	1.5	7.2	2-Pole 1.0 1-Pole 0.9	2-Pole 1.15 1-Pole 0	20°C
	Operating Time	Non-Operation (2 Hours)	Within 2 Hours	(5) Less Than 2 Minutes (10A) Less Than 2 Minutes (10) Less Than 4 Minutes (20) Less Than 8 Minutes (30) Less Than 12 Minutes	(5) Tp ≤ 5 Seconds (10A) 2 < Tp ≤ 10 Seconds (10) 4 < Tp ≤ 10 Seconds (20) 6 < Tp ≤ 20 Seconds (30) 9 < Tp ≤ 30 Seconds	Non-Operation (2 Hours)	Within 2 Hours	
IEC 60947-4-1	Multiple of Settling Current	1.05	1.2	1.5	7.2	2-Pole 1.0 1-Pole 0.9	2-Pole 1.15 1-Pole 0	20°C
	Operating Time	Non-Operation (2 Hours)	Within 2 Hours	(10A) Less Than 2 Minutes (10) Less Than 4 Minutes (20) Less Than 8 Minutes (30) Less Than 12 Minutes	(10A) 2 < Tp ≤ 10 Seconds (10) 4 < Tp ≤ 10 Seconds (20) 6 < Tp ≤ 20 Seconds (30) 9 < Tp ≤ 30 Seconds	Non-Operation (2 Hours)	Within 2 Hours	
JEM 1356	Multiple of Settling Current	1.05	1.2	1.5	7.2	2-Pole 1.0 1-Pole 0.9	2-Pole 1.15 1-Pole 0	20°C
	Operating Time	Non-Operation (2 Hours)	Within 2 Hours	(Quick) Within 4 Minutes (Standard) Within 8 Minutes (Delay) Within 12 Minutes	(Quick) Tp ≤ 5 Seconds (Standard) 2 ≤ Tp ≤ 15 Seconds (Delay) 9 ≤ Tp ≤ 30 Seconds	Non-Operation (2 Hours)	Within 2 Hours	

Note 1. It shows the case of the thermal overload relay with ambient temperature compensation and open phase detection.
Note 2. Tp shows the operating time while restrained.
Note 3. The operating time field ( ) of the operation during overload and constraint represents the trip class in JIS and IEC, and type in JEM.

5.4 Selection and Application

● Selecting Thermal Overload Relays

The principles in the selection of the thermal overload relay are that its operating characteristic curve falls below the thermal properties (overcurrent - service lifetime properties) of the motor, and exceeds the startup properties (startup current - time properties) curve of the motor. Judge the suitability of the thermal properties and starting properties of the motor by superposing them on the operating characteristic curve (see page 153) of the thermal overload relay. (Refer to Figure 4 on page 143)

Motor, Running, Protection Conditions, etc.	Selection	Applicable Thermal Overload Relays	
		With 2-Element	With 3-Element (2E)
Standard Start, Stop (Low Frequency)	Standard Thermal Overload Relays	TH-□Type	TH-□KP Type
Fan, blower, etc. with long start-up time	Thermal Overload Relays With Saturable Reactor	TH-□SR Type	TH-□KPSR Type
Submersible motor and compressor motor with short allowable constraint time	Quick-acting Characteristics Thermal Overload Relays	TH-□FS Type	TH-T□FSKP Type
Inching, High Frequency Intermittent Running	Although unnecessary trips may be avoided by the thermal overload relay with a saturable reactor to provide the adequate protection, detailed consideration is required	Consideration Required	Consideration Required
For Open-Phase Protection	Thermal Overload Relays With 3-Element (2E)	—	TH-□KP Type
Reverse-Phase and Open-Phase Protection Dual Use	Electronic Motor Protection Relays (3E)	—	(ET-□ Type)

Note 1. For more information on the startup time of motors and application of thermal overload relays, refer to page 140.

● Thermal Overload Relay Heater Designation Selection Table

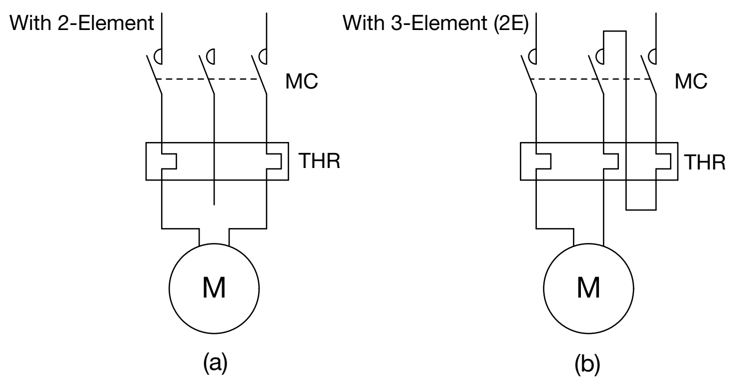
Guidelines for the selection of general thermal overload relays are shown in the following table.

Voltage / Motor Capacity [kW]	Three-Phase Motors								Single-Phase Motors				Voltage / Capacity [kW]
	200 to 220V	230 to 240V	346 to 350V	380V	400 to 440V	460 to 500V	550 to 600V	660V	100 to 110V	115 to 120V	200 to 220V	230 to 240V	
0.03	0.24A	0.24A	—	—	—	—	—	—					0.03
0.035	0.35A	0.24A	0.24A	0.24A	—	—	—	—	1.7A		0.9A		0.035
0.05	0.35A	0.35A	0.24A	0.24A	0.24A	—	—	—					0.05
0.06 to 0.065	0.5A	0.35A	0.35A	0.24A	0.24A	0.24A	—	—	2.5A		1.3A		0.06 to 0.065
0.07	0.5A	0.5A	0.35A	0.35A	0.35A	0.24A	—	—					0.07
0.09	0.7A	0.7A	0.35A	0.35A	0.35A	0.24A	0.24A	—					0.09
0.1	0.7A	0.7A	0.35A	0.35A	0.35A	0.35A	0.24A	—	3.6A		1.7A		0.1
0.12	0.9A	0.7A	0.5A	0.5A	0.5A	0.35A	0.24A	—		3.6A		2.1A	0.12
0.15	0.9A	0.9A	0.7A	0.7A	0.5A	0.5A	0.35A	—	5A		2.5A		0.15
0.18	1.3A	0.9A	0.7A	0.7A	0.7A	0.5A	0.5A	—	5A	5A		2.5A	0.18
0.2	1.3A	0.9A	0.7A	0.7A	0.7A	0.7A	0.5A	—	5A		2.5A		0.2
0.25	1.7A	1.3A	0.9A	0.9A	0.7A	0.7A	0.5A	—	6.6A	6.6A	3.6A	3.6A	0.25
0.3	1.7A	1.3A	0.9A	0.9A	0.9A	0.9A	0.7A	—	6.6A		3.6A		0.3
0.37 to 0.4	2.1A	2.1A	1.3A	1.3A	1.3A	0.9A	0.7A	—	9A	9A	5A	5A	0.37 to 0.4
0.55	2.5A	2.5A	1.7A	1.7A	1.3A	1.3A	0.9A	—	11A	11A	5A	6.6A	0.55
0.75	3.6A	3.6A	2.1A	2.1A	1.7A	1.7A	1.3A	1.3A	15A	15A	6.6A	9A	0.75
1.0	5A	5A	2.5A	2.5A	2.5A	2.1A	1.7A	1.7A					1.0
1.1	5A	5A	3.6A	2.5A	2.5A	2.1A	1.7A	1.7A	22A	22A	9A	9A	1.1
1.3	6.6A	5A	3.6A	3.6A	2.5A	2.5A	2.1A	2.1A					1.3
1.5	6.6A	6.6A	3.6A	3.6A	3.6A	2.5A	2.5A	2.1A	29A	22A	15A	11A	1.5
2.2	9A	9A	5A	5A	5A	3.6A	3.6A	3.6A					2.2
3	11A	11A	6.6A	6.6A	6.6A	5A	5A	3.6A		35A		15A	3
3.7 to 4	15A	15A	9A	9A	6.6A	6.6A	5A	5A		54A		29A	3.7 to 4
5.5	22A	22A	15A	11A	11A	9A	9A	6.6A		82A		42A	5.5
7.5	29A	29A	15A	15A	15A	11A	9A	9A		105A		54A	7.5
9	35A	29A	22A	22A	15A	15A	11A	11A					9
11	42A	42A	22A	22A	22A	22A	15A	15A					11
15	54A	54A	35A	29A	29A	22A	22A	15A					15
18.5 to 19	67A	67A	42A	35A	35A	29A	22A	22A					18.5 to 19
22	82A	82A	54A	42A	42A	35A	29A	22A					22
25	82A	82A	54A	54A	54A	35A	35A	29A					25
30	105A	105A	67A	54A	54A	42A	42A	35A					30
37	125A	125A	82A	67A	67A	54A	54A	42A					37
45	150A	150A	105A	82A	82A	67A	54A	54A					45
55 to 60	180A	180A	125A	105A	105A	82A	67A	67A					55 to 60
75	250A	250A	150A	125A	125A	105A	105A	82A					75
90	330A	330A	180A	150A	150A	125A	105A	105A					90
110	330A	330A	250A	180A	180A	150A	125A	105A					110
132	500A	500A	250A	250A	250A	180A	150A	150A					132
150 to 160	500A	500A	330A	250A	250A	250A	180A	180A					150 to 160
185	660A	500A	330A	330A	330A	250A	250A	180A					185
200	660A	660A	500A	330A	330A	330A	250A	180A					200
220	660A	660A	500A	500A	500A	330A	250A	250A					220
250	—	—	500A	500A	500A	330A	330A	250A					250
300 to 315	—	—	660A	500A	500A	500A	330A	330A					300 to 315
370 to 400	—	—	—	660A	660A	500A	500A	500A					370 to 400

Note 1. The table above shows the selection of heater designation based on the full-load current value of the 4-pole standard three-phase motor and single-phase motor manufactured by Mitsubishi Electric.
When ordering by motor capacity, determine the heater designation of the thermal overload relay with this table. Specify the voltage and capacity accurately.

Note 2. If the number of poles in the three-phase motor is different, or in the case of special motors, the full-load current value may be different.
In such a case, specify by the heater designation upon investigating the full-load current of the motor.

Note 3. For single-phase motors, the full-load current varies depending on the start-up and running methods. Therefore, treat the values in the above table as guidelines, and specify the appropriate heater designation upon checking the full-load current for actual use. For single-phase motors, connect as shown in the figure below.



Connecting Thermal Overload Relays to a Single-Phase Motor

5 TH-T/N Type Thermal Overload Relays

Application of Various Thermal Overload Relays

- TH (standard/with 2-element):
  General overload and constraint protection of the motor
- TH-KP (with 3-element [2E]):
  Overload, constraint and open-phase protection of the motor
- TH-SR (with saturable reactor)
  Motors with long startup time, applications with frequent inching and intermittent running.
- TH-T□FSKP (quick trip type with 3-element [2E])
  Protection of submersible motors and explosion proof motors
- TH-FS (2-element quick trip type)
  Protection of compressor motor for refrigerators

Application to Standard Three-Phase Motors

Select the frame and heater designation from the table below. Refer to page 139 for details.

Heater Designation [A]	Setting Range Current [A]	Frame	Standard Three-Phase Motor Capacity [kW] 200 to 220 V	Standard Three-Phase Motor Capacity [kW] 380 to 440 V	Reference Connecting Electric Wire Size [mm²]
0.12	0.1 to 0.16	T18			
0.17	0.14 to 0.22	T18			
0.24	0.2 to 0.32	T18, T25	0.03	0.05	1.5
0.35	0.28 to 0.42	T18, T25	0.05	0.1	1.5
0.5	0.4 to 0.6	T18, T25	0.07		1.5
0.7	0.55 to 0.85	T18, T25	0.1	0.2	1.5
0.9	0.7 to 1.1	T18, T25			
1.3	1 to 1.6	T18, T25	0.2	0.4	1.5
1.7	1.4 to 2	T18, T25		0.75	1.5
2.1	1.7 to 2.5	T18, T25	0.4		1.5
2.5	2 to 3	T18, T25		1	1.5
3.6	2.8 to 4.4	T18, T25	0.75	1.5	1.5
5	4 to 6	T18, T25	1	2.2	1.5
6.6	5.2 to 8	T18, T25	1.5	3.7	1.5
9	7 to 11	T18, T25	2.2		1.5
11	9 to 13	T18, T25		5.5	2.5
15	12 to 18	T18, T25, T65	3.7	7.5	4
22	18 to 26	T25, T65	5.5	11	6
29	24 to 34	T50, T65	7.5	15	10
35	30 to 40	T50, T65		18.5	10
42	34 to 50	T50, T65, N120	11	22	16
54	43 to 65	T65, N120	15	30	25
67	54 to 80	T100, N120	18.5	37	25
82	65 to 100	T100, N120, N220	22	45	35
95	85 to 105	T100	30	55	50
105	85 to 125	N120TA, N220, *1 N400	30	55	50
125	100 to 150	N120TA, N220, *1 N400	37	75	50
150	120 to 180	N220, *1 N400	45	90	70
180	140 to 220	N220, *1 N400	55	110	95
210	170 to 250	N220	75	132	150
250	200 to 300	*1 N400, N600	75	132, 160	150
330	260 to 400	*1 N400, N600	90, 110	200	185
500	400 to 600	N600	132, 160	315	2 x 200 (2 x 150) *2
660	520 to 800	N600	200	400	2 x 240

*1 The thermal overload relay with the heater designation of 180A or less in the N400 frame is the same as that of the N220 frame.
*2 The value in parentheses is applicable to 220 V, 132 kW

Note 1. The connecting electric wire size indicates the selection of HIV wire based on indoor wiring regulations (Section 1340) when performing metal tube wiring at the ambient temperature of 40°C.

Startup Time of Motor and Application of TH Thermal Overload Relays

An overview of the application classifications for the standard TH and TH-SR with saturable reactor by motor start-up time is shown in the table below.

Frame	Heater Designation [A]	Motor Starting Time [sec] (to 5 / 8)	Motor Starting Time [sec] (to 20)	
T18	0.12 to 15	T18	T18SR	The heater of the thermal overload relay is short-circuited during the start-up.
T25	0.24 to 22	T25	T25SR	
T50	29 to 42	T50	T50SR	
T65	15 to 54	T65	T65SR	
T100	67, 82, 95	T100	T100SR	
N120, N120TA	42 to 125	N120, N120TA	N120SR, N120TASR	
N220	82 to 210	N220	N220SR	
N400	105 to 330	N400	N400SR	
N600	250 to 660	N600	N600SR	

Note 1. The above table is a measure of the central value of the heater designation when the motor startup current is 500 to 600%. Check the characteristic curve for details.

Application to Single-Phase Circuits

When applying a thermal overload relay (TH-□KP, etc.) with 3-element (2E) to a single-phase circuit, it will not operate normally if only 2 elements are energized. As in Fig. (b) on page 139, make sure that all 3 elements can be energized.

5.5 Structure

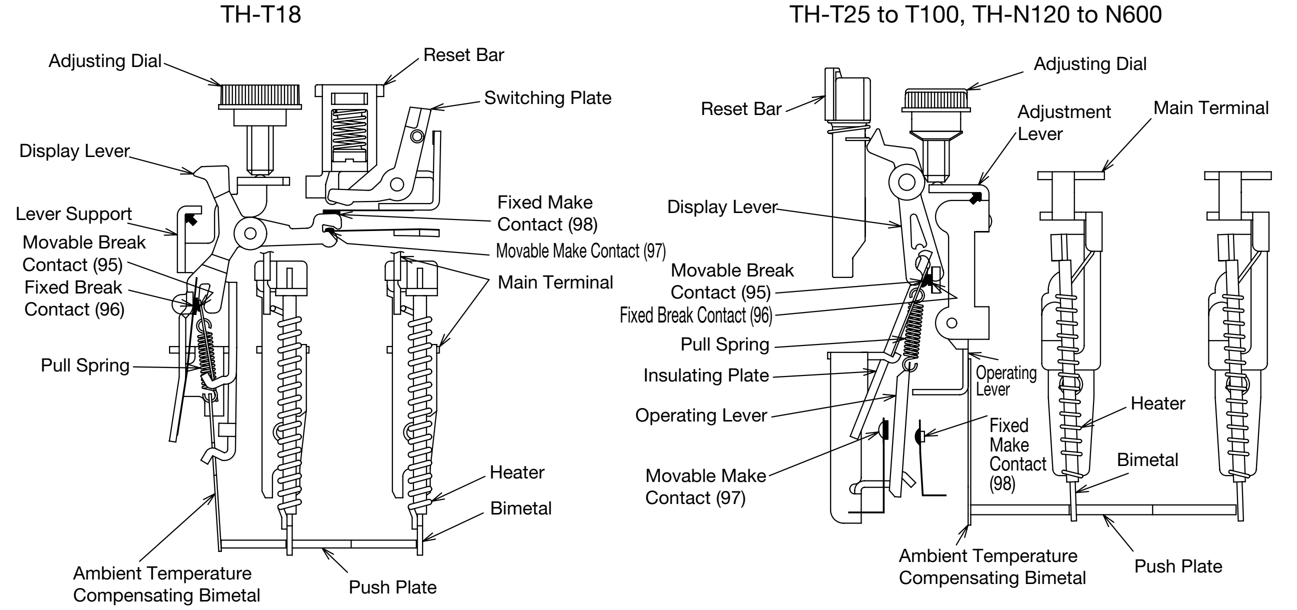


Fig. 1. Structure of the Thermal Overload Relay (with 2-Element)

Reset Method

All models of TH-T/N Series thermal overload relays have a structure that allows manual/automatic reset switching. The factory default (standard) is manual reset.

Structure of the Thermal Overload Relay With Open-Phase Protection Function

The push plate of the thermal overload relay with overload and open-phase protection (TH-☐KP) has a differential amplification mechanism that transmits the action of the bimetal to the contact mechanism as shown in Figure 2. Its design is suitable for protection during open phase.

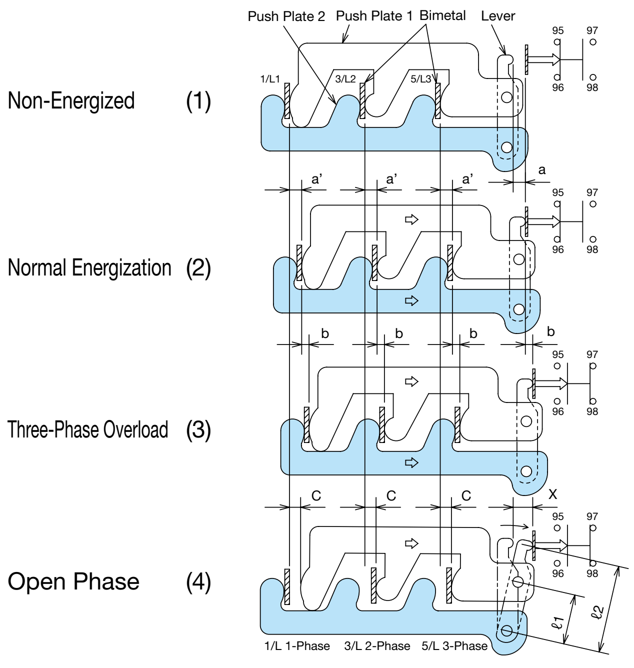


Fig. 2. Operation explanatory diagram of TH-KP thermal overload relay with 3-element (2E)

(1) Non-Energized
The 3-pole bimetal is not displaced and maintains a distance of "a" from the position where the lever is pressed. The push plates 1 and 2 are placed so as to sandwich the bimetal.

(2) Normal Energization
If the 3-pole bimetal is displaced by the amount a', push plate 1 also slides by a' (a' < a), and push plate 2 slides with it. This state does not lead to the operation of the contact.

(3) Three-Phase Overload
The state of the bimetal is further displaced from (2), making the push plate slide by b together with the lever to operate (trip) the contact.

(4) Open Phase
As shown in the figure, if the 1/L1 phase is open, the bimetal of this phase will not be displaced, and the bimetal of 3/L2 phase and 5/L3 phase that are energized will be displaced by C. In this case, push plate 2 will be restrained by the bimetal of the 1/L1 phase at open-phase and will not be able to slide to the right, and only push plate 1 will slide. As a result, the lever will rotate clockwise about the rotation axis of push plate 2. This enlarges the movement of the position where the lever contact is pushed by $x \approx c \times \ell_2/\ell_1$, allowing operation with a smaller current at open-phase compared with the all-phase energization.

5.6 Precautions for Use

● Model Name Identification by Mounting Method

Note 1. T25, T65 and N120 can be independently mounted as standard.

Note 2. T18, T50, T100, N120TA, N220RH and N400RH are for magnetic starters. (No Independent Mounting)
N120TAHZ, N220HZ and N400HZ are for independent mounting.

Note 3. For T18, independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.
For T25, IEC 35 mm rail mounting may be enabled by combining with UN-RM20.

● Disassembly

The Thermal Overload Relays are adjusted at the time of assembly. Do not disassemble it.
Do not use with the terminal removed, as the properties may change.

● Ambient Temperature Compensation

The TH-T/N type Thermal Overload Relays are adjusted with the Magnetic Starters in the standard box (the MS type) relative to the ambient temperature of 20°C (The temperature on the control board of the MSO type Magnetic Starters is 35°C).
The ambient temperature compensator is mounted on the TH-T/N type Thermal Overload Relays. Therefore, the ambient temperature less affects the operational characteristic change. The minimum operating current change according to the ambient temperature change relative to the ambient temperature of 20°C (the temperature on the control board of 35°C) generally depends on the characteristics in the diagrams 1 and 2. The Thermal Overload Relays have a characteristic that the operating current becomes high when the ambient temperature is low and becomes low when the ambient temperature is high. If the ambient temperature of the installation site is significantly different from 20°C (the temperature on the control board of 35°C), the setting current of the Thermal Overload Relays needs to be corrected as shown in diagrams 1 and 2. In addition, note that the compensation factor has a characteristic to be the minimum scale>middle scale>maximum scale at the adjustment knob location. (Note that the Thermal Overload Relays may operate at a current of less than 100% stabilized current if in use at temperatures exceeding the allowable working temperature of 40°C (55°C).)

Fig. 3.1 Ambient temperature compensation curve (T18 frame)

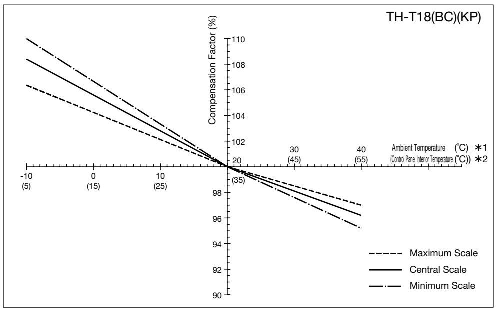


Fig. 3.2 Ambient temperature compensation curve (T25/T50/T65/T100 frame)

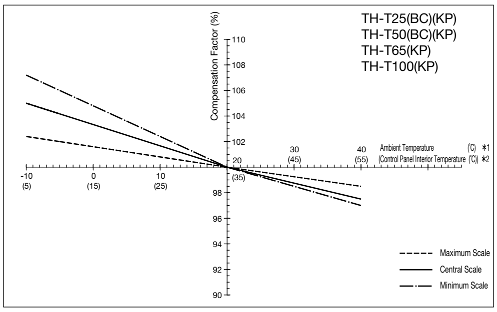


Fig. 3.3 Ambient temperature compensation curve (N120 frame)

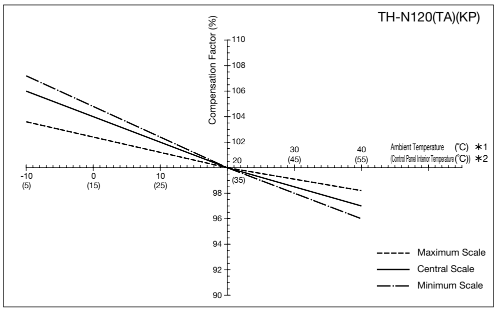


Fig. 3.4 Ambient temperature compensation curve (N220/N400 frame)

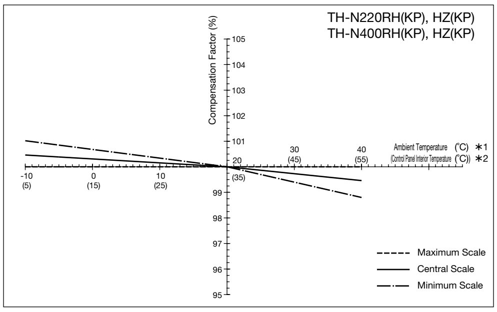
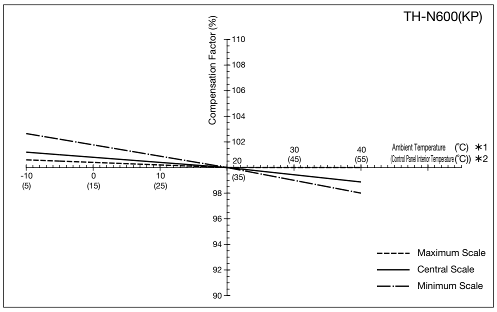


Fig. 3.5 Ambient temperature compensation curve (N600 frame)



Compensation factor: Percentage of the minimum operating current at the ambient temperature of 20°C(the temperature on the control board of 35°C)

<Compensation procedure of setting current>
Determine the compensation factor of the working ambient temperature according to the curves in diagrams 3.1 and 3.5 and use the value of all load currents of the motor divided by the determined compensation factor as the stabilization value.
(Example: The ambient temperature compensation factor for TH-T50 at the ambient temperature of 40°C (the temperature on the control board of 55°C) is 97% at the minimum scale according to diagram 3.2. If the motor rated current is 43A, the stabilization value is 44.3A (=43/0.97).)

Note 1. The ambient temperature applied to MS type indicates the outside temperature of the box.

Note 2. The temperature including the temperature increase on the control board applied to the MSO type is indicated.

Note 2. When the thermal overload relay is independently mounted, divide the settling value obtained in Figure 3.1 to 3.5 by the compensation factors in the table below.

● Compensation factor when using the thermal overload relay independently

Model Name	Independent Thermal Overload Relays TH-□
TH-T18(BC)(KP) 0.12 to 2.5A	1.04
TH-T18(BC)(KP) 3.6A	1.05
TH-T18(BC)(KP) 5 to 15A	1.06
TH-T25(BC)(KP)	1.06
TH-T65(KP)	1.05

Model Name	Independent Thermal Overload Relays TH-□
TH-N120(KP) 42A 54A	1.08
TH-N120(KP) 67A 82A	1.16
TH-N220(KP)/N400(KP)	1.01
TH-N600(KP)	1.02

Connecting Electric Wire Size And Operating Current

The minimum operating current of TH-T/N has been adjusted by the standard wire size as shown in the table below. If the electric wire is thicker or thinner than this standard electric wire size, the operating current becomes high or low, respectively. Therefore, correct the stabilized current (divide it by the change rate of the minimum operating current) to use a size different from the standard connecting electric wire size.

● Connecting Electric Wire Size and Minimum Operating Current

Model Name	Heater Designation [A]	Standard Electric Wire Size [mm^2]	Connecting Electric Wire Size [mm^2]	Change Rate of Minimum Operating Current [%]
TH-T18(KP)	0.12 to 15	2	1.25 2.5	98 103
TH-T25(KP)	0.24 to 11			
TH-T25(KP)	15, 22	3.5	2 6	97 104
TH-T50(KP)	29	8	5.5 14	96 104
	35			
	42	14	8	95
TH-T65(KP)	15	3.5	2 5.5	95 105
	22, 29	5.5	3.5 8	96 105
	35	8	5.5 14	95 105
	42	14	8 22	95 104
	54	22	14 30	96 104

Model Name	Heater Designation [A]	Standard Electric Wire Size [mm^2]	Connecting Electric Wire Size [mm^2]	Change Rate of Minimum Operating Current [%]
TH-T100(KP)	67	22	14 30	97 103
	82	38	30	97
TH-N120(KP)	42	14	8 22	95 104
	54, 67	22	14 30	96 104
	82	38	30 50	97 103
TH-N120TA(KP)	105	60	38 60	97 103
	125	60	50 80	98 103

Combination With No-Fuse Breaker (Protection Coordination)

Magnetic starters are responsible for the starting and stopping of motors, and protection from burnout due to overload, constraint or open-phase. Short-circuit protection devices such as no-fuse breakers are responsible for the current larger than the interruption capability of the magnetic starter caused by a short circuit, etc.

Properly performing these allocations is called protection coordination and the principles are as follows (see Figure 4)

(1) The combined operating properties of the thermal overload relay and no-fuse breaker must be on the lower side of the thermal properties of the motor, which are on the upper side (right side) of the start-up properties and full-load current of the motor.

(2) For overload current of less than the constraint (startup) current, the thermal overload relay must operate earlier than the no-fuse breaker.

(3) The no-fuse breaker must operate if the current is larger than the interruption capability of the magnetic starter.

(4) The no-fuse breaker should operate if the current is less than the overload resistance of the magnetic starter.

(5) The operating properties of the no-fuse breaker must be lower than the allowable current - time properties of the wire.

For more information, refer to the catalog and technical documents of the no-fuse breaker.

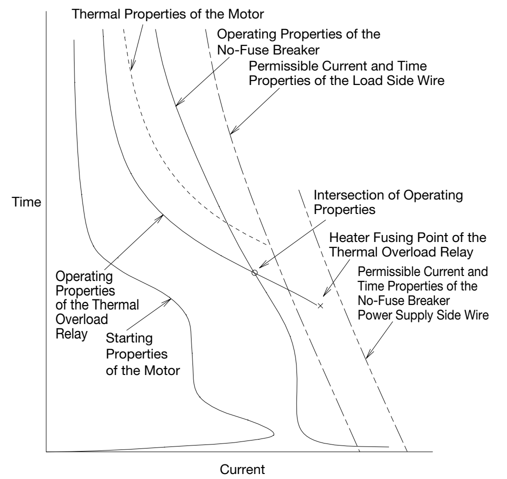


Fig. 4. Protection coordination

Handling (Precautions)

(1) When restarting the tripped thermal overload relay, remove the cause of the trip.
When the automatic reset method is used, in order to prevent the motor from automatically restarting due to reset, implement measures such as adopting a self-retaining circuit. Regardless of the method, the resettable time will be from about 10 seconds to 10 minutes depending on the heating temperature of the bimetal.
Furthermore, to cool the bimetal to the surrounding temperature, use equipment such as fans for about 30 minutes.

(2) Never touch the inside of the thermal overload relay.

(3) The heater wire of the thermal overload relay may blow before tripping if it is charged with a current of 13 times higher than the rating.

(4) The reset method is changed as follows.

Changing the reset method of TH-T18

· Manual→automatic switching method:
After removing the stopper by cutting it with a nipper or the like, slide the switching plate to the right and align it with A as shown in Figure 5.
(In the state as shown in Figure 6.2)

· Automatic→manual switching method:
Slide the switching plate to the left to align with H.
(In the state as shown in Figure 6.1)

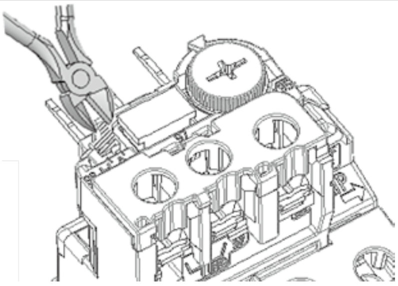


Fig. 5. Cutting the stopper

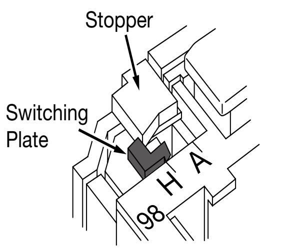


Fig. 6.1 Manual reset

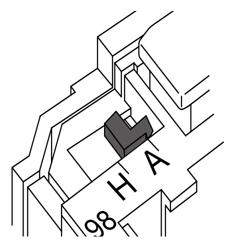


Fig. 6.2 Automatic reset

Note 1. Take precautions as follows when cutting off the stopper.
· Be careful not to let fragments enter the eyes.

Changing the reset method of TH-T25 to T100, TH-N120 to N600

· Manual→automatic switching method:
After cutting off the stopper on the tip of the reset bar, fully push it in, then rotate it in the direction of A. (Figs. 7, 8)

· Automatic→manual switching method:
Rotate the reset bar in the direction of H, to pop out the reset bar. (Fig. 9)

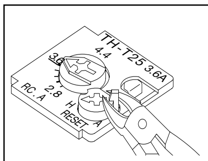


Fig. 7. Cutting the stopper

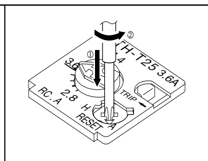


Fig. 8. Automatic reset

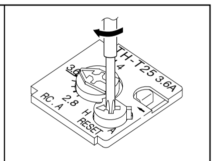
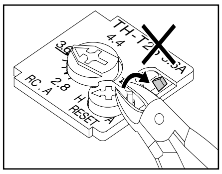


Fig. 9. Manual reset

Note 1.Take precautions as follows when cutting off the stopper on the tip of the reset bar.
·Make sure that segments do not enter from the display window.
The display lever may stop moving.
Block the display window when cutting off the stopper to prevent segments from entering it.
·Be careful not to let fragments enter the eyes.



(5) Manual tripping

Manual tripping is enabled by inserting a screwdriver or the like into the display window in manual reset. (Fig. 10)

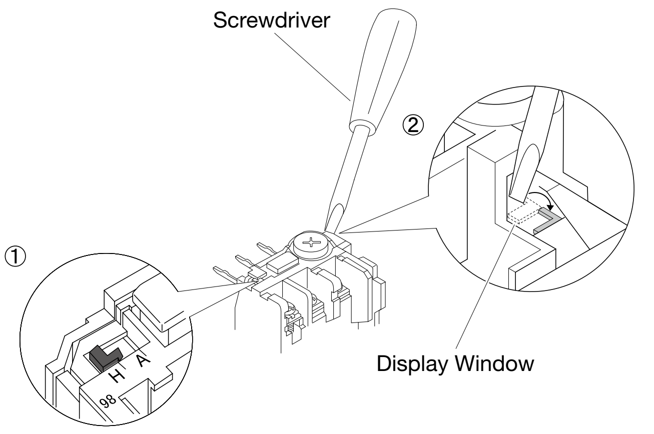


Fig. 10. Manual tripping

Note.For TH-T18, do not perform manual tripping in the automatic reset mode, as this leads to internal component failure. When performing a sequence check, be sure that the automatic reset is switched to manual reset.

(6) Precautions When Combining With the Magnetic Contactor

For the assembling method and precautions when using in combination with the thermal overload relay and magnetic contactor, refer to page 231.

5.7 Standard/Overload and Open-Phase Protection Type Thermal Overload Relays TH-□/KP

TH (standard with 2-element) is suitable for the overload and constraint protection of standard motors, and TH-KP (with 3-element (2E)) is suitable for the overload, constraint and open-phase protection of motors.

TH-KP has the same shape and size as TH (standard with 2-element), and can be easily combined with magnetic contactors.

Features

- Extensive lineup

  2-Element
  With 3-Element (2E)
  Same Dimensions

- Changing the reset method

  Changing between the manual reset and automatic reset is easy

- Easy wiring

TH-N120

Features of the TH Thermal Overload Relay

- Easy current setting

  The motor current direct setting can be adjusted by both Phillips and flathead screwdrivers

- Can be manually checked

  Allows manual tripping from the surface using a screwdriver

- With operation indicator
- Trip-Free structure
- With 1a1b contact

  Make and break contacts with different voltage can be used

5

Application

For the selection of heater designation for the capacity of the standard three-phase motor, refer to page 48 or 139.
The manufactured model name, heater designation and combined magnetic contactor frame are shown in the table below.

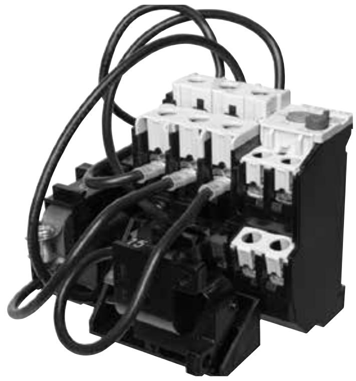
- Manufactured model name, heater designation and combined magnetic contactor frame (standard 2-element, 3-element, and overload and open-phase protection type)

Model Name												
Model Name	Standard with 2-Element	For Magnetic Starters	TH-T18	TH-T25	TH-T50	TH-T65	TH-T100	TH-N120	TH-N120TA	TH-N220RH	TH-N400RH	TH-N600 (Note 3)
		For Independent Mounting	(Note 1)		—		—		TH-N120TAHZ	TH-N220HZ	TH-N400HZ	
	With 3-Element (2E)	For Magnetic Starters	TH-T18KP	TH-T25KP	TH-T50KP	TH-T65KP	TH-T100KP	TH-N120KP	TH-N120TAKP	TH-N220RHKP	TH-N400RHKP	TH-N600KP (Note 3)
		For Independent Mounting	(Note 1)		—		—		TH-N120TAHZKP	TH-N220HZKP	TH-N400HZKP	
Operating Frequency Range [Hz]			0 (DC) to 400 (Note 6)							50 to 60		
Heater Designation (Adjustment Range of Settling Current) [A] (The --- line in the table on the right represents the correspondence between the magnetic contactor and frame to be combined)			0.12 (0.1 to 0.16) 0.17 (0.14 to 0.22) 0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18)	0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) 22 (18 to 26)	29(24 to 34) 35(30 to 40) 42(34 to 50)	15(12 to 18) 22(18 to 26) 29(24 to 34) 35(30 to 40) 42(34 to 50) 54(43 to 65)	67(54 to 80) 82 (65 to 100) 95 (85 to 105)	42(34 to 50) 54(43 to 65) 67(54 to 80) 82(65 to 100)	105(85 to 125) 125 (100 to 150)	82(65 to 100) 105(85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 210 (170 to 250)	105(85 to 125) 125 (100 to 150) 150(120 to 180) 180 (140 to 220) 250(200 to 300) 330 (260 to 400) *The thermal overload relay with heater designation of 180A or less is the same as the N220 frame.	250 (200 to 300) (Current Transformer Ratio 400/5 A) 330 (260 to 400) (Current Transformer Ratio 500/5 A) 500 (400 to 600) (Current Transformer Ratio 750/5 A) 660 (520 to 800) (Current Transformer Ratio 1000/5 A)
Trip Class (see page 148)			10A	10A	10A	15A to 42A : 10 54A : 10A	67A : 10 82A : 10A	10	10	10	10	10A
Frame of the Combined Magnetic Contactor			T10, T12, T20 T12, T20 T20	T21, T25 T35, T50	T35,T50 T50	T65,T80 T100	T80,T100 T100	N125,N150	N125,N150 N150	N180,N220 N220	N300,N400 N400	N600,N800

Note 1.For TH-T18(KP), independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.
Note 2.For TH-T25(KP), IEC 35 mm rail mounting may be enabled by combining with UN-RM20.
Note 3.Use TH-N600(KP) in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more: recommended model names are CW-15LM, CW-15L or CW-40LM).
The ratio of current transformation is as shown in the heater designation field in the table.
Note 4.The - mark in the model name field indicates that it is outside production range.
Note 5.TH-T18(KP), T25(KP), T50(KP) with BC and TH-T65(KP) with CW can also be manufactured.
However, TH-T50BC(KP) has no screw holder attached to the main circuit terminal (3-pole) on the power supply side.
Note 6.It is standardly used at the commercial frequency of 50/60 Hz. Make sure that the protection coordination with motor characteristics is possible before use.

5.8 Thermal Overload Relays with Saturable Reactor TH-□(KP)SR

As the standard thermal overload relay operates at startup, suitable protective properties may not be obtained for motors that take a long time to start, such as those that are started with a large inertial load.
The thermal overload relay with saturable reactor has a structure with a small reactor with an iron-containing core connected in parallel with the heater. It causes little change to the operating properties in the current range of up to about 200% of settling current, and in the current range beyond that, the iron core of the reactor is saturated to increase the shunt current to the reactor and limit the current to the heater in order to increase the operating time limit.
In addition, it helps achieve protection coordination with a low voltage circuit breaker.



TH-T25KPSR

● Application

For selection of heater designation for the capacity of the standard three-phase motor, refer to pages 48 and 139. Selection guidelines for motor start-up time are shown on page 140. The manufactured model name, heater designation and combined magnetic contactor frame are indicated in the table below.

● Manufactured model name, heater designation and combined magnetic contactor frame (with saturable reactor)

Model Name	With 2-Element	For Magnetic Starters	For Non-Reversing	TH-T18SR	TH-T25SR (Note 5)	TH-T50SR	TH-T65SR	TH-T100SR	TH-N120SR	TH-N120TASR	TH-N220RHSR	TH-N400RHSR	TH-N600SR
			For Reversing	TH-T18HZSR									
		For Independent Mounting		(See Note 1)		–		–		–	TH-N220HZSR	TH-N400HZSR	
	With 3-Element (2E)	For Magnetic Starters	For Non-Reversing	–	TH-T25KPSR (Note 5)	TH-T50KPSR	TH-T65KPSR	TH-T100KPSR	TH-N120KPSR	TH-N120TAKP SR	TH-N220RHKP SR	TH-N400RHKP SR	TH-N600KPSR
			For Reversing										
		For Independent Mounting		–		–		–		–	TH-N220HZKP SR	TH-N400HZKP SR	
Operating Frequency Range [Hz]				50 to 60									
Heater Designation (Adjustment Range of Settling Current) [A] (The --- line in the table on the right represents the correspondence between the magnetic contactor and frame to be combined)				0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) --- 11 (9 to 13) --- 15 (12 to 18)	0.24 (0.2 to 0.32) 0.35 (0.28 to 0.42) 0.5 (0.4 to 0.6) 0.7 (0.55 to 0.85) 0.9 (0.7 to 1.1) 1.3 (1 to 1.6) 1.7 (1.4 to 2) 2.1 (1.7 to 2.5) 2.5 (2 to 3) 3.6 (2.8 to 4.4) 5 (4 to 6) 6.6 (5.2 to 8) 9 (7 to 11) 11 (9 to 13) 15 (12 to 18) 22 (18 to 26)	29 (24 to 34) --- 35 (30 to 40) 42 (34 to 50)	15 (12 to 18) 22 (18 to 26) 29 (24 to 34) 35 (30 to 40) 42 (34 to 50) 54 (43 to 65)	67 (54 to 80) --- 82 (65 to 100) 95 (85 to 105)	42 (34 to 50) 54 (43 to 65) 67 (54 to 80) 82 (65 to 100)	105 (85 to 125) --- 125 (100 to 150)	82 (65 to 100) 105 (85 to 125) 125 (100 to 150) 150 (120 to 180) --- 180 (140 to 220) 210 (170 to 250)	105 (85 to 125) 125 (100 to 150) 150 (120 to 180) 180 (140 to 220) 250 (200 to 300) --- 330 (260 to 400) *The thermal overload relay with heater designation of 180A or less is the same as the N220 frame.	250 (200 to 300) (Current Transformer Ratio 400/5 A) 330 (260 to 400) (Current Transformer Ratio 500/5 A) 500 (400 to 600) (Current Transformer Ratio 750/5 A) 660 (520 to 800) (Current Transformer Ratio 1000/5 A)
Frame of the Combined Magnetic Contactor				T10, T12, T20 --- T12,T 20 --- T20	T21,T25 T35,T50	T35, T50 --- T50	T65, T80 T100	T80, T100 --- T100	N125, N150	N125, N150 --- N150	N180, N220 --- N220	N300, N400 --- N400	N600, N800

Note 1. For TH-T18HZSR, independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.
Note 2. Use TH-N600(KP)SR in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more: recommended model names are CW-15LM, CW-15L or CW-40LM).
The alternating current ratio is as shown in the heater designation field in the table.
Note 3. The - mark in the model name field indicates that it is outside production range.
Note 4. TH-T18(HZ)SR, T25(KP)SR, T50(KP)SR with BC can also be manufactured.
However, TH-T50BC(KP)SR has no screw holder attached to the main circuit terminal (3-pole) on the power supply side.
Note 5. TH-T25BC (KP) SR with wiring streamlining terminal and S(D)-2 x T21 to T50BC cannot be combined. Order with MSO(D) (MSO(D)-2 x T21 to T50BC (KP) SR).

5.9 Quick-acting Characteristics Thermal Overload Relays TH-☐FS(KP)

TH-FSKP and FS quick-acting characteristics thermal overload relays have quicker operation time than the standard TH type, so that they can be applied to motors such as submersible motors that have short allowable time during constraint.
Please note that TH-T☐FSKP has 3 elements and can be used for 2E thermal, while TH-FS has 2 elements.

TH-T25FSKP

5

● Application

The manufactured model name, heater designation and combined magnetic contactor frame are shown in the table below.

Model Name	With 2-Element	For Magnetic Starters	–	TH-T25FS	TH-T50FS	TH-T65FS	TH-T100FS
		For Independent Mounting	–		–		–
	With 3-Element (2E)	For Magnetic Starters	TH-T18FSKP	TH-T25FSKP	TH-T50FSKP	TH-T65FSKP	TH-T100FSKP
		For Independent Mounting	(See Note 1)		–		–
Operating Frequency Range [Hz]			0 (DC) to 400 (Note 4)				
Heater Designation (Adjustment Range of Settling Current) [A] (The --- line in the table on the right represents the correspondence between the magnetic contactor and frame to be combined)			2.1(1.7 to 2.5) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18)	2.1(1.7 to 2.5) 3.6(2.8 to 4.4) 5(4 to 6) 6.6(5.2 to 8) 9(7 to 11) 11(9 to 13) 15(12 to 18) 22(18 to 26)	29(24 to 34) 35(30 to 40) 42(34 to 50)	42(34 to 50) 54(43 to 65)	67(54 to 80) 82(65 to 93)
Trip Class (see page 138)			5	5	5	5	5
Frame of the Combined Magnetic Contactor			T10, T12, T20 T12, T20 T20	T21, T25, T35, T50 T25, T35, T50	T35, T50 T50	T65, T80, T100	T80, T100 T100

Note 1. For TH-T18FSKP, independent mounting and IEC 35 mm rail mounting may be enabled by combining with UT-HZ18.
For TH-T25FS(KP), IEC 35 mm rail mounting may be enabled by combining with UN-RM20.
Note 2. TH-T18FSKP, T25FS(KP), T50FS(KP) with BC can also be manufactured.
Note 3. The - mark in the model name field indicates that it is outside production range.
Note 4. It is standardly used at the commercial frequency of 50/60 Hz. Make sure that the protection coordination with motor characteristics is possible before use.

● Outline Drawings

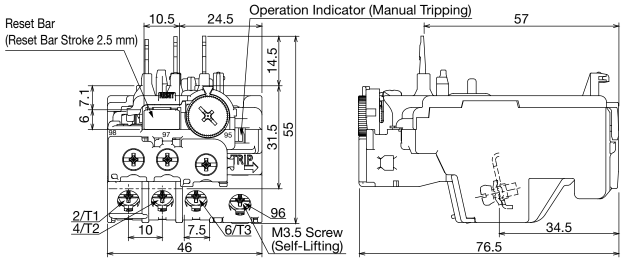
The same as the standard (with 2-element and 3-element (2E)). Refer to page 148.

5.10 Outline Drawings/Contact Arrangements

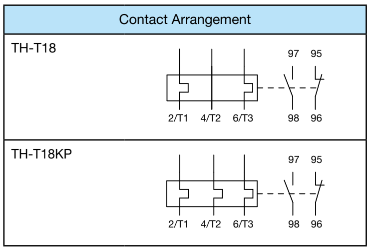
■ T18 (The diagrams show models without "BC".)

TH-T18(BC)(KP)

0.11kg

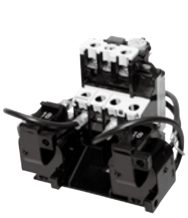


For combination with the following magnetic contactors
TH-T18: S-T10, T12, T20 SD-T12, T20
Independent use is possible by combining with the independent mounting unit UT-HZ18

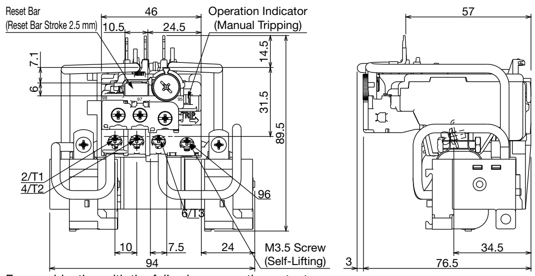


Model Name		Model Name	
TH-T18	0.12A to 11A	TH-T18BC	0.12A to 11A
	15 A		15 A

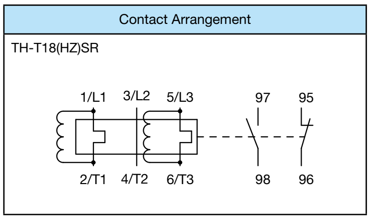
TH-T18(HZ)SR



0.29kg



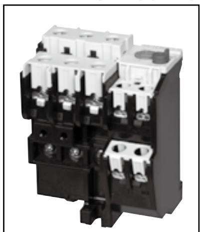
For combination with the following magnetic contactors
TH-T18SR: S-T10, T12, T20 SD-T12, T20
TH-T18HZSR can be used independently when used in combination with the independent mounting unit UT-HZ18.



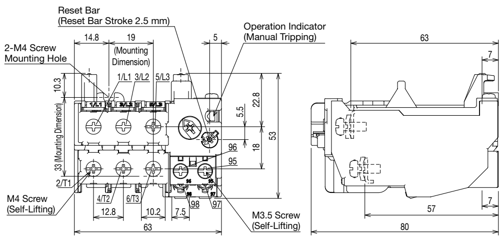
Model Name		Model Name	
TH-T18SR	0.12A to 11A	TH-T18SR	0.12A to 11A
	15 A		15 A

■ T25 (The diagrams show models without "BC".)

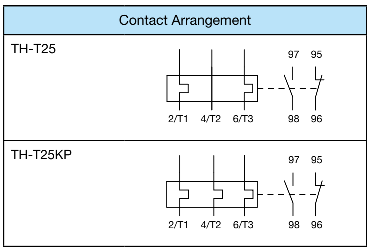
TH-T25(BC)(KP)



0.16kg

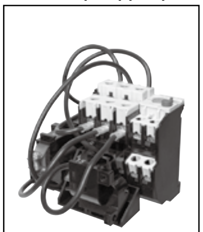


When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S-T21/T25(BC), SD-T21(BC), SL(D)-T21(BC): UN-TH21
Combination with S-T35/T50(BC), SD-T35/T50(BC), SL(D)-T35/T50(BC): UT-TH50
Independent DIN rail mounting is possible by combining with the independent mounting unit UN-RM20

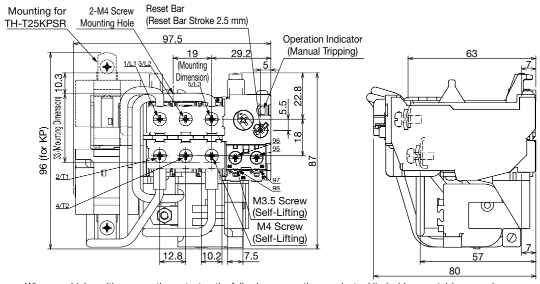


Model Name		Model Name	
TH-T25	0.24A to 15A	TH-T25BC	0.24A to 15A
	22 A		22 A

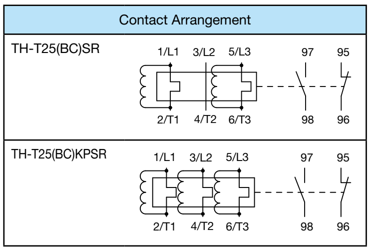
TH-T25(BC)(KP)SR



0.36(0.44)kg



When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S-T21/T25(BC), SD-T21(BC), SL(D)-T21(BC): UN-TH21
Combination with S-T35/T50(BC), SD-T35/T50(BC), SL(D)-T35/T50(BC): UT-TH50
∗ Reversible magnetic contactor with wiring streamlining terminal S-2xT21/T25BC and TH-T25BC(KP)SR cannot be combined.

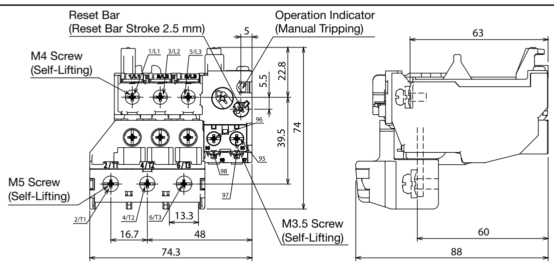


Model Name		Model Name	
TH-T25BCSR	0.24A to 15A	TH-T25SR	0.24A to 15A
	22 A		22 A

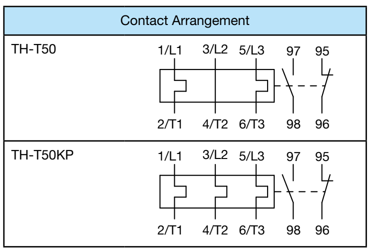
■ T50 (The diagrams show models without "BC".)

TH-T50(BC)(KP)

0.2kg

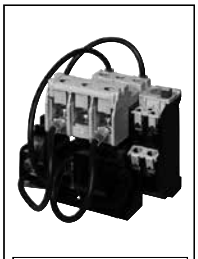


Cannot be used in independent mounting
When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
Combination with S-T35/T50(BC) and SD-T35/T50(BC): UT-TH50

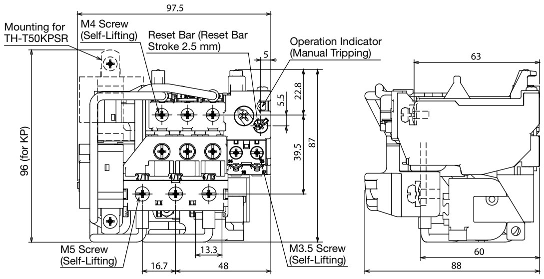


Model Name		Model Name	
TH-T50	29 A	TH-T50BC	29 A
	35 A/42 A		35 A/42 A

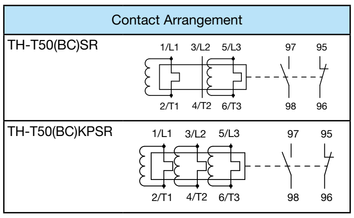
TH-T50(BC)(KP)SR



0.4(0.48)kg



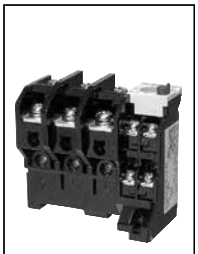
Cannot be used in independent mounting
When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
Combination with S-T35/T50(BC) and SD-T35/T50(BC): UT-TH50



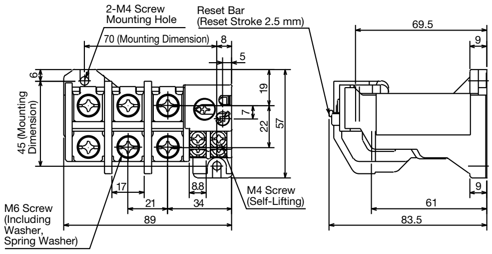
Model Name	
TH-T50SR	29 A
	35 A/42 A

T65 (The diagrams show models without "CW".)

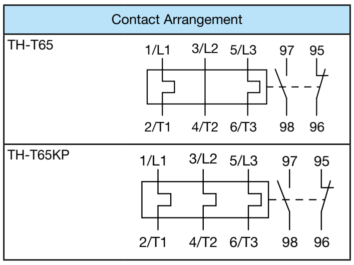
TH-T65(CW)(KP)



0.26(0.27)kg



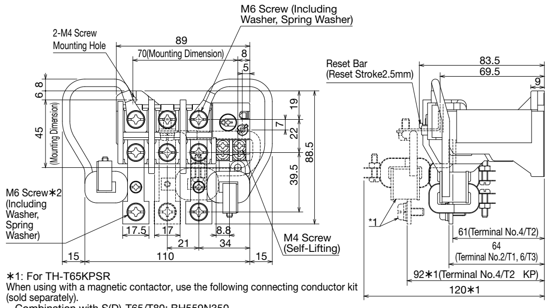
When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-T65/T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352



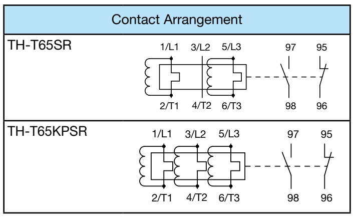
Model Name	
TH-T65	15A to 54A

TH-T65(KP)SR

0.41(0.5)kg



∗1: For TH-T65KPSR
When using with a magnetic contactor, use the following connecting conductor kit (sold separately).
Combination with S(D)-T65/T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352

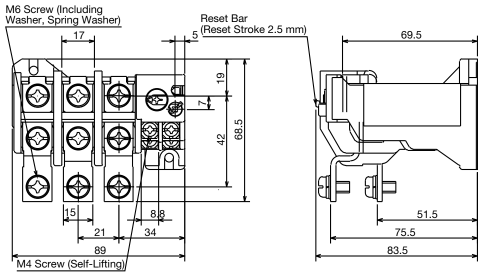


Model Name	
TH-T65SR	15A to 54A

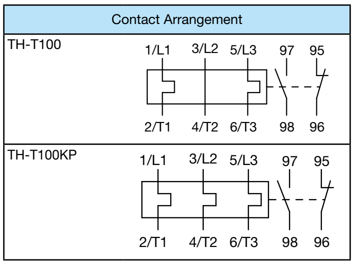
T100

TH-T100(KP)

0.32(0.33)kg



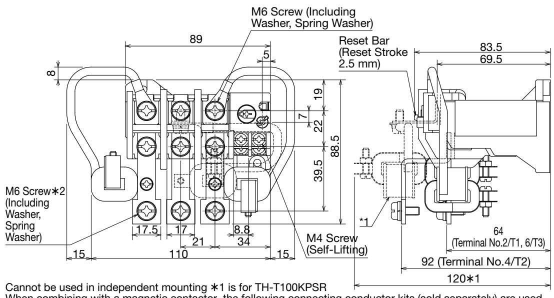
Cannot be used in independent mounting
When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352



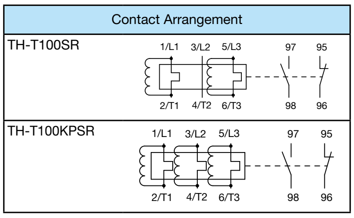
Model Name	
TH-T100	67A/82A

TH-T100(KP)SR

0.45(0.52)kg



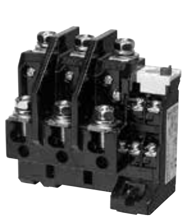
Cannot be used in independent mounting ∗1 is for TH-T100KPSR
When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-T80: BH559N350
Combination with S-T100: BH569N350
Combination with SD-T100: BH569N352



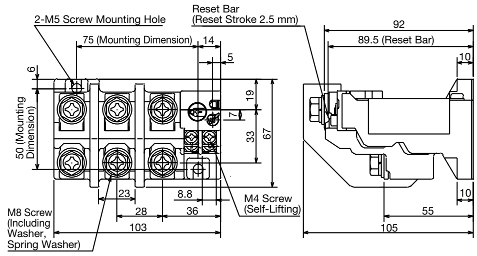
Model Name	
TH-T100SR	67A/82A

N120/N120TA

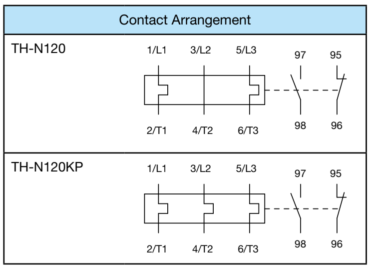
TH-N120(KP)



0.48 (0.51) kg



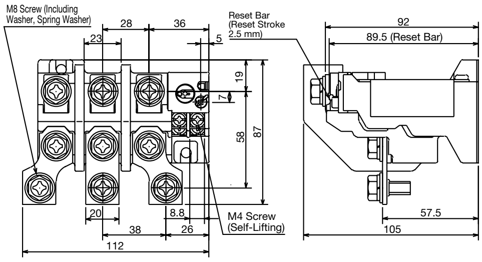
When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
Combination with S(D)-N125, SL(D)-N125: BH579N355
Combination with S(D)-N150, SL(D)-N150: BH589N355
TH-N120 and TH-N120KP can be used for both magnetic starter (MSO) or independent mounting



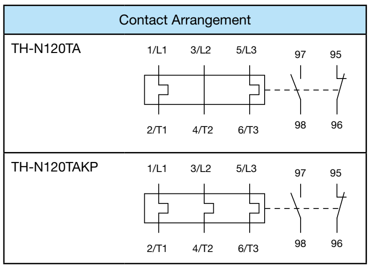
Model Name	Model Number
TH-N120	THN65 □□

TH-N120TA(KP)

0.59 (0.61) kg



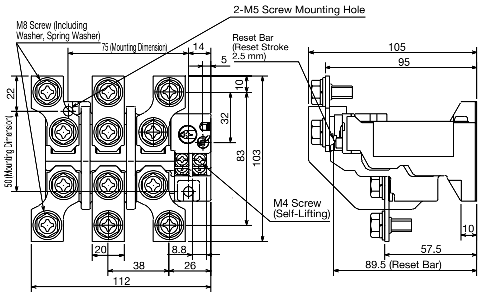
Cannot be used in independent mounting When combining with a magnetic contactor, the following connecting conductor kits (sold separately) are used
Combination with S(D)-N125, SL(D)-N125: BH579N355
Combination with S(D)-N150, SL(D)-N150: BH589N355

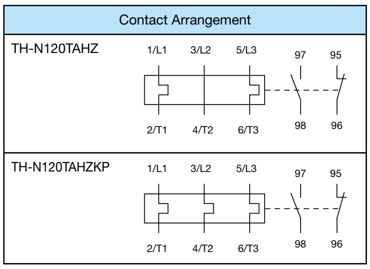


Model Name	Model Number
TH-N120TA	THN65□□

TH-N120TAHZ(KP)

0.7 (0.72) kg

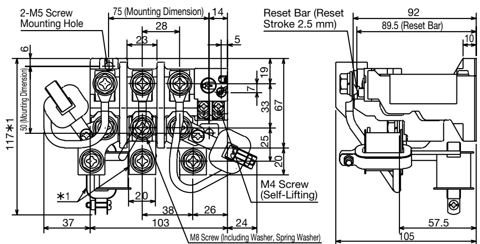




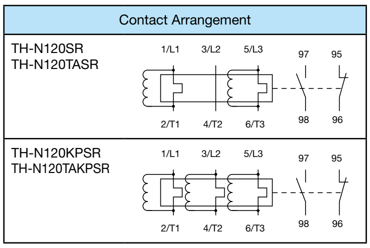
Model Name
TH-N120TAHZ

TH-N120(TA)(KP)SR

TH-N120SR: 0.67 kg
TH-N120TASR: 0.78 kg
TH-N120KPSR: 0.78 kg
TH-N120TAKPSR: 0.9 kg



∗1: For TH-N120(TA)KPSR
TH-N120TA(KP)SR cannot be used in independent mounting
When combining with a magnetic contactor, the following connecting conductor kit (sold separately) is used
Combination with S(D)-N125, SL(D)-N125: BH579N355
Combination with S(D)-N150, SL(D)-N150: BH589N355

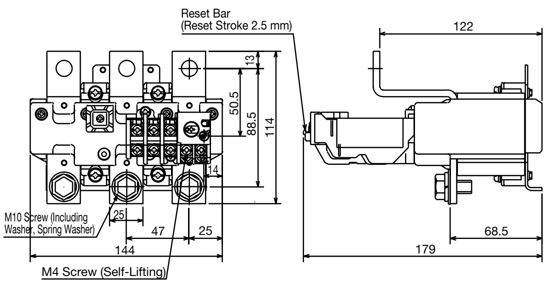


Model Name
TH-N120SR
TH-N120TASR

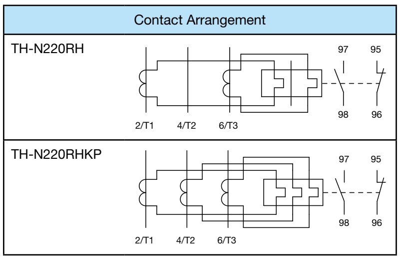
N220RH/N220HZ

TH-N220RH(KP)

1.8 (2.1) kg



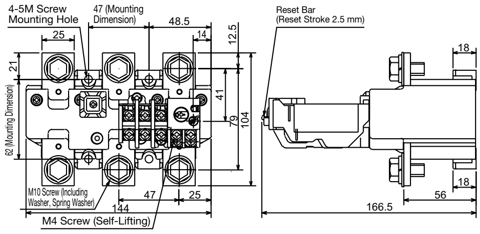
Cannot be used in independent mounting
Attached 2 M4 screws and wiring screws for magnetic contactor are used when combining with S-N180/N220, SD-N220 and SL(D)-N220

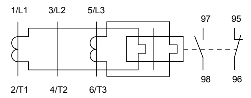
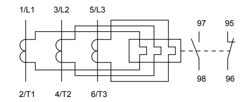


Model Name	Model Number
TH-N220RH	THN70 □□

TH-N220HZ(KP)

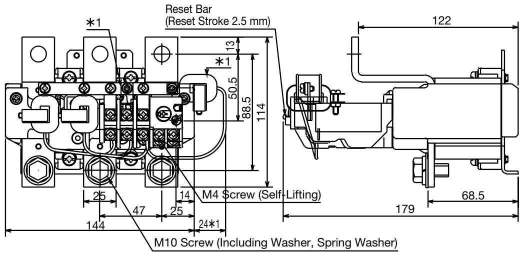
1.5 (1.8) kg



Contact Arrangement	
TH-N220HZ	
TH-N220HZKP	

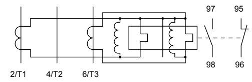
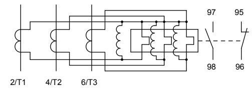
Model Name	Model Number
TH-N220HZ	THN72□□

TH-N220RH(KP)SR



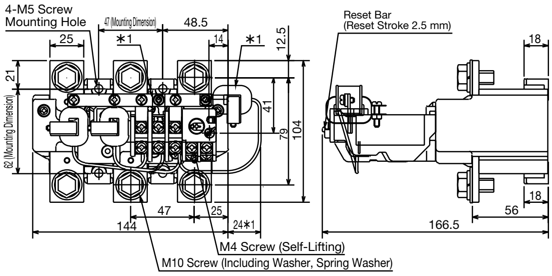
2.0 (2.3) kg

∗1: For TH-N220RHKPSR
Cannot be used in independent mounting
The attached 2 M4 screws and wiring screws for magnetic contactor are used when combining with S-N180/N220, SD-N220 and SL(D)-N220

Contact Arrangement	
TH-N220RHSR	
TH-N220RHKPSR	

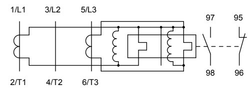
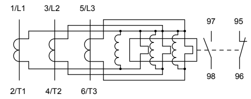
Model Name
TH-N220RHSR

TH-N220HZ(KP)SR



1.6 (2.0) kg

∗1: TH-N220HZKPSR

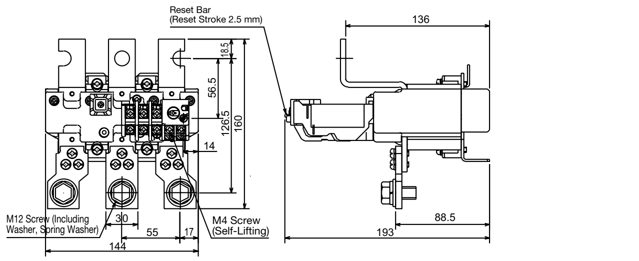
Contact Arrangement	
TH-N220HZSR	
TH-N220HZKPSR	

Model Name
TH-N220HZSR

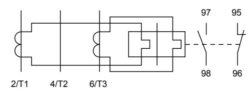
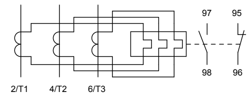
● N400RH/N400HZ

TH-N400RH(KP)

2.2 (2.5) kg



Cannot be used in independent mounting
Attached M5 screw and wiring screws for magnetic contactor are used when combining with S(D)-N300/N400 and SL(D)-N300/N400

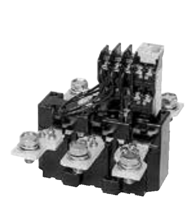
Contact Arrangement	
TH-N400RH	
TH-N400RHKP	

Model Name	Model Number
TH-N400RH	THN75 □□

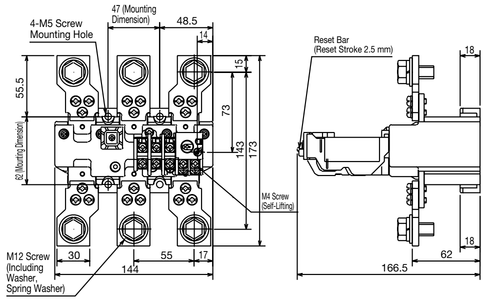
5

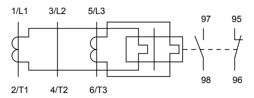
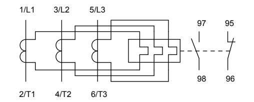
5 TH-T/N Type Thermal Overload Relays

TH-N400HZ(KP)



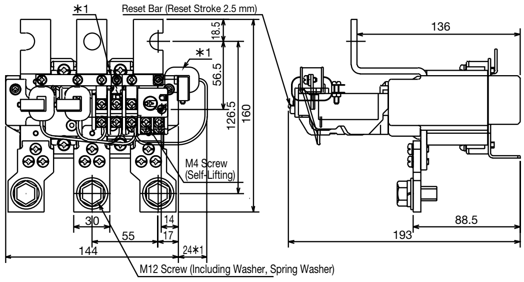
2.1 (2.4) kg



Contact Arrangement	
TH-N400HZ	
TH-N400HZKP	

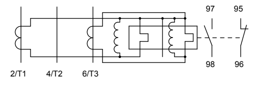
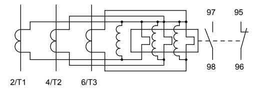
Model Name	Model Number
TH-N400HZ	THN77 □□

TH-N400RH(KP)SR



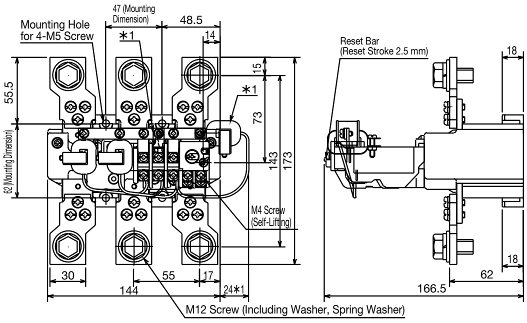
2.4 (2.6) kg

∗1: TH-N400RHKPSR
Cannot be used in independent mounting
The attached M5 screw and wiring screws for magnetic contactor are used when combining with S(D)-N300/N400 and SL(D)-N300/N400

Contact Arrangement	
TH-N400RHSR	
TH-N400RHKPSR	

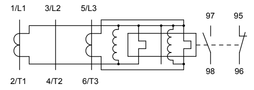
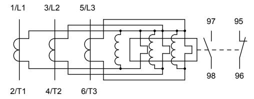
Model Name
TH-N400RHSR

TH-N400HZ(KP)SR



2.3 (2.5) kg

∗1: For TH-N400HZKPSR

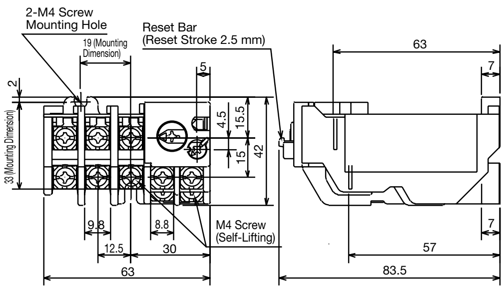
Contact Arrangement	
TH-N400HZSR	
TH-N400HZKPSR	

Model Name
TH-N400HZSR

■ N600

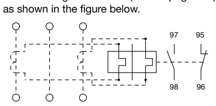
TH-N600(KP)

0.14 kg

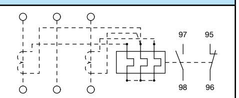


Contact Arrangement

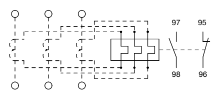
Use in combination with current transformer for measuring instruments (refer to page 136) as shown in the figure below.



TH-N600 With 2-Element



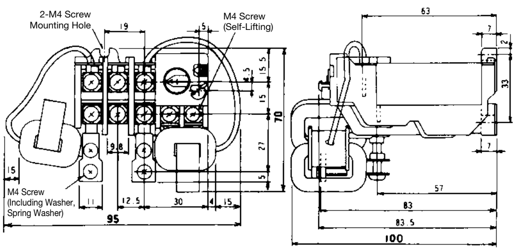
TH-N600KP With 3-Element (2 Current Transformers Used)



TH-N600KP With 3-Element (3 Current Transformers Used)

Model Name
TH-N600

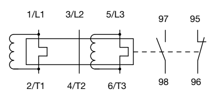
TH-N600(KP)SR



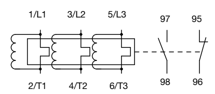
0.3 (0.36) kg

Contact Arrangement

As with TH-N600(KP), use in combination with current transformer for measuring instruments (refer to page 136).



TH-N600SR With 2-Element



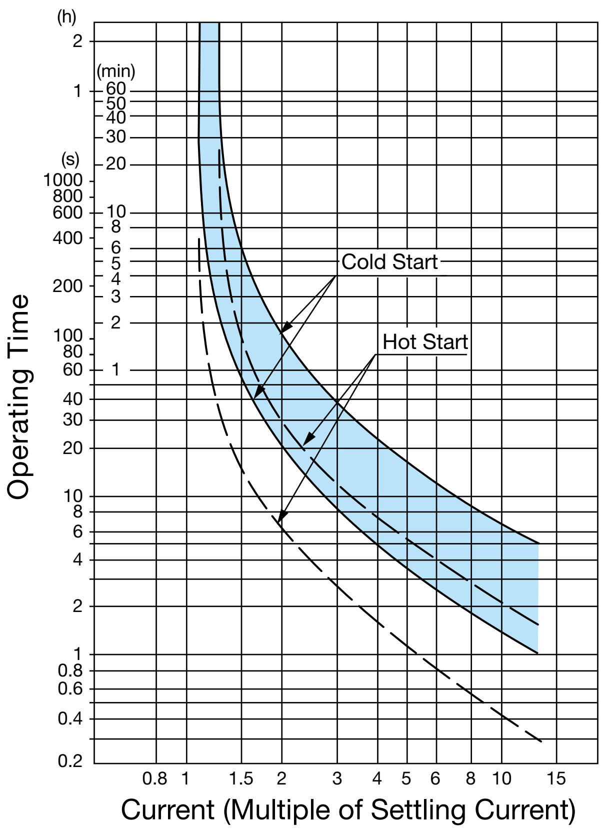
TH-N600KPSR With 3-Element

Model Name
TH-N600SR
TH-N600KPSR

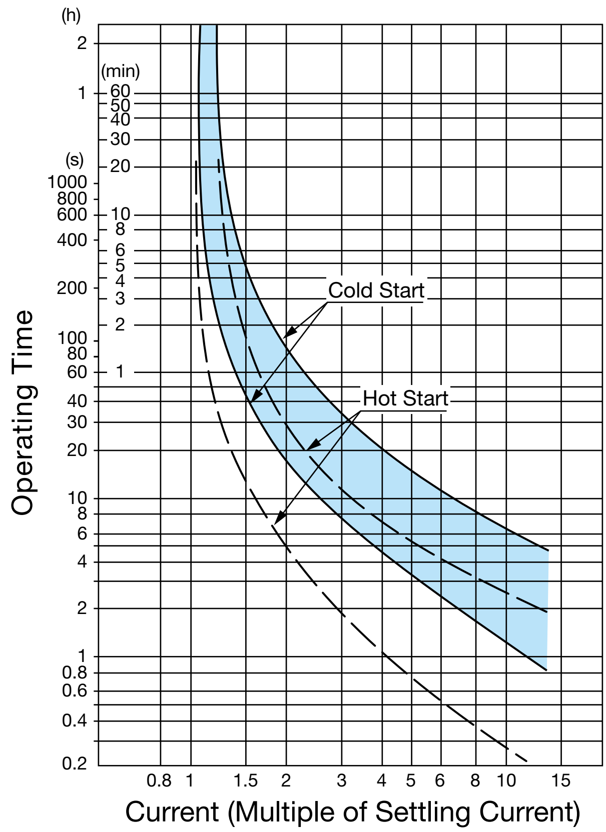
5.11 Operating Characteristic of Thermal Over Relay (Ambient Temperature of 20°C)

Refer to page 143 regarding the connecting electric wire size.

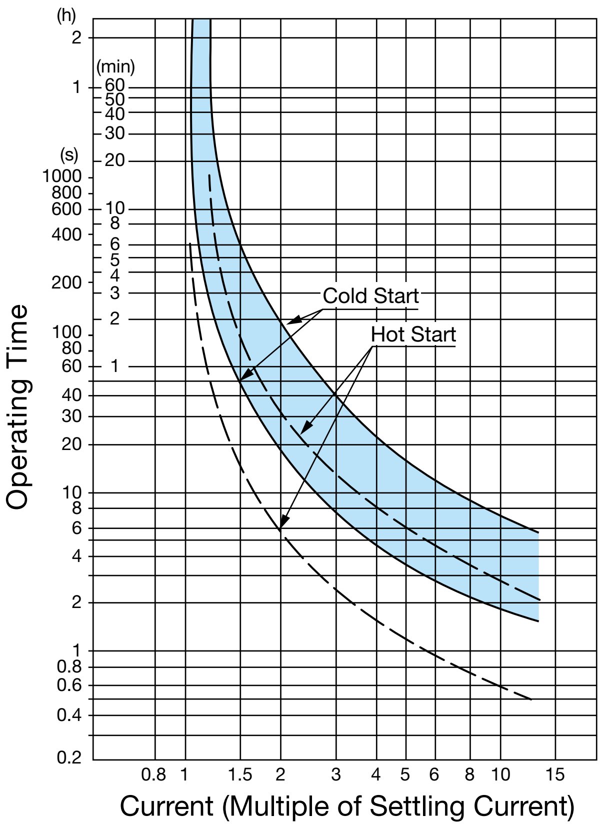
TH-T18, T18KP



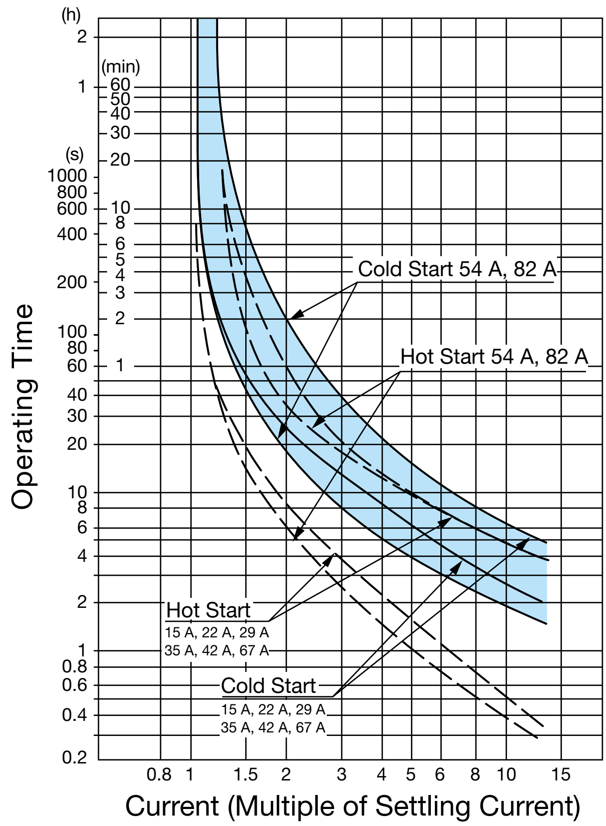
TH-T25, T25KP



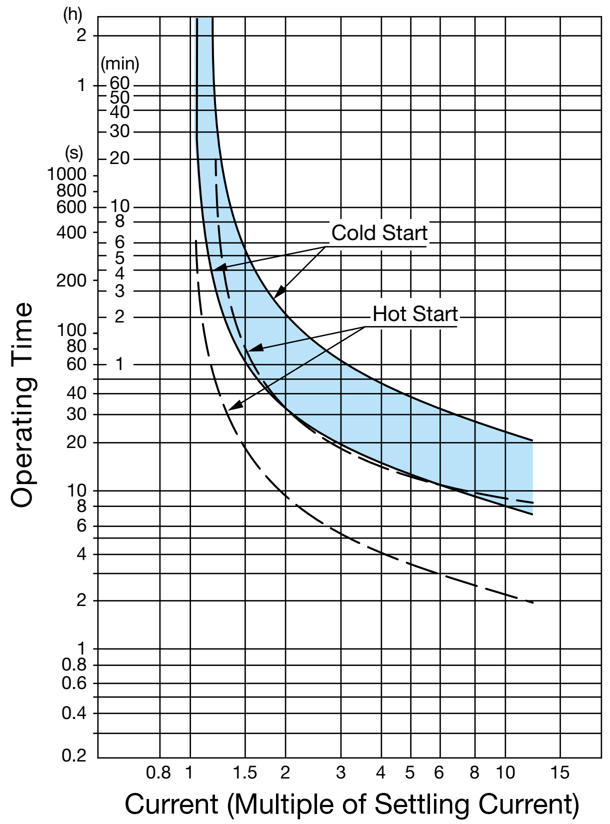
TH-T50, T50KP



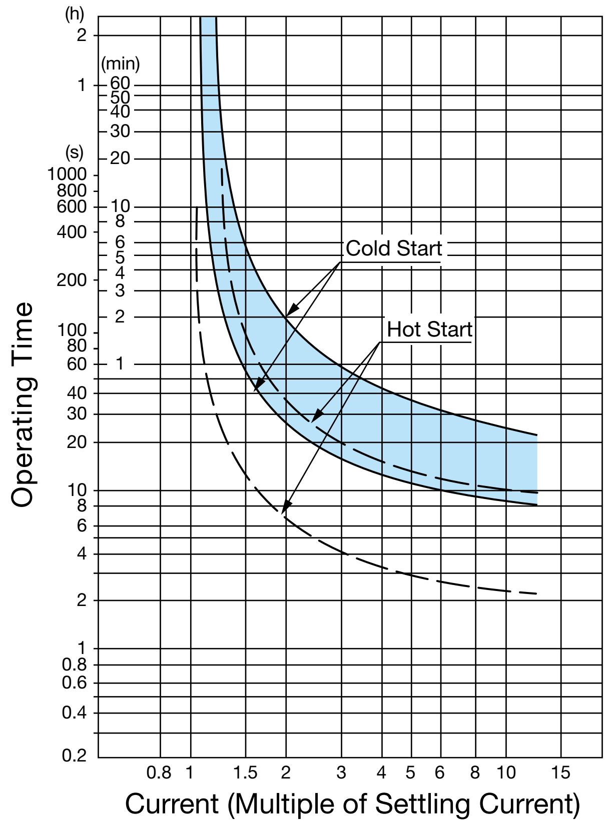
TH-T65, T65KP,
TH-T100, T100KP



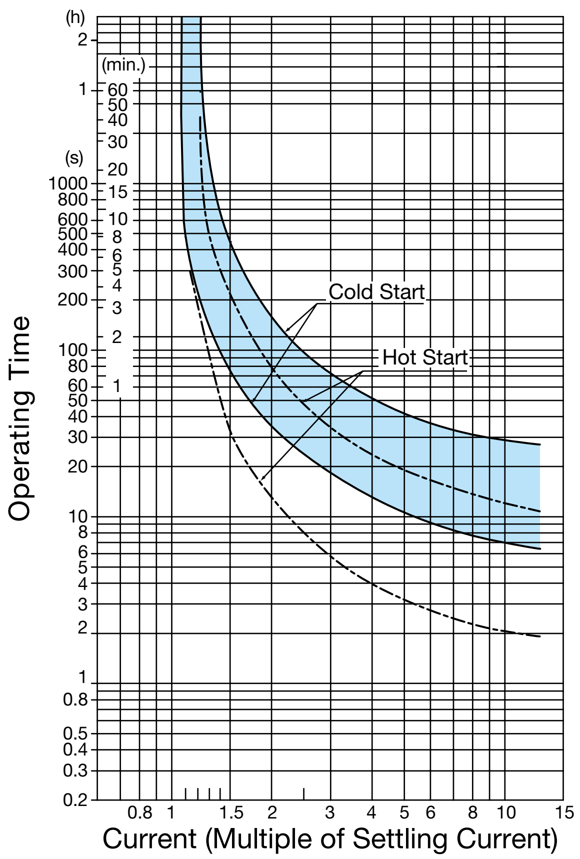
TH-T18SR



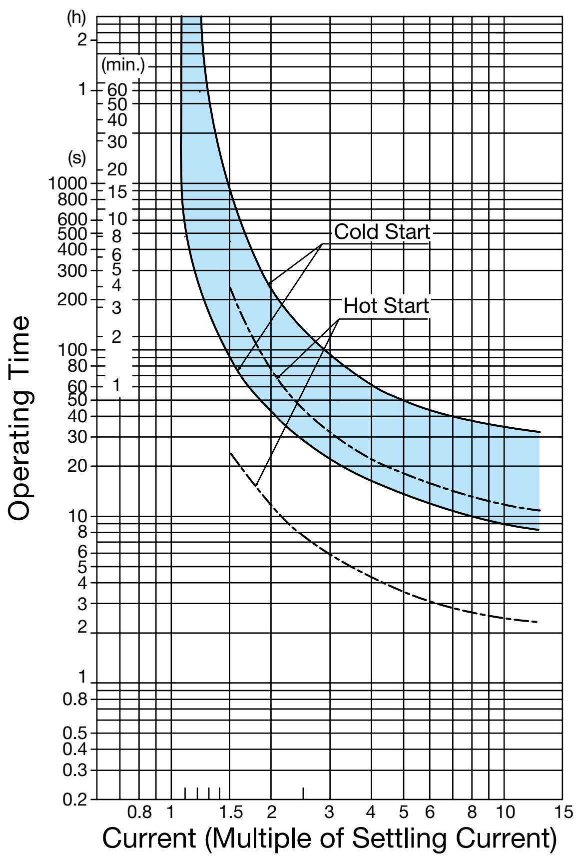
TH-T25SR, T25KPSR



TH-T50SR, T50KPSR

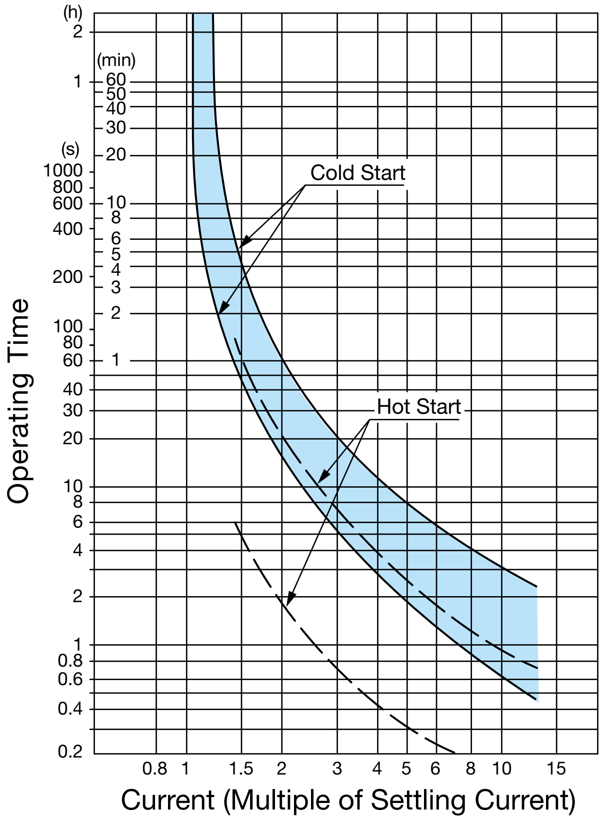


TH-T65SR, T65KPSR,
TH-T100SR, T100KPSR

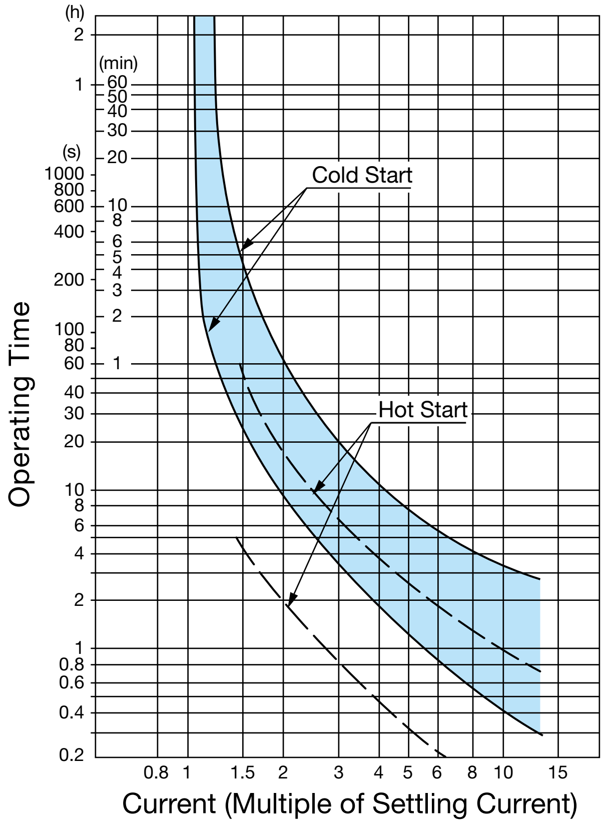


5

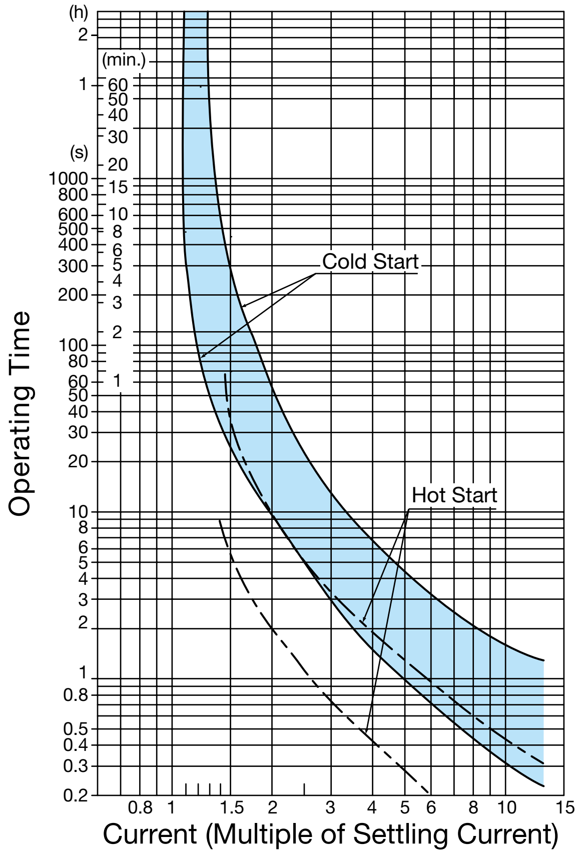
TH-T18FSKP



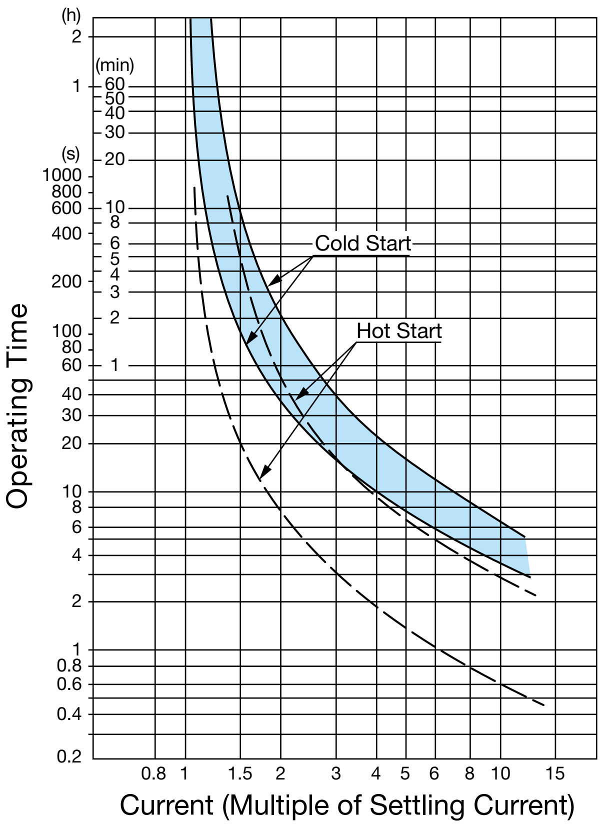
TH-T25FS, TH-T25FSKP,
TH-T50FS, TH-T50FSKP



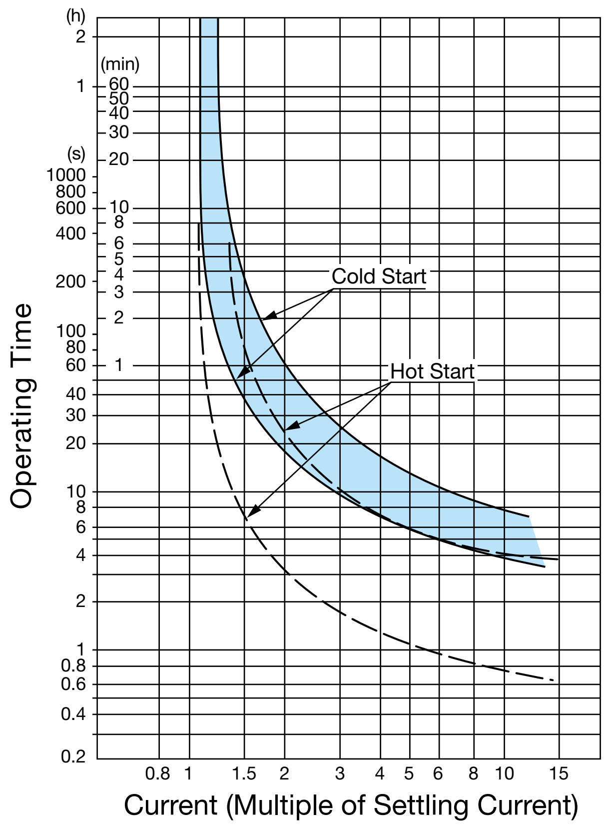
TH-T65FS, T65FSKP,
TH-T100FS, T100FSKP



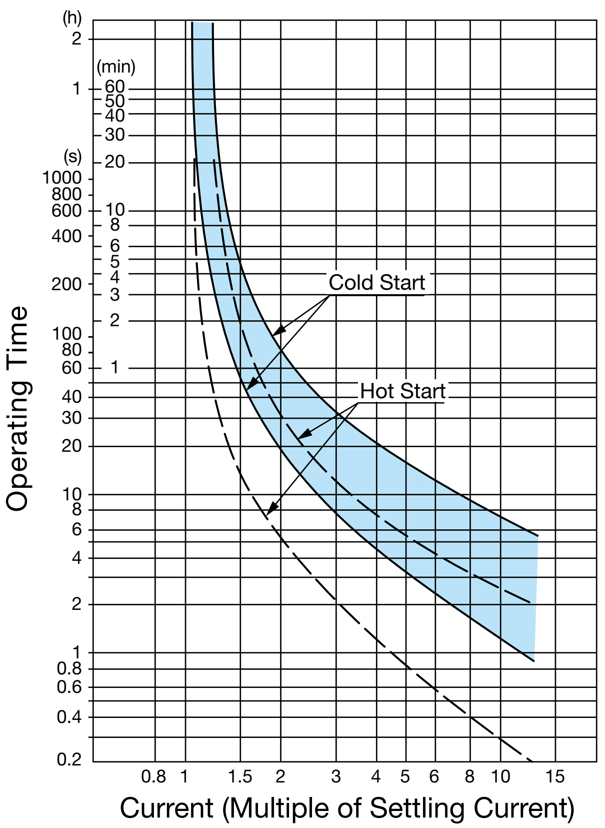
TH-N120, N120TA, N120KP, N120TAKP



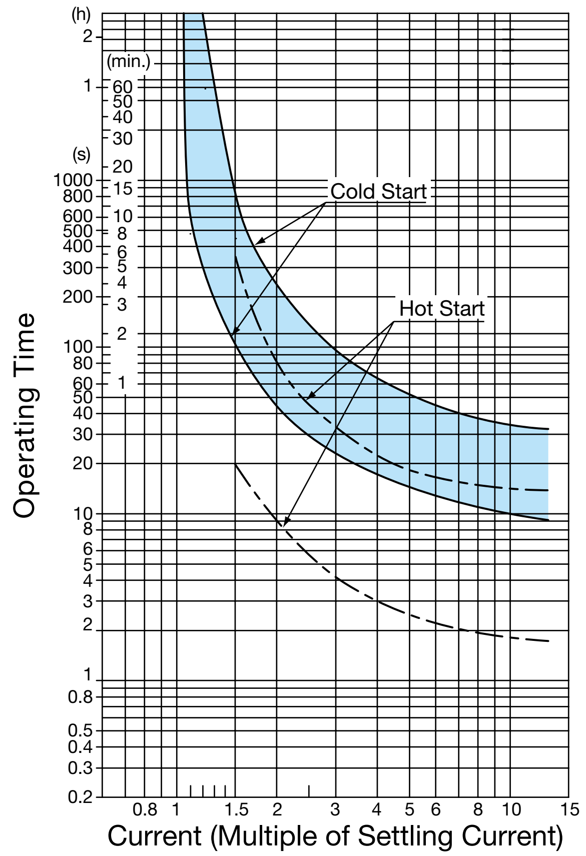
TH-N220RH/HZ(KP), N400RH/HZ(KP)



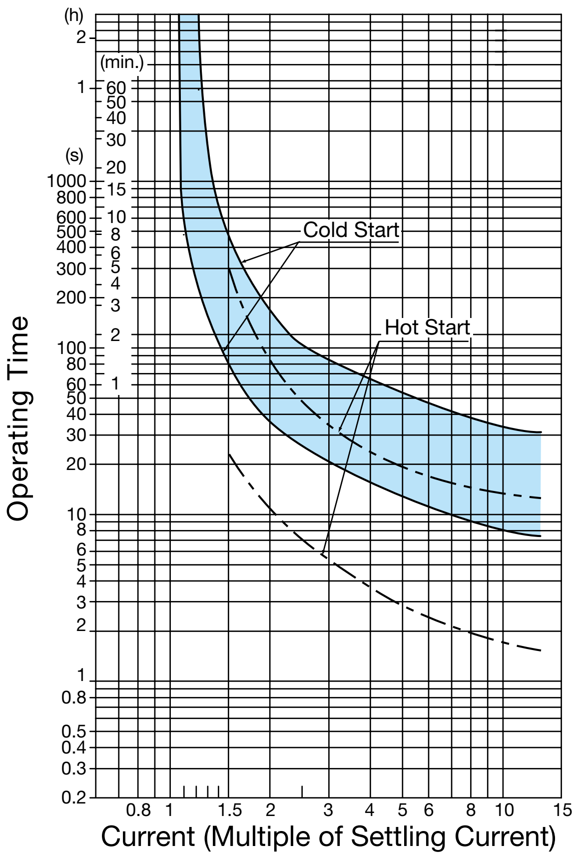
TH-N600, N600KP



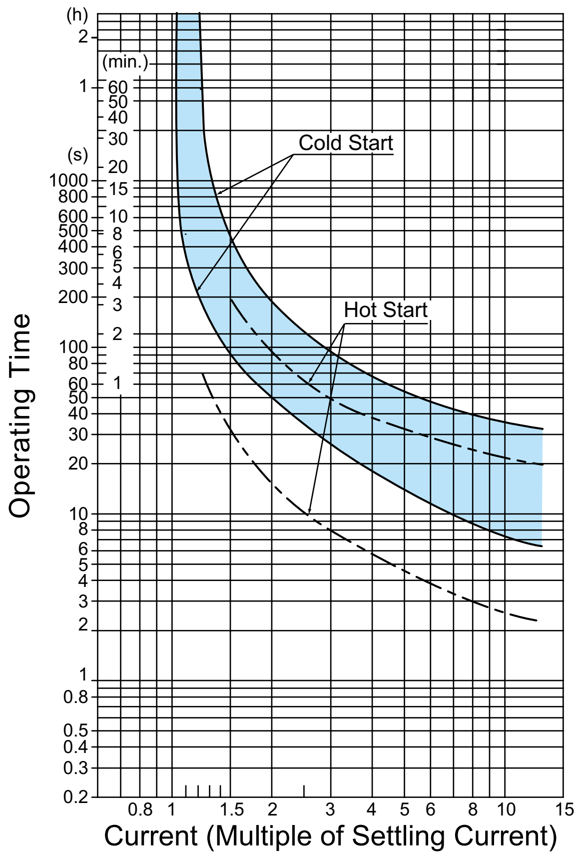
TH-N120SR, N120TASR, N120KPSR, N120TAKPSR



TH-N220RH/HZ(KP)SR, N400RH/HZ(KP)SR



TH-N600SR, N600KPSR



5

5.12 How to Order

Follow the steps below when ordering. (Enter a space in ▲ .)

TH-T Thermal Overload Relays

Model Name		Heater Designation
TH-T25	▲	15A
Specify from the following model name codes.		Specify the heater designation from pages 145, 146 or 147. When the full-load current of the motor is included in 2 heater designations, give priority to the heaters listed in the table on page 48.

Model Name Codes of Thermal Overload Relays

TH – T18 KP ▲ Heater Designation

Frame
T18
T25
T50
T65
T100

Symbol	Specifications
None	With 2-Element
KP	With 3-Element (2E)
FS	Quick Trip Type
SR	With Saturable Reactor
BC	Wiring Streamlining Terminal
AR	Automatic Reset

TH-N Thermal Overload Relays

Model Name		Heater Designation
TH-N120KP	▲	82A
Specify from the following model name codes.		Specify the heater designation from pages 145, 146 or 147. When the full-load current of the motor is included in 2 heater designations, give priority to the heaters listed in the table on page 48.

Model Name Codes of Thermal Overload Relays

TH – N220 KP ▲ Heater Designation

Frame
N120
N120TA
N220
N400
N600

Symbol	Specifications
None	With 2-Element
KP	With 3-Element (2E)
RH	For Magnetic Starter
HZ	For Independent Mounting
SR	With Saturable Reactor
AR	Automatic Reset

Note 1. Model names that correspond to mounting methods (for magnetic starters, independent mounting and DIN rail mounting) are shown in the table below.

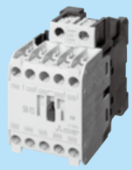
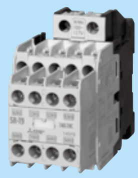
For Magnetic Starters	For Independent Mounting	For DIN Rail Mounting
TH-T18 ∗1	TH-T18 + UT-HZ18 ∗2	TH-T18 + UT-HZ18 ∗2
TH-T25	TH-T25	TH-T25 + UN-RM20 ∗2
TH-T50 ∗1	—	—
TH-T65	TH-T65	—
TH-T100 ∗1	—	—
TH-N120	TH-N120	—
TH-N120TA ∗1	TH-N120TAHZ	—
TH-N220RH ∗1	TH-N220HZ	—
TH-N400RH ∗1	TH-N400HZ	—
—	TH-N600 + CT ∗3	—

∗1 Cannot be independently mounted.
∗2 Order UT-HZ18 and UN-RM20 separately from the thermal overload relay body (TH-T18 and TH-T25). (Refer to page 230)
∗3 Use TH-N600 in combination with current transformer for measuring instruments (rated secondary load of 15 VA or more). (Refer to page 136)

6

MS-T Series Contactor Type Contactor Relays

6.1 Model List

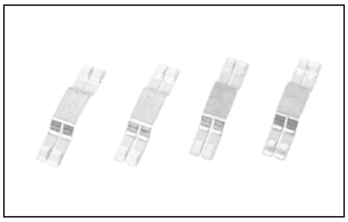
<table>
<tr><td colspan="4">Appearance</td><td>
SR-T5</td><td>
SR-T9</td></tr>
<tr><td colspan="4">Frame</td><td>T5</td><td>T9</td></tr>
<tr><td colspan="4">Number of Contacts</td><td>5</td><td>9</td></tr>
<tr><td colspan="4" rowspan="3">Contact Arrangement</td><td>5a</td><td>9a</td></tr>
<tr><td>4a1b</td><td>7a2b</td></tr>
<tr><td>3a2b</td><td>5a4b</td></tr>
<tr><td colspan="4">Rated Insulation Voltage [V]</td><td colspan="2">690</td></tr>
<tr><td colspan="4">Applicable Standard</td><td colspan="2">JIS C8201-5-1, IEC60947-5-1, EN60947-5-1, GB14048.5</td></tr>
<tr><td colspan="4">Rated Impulse Withstand Voltage [kV]</td><td colspan="2">6</td></tr>
<tr><td colspan="4">Rated Frequency [Hz]</td><td colspan="2">50/60</td></tr>
<tr><td colspan="4">Pollution Degree</td><td colspan="2">3</td></tr>
<tr><td rowspan="18">Contact Rating (Note 2)</td><td colspan="3">Conventional Free Air Thermal Current Ith [A]</td><td colspan="2">10</td></tr>
<tr><td rowspan="8">AC Rated Operational Current [A]</td><td rowspan="4">Category AC-15 (Coil Load)</td><td>AC120 V</td><td colspan="2">6</td></tr>
<tr><td>AC240 V</td><td colspan="2">3</td></tr>
<tr><td>AC440 V</td><td colspan="2">1.5</td></tr>
<tr><td>AC550 V</td><td colspan="2">1.2</td></tr>
<tr><td rowspan="4">Category AC-12 (Resistive Load)</td><td>AC120 V</td><td colspan="2">10</td></tr>
<tr><td>AC240 V</td><td colspan="2">8</td></tr>
<tr><td>AC440 V</td><td colspan="2">5</td></tr>
<tr><td>AC550 V</td><td colspan="2">5</td></tr>
<tr><td rowspan="8">DC Rated Operational Current [A]</td><td rowspan="4">Category DC-13 (Coil Load)</td><td>DC24 V</td><td colspan="2">3</td></tr>
<tr><td>DC48 V</td><td colspan="2">1.5</td></tr>
<tr><td>DC110 V</td><td colspan="2">0.6 (2)</td></tr>
<tr><td>DC220 V</td><td colspan="2">0.3 (0.8)</td></tr>
<tr><td rowspan="4">Category DC-12 (Resistive Load)</td><td>DC24 V</td><td colspan="2">10</td></tr>
<tr><td>DC48 V</td><td colspan="2">8</td></tr>
<tr><td>DC110 V</td><td colspan="2">5 (8)</td></tr>
<tr><td>DC220 V</td><td colspan="2">1 (3)</td></tr>
<tr><td colspan="3">Minimum Applicable Load Level</td><td colspan="2">20 V 3 mA (Note 5)</td></tr>
<tr><td colspan="3">Standard Type</td><td>SR-□</td><td>◎</td><td>◎</td></tr>
<tr><td colspan="3">DC Operated Type</td><td>SRD-□</td><td>◎</td><td>◎</td></tr>
<tr><td colspan="3" rowspan="2">Mechanically Latched Type</td><td>SRL-□</td><td>◎</td><td>—</td></tr>
<tr><td>SRLD-□</td><td>◎</td><td>—</td></tr>
<tr><td colspan="3" rowspan="2">With Large Rated Auxiliary Contacts</td><td>SR-□JH</td><td>○</td><td>○</td></tr>
<tr><td>SRD-□JH</td><td>○</td><td>○</td></tr>
<tr><td colspan="3" rowspan="2">With Overlap Contacts</td><td>SR-□LC</td><td>○</td><td>○</td></tr>
<tr><td>SRD-□LC</td><td>○</td><td>○</td></tr>
<tr><td colspan="3">Delay Open Type</td><td>SR-□DL</td><td>○</td><td>○</td></tr>
<tr><td colspan="3" rowspan="2">With Wiring Streamlining Terminals</td><td>SR-□BC</td><td>○</td><td>○</td></tr>
<tr><td>SRD-□BC</td><td>○</td><td>○</td></tr>
<tr><td colspan="3" rowspan="2">With Spring Clamp Terminals</td><td>SR-□SQ</td><td>○</td><td>—</td></tr>
<tr><td>SRD-□SQ</td><td>○</td><td>—</td></tr>
<tr><td colspan="3" rowspan="2">With Surge Absorbers (Varistors)</td><td>SR-□SA</td><td>○</td><td>○</td></tr>
<tr><td>SRD-□SA</td><td>○</td><td>○</td></tr>
<tr><td rowspan="3">Optional Units</td><td colspan="3">Surge Absorber (Note 3)</td><td>○</td><td>○</td></tr>
<tr><td colspan="3">Additional Auxiliary Contact (Note 4)</td><td>○</td><td>—</td></tr>
<tr><td colspan="3">DC/AC Interface</td><td>○</td><td>○</td></tr>
<tr><td colspan="4">IEC 35 mm Rail Mounting</td><td>◎</td><td>◎</td></tr>
</table>

Note 1. ◎ indicates standard, ○ indicates semi-standard and - indicates products outside production range.
Note 2. Refer to the individual ratings chart for the contact ratings of large rated auxiliary contacts and overlap contacts. The value in parentheses indicates that when switching a 2-pole load in series.
Note 3. For the mechanically latched type (SRL-T□, SRLD-T□), 1 piece can be mounted on each closing coil and tripping coil.
Note 4. For the mechanically latched type SRL-T5 and SRLD-T5 only the side clip-on auxiliary contact unit UT-AX11 can be mounted.
Note 5. The contact minimum applicable load level of the front clip-on (4 upper terminals) of SR (D)-T9 is the same as that of UT-AX2/4.

6.2 Selection and Application

Features

- **Rail mounting is fully adopted**
  IEC 35 mm rail mounting mechanism that dramatically reduces assembly time has been fully adopted.
- **High contact reliability**
  The full adoption of twin contacts improves the contact reliability.



- **Clearly visible coil rating**
- **The make and break contacts can be used at different voltages**
  Strengthened insulation between poles and between upper and lower contacts of the same pole.
- **Easy wiring**
  Uses self-lifting terminal screws that can reliably tighten wires, ring crimp lugs and square-tip crimp lugs.
- **Live part protection covers are standard equipment**

SR-T9

- **Wide range of types**
  In addition to the basic frame, extensive applied products such as the DC operated type and the mechanically latched type are also available.
- **A wide selection of optional units**
  auxiliary contact units (UT-AX☐)
  The 2-pole and 4-pole contact units can be easily added to SR-T5.
  Surge Absorber Units (UT-SA☐)
  For the surge absorber unit that can be mounted in one-touch,the C-R type and indicator type are available aside from the varistor type.
  With Wiring Streamlining Terminal (SR-T☐BC)
  The terminal screw does not fall off and wiring is easy (open-tip crimp lugs and bare wires, ring crimp lugs can be used).

Type Designations

MS-T Series

SR — T5 BC 4a1b

Model Name	Model
SR	AC Operated
SRD	DC Operated
SRL	Mechanically Latched Type (AC Operated)
SRLD	Mechanically Latched Type (DC Operated)

Frame	No. of Poles
T5	5-Pole
T9	9-Pole

Symbol	Specifications
None	Standard
JH	With Large Rated Auxiliary Contacts
LC	With Overlap Contacts
DL	Delay Open Type
BC	With Wiring Streamlining Terminals
SA	Surge Absorber Mounted Type
SQ	Spring Clamp Terminals

Contact Arrangement
Select a contact arrangement according to the model.

6

6 MS-T Series Contactor Type Contactor Relays

Function and Operation Classification by Application Type

Model Name	Operation Category	Application	Reference Page
SR-T☐	AC	General control circuit sequence relay for magnetic contactor command contacts etc.	Page 163
SRD-T☐	DC		Page 166
SRL-T☐ SRLD-T☐	AC DC	Same applications as SR and SRD types and also those requiring memory functionality	Page 168
SR-T☐JH SRD-T☐JH	AC DC	AC100 to 220 V, 3 to 10 A control of large breakers and solenoids	Page 170

Model Name	Operation Category	Application	Reference Page
SR-T☐LC SRD-T☐LC	AC DC	Applications that require the overlap switching of the make and break contacts	Page 171
SR-T☐DL	AC	For 2^{+2}_{-1}-Second Delayed Release	Page 172
SR-T☐BC SRD-T☐BC	AC DC	With Wiring Streamlining Terminal	Page 173
SR-T☐SQ SRD-T☐SQ	AC DC	With Spring Clamp Terminals	Page 175
SR-T☐SA SRD-T☐SA	AC DC	Surge Absorber Mounted Type (Varistor)	Page 43 Page 44

Application by Contact Voltage, Current, Electrical Durability and Contact Reliability

For applications requiring greater contact reliability than indicated in Figs. 1 to 3, parallel contact connections (redundancy) are required. The reliability of the contacts decreases for contacts connected in series.

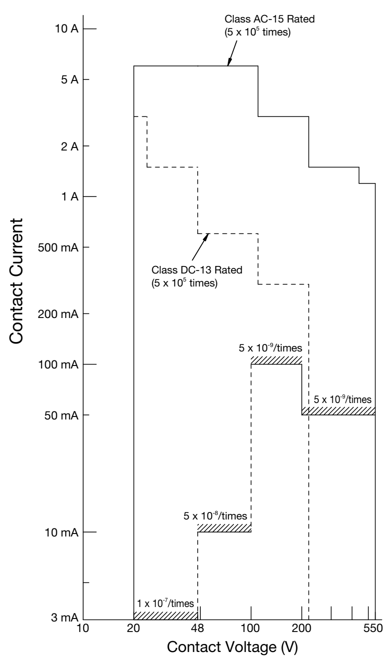


Fig. 1. SR(D)-T☐

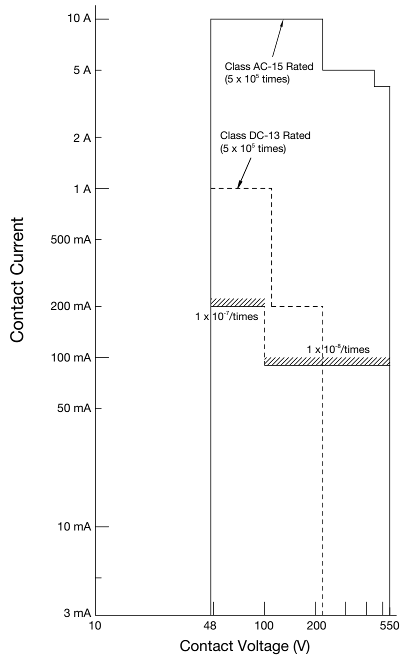


Fig. 2. SR(D)-T☐JH

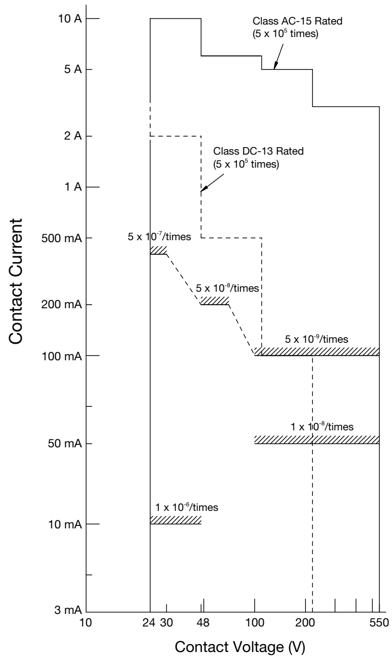


Fig. 3. SR(D)-T☐LC

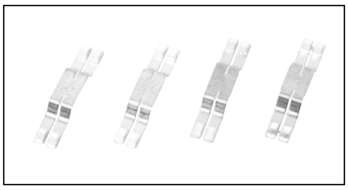
Note 1. The contact reliability indicates a 60% confidence rate for a λ60 failure rate (no. of faults/times switching, no. of contacts)

	Item	Reference Page	Remarks
Related Reference Page	· Working Environment	Page 64	—
	· Mounting	Page 64	—
	· Wiring	Page 68	—
	· Control Circuit Power Supply Voltage Fluctuation Range	Page 71	—
	· Applicable Wire Size and Terminal Screw Tightening Torque	Page 67	—

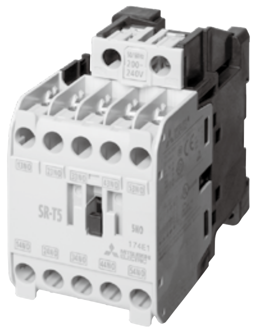
6.3 SR-T☐ Standard Type (AC Operated) Contactor Relays

Features

- **Rail mounting is fully adopted**
  IEC 35 mm rail mounting mechanism that dramatically reduces assembly time has been fully adopted.
- **High contact reliability**
  The full adoption of twin contacts improves the contact reliability.



- Clearly visible coil rating
- The make and break contacts can be used at different voltages
  Strengthened insulation between poles and between upper and lower contacts of the same pole.
- Live part protection covers are standard equipment



SR-T5

SR-T9

- **Easy wiring**
  Uses self-lifting terminal screws that can reliably tighten wires, ring crimp lugs and square-tip crimp lugs.
- **Extensive contact arrangements**
  Selectable according to the required number of contacts.
- **A Wide selection of optional units**
  Auxiliary Contact Units (UT-AX☐)
  The 2-pole and 4-pole contact units can be easily added to SR-T5.
  Surge Absorber Units (UT-SA☐)
  For the surge absorber unit that can be mounted in one-touch, the C-R type and indicator type are available aside from the varistor type.

6

Rating (SR, SRD, SRL, SRLD, SR-T☐DL, SR-T☐BC, SRD-T☐BC, SR-T☐SQ and SRD-T☐SQ)

Frame				T5	T9
No. of Contacts				5	9
Contact Arrangement				5a	9a
				4a1b	7a2b
				3a2b	5a4b
Contact Rating	Rated Insulation Voltage [V]			690	
	Conventional Free Air Thermal Current Ith [A]			10	
	AC Rated Operational Current [A]	Category AC-15 (Coil Load)	AC120V	6	
			AC240V	3	
			AC440V	1.5	
			AC550V	1.2	
		Category AC-12 (Resistive Load)	AC120V	10	
			AC240V	8	
			AC440V	5	
			AC550V	5	
	DC Rated Operational Current [A]	Category DC-13 (Coil Load)	DC24V	3	
			DC48V	1.5	
			DC110V	0.6(2)	
			DC220V	0.3(0.8)	
		Category DC-12 (Resistive Load)	DC24V	10	
			DC48V	8	
			DC110V	5(8)	
			DC220V	1(3)	

Note 1. JIS C8201-5-1 classifications are class AC-15 applicable to AC solenoid and class DC-13 applicable to DC solenoid switching.
JIS C8201-5-1 classifications are class AC-12 applicable to AC resistive load switching and class DC-12 applicable to DC resistive load switching.
Note 2. The value in parentheses for the DC rated operational current indicates the rated operating current when switching a 2-pole load in series.
Note 3. The making and breaking capacities are 10 times with AC-15 and 1.1 times with DC-13.
Note 4. Electrical durability of 500,000 operations. (For AC-15, it is 1 million times at 220 V 2 A and 3 million times at 1 A.)
Note 5. The minimum operating voltage and current differ depending on the allowable fault rate. Select them from Figure 1 on page 162.
Note 6. The withstand voltage is AC2500 V for 1 minute.
Note 7. SR-T5 and SRD-T5 with spring clamp terminals (SQ) can also be manufactured.

Performance (SR, SRD, SRL, SRLD, SR-T□DL, SR-T□BC, SRD-T□BC, SR-T□SQ and SRD-T□SQ)

Frame		Making and Breaking Capacities				Switching Frequency	Switching Durability	
		Category	Rated Operational Voltage	Making Current [A]	Breaking Current [A]		Electrical	Mechanical
SR - T Series	T5 T9	AC-15	AC120V	66	66	1800 Times/Hour [Standard Type] 1200 Times/Hour [Mechanically Latched Delay Open Type]	Class AC-15 (AC Coil Load) 240 V 3 A, 0.5 mil. times 240 V 2 A, 1 mil. times 440 V 1.5 A, 0.5 mil. times Class DC-13 (DC Coil Load) 110 V 0.6 A, 0.5 mil. times 220 V 0.3 A, 0.5 mil. times	10 mil. times [Standard Type] 0.5 mil. times [Mechanically Latched Type] 0.5 mil. times [Delay Open Type]
			AC240V	55	55			
			AC550V	33	33			
		DC-13	DC24V	20	20			
			DC48V	10	10			
			DC110V	2(5)	2(5)			
			DC220V	0.4(1.5)	0.4(1.5)			

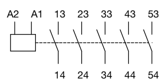
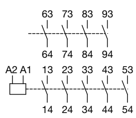
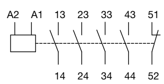
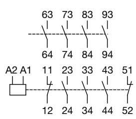
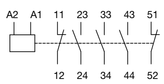
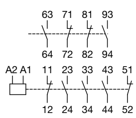
Note 1. The DC values in parentheses are the making and breaking capacities when using 2-poles in series.
Note 2. Making current capacity tests are performed 100 times, while breaking current capacity tests are performed 25 times.

Properties (SR-T□, SR-T□JH, SR-T□BC and SR-T□SQ)

Frame	Coil Input [VA]		Coil Power Consumption [W]	Coil Current [A]	Contact Arrangement	Operating Voltage [V]		Operating Time [ms]			
	Inrush	Normal				Close	Open	Coil ON → Make Contact ON	Coil ON → Break Contact OFF	Coil OFF → Make Contact OFF	Coil OFF → Break Contact ON
T5	45	7	2.2	0.03	5a	115 to 145	75 to 115	12 to 20	―――	4 to 16	―――
					3a2b	120 to 150	75 to 115	12 to 20	7 to 14	4 to 16	6 to 17
T9					9a	125 to 156	85 to 125	12 to 20	―――	4 to 16	―――
					5a4b	130 to 160	80 to 120	12 to 20	7 to 15	4 to 16	5 to 16

Note 1. The above indicates rough property indices for AC200V coils.
Note 2. The operating voltage is that at a 20°C cold state at 60 Hz. Voltages for coils other than AC200V can be calculated proportionately.
Note 3. The input and power consumption are average values. These are almost the same for coils other than AC200V.
Note 4. The operating time is the value when applying 200 V at 60 Hz. These are almost the same for coils other than AC200V.
Make contacts and break contacts cannot be overlapped in time.
Note 5. The coil current is the average normal value with a 220 V, 60 Hz applied voltage. Divide the regular input by the coil voltage for coils other than AC200V.

Contact Arrangement/Contact Placement

Frame	T5	T9
Contact Arrangement	5a	9a
	4a1b	7a2b
	3a2b	5a4b
Contact Placement	 5a	 9a
	 4a1b	 7a2b
	 3a2b	 5a4b

Related Reference Page	Item	Reference Page	Remarks
	· Operation Coil	Page 43	–
	· How to Order	Page 177	–
	· Combining with Optional Units	Pages 165, 196	–

● Combining With Additional Auxiliary Contact Block

■The SR-T Series contactor type Contactor Relay is usable in combination with the following additional auxiliary contact blocks.

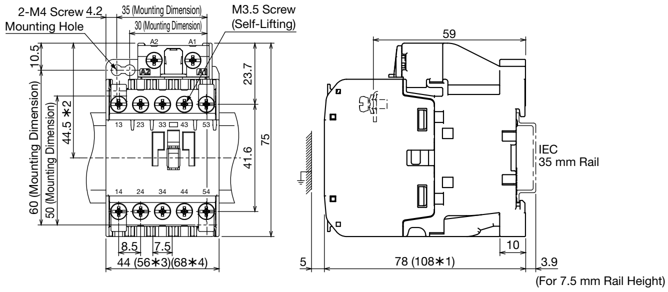
Contactor Relay	Auxiliary Contact Blocks	Front clip-on						Side clip-on	
		UT-AX4(BC)			UT-AX2(BC)			UT-AX11(BC)	UT-AX11(BC)
Model Name	Contact Arrangement	4a	3a1b	2a2b	2a	1a1b	2b	1a1b + 1a1b	1a1b
SR-T5(BC) SRD-T5(BC)	5a	9a	8a1b	7a2b	7a	6a1b	5a2b	7a2b	6a1b
	4a1b	8a1b	7a2b	6a3b	6a1b	5a2b	4a3b	6a3b	5a2b
	3a2b	7a2b	6a3b	5a4b	5a2b	4a3b	3a4b	5a4b	4a3b

Note 1. The auxiliary contact blocks cannot be mounted on SR(D)-T9(BC).
Note 2. The Contactor Relay is not usable with front clip-on blocks mounted at the same time.
Note 3. The contact arrangements in ▭ are the standard combinations.

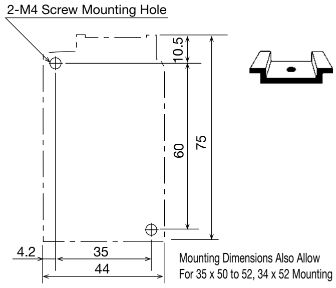
● Outline Drawings (The diagrams show models without "BC".)

SR-T5(BC)

0.27 kg



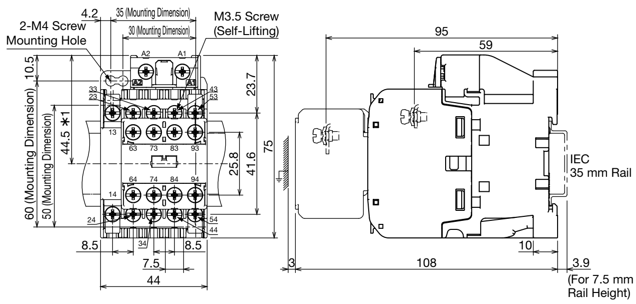
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC)/UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) -
∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)



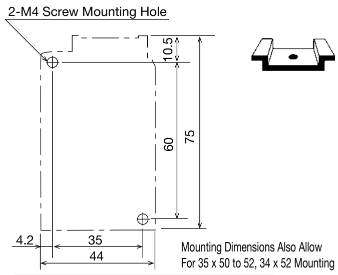
Model Name	Model Name
SR-T5	SR-T5BC

SR-T9(BC)

0.32 kg



∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail



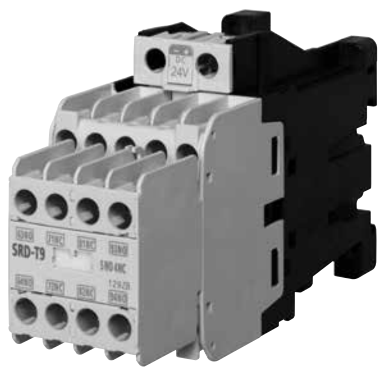
Model Name	Model Name
SR-T9	SR-T9BC

6

6.4 SRD-T□DC Operated Contactor Relays

Features

- IEC 35 mm rail mounting is adopted
- High contact reliability
  The adoption of twin contacts improves the contact reliability.
- Excellent operational reliability and high frequency switching capacity
  Uses a DC full-applied voltage type solenoid.
- Live part protection covers are standard equipment

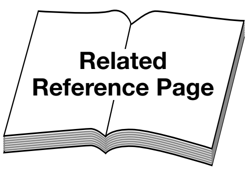

SRD-T9

- No buzzing sound
- No coil inrush current
  The coil doesn't use saving resistance so there is no inrush current.
- Extensive options
  Auxiliary Contact Units (UT-AX□)
  Surge Absorber Units (UT-SA□)

Properties (SRD-T□, SRD-T□JH, SRD-T□BC and SRD-T□SQ)

Frame	Coil			Operating Voltage [V]		Operating Time [ms]			
	Current [A]	Power Consumption [W]	Time Constant [ms]	Close	Open	Coil ON → Make Contact ON	Coil ON → Break Contact OFF	Coil OFF → Make Contact OFF	Coil OFF → Break Contact ON
T5	0.033	3.3(2.2)	40(45)	60 to 75	10 to 30	55 to 75(75 to 95)	50 to 70(70 to 90)	5 to 15	10 to 20
T9				60 to 75	10 to 30	55 to 75(75 to 95)	50 to 70(70 to 90)	5 to 15	10 to 20

Note 1. The above indicates rough property indices for DC100V coils. The values in the parentheses for SRD-T5, T9 indicate rough property indices for DC12V or DC24V coils.
Note 2. The operating voltage is that at a 40°C cold state. Voltages for coils other than DC100V can be calculated proportionately.
Note 3. The power consumption and coil time constant are average values. These are almost the same for coils other than DC100V.
Note 4. The coil current value is the average of the current when DC100V is applied to the coil. For coils other than DC100V coils, obtain the coil current value by dividing the power consumption by the coil voltage.
E.g.: For DC24V coils, the coil current value ≈ 2.2W ÷ 24V
Note 5. The operating time is the value when applying DC100V (with 5% or less ripple). These are almost the same for coils other than DC100V. Make contacts and break contacts cannot be overlapped in time.
Note 6. The drive time (coil OFF→make contact OFF/break contact ON) slows down when combined with a surge absorber element, so care should be taken with sequence timing. Furthermore, use only after confirming there is no fault with the real-life application.
Note 7. Note that operation coil terminals have polarity. A1 (+), A2 (-)

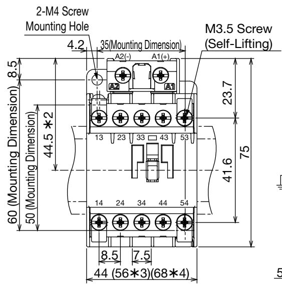


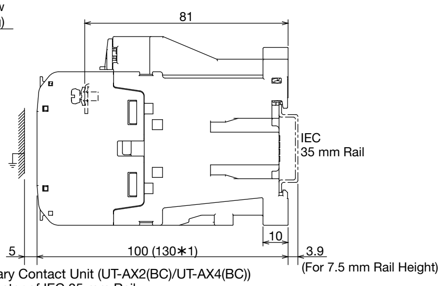
Item	Reference Page	Remarks
· Operation Coil	Page 44	—
· Rating	Pages 160, 163	—
· Performance	Page 164	—
· Contact Arrangement/Contact Placement	Page 164	—
· How to Order	Page 177	—
· Combining with Optional Units	Pages 165, 196	—

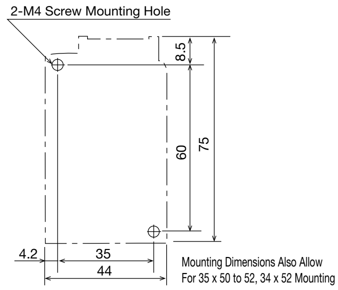
Outline Drawings (The diagrams show models without "BC".)

SRD-T5(BC)

0.42 kg





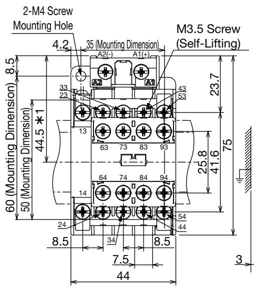


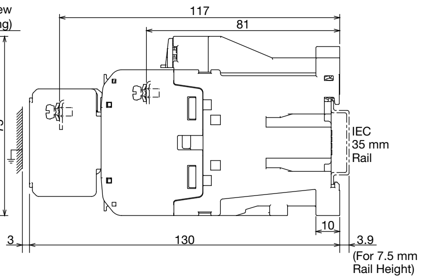
∗1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC)/UT-AX4(BC))
∗2 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗3, ∗4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) -
∗3 Has 1 Piece, ∗4 Has 2 Pieces (Both Sides)

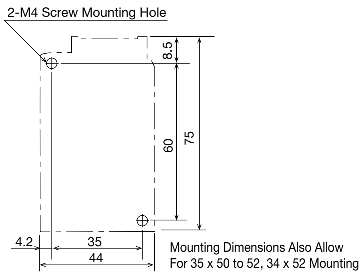
Model Name	Model Name
SRD-T5	SRD-T5BC

SRD-T9(BC)

0.47 kg







∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name	Model Name
SRD-T9	SRD-T9BC

6.5 SRL-T☐, SRLD-T☐ Mechanically Latched Contactor Relays

SRL is SR with a mechanical latch mechanism attached at the top. The closed state is mechanically maintained by simply exciting the closing coil for 0.3 seconds or more, and tripping is done by energizing the tripping coil. Closing coils are available as SRL AC operated types or SRLD DC operated types. These are sometimes called keep relays or momentary energizing relays.

Features

- Can be used as a memory relay
  The mechanical retention prevents opening due to power failures or voltage drops.
- Reduced coil power consumption
  The constant power consumption of the solenoid of the operation coil can be reduced.
- Allows manual closing
- Allows manual tripping
- Live part protection covers are standard equipment

SRL-T

- No buzzing sound
- Stable operation
  The self-demagnetizing break contact of the closing coil has been built into the latch mechanism.
- High contact reliability
  The adoption of twin contacts improves the contact reliability.
- IEC 35 mm rail mounting is fully adopted

Performance

Closing Coil Operation Category	Model Name	Tripping Coil Self-Demagnetizing	Closing Coil Self-Demagnetizing	Contact Arrangement (Valid)	Switching Frequency [Times/Hour]	Switching Durability (Ten Thousand Times)	
						Electrical	Mechanical
AC Operated	SRL-T5(BC)	Incl.	Incl.	5a, 4a1b, 3a2b	1200	50	50
DC Operated	SRLD-T5(BC)						

Properties

Frame		Operation Coil Input [VA]	Contact Arrangement	Operating Voltage [V]		Operating Time [ms]			
				Close	Trip	Closing Coil ON → Make Contact ON	Closing Coil ON → Break Contact OFF	Tripping Coil ON → Make Contact OFF	Tripping Coil ON → Break Contact ON
AC Operated	SRL-T5(BC)	Closing 80 Tripping 110	5a	122 to 128	90 to 96	10 to 16	—	9 to 14	—
			3a2b	139 to 147	90 to 94	10 to 15	8 to 13	8 to 13	10 to 15
DC Operated	SRLD-T5(BC)	Closing 90 Tripping 180	5a	60 to 70	44 to 60	10 to 20	—	8 to 15	—
			3a2b	60 to 70	44 to 60	10 to 20	9 to 16	8 to 15	10 to 20

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SRL-T☐) and for DC100V coils under DC operation (SRLD-T☐).
Note 2. The operating voltage is the value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC100V can be calculated proportionately.
Note 3. The coil input indicates the average value. These are almost the same for coils other than AC200V or DC100V.
Note 4. The drive time is the time taken from when the closing coil or tripping coil is excited until the contact transitions (ON or OFF) when 200 V, 60 Hz is applied for AC operation or DC100V is applied for DC operation. These are almost the same for coils other than AC200V or DC100V.
Make contacts and break contacts cannot be overlapped in time.
Note 5. The closing coil and tripping coil have the 15-second rating.

Related Reference Page	Item	Reference Page	Remarks
	· Rating	Pages 160, 163	Same as SR-☐.
	· Operation Coil of SRL/SRLD-☐	Page 44	—
	· How to Order	Page 177	—
	· Combining with Optional Units	Page 196	—

Handling

- **Set the excitation time of the closing coil and tripping coil to 0.3 seconds.**

When the excitation time is less than 0.3 seconds (circuit example at left), in order to avoid malfunction, change to the circuit at right.

(1) The closing coil #1MC is excited only by 10 ms by the break contact of the #2 relay.

(2) The closing coil #1MC is excited only by 10 ms by the tripping of #2MT.

(3) A pulse with operating switch LS contact time of 0.3 seconds or less.

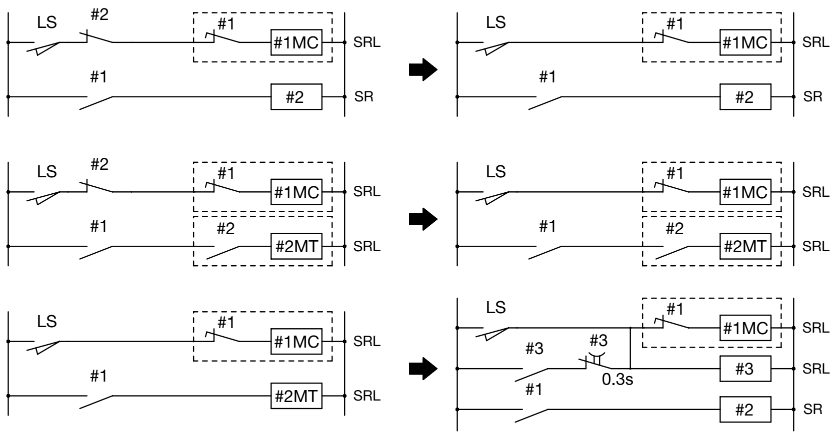


Fig. 6. Excitation time of 0.3 seconds or more

- **Do not apply the closing command and tripping command at the same time**

To avoid giving the closing command and tripping command at the same time or giving the tripping command (or closing command) during the closing command (or tripping command), use an interlock for the closing and tripping commands.

(1) Turn the tripping operating switch LS2 ON before turning the closing operating switch LS1 OFF.

(2) The tripping command is given during the closing command.

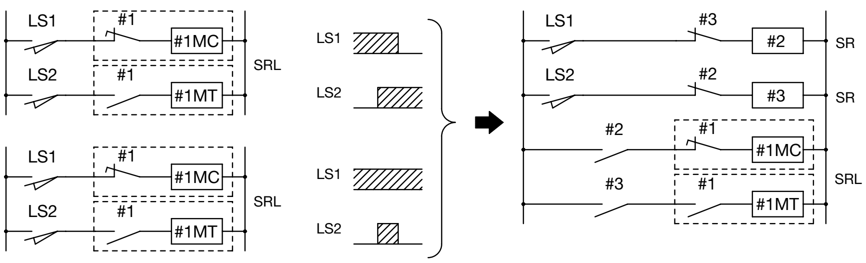
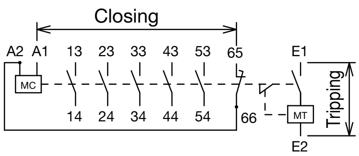
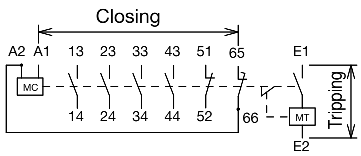
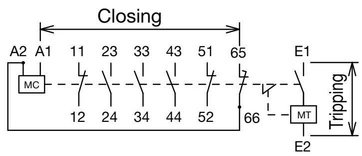


Fig. 7. Prevention of simultaneous excitation

- **Capacitor trip**

The capacitor trip unit (see page 103) can also be used for SRL-T5.
When the coil designation is AC100V: CTU-A1
When the coil designation is AC200V: CTU-A2

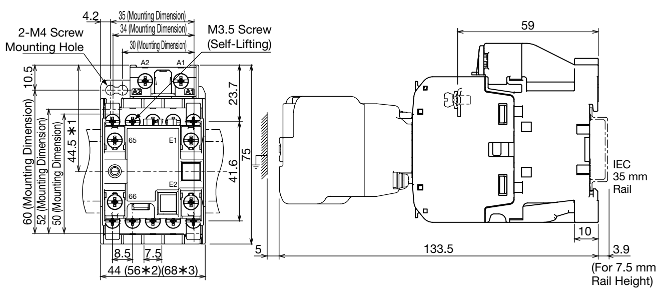
Contact Arrangement/Contact Placement

SRL-T5(BC)	SRLD-T5(BC)	SRL-T5(BC)	SRLD-T5(BC)	SRL-T5(BC)	SRLD-T5(BC)
5a		4a1b		3a2b	
					

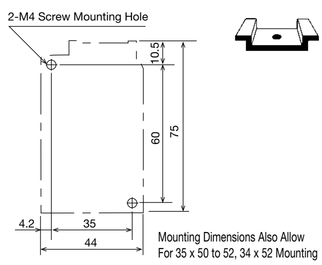
Outline Drawings (The diagrams show models without "BC".)

SRL(D)-T5(BC)

0.39 kg



∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail
∗2, ∗3 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - ∗2 Has 1 Piece, ∗3 Has 2 Pieces (Both Sides)



Model Name	Model Name
SRL-T5	SRLD-T5
SRL-T5BC	SRLD-T5BC

6.6 SR-T□JH, SRD-T□JH Contactor Relays with Large Rated Auxiliary Contacts

Through the use of S-T12 magnetic contactor contacts, the SR(D)-T□JH type is suitable for applications requiring use of comparatively large currents and great electrical durability.

● Rating

Model Name				SR-T5JH SRD-T5JH	SR-T9JH SRD-T9JH
Contact Arrangement				5a	9a
				4a1b	7a2b
				3a2b	5a4b
Contact Rating	Rated Insulation Voltage [V]			690	
	Conventional Free Air Thermal Current Ith [A]			20	
	AC Rated Operational Current [A]	Category AC-15 (Coil Load)	AC120V	10(6)	
			AC240V	10(5)	
			AC440V	5(3)	
			AC550V	4(3)	
		Category AC-12 (Resistive Load)	AC120V	20	
			AC240V	16	
			AC440V	10	
			AC550V	10	
	DC Rated Operational Current [A]	Category DC-13 (Coil Load)	DC24V	7	
			DC48V	5	
			DC110V	1.2	
			DC220V	0.2	
		Category DC-12 (Resistive Load)	DC24V	10	
			DC48V	8	
			DC110V	5	
			DC220V	1	

Note 1. Electrical durability of 500,000 operations.
Note 2. The value in parentheses for the AC rated operational current indicates the rated operating current when using different voltages.
Note 3. The minimum operating voltage and current differ depending on the allowable fault rate. Select from Figure 2 on page 162.

	Item	Reference Page	Remarks
Related Reference Page	· Operation Coil	Pages 43, 44	Same as SR-□ and SRD-□.
	· Properties	Pages 164, 166	Same as SR-□ and SRD-□.
	· Contact Arrangement/Contact Placement	Page 164	Same as SR-□ and SRD-□.
	· Outline Drawings	Pages 165, 167	Same as SR-□ and SRD-□.
	· How to Order	Page 177	—
	· Combining with Optional Units	Pages 165, 196	—

6.7 SR-T☐LC, SRD-T☐LC Contactor Relays with Overlap Contacts

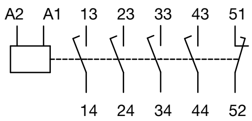
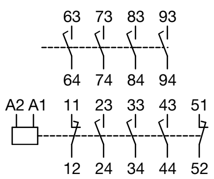
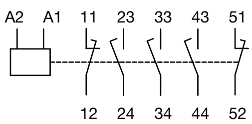
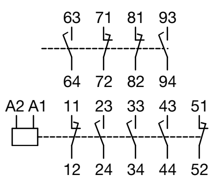
SR(D)- ☐ LC types with overlap contacts turn off the break contact after the make contact turns on.

● Rating (SR, SRD)

<table>
<tr><td colspan="4">Frame</td><td>T5LC</td><td>T9LC</td></tr>
<tr><td colspan="4" rowspan="2">Contact Arrangement</td><td>4a1b</td><td>7a2b</td></tr>
<tr><td>3a2b</td><td>5a4b</td></tr>
<tr><td rowspan="18">Contact Rating (Note 2)</td><td colspan="3">Rated Insulation Voltage [V]</td><td colspan="2">690</td></tr>
<tr><td colspan="3">Conventional Free Air Thermal Current Ith [A]</td><td colspan="2">16</td></tr>
<tr><td rowspan="8">AC Rated Operational Current [A]</td><td rowspan="4">Category AC-15 (Coil Load)</td><td>AC120 V</td><td colspan="2">6</td></tr>
<tr><td>AC240 V</td><td colspan="2">5</td></tr>
<tr><td>AC440 V</td><td colspan="2">3</td></tr>
<tr><td>AC550 V</td><td colspan="2">3</td></tr>
<tr><td rowspan="4">Category AC-12 (Resistive Load)</td><td>AC120 V</td><td colspan="2">16</td></tr>
<tr><td>AC240 V</td><td colspan="2">12</td></tr>
<tr><td>AC440 V</td><td colspan="2">5</td></tr>
<tr><td>AC550 V</td><td colspan="2">5</td></tr>
<tr><td rowspan="8">DC Rated Operational Current [A]</td><td rowspan="4">Category DC-13 (Coil Load)</td><td>DC24 V</td><td colspan="2">3</td></tr>
<tr><td>DC48 V</td><td colspan="2">2</td></tr>
<tr><td>DC110 V</td><td colspan="2">0.5</td></tr>
<tr><td>DC220 V</td><td colspan="2">0.1</td></tr>
<tr><td rowspan="4">Category DC-12 (Resistive Load)</td><td>DC24 V</td><td colspan="2">8</td></tr>
<tr><td>DC48 V</td><td colspan="2">5</td></tr>
<tr><td>DC110 V</td><td colspan="2">3</td></tr>
<tr><td>DC220 V</td><td colspan="2">0.5</td></tr>
</table>

Note 1. The AC rated operational current for the make contact is shown in the table above.
The break contact rated making current is 20 A and the rated breaking current AC 24 to 550 V 3 A. (However, COSφ = 0.3 to 1.0)
Note 2. The contacts may not overlap when worn out through current switching and chattering. Take sufficient precautions.

● Contact Arrangement/Contact Placement

SR-T5LC SRD-T5LC	SR-T9LC SRD-T9LC
4a1b	7a2b
3a2b	5a4b
 4a1b	 7a2b
 3a2b	 5a4b

Related Reference Page

Item	Reference Page	Remarks
· Operation Coil	Pages 43, 44	Same as SR-☐ and SRD-☐.
· Properties	Pages 164, 166	Same as SR-☐ and SRD-☐. However, break contact operating times differ.
· Outline Drawings	Pages 165, 167	Same as SR-☐ and SRD-☐.
· How to Order	Page 177	–
· Combining with Optional Units	Page 196	Auxiliary contact units and front clip-on timer units cannot be combined together.

6.8 SR-T☐DL Delay Open Contactor Relays

SR-T☐DL functions to hold the contactor relay for 2^{+2}_{-1} seconds with the use of a capacitor, so that the relay does not open due to a momentary power failure or voltage drop caused by lightning, etc.

Specifications (SR-T☐DL Delay Open Contactor Relays)

Model Name	Contact Arrangement (Valid)	Designation (Rated Voltage)	Switching Frequency	Switching Durability [x 10000]		Retention Time
				Mechanical	Electrical	
SR-T5DL	2a1b	AC100V (100 to 110 V 50 Hz/ 100 to 110 V 60 Hz) AC200V (200 to 220 V 50 Hz/ 200 to 220 V 60 Hz)	1800 Times/Hour	50	50	2^{+2}_{-1}Seconds (Fixed)
SR-T9DL	6a1b, 4a3b					

Note 1. The rating is the same as that on pages 160 and 163.
Note 2. The retention time is a value where the rated voltage is applied.
Note 3. Uses an electrolytic capacitor, so the retention time should be checked periodically.
Note 4. The contactor relay to be combined is an exclusive product that uses the AC operated type, and cannot be replaced by itself.
Note 5. For the operation coil, only AC100V and AC200V can be manufactured.
Note 6. An additional auxiliary contact unit cannot be installed.

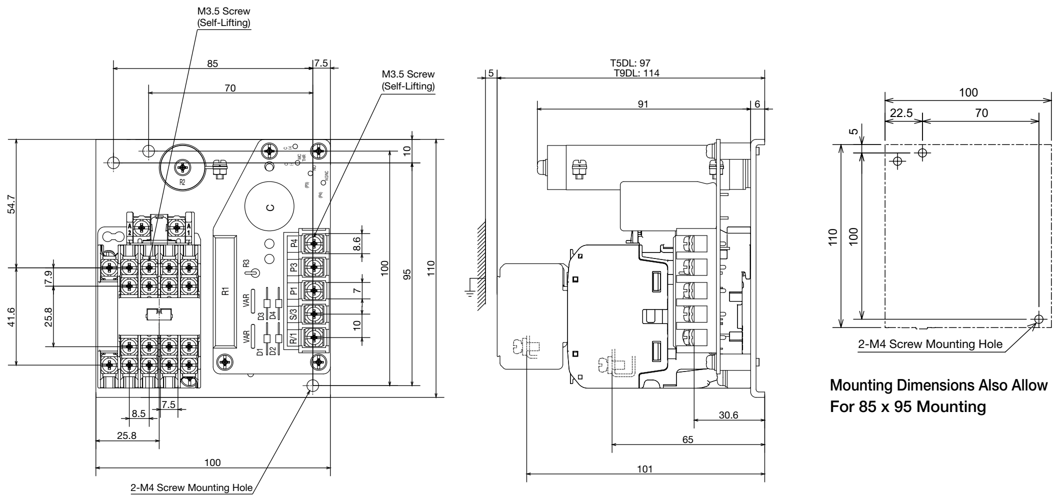
Coil Properties

Model Name	Input [VA]		Operating Voltage [V]		Operating Time [ms]	
	Momentary	Normal	Close	Open	Operating Power ON --> Contact a ON	Operating Power OFF --> Contact a OFF
SR-T5DL SR-T9DL	70	13	85% or Less of Control Coil Rated Voltage	10% or More of Control Coil Rated Voltage	7 to 100	10 to 100

Outline Drawings

SR-T5DL/SR-T9DL

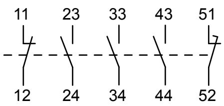
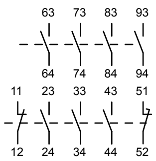
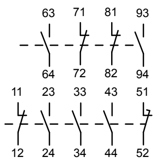
0.65/0.7 kg



The figure indicates SR-T9DL

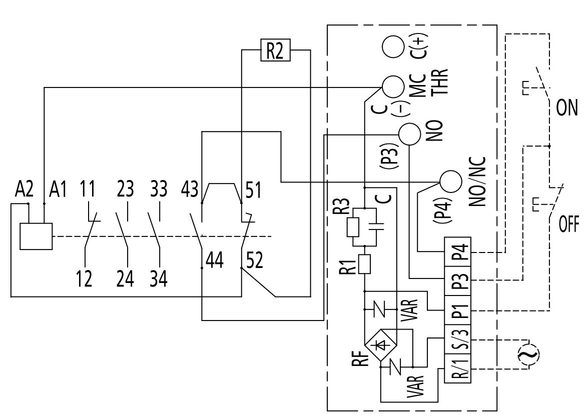
SR-T☐DL

Contact Arrangement

SR-T5DL	 2a1b	
SR-T9DL	 6a1b	 4a3b

Note: 43-44 and 51-52 terminals are internally wired.

Connection Diagram



Note. Operate the relay with the push button in the figure above. The contactor relay may flip-flop when the power is switched ON or OFF.

6.9 SR-T☐BC, SRD-T☐BC Contactor Relays with Wiring Streamlining Terminals

● SR(D)-T☐BC

SR-T☐BC with wiring streamlining terminal is capable of crimp lug wiring and bare wire wiring without removing the terminal cover.

SR-T5BC

● Specifications

(1) Specifications of the Contactor Relay With Wiring Streamlining Terminal

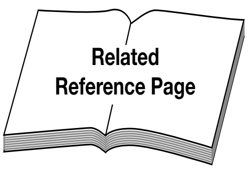
Standard Specifications (Terminal Cover) + Wiring Streamlining Terminal	
Model Name	Contact Arrangement
SR-T5BC	5a, 4a1b
SRD-T5BC	3a2b
SR-T9BC SRD-T9BC	9a 7a2b 5a4b

(2) Specifications of the Auxiliary Contact Unit With Wiring Streamlining Terminal

Standard Specifications (Terminal Cover)		
Model Name	Contact Arrangement	Combinable Contactor Relay Model Name
UT-AX2BC	2a 1a1b 2b	SR, SRD-T5BC
UT-AX4BC	4a 3a1b 2a2b	
UT-AX11BC	1a1b	

● Application

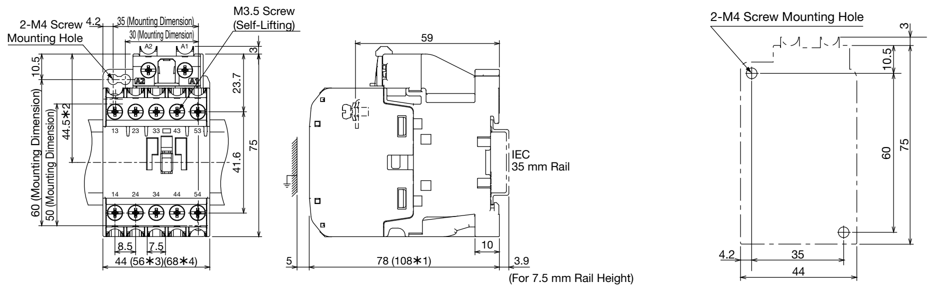
Although all terminals are for the insertion wiring, it is also possible to wire using open-tip crimp lugs. (Ring crimp lugs can also be wired.)
To comply with DIN EN 50274/VDE 0660 Teil 514 finger safe specifications, be sure to completely cover the entire crimp portion of the crimp lug with an insulating sleeve.



Item	Reference Page	Remarks
· Operation Coil	Page 43	Same as SR-☐.
· Rating	Pages 160, 163	Same as SR-☐.
· Properties	Page 164	Same as SR-☐.
· How to Order	Page 177	–
· Combining with Optional Units	Page 196	–

Outline Drawings

SR-T5BC

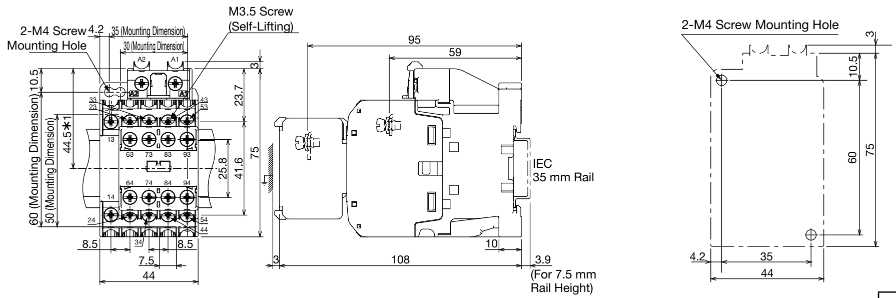


0.27 kg

*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC)/UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

Model Name
SR-T5BC

SR-T9BC

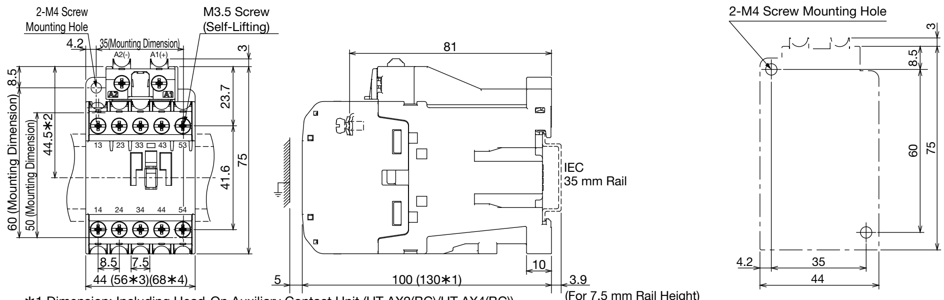


0.32 kg

*1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name
SR-T9BC

SRD-T5BC

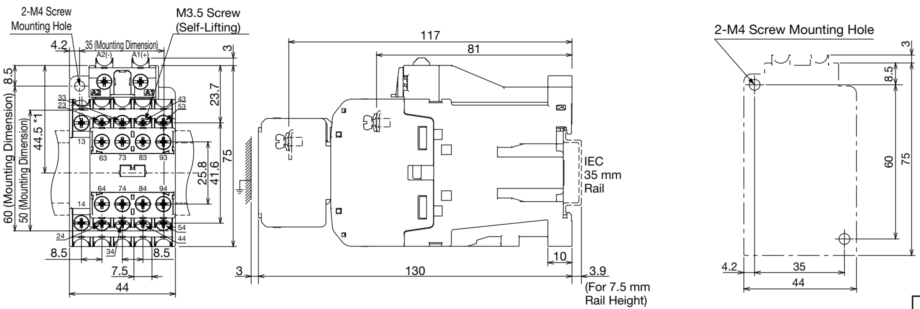


0.42 kg

*1 Dimension: Including Head-On Auxiliary Contact Unit (UT-AX2(BC)/UT-AX4(BC))
*2 Dimension: Width Dimension from Center of IEC 35 mm Rail
*3, *4 Dimension: Including Side-On Auxiliary Contact Unit (UT-AX11(BC)) - *3 Has 1 Piece, *4 Has 2 Pieces (Both Sides)
It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.

Model Name
SRD-T5BC

SRD-T9BC



0.47 kg

*1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name
SRD-T9BC

6.10 SR-T□SQ, SRD-T□SQ Contactor Relays with Spring Clamp Terminals

Just insert solid wires or ferrules into terminals. No terminal screws are required, which makes wiring quicker and easier.

●Shorter Wiring Time
Wiring time becomes shorter than the time required for tightening screws.
No worry about loss of screws.
Solid wires, stranded wires, and ferrules can be connected to the terminals.

●Easier Maintenance
No worry about loose screws. Conventionally, terminal screws come loose due to vibrations, impacts, or long-time use, and must be tightened when products come in or during inspection.

SR-T5SQ

● Manufacturing Range List

Frame	Model Name	Auxiliary Contact	Terminal
T5	SR-T5SQ SRD-T5SQ	5a, 4a1b 3a2b	Spring Clamp Terminals

Note 1. Terminal numbers are compliant with EN standards (EN50005 and EN50012).

Related Reference Page

Item	Reference Page	Remarks
· Rating	Pages 160, 163	—
· Operation Coil	Page 43	—
· Properties	Page 166	—
· Contact Arrangement/Contact Placement	Page 164	
· Applicable wires	Page 68	—
· How to Order	Page 177	—
· Combining with Optional Units	Page 196	Devices such as coil surge absorbers and manual operation prevention covers can be installed.

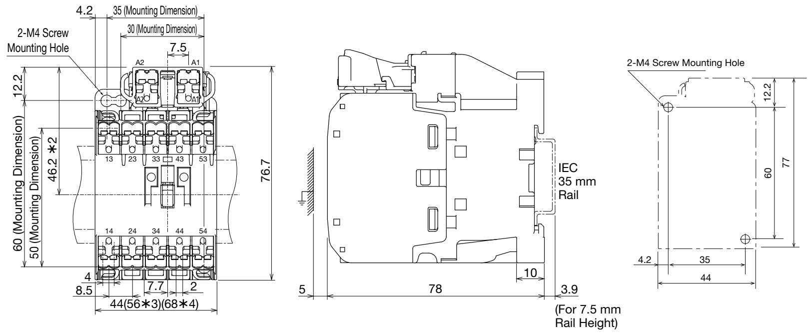
6

6 MS-T Series Contactor Type Contactor Relays

Outline Drawings

SR-T5SQ

0.28kg



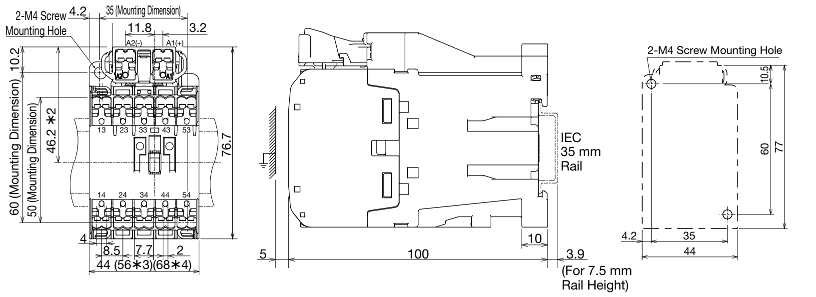
∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Mounting Dimensions Also Allow
For 30 x 60, 35 x 50 to 52, 34 x 52 Mounting

Model Name
SR-T5SQ

SRD-T5SQ

0.43kg



∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Mounting Dimensions Also Allow For
35 x 60, 35 x 50 to 52, 34 x 52 Mounting

Model Name
SRD-T5SQ

6.11 How to Order

Follow the steps below when ordering. (Enter a space in ▲ .)

SR, SRD-T(BC) Contactor Relays

Model Name		Operation Coil Designation		Contact Arrangement
SR-T5 SRD-T5	▲ ▲	AC200V DC100V	▲ ▲	3A2B 4A1B
Specify from pages 163 and 166.		Select the coil designation from page 43 or specify the control circuit voltage and frequency used.		Specify the contact arrangement described on pages 160, 168, 169 and 171.

SRL, SRLD-T(BC) Contactor Relays

Model Name		Closing Control Coil		Tripping Control Coil		Contact Arrangement
SRL-T5BC SRLD-T5BC	▲ ▲	MC-AC200V MC-DC100V	▲ ▲	MT-DC100V MT-DC100V	▲ ▲	3A2B 3A2B
Specify from page 168.		Specify the closing (MC) and tripping (MT) operation coil designation (or coil voltage and frequency) from the ratings on pages 44 and 168.				Specify a (valid) contact arrangement from page 169.

SR, SRD-T☐SQ Contactor Relays

Model Name		Operation Coil Designation		Contact Arrangement
SR-T5SQ SRD-T5SQ	▲ ▲	AC200V DC100V	▲ ▲	3A2B 4A1B
Specify from page 175.		Select the coil designation from page 43 or specify the control circuit voltage and frequency used.		Specify from the contact arrangement on page 163.

SR-T☐ DL Delay Open Contactor Relays

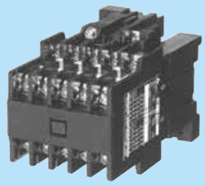
Model Name		Operation Coil Designation		Contact Arrangement
SR-T5DL	▲	AC200V	▲	2A1B
Specify from page 172.		The operation coil designation is available in AC100V and AC200V.		Specify from the contact arrangement on page 172.

MEMO

7

MS-K Series Contactor Type Contactor Relays

7.1 Model List

Appearance				 SR-K100
Frame				K100
No. of Contacts				10
Contact Arrangement				10a, 9a1b
				8a2b, 7a3b
				6a4b, 5a5b
Contact Rating (Note 2)	Conventional Free Air Thermal Current Ith [A]			16
	AC Rated Operational Current [A]	Category AC-15 (Coil Load)	AC110 V	6
			AC220 V	5
			AC440 V	3
			AC550 V	3
		Category AC-12 (Resistive Load)	AC110 V	16
			AC220 V	12
			AC440 V	5
			AC550 V	5
	DC Rated Operational Current [A]	Category DC-13 (Coil Load)	DC24 V	5
			DC48 V	3
			DC110 V	0.8 (2)
			DC220 V	0.2 (0.8)
		Category DC-12 (Resistive Load)	DC24 V	10
			DC48 V	8
			DC110 V	5 (8)
			DC220 V	1 (3)
Standard Type			SR-☐	◎
DC Operated Type			SRD-☐	◎
Mechanically Latched Type			SRL-☐	◎
			SRLD-☐	◎
With Large Rated Auxiliary Contacts			SR-☐JH	○
			SRD-☐JH	○
With Overlap Contacts			SR-☐LC	○
			SRD-☐LC	○
Optional Units	Surge Absorber (Note 3) (Note 4)			○
	DC/AC Interface (Note 4)			○
	Live Part Protection Cover			-
IEC 35 mm Rail Mounting				◎
690 V Application				◎

Note 1. ◎ indicates standard, ○ indicates semi-standard and - indicates products outside production range.
Note 2. Refer to the individual ratings chart for the contact ratings of large rated auxiliary contacts and overlap contacts. The value in parentheses indicates that when switching a 2-pole load in series.
Note 3. For the mechanically latched type (SRL-K100, SRLD-K100), 1 piece can be mounted on each closing coil and tripping coil.
Note 4. The coil terminal of the contactor relay does not allow the attachment of both the surge absorber and DC/AC interface unit.

7.2 Selection and Application

● Type Designations

SR — K100 JH 9a1b

Model Name	Model
SR	AC Operated
SRD	DC Operated
SRL	Mechanically Latched Type (AC Operated)
SRLD	Mechanically Latched Type (DC Operated)

Frame	No. of Poles
K100	10-Pole

Symbol	Specifications
None	Standard
JH	With Large Rated Auxiliary Contacts
LC	With Overlap Contacts

Contact Arrangement
Specify by the contact arrangement of each model name on pages 184, 187 and 189.

● Function and Operation Classification by Application Type

Model Name	Operation Category	Application	Reference Page
SRD-K100	DC	General control circuit sequence relay for magnetic contactor command contacts etc	Page 185
SRL-K100 SRLD-K100	AC DC	Same applications as SR and SRD types and also those requiring memory functionality	Page 186
SR-K100JH SRD-K100JH	AC DC	AC100 to 220 V, 3 to 10 A control of large breakers and solenoids	Page 188

Model Name	Operation Category	Application	Reference Page
SR-K100LC SRD-K100LC	AC DC	Applications that require the overlap switching of the make and break contacts	Page 189

● Application by Contact Voltage, Current, Electrical Durability and Contact Reliability

For applications requiring greater contact reliability than indicated in Figs. 1 to 2, parallel contact connections (redundancy) are required. The reliability of the contacts decreases for contacts connected in series.

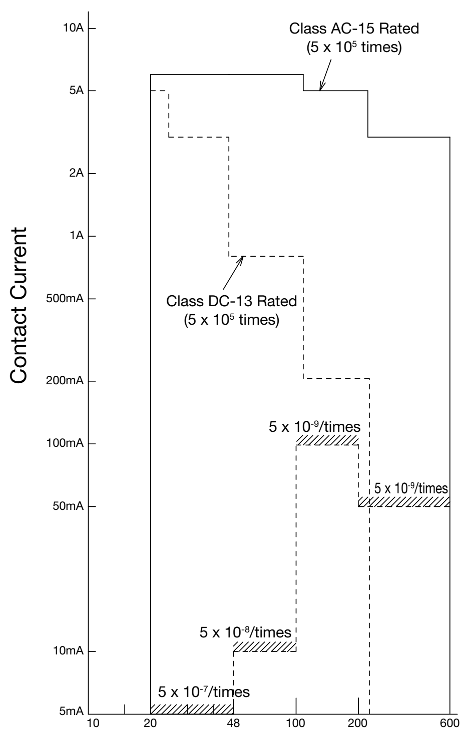


Fig. 1. SR/SRD/SRL(D)-K100

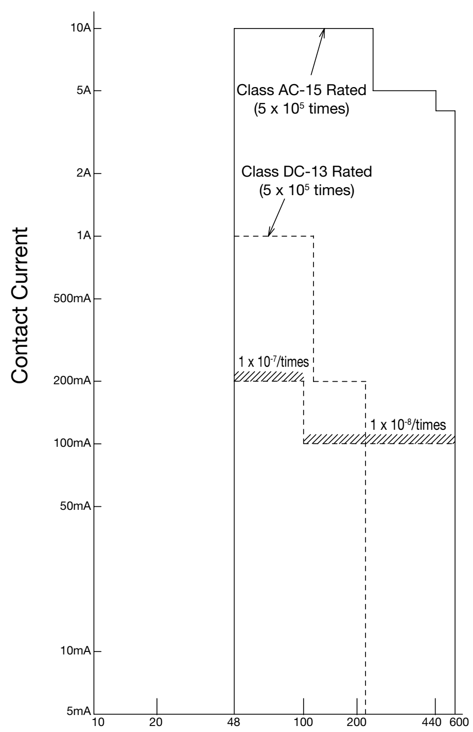


Fig. 2. SR/SRD-K☐JH (Large Capacity)

● Note 1. The contact reliability indicates a 60% confidence rate for a λ60 failure rate (no. of faults/times switching, no. of contacts)

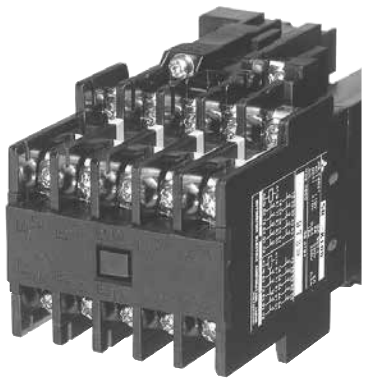
Related Reference Page

Item	Reference Page	Remarks
· Working Environment	Page 64	–
· Mounting	Page 64	–
· Wiring	Page 68	–
· Control Circuit Power Supply Voltage Fluctuation Range	Page 71	–
· Applicable Wire Size and Terminal Screw Tightening Torque	Page 67	–

7.3 SR-K100 Standard Type (AC Operated) Contactor Relays

Features

- **Rail mounting is fully adopted**
  IEC 35 mm rail mounting mechanism that dramatically reduces assembly time has been fully adopted.
- **High contact reliability**
  The full adoption of twin contacts improves the contact reliability.



SR-K100

- **Easy wiring**
  Uses self-lifting terminal screws that can reliably tighten wires, ring crimp lugs and square-tip crimp lugs.
- **Clearly visible coil rating**
- **The make and break contacts can be used in different voltages**
  Strengthened insulation between poles and between upper and lower contacts of the same pole.

Ratings (SR, SRD-K100/SRL, SRLD-K100)

Frame				K100 Note 7
Contact Arrangement				10a, 9a1b (9a, 8a1b)
				8a2b, 7a3b (7a2b, 6a3b)
				6a4b, 5a5b (5a4b, 4a5b)
Contact Rating (Note 2)	Rated Insulation Voltage [V]			660
	Conventional Free Air Thermal Current Ith [A]			16
	AC Rated Operational Current [A]	Category AC-15 (Coil Load)	AC110 V	6
			AC220 V	5
			AC440 V	3
			AC550 V	3
		Category AC-12 (Resistive Load)	AC110 V	16
			AC220 V	12
			AC440 V	5
			AC550 V	5
	DC Rated Operational Current [A]	Category DC-13 (Coil Load)	DC24 V	5
			DC48 V	3
			DC110 V	0.8 (2)
			DC220 V	0.2 (0.8)
		Category DC-12 (Resistive Load)	DC24 V	10
			DC48 V	8
			DC110 V	5 (8)
			DC220 V	1 (3)

Note 1. JIS C8201-5-1 classifications are class AC-15 applicable to AC solenoid and class DC-13 applicable to DC solenoid switching. JIS C8201-5-1 classifications are class AC-12 applicable to AC resistive load switching and class DC-12 applicable to DC resistive load switching.

Note 2. The value in parentheses for the DC rated operational current indicates the rated operating current when switching a 2-pole load in series.

Note 3. The making and breaking capacities are 10 times with AC-15 and 1.1 times with DC-13.

Note 4. Electrical durability of 500,000 operations. (Class AC-15 at 220 V 3 A is 1 million operations, or 5 million operations at 1 A.)

Note 5. The minimum opereting voltage and current differ depending on the allowable fault rate. Refer to Figure 1 and 2 on page 181 for details.

Note 6. The withstand voltage is AC2500 V for 1 minute.

Note 7. The contact arrangement for latched SRL-K100 and SRLD-K100 types is shown in parentheses.

Performance (SR, SRD-K100/SRL, SRLD-K100)

Frame	Making and Breaking Capacities				Switching Frequency	Switching Durability	
	Category	Rated Operational Voltage	Making Current [A]	Breaking Current [A]		Electrical	Mechanical
K100	AC-15	AC110V AC220V AC550V	66 55 33	66 55 33	1800 Times/Hour [Standard Type DC Operated Type] 1200 Times/Hour [Mechanically Latched Type]	Class AC-15 (AC Coil Load) 220 V 5 A, 0.5 mil. times 220 V 3 A, 1 mil. times 440 V 3 A, 0.5 mil. times Class DC-13 (DC Coil Load) 110 V 0.8 A, 0.5 mil. times 220 V 0.2 A, 0.5 mil. times	10 mil. times [Standard Type, DC Operated Type] 1 mil. times [Mechanically Latched Type]
	DC-13	DC24V DC48V DC110V DC220V	20 10 2(5) 0.4(1.5)	20 10 2(5) 0.4(1.5)			

Note 1. The DC values in parentheses are the making and breaking capacities when using 2-poles in series.
Note 2. Making current capacity tests are performed 100 times, while breaking current capacity tests are performed 25 times.

Properties (SR, SR-K100JH)

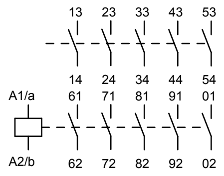
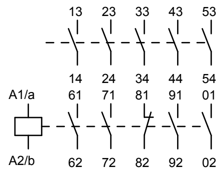
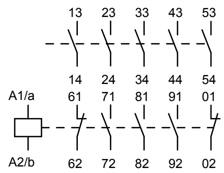
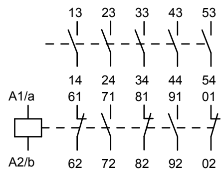
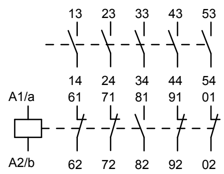
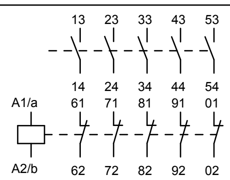
Frame	Coil Input [VA]		Coil Power Consumption [W]	Contact Arrangement	Operating Voltage [V]		Operating Time [ms]			
	Inrush	Normal			Close	Open	Coil ON→ Make Contact ON	Coil ON→ Break Contact OFF	Coil OFF→ Make Contact OFF	Coil OFF→ Break Contact ON
K100	50	10	3.0	10a	125 to 156	85 to 120	9 to 17	——	4 to 13	——
				5a5b	120 to 153	87 to 123	9 to 17	7 to 14	4 to 12	5 to 14

Note 1. The above indicates rough property indices for AC200V coils.
Note 2. The operating voltage is that at a 20°C cold state at 60 Hz. Voltages for coils other than AC200V can be calculated proportionately.
Note 3. The input and power consumption are average values. These are almost the same for coils other than AC200V.
Note 4. The operating time is the value when applying 200 V at 60 Hz. These are almost the same for coils other than AC200V. Make contacts and break contacts cannot be overlapped in time.

Related Reference Page	Item	Reference Page	Remarks
	· Operation Coil	Page 43	–
	· How to Order	Page 190	–
	· Combining with Optional Units	Page 196	–

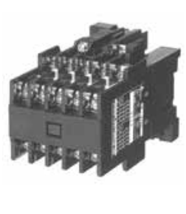
7

Contact Arrangement/Contact Placement

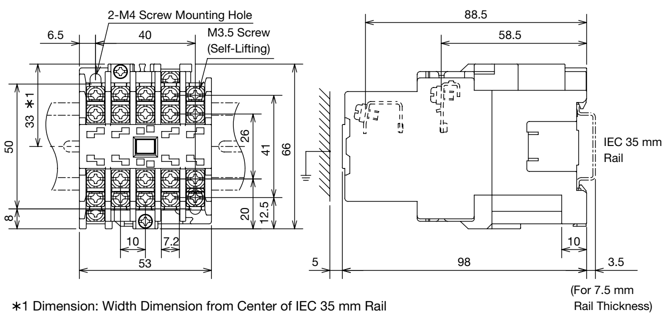
Frame	K100
Contact Arrangement	10a, 9a1b
	8a2b, 7a3b
	6a4b, 5a5b
Contact Placement	 10a
	 9a1b
	 8a2b
	 7a3b
	 6a4b
	 5a5b

Outline Drawings

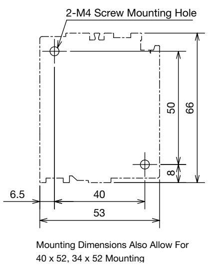
SR-K100



0.37kg



∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail



Mounting Dimensions Also Allow For 40 x 52, 34 x 52 Mounting

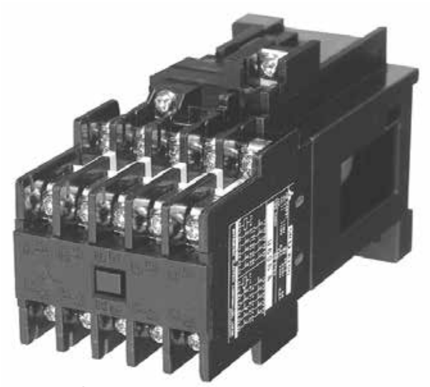
Model Name	Model Number
SR-K100	SR08□

mark indicates that it can be mounted on IEC 35 mm rails.

7.4 SRD-K100 DC Operated Contactor Relays

Features

- **IEC 35 mm rail mounting is adopted**
- **High contact reliability**
  The adoption of twin contacts improves the contact reliability.
- **Excellent operational reliability and high frequency switching capacity**
  Uses a DC full-applied voltage type solenoid.



SRD-K100

- **No buzzing sound**
- **No coil inrush current**
  The coil doesn't use saving resistance so there is no inrush current.

Properties (SRD, SRD-K100JH)

Frame	Coil			Operating Voltage [V]		Operating Time [ms]			
	Current [A]	Power Consumption [W]	Time Constant [ms]	Close	Open	Coil ON→ Make Contact ON	Coil ON→ Break Contact OFF	Coil OFF→ Make Contact OFF	Coil OFF→ Break Contact ON
K100	0.067	7	40	52 to 70	12 to 30	40 to 63	37 to 53	7 to 15	11 to 20

Note 1. The above indicates rough property indices for DC100V coils.
Note 2. The operating voltage is that at a 40°C cold state. Voltages for coils other than DC100V can be calculated proportionately.
Note 3. The power consumption and coil time constant are average values. These are almost the same for coils other than DC100V.
Note 4. The coil current value is the average of the current when DC100V is applied to the coil. For coils other than DC100V coils, obtain the coil current value by dividing the power consumption by the coil voltage.
E.g.: For DC24V coils, the coil current value ≈ 7W ÷ 24V
Note 5. The operating time is the value when applying DC100V (with 5% or less ripple). These are almost the same for coils other than DC100V.
Make contacts and break contacts cannot be overlapped in time.

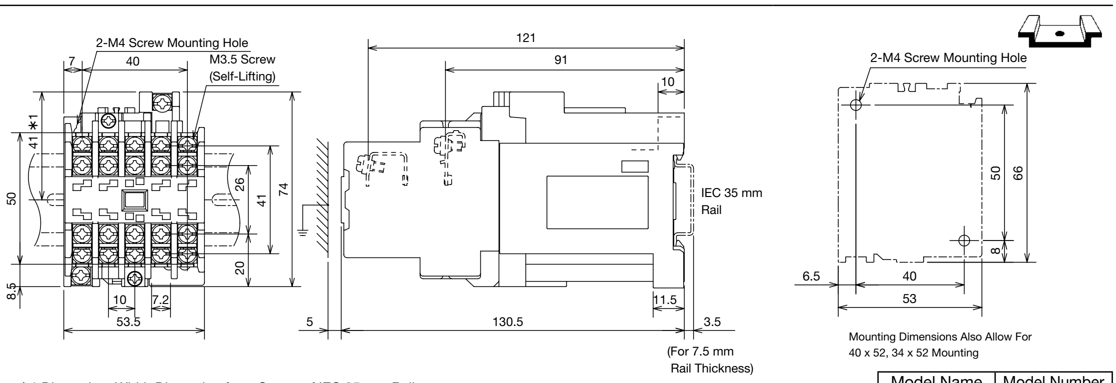
Related Reference Page

Item	Reference Page	Remarks
· Operation Coil	Page 44	–
· Rating	Pages 180, 182	–
· Performance	Page 183	–
· Contact Arrangement/Contact Placement	Page 184	–
· How to Order	Page 190	–
· Combining with Optional Units	Page 196	–

Outline Drawings

SRD-K100

0.67kg



∗1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name	Model Number
SRD-K100	SR13□

7.5 SRL-K100, SRLD-K100 Mechanically Latched Contactor Relays

SRL is SR with a mechanical latch mechanism attached at the top. Simply energizing the closing coil for approximately 0.5 seconds causes mechanical retention in the closed state, tripping only when the tripping coil is energized. Closing coils are available as SRL AC operated types or SRLD DC operated types. These are sometimes called keep relays or momentary energizing relays.

Features

- **Can be used as a memory relay**
  The mechanical retention prevents opening due to power failures or voltage drops.
- **Reduced coil power consumption**
  The constant power consumption of the solenoid of the operation coil can be reduced.
- Allows manual closing
- Allows manual tripping

SRL-K100

- No buzzing sound
- **Stable operation**
  The self-demagnetizing break contact of the closing coil has been built into the latch mechanism.
- **High contact reliability**
  The adoption of twin contacts improves the contact reliability.
- IEC 35 mm rail mounting is fully adopted

Performance

Closing Coil Operation Category	Model Name	Tripping Coil Self-Demagnetizing	Closing Coil Self-Demagnetizing	Contact Arrangement (Valid)	Switching Frequency [Times/Hour]	Switching Durability (Ten Thousand Times)	
						Electrical	Mechanical
AC Operated	SRL-K100	Incl.	Incl.	9a, 8a1b, 7a2b, 6a3b, 5a4b, 4a5b	1200	50	100
DC Operated	SRLD-K100						

Properties

Frame		Operation Coil Input [VA]		Contact Arrangement	Operating Voltage [V]		Operating Time [ms]			
					Close	Trip	Closing Coil ON→ Make Contact ON	Closing Coil ON→ Break Contact OFF	Tripping Coil ON→ Make Contact OFF	Tripping Coil ON→ Break Contact ON
AC Operated	SRL-K100	Closing	100	8a1b	115 to 156	68 to 110	8 to 16	6 to 15	10 to 18	11 to 20
		Tripping	90	4a5b	115 to 155	70 to 115	8 to 16	6 to 15	10 to 18	11 to 20
DC Operated	SRLD-K100	Closing	90	8a1b	50 to 80	35 to 75	10 to 18	10 to 19	10 to 18	10 to 19
		Tripping	100	4a5b	45 to 80	35 to 80	10 to 20	10 to 19	10 to 18	10 to 19

Note 1. The above indicates rough property indices for AC200 V coils under AC operation (SRL-K100) and for DC100 V coils under DC operation (SRLD-K100).
Note 2. The operating voltage is the value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC100V can be calculated proportionately.
Note 3. The coil input indicates the average value. These are almost the same for coils other than AC200V or DC100V.
Note 4. The drive time is the time taken from when the closing coil or tripping coil is excited until the contact transitions (ON or OFF) when 200 V, 60 Hz is applied for AC operation or DC100V is applied for DC operation. These are almost the same for coils other than AC200V or DC100V.
Make contacts and break contacts cannot be overlapped in time.
Note 5. The closing coil and tripping coil have the 15-second rating.

Operation Coil Rating (SRL, SRLD-K100)

For AC

Coil Designation	Rated Voltage [V]		Coil Indicator
	50Hz	60Hz	
AC24V	24	24	Rated Voltage/ Frequency
AC48V	48 to 50	48 to 50	
AC100V	100	100 to 110	
AC120V	110 to 120	115 to 120	
AC200V	200	200 to 220	
AC220V	208 to 220	220	
AC260V	240 to 260	260 to 280	
AC400V	380 to 415	400 to 440	
AC440V	415 to 440	460 to 480	
AC500V	500	500 to 550	

For DC

Coil Designation	Rated Voltage	Coil Indicator
DC12V	DC12 V	Rated Voltage
DC24V	DC24 V	
DC48V	DC48 V	
DC100V	DC100V to 110 V	
DC125V	DC120V to 125 V	
DC200V	DC200V to 220 V	

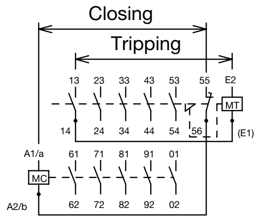
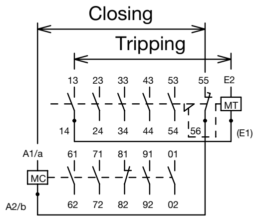
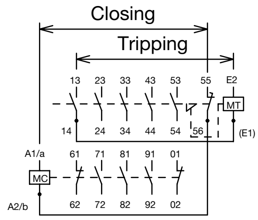
Note 1. DC coils have no polarity.

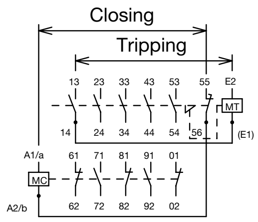
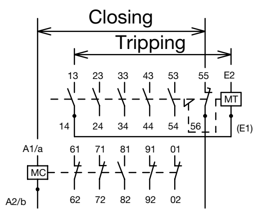
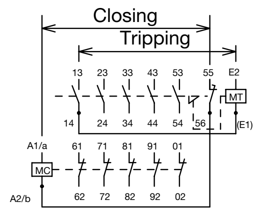
The designation is a symbol to be specified when ordering.

Related Reference Page

Item	Reference Page	Remarks
· Rating	Pages 180, 182	Same as SR- □ .
· Handling	Page 169	Same as SRL, SRLD- □ .
· How to Order	Page 190	–
· Combining with Optional Units	Page 196	–

Contact Arrangement/Contact Placement

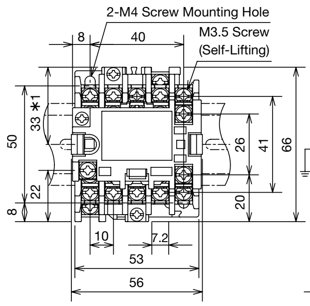
SRL-K100	SRLD-K100	SRL-K100	SRLD-K100	SRL-K100	SRLD-K100
9a		8a1b		7a2b	
					

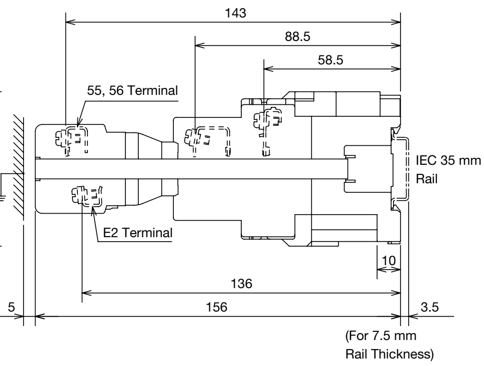
SRL-K100	SRLD-K100	SRL-K100	SRLD-K100	SRL-K100	SRLD-K100
6a3b		5a4b		4a5b	
					

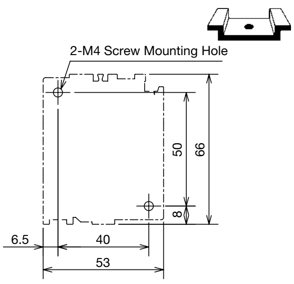
Outline Drawings

SRL-K100
SRLD-K100

0.53kg







Mounting Dimensions Also Allow For
40 x 52, 34 x 52 Mounting

∗ 1 Dimension: Width Dimension from Center of IEC 35 mm Rail

Model Name
SRL-K100
SRLD-K100

7.6 SR/SRD-K100JH Contactor Relays with Large Rated Auxiliary Contacts

SR-☐JH type uses S-N11, S-N12 magnetic contactor contacts to be suitable for applications requiring use of comparatively large currents and great electrical durability.

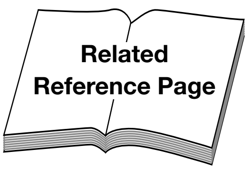
● Rating

Model Name				SR-K100JH SRD-K100JH
Contact Arrangement				10a, 9a1b
				8a2b, 7a3b
				6a4b, 5a5b
Rated Insulation Voltage [V]				660
Contact Rating	Conventional Free Air Thermal Current Ith [A]			20
	AC Rated Operational Current [A]	Category AC-15 (Coil Load)	AC110 V	10 (6)
			AC220 V	10 (5)
			AC440 V	5 (3)
			AC550 V	4 (3)
		Category AC-12 (Resistive Load)	AC110 V	20
			AC220 V	16
			AC440 V	10
			AC550 V	10
	DC Rated Operational Current [A]	Category DC-13 (Coil Load)	DC24 V	5
			DC48 V	3
			DC110 V	0.8
			DC220 V	0.2
		Category DC-12 (Resistive Load)	DC24 V	10
			DC48 V	8
			DC110 V	5
			DC220 V	1

Note 1. Electrical durability of 500,000 operations.

Note 2. The value in parentheses for the AC rated operational current indicates the rated operating current when using different voltages.

Note 3. The minimum operating voltage and current differ depending on the allowable fault rate. Select from Figure 2 on page 181.



Item	Reference Page	Remarks
· Operation Coil	Pages 43, 44	Same as SR-☐ and SRD-☐.
· Properties	Pages 183, 185	Same as SR-☐ and SRD-☐.
· Contact Arrangement/Contact Placement	Page 184	Same as SR-☐ and SRD-☐.
· Outline Drawings	Pages 184, 185	Same as SR-☐ and SRD-☐.
· How to Order	Page 190	–
· Combining with Optional Units	Page 196	–

7.7 SR/SRD-K100LC Contactor Relays with Overlap Contacts

SR-☐LC types with overlap contacts overlap operation by turning the break contact OFF after the make contact turns ON.

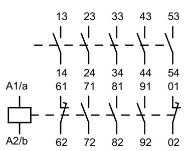
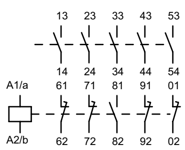
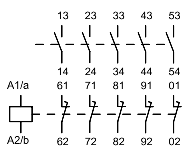
● Rating (SR, SRD)

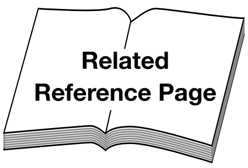
Model Name				K100LC
Contact Arrangement				8a2b
				6a4b, 5a5b
Contact Rating	Rated Insulation Voltage [V]			600
	Conventional Free Air Thermal Current Ith [A]			16
	AC Rated Operational Current [A]	Category AC-15 (Coil Load)	AC110 V	6
			AC220 V	5
			AC440 V	3
			AC550 V	3
		Category AC-12 (Resistive Load)	AC110 V	16
			AC220 V	12
			AC440 V	5
			AC550 V	5
	DC Rated Operational Current [A]	Category DC-13 (Coil Load)	DC24 V	3
			DC48 V	2
			DC110 V	0.5
			DC220 V	0.1
		Category DC-12 (Resistive Load)	DC24 V	8
			DC48 V	5
			DC110 V	3
			DC220 V	0.5

Note 1. The AC rated operational current for the make contact is shown in the table above.
The break contact rated making current is 20 A and the rated breaking current AC 24 to 550 V 3 A. (However, COSφ = 0.3 to 1.0)
Note 2. The contacts may wear out through current switching and may not overlap. Take sufficient precautions.

7

● Contact Arrangement/Contact Placement

SR-K100LC SRD-K100LC		
8a2b	6a4b	5a5b
		



Item	Reference Page	Remarks
· Operation Coil	Pages 43, 44	Same as SR-☐ and SRD-☐.
· Properties	Pages 183, 185	Same as SR-☐ and SRD-☐. However, break contact operating times differ.
· Outline Drawings	Pages 184, 185	Same as SR-☐ and SRD-☐.
· How to Order	Page 190	—
· Combining with Optional Units	Page 196	Auxiliary contact units and front clip-on timer units cannot be combined together.

7.8 How to Order

Follow the steps below when ordering. (Enter a space in ▲ .)

■ SR, SRD-K Type Contactor Relays

Model Name		Operation Coil and Designation		Contact Arrangement
SR-K100	▲	AC200V	▲	5A1B
SRD-K100	▲	DC100V	▲	5A5B
Specify from pages 180 and 181.		Select the operation coil designation (or coil voltage and frequency) from the ratings on pages 43 and 44.		Specify from the contact arrangement on page 184.

■ SRL, SRLD-K Type Mechanically Latched Contactor Relays

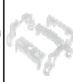
Model Name		Closing Control Coil		Tripping Control Coil		Contact Arrangement
SRL-K100	▲	MC-AC200V	▲	MT-DC100V	▲	5A4B
SRLD-K100	▲	MC-DC100V	▲	MT-DC100V	▲	5A4B
Specify from pages 180 and 181.		Specify the closing (MC) and tripping (MT) operation coil designation (or coil voltage and frequency) from the ratings on page 186.				Specify a (valid) contact arrangement from page 187.

8

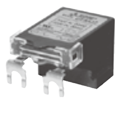
Optional Units

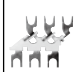
8.1 Model List (for MS-T/N Series)

Model Name	Auxiliary Contact Blocks									Auxiliary Contact Units for Low-level Signals
Type	UT-AX2(BC)	UT-AX4(BC)	UT-AX11(BC)	UN-AX2(CX)	UN-AX4(CX)	UN-AX11(CX)	UN-AX80	UN-AX150	UN-AX600	UN-LL22(CX)
Mounting	Front Clip-on		Side Clip-on	Front Clip-on		Side Clip-on				Front Clip-on
Specification/ Functions	Twin Contact Built-in 2-Pole Auxiliary Contact (2a, 1a1b, 2b)	Twin Contact Built-in 4-Pole Auxiliary Contact (4a, 2a2b, 3a1b)	Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b)	Twin Contact Built-in 2-Pole Auxiliary Contact (2a, 1a1b, 2b)	Twin Contact Built-in 4-Pole Auxiliary Contact (4a, 2a2b, 3a1b)	Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b)	Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b)	Twin Contact Built-in 2-Pole Auxiliary Contact (1a1b)	Twin Contact Built-in 4-Pole Auxiliary Contact (2a2b)	Total 4-Pole Structure Auxiliary Contacts for Low-Level Signal and Twin (Standard) Types For Low-Level Signals 1a1b (5 V 5 mA) Twin Contact 1a1b (20 V 5 mA)
Appearance (Typical Example)	 UT-AX2	 UT-AX4	 UT-AX11	 UN-AX2	 UN-AX4	 UN-AX11	 UN-AX80	 UN-AX150	 UN-AX600	 UN-LL22
Other	Cannot be used in combination with UT-AX11(BC).		Cannot be used in combination with UT-AX2 or 4(BC).	Cannot be used in combination with UN-AX11(CX).		Cannot be used in combination with UN-AX2, 4, or LL22(CX).	—			Cannot be used in combination with UN-AX11(CX).
Reference Page	197									203

Model Name	DC/AC Interface Units for Operation Coils								Protection Cover Units							
Type	UT-SY21(BC)	UT-SY22(BC)	UN-SY11	UN-SY12	UN-SY21(CX)	UN-SY22(CX)	UN-SY31	UN-SY32	UN-CV□0	UN-CZ605	UN-CZ□0	UN-CZ□2	UN-CZ□1	UN-CZ□4	UT-CV□, UN-CV□	UT-CW□
Mounting	Top-On		For Independent Mounting		Top-On				Front Clip-on							
Specification/ Functions	Enables AC-operated magnetic contactors and relays to be operated at DC24 V								Live Part Protection Cover						Misoperation Prevention Cover	Terminal Cover
	Triac Output Input DC24 V 15 mA	Relay Output Input DC24 V 10 mA	Triac Output Input DC24 V 15 mA	Relay Output Input DC24 V 10 mA	Triac Output Input DC24 V 15 mA	Relay Output Input DC24 V 10 mA	Triac Output Input DC24 V 15 mA	Relay Output Input DC24 V 10 mA	For Magnetic Contactors For Contactor Relays	For Thermal Overload Relays (TH-T65, TH-N60)	For Magnetic Contactors (Power Supply Side, Load Side) For Magnetic Starters (Power Supply Side)	For Reversible Magnetic Contactors	For Magnetic Starters (Load Side)	For Reversible Magnetic Starters	UT-CV107 For Magnetic Contactors/ Contactor Relays UN-CV□3 For Thermal Overload Relays (TH-)	For Magnetic Contactors For Magnetic Starters For Thermal Overload Relays
Appearance (Typical Example)	 UT-SY21		 UN-SY11		 UN-SY21		 UN-SY32		 UN-CV250	 UN-CZ605	UN-CZ500		UN-CZ501		 UN-CV203	 UT-CW800
Other	—								—							
Reference Page	218								221							227

Note 1. There are limitations on models, rated voltage and combined use.

	Operation Coils Surge Absorber Unit										Main Circuit Surge Absorber Unit	
	UT-SA□3	UT-SA21	UT-SA22	UT-SA25	UN-SA721	UN-SA712	UN-SA722	UN-SA713	UN-SA723	UN-SA725	UT-SA33□	UN-SA33
	Top-On										Front Clip-on	Independent Mounting
	Surge Absorbers for Operation Coils										Surge Absorbers for Main Circuits	
	With CR UT-SA23 AC200V UT-SA13 DC200V	With Varistor AC24 V (DC Shared Use) AC48 V (DC Shared Use) AC200 V (DC Shared Use) AC400 V	With Varistor + Indicator Lamp AC200 V (DC Shared Use)	With Varistor + CR AC48 V (DC Shared Use) AC200 V (DC Shared Use)	With Varistor AC48 V (DC Shared Use) AC100 V (DC Shared Use) AC200 V (DC Shared Use) AC400 V	With Varistor + Indicator Lamp AC100 V (DC Shared Use) AC200 V (DC Shared Use)		With CR DC200 V	With CR AC200 V	With Varistor + CR AC48 V (DC Shared Use) AC100 V (DC Shared Use) AC200 V (DC Shared Use)	With CR AC240 V (AC100 to 240 V)	
	 UT-SA21		 UT-SA22		 UN-SA721	 UN-SA712	 UN-SA722	 UN-SA713	 UN-SA723	 UN-SA725	 UT-SA33□	 UN-SA33
	—										—	
	205										212	

	Mechanical Interlock Units		Main Circuit Conductor Kits							3-Pole Array Connection Units	Connecting Conductor Kits	Fault Detection Units	Reset Releases		Fluorescent Display Lamps	Independent Mounting Units	
	UT-ML20 (BC)	UN-ML□	UT-SD□	UN-SD□	UT-SG□	UN-SG□	UN-YG□	UT-YD20	UN-YD□	UT-YY20, UN-YY□	UT-TH50, UN-TH□	UN-FD□ (CX)	UT-RR□	UN-RR□	UN-TL□	UT-HZ18 (BC)	UN-RM20
	Side Clip-on		Main Circuit									Independent Mounting	Front Clip-on		Front Clip-on	—	
	Combines with 2 units of independent magnetic contactors to constitute a reversing type. Electrical Interlock 2-Break Contact Built-in Type	Combines with 2 units of independent magnetic contactors to constitute a reversing type.	Connecting Conductors for Reversing Type Magnetic Contactors		Connecting Conductors for Reversing Type Magnetic Contactors Crossover		3-Pole Short-Circuit Connecting Conductors	2-Pole Short-Circuit Connecting Conductors		3-Pole Parallel Connecting Conductors	Connecting Conductors for Magnetic Contactors and Thermal Overload Relays	Detects the conduction mode of the main circuit (contact welding) AC100 V AC200 V	For Thermal Reset From Outside the Panel 200 mm 400 mm 550 mm 700 mm		Thermal Overload Relay Trip Display AC100 V AC200 V DC24 V	Allows screwmounting and IEC 35 mm railmounting for TH-T18	Allows IEC 35 mm rail-mounting for TH-T25
	 UT-ML20	 UN-ML21										 UN-FD4				 UT-HZ18	 UN-RM20
	—		—									—	—		—	—	
	213		216							217	231	232, 327	228	228	229	230	

8

8 Optional Units

Type Designation Structure

(E.g.) **UT** – **SA** **21** ▲ **AC200V**

- UT: Symbol Indicates Unit
- SA: Symbol Indicates Unit Product Name (Table at right)
- 21: Indicates specifications, applicable models etc. of the units. (Enter a space in ▲.)
- AC200V: Rated Voltage Designation

Symbol	Product Name
AX	Auxiliary Contact Units
LL	Auxiliary Contact Units with Contact for Low-level Signals
SA	For Operation Coils or Main Circuit Surge Absorber Units
SY	DC24 V→AC100 to 240 V DC/AC Interface Units for Operation Coils
CV CZ CW	Live Part Protection Covers (Magnetic Starters, Contactor Relays)
CV	Misoperation Prevention Covers (Magnetic Contactors, Relays, Thermal Overload Relays)

Symbol	Product Name
ML	Mechanical Interlock Units
SD	Reversing Main Circuit Conductor Kits
SG	Main Circuit Conductor Kits for Crossover
YG	3-Pole Short Circuit Main Circuit Conductor Kits
YD	2-Pole Short Circuit Main Circuit Conductor Kits
RR	Thermal Overload Relay Reset Release Units
TL	Thermal Overload Relay Trip Indicator Lamps
HZ RM	Independent Mounting Units for Thermal Overload Relays

8.2 Applicable Model List

Those with an x in the Applicable Models column cannot be combined.
The units that can be used with the spring clamp terminal models are marked with "SQ" in the Applicable Models column.
For the spring clamp terminal models, refer to pages 127 and 175.

Magnetic Starters/Magnetic Contactors

Section	Product Name	Model Name	Specifications	See Page	Applicable Models: Magnetic Starters, Magnetic Contactors: AC Operated	DC Operated	Latched Type	Enclosed Type (MS-N□)	Delay Open Type (S-N□DL)	With Saturable Reactor (MSO-N□SR)
1	Auxiliary Contact Units	UT-AX2	2-Pole	197	S-T10 to T50	SD-T12 to T50	x	x	x	MSO-T10SR to T50SR
		UT-AX4	4-Pole							
		UT-AX11	2-Pole 1A1B				SL(D)-T21			
		UN-AX2	2-Pole		S-T65, T80 S-N38, N48 DU-N30	SD-T65, T80 DUD-N30	x	x	x	MSO-T65SR, T80SR
		UN-AX4	4-Pole							
		UN-AX11	2-Pole 1A1B		S-T65, T80 DU-N30	SD-T65, T80 DUD-N30	SL(D)-T65, T80	x	x	MSO-T65SR, T80SR
		UN-AX80	2-Pole 1A1B		S-T100, S-N125 DU-N60	SD-T100, SD-N125 DUD-N60	SL(D)-T100 SL(D)-N125	x	x	MSO-T100SR MSO-N125SR
		UN-AX150	2-Pole 1A1B		S-N150 to N400 DU-N120, N180, N260	SD-N150 to N400 DUD-N120, N180, N260	SL(D)-N150 to N400	MS-N150 to N400	S-N150DL to N400DL (Left Side Only)	MSO-N150SR to N400SR
		UN-AX600	4-Pole 2A2B		S-N600, N800	SD-N600, N800	SL(D)-N600, N800	x	x	x
2	Auxiliary Contact Units with Contact for Low-level Signals	UN-LL22	4-Pole 1A1B (Low-Level) + 1A1B (Standard Contact)	203	S-T65, T80 DU-N30	SD-T65, T80 DUD-N30	x	x	x	MSO-T65SR to T80SR
3	Operation Coil Surge Absorber Units	UT-SA13	C + R	205	x	SD-T12 to T50 BD-T21 SQ	SLD-T21 to T50 (Closing Coil)	x	x	x
		UT-SA21	Varistor		S-T10 to T50 B-T21 S-N38, N48 SQ		SL(D)-T21 to T50 (Closing Coil)	MS-T10SA to T50SA	x	MSO-T10SR to T50SR
		UT-SA22	Varistor + Indicator Lamp					x	x	
		UT-SA23	C + R			x	SL-T21 to T50 (Closing Coil)		x	
		UT-SA25	Varistor + CR			SD-T12 to T50 BD-T21 SQ	SL(D)-T21 to T50 (Closing Coil)		x	
		UN-SA712	Varistor + Indicator Lamp		x	x	SL(D)-T21 to T50 (Tripping Coil)	x	x	x
		UN-SA713	C + R		x	SD-T65, T80 DUD-N30	SLD-T21 to T80 (Tripping Coil)	x	x	x
		UN-SA721	Varistor		x		SL(D)-T21 to T80 (Tripping Coil)	x	x	x
		UN-SA722	Varistor + Indicator Lamp		x		SL(D)-T65, T80 (Tripping Coil)	x	x	x
		UN-SA723	C + R		x	x	SL(D)-T65, T80 (Tripping Coil)	x	x	x
		UN-SA725	Varistor + C + R		x	SD-T65, T80 DUD-N30	SL(D)-T21 to T80 (Tripping Coil)		x	
4	Main Circuit Surge Absorber Units	UT-SA3320	C + R Delta Connection	212	S-T10 to T20	SD-T12, T20	x	x	S-T12DL	MSO-T10SR to T20SR
		UT-SA3332			S-T21 to T32	SD-T21, T32	x	x	S-T21DL	MSO-T21SR to T25SR
		UN-SA33			S-T10 to T100 S-N125 to N800	SD-T12 to T100 SD-N125 to N800	SL(D)-T21 to T100 SL(D)-N125 to N800	MS-T10 to T100 (External) MS-N125 to N400 (External)	S-T12DL to T100DL S-N125DL to N400DL	MSO-T10SR to T100SR MSO-N125 to N400SR
5	DC/AC Interface Units for Operation Coils	UT-SY21	Triac Output	218	S-T10 to T50 B-T21	x	x	x	x	MSO-T10SR to T50SR
		UT-SY22	Contact Output							
		UN-SY11	Triac Output		S-T10 to T100 S-N125 to N400					MSO-N125SR to N400SR
		UN-SY12	Contact Output							
		UN-SY21	Triac Output		S-N38, N48					
		UN-SY22	Contact Output							
		UN-SY31	Triac Output		S-T65, T80					
		UN-SY32	Contact Output							

Section	Product Name	Model Name	Specifications	See Page	Applicable Models: Magnetic Starters, Magnetic Contactors: AC Operated	DC Operated	Latched Type	Enclosed Type (MS-N□)	Delayed Release Type (S-N□DL)	With Saturable Reactor (MSO-N□SR)
6	Protection Cover Units	UT-CV107	Operation Prevention Covers: Magnetic Contactors/ Contactor Relays Manual Operation Prevention	221	S-T10 to T50, B-T21 SQ	SD-T12 to T50, BD-T21 SQ	×	×	×	×
		UN-CV117			S-T65,T80	SD-T65,T80	×	×	×	×
		UN-CZ500	Power Supply Side Terminals Load Side Terminals For Magnetic Contactors For Magnetic Starters (Power Supply Side Terminals)		S-T65,T80, DU-N30	SD-T65,T80, DUD-N30	SL(D)-T65, T80 *1			
		UN-CZ800			S-T100, B-N65	SD-T100, BD-N65	SL(D)-T100 *2			
		UN-CZ1250			S-N125, B-N100, DU-N60	SD-N125, BD-N100, DUD-N60	SL(D)-N125 *2			
		UN-CZ1500			S-N150, DU-N120	SD-N150, DU-N120	SL(D)-N150 *2			
		UN-CZ2200			S-N180,N220, DU-N180	SD-N220, DUD-N180	SL(D)-N220 *2			
		UN-CZ3000			S-N300,N400, DU-N260	SD-N300,N400, DUD-N260	SL(D)N300, N400 *2			
		UN-CZ501	For Magnetic Starters (Load Side Terminals)		MSO-T65,T80	MSOD-T65,T80	MSOL(D)-T65,T80 *1			
		UN-CZ801			MSO-T100	MSOD-T100	MSOL(D)-T100 *2			
		UN-CZ1251			MSO-N125	MSOD-N125	MSOL(D)-N125 *2			
		UN-CZ1501			MSO-N150	MSOD-N150	MSOL(D)-N150 *2			
		UN-CZ2201			MSO-N180,N220	MSOD-N220	MSOL(D)N220 *2			
		UN-CZ3001			MSO-N300,N400	MSOD-N300,400	MSOL(D)-N300,N400 *2			
		UN-CZ502	For Reversible Magnetic Contactors		S-2×T65,T80	SD-2×T65,T80	SL(D)-2×T65,T80 *3			
		UN-CZ802			S-2×T100	SD-2×T100	SL(D)-2×T100 *4			
		UN-CZ1252			S-2×N125	SD-2×N125	SL(D)-2×N125 *4			
		UN-CZ1502			S-2×N150	SD-2×N150	SL(D)-2×N150 *4			
		UN-CZ2202			S-2×N180,N220	SD-2×N220	SL(D)-2×N220 *4			
		UN-CZ3002			S-2×N300,N400	SD-2×N300,N400	SL(D)-2×N300,N400 *4			
		UN-CZ504	For Reversible Magnetic Starters		MSO-2×T65,T80	MSOD-2×T65,T80	MSOL(D)-2×T65,T80 *3			
		UN-CZ804			MSO-2×T100	MSOD-2×T100	MSOL(D)-2×T100 *4			
		UN-CZ1254			MSO-2×N125	MSOD-2×N125	MSOL(D)-2×N125 *4			
		UN-CZ1504			MSO-2×N150	MSOD-2×N150	MSOL(D)-2×N150 *4			
		UN-CZ2204			MSO-2×N180,N220	MSOD-2×N220	MSOL(D)-2×N220 *4			
		UN-CZ3004			MSO-2×N300,N400	MSOD-2×N300,N400	MSOL(D)-2×N300,N400 *4			
		UN-CZ506	Latch Mechanism Live Part Protection Covers		×	×	SL(D)-(2×)T65,T80 MSOL(D)-(2×)T65,T80	×	×	×
		UN-CZ806			×	×	SL(D)-(2×)T100 MSOL(D)-(2×)T100 SL(D)-(2×)N125 to N400 MSOL(D)-(2×)N125 to N400"	×	×	×
7	Mechanical Interlock Units	UT-ML20	For Reversing Configuration ML20 Only Electrical Interlock 2-Break Contact Built-in Type	213	S-T10 to T20(Note1)	SD-T12,T20	×	×	×	×
		UN-ML21			S-T21 to T80	SD-T21 to T80	SL(D)-T21 to T80	×	×	×
		UN-ML80			S-T100, S-N125	SD-T100, SD-N125	SL(D)-N125	×	×	×
		UN-ML150			S-N150	SD-N150	SL(D)-N150	×	×	×
		UN-ML220			S-N180 to N400	SD-N220 to N400	SL(D)N220 to N400	×	×	×
8	Main Circuit Conductor Kits	UT-SD□	For Reversing (for Magnetic Contactors)	216	S-2×T10 to T25	SD-2×T12,T20 T21,T32	SL(D)-2×T21			
		UT-SG□	For Crossover (for Magnetic Contactors)							
		UN-SD□	For Reversing (for Magnetic Contactors)		S-2×T32 to T100 S-2×N125 to N800	SD-2×T32 to T100 SD-2×N125 to N800	SL(D)-2×N125 to N800			
		UN-SG□	For Crossover (for Magnetic Contactors)							
		UN-YG□	For 3-Pole Short-Circuit		S-T21 to T100, S-N125 to N400	SD-T21 to T100 SD-N125 to N400	SL(D)-N125 to N400			
		UT-YD20	For 2-Pole Short-Circuit		S-T10 to T20	SD-T12 to T20	×			
		UN-YD□	For 2-Pole Short-Circuit		S-T21 to T100, S-N125 to N400	SD-T21 to T100 SD-N125 to N400	SL(D)-N125 to N400			
9	Fault Detection Units	UN-FD	200 V Main Circuit, 1c Output	232, 327	S-T10 to T100 S-N125 to N400	SD-T12 to T100 SD-N125 to N400	×	MS-T10 to T100 MS-N125 to N400 (External)	×	MSO-T10SR to T100SR MSO-N125SR to N400SR
		UN-FD4	400 V Main Circuit, 1a/1b Output				×		×	

Notes for section 6 (UN-CZ□):

- No UN-CZ□ types can be combined with enclosed types, delay open types or saturable reactor attached types.
- Use the following covers for the latch mechanism.
  - ∗ 1 : UN-CZ506(1 pc)
  - ∗ 2 : UN-CZ806(1 pc)
  - ∗ 3 : UN-CZ506(2 pcs)
  - ∗ 4 : UN-CZ806(2 pcs)

Notes for section 8:

- Refer to page 216 for "□" of the model names and applicable models.
- None of these can be combined with enclosed types, delay open types or saturable reactor attached types.

Note 1. The units can be combined only with S-T10 to T20 produced in March, 2019 and later.

8

8 Optional Units

Thermal Overload Relays (Including ET-N Electronic Thermal)

Section	Product Name	Model Name	Specifications	See Page	Applicable Models Thermal Overload Relays
	Protection Cover (Note 1) Units	UN-CZ605	Live Part Protection Cover	221, 343	TH-T65
		UN-CV203	Current Setting Dial Misoperation Prevention Covers		TH-T25/T50
		UN-CV603 (Note 2)			TH-T65/T100, TH-N120 to N600
		UN-CV602	Terminal Cover		ET-N60
11	Reset Releases	UT-RR☐5	Release Length 200 mm to 700 mm	228	TH-T18
		UN-RR☐0			TH-T25/T50
		UN-RR☐6 (Note 3)			TH-T65/T100 TH-N120 to N600
12	Fluorescent Display Lamps	UN-TL12	Tripping Display	229	TH-T18
		UN-TL20			TH-T25, T50
		UN-TL60 (Note 4)			TH-T65, T100
13	Independent Mounting Units	UT-HZ18	Screw Mounting, IEC 35 mm Mounting	230	TH-T18
		UN-RM20	IEC 35 mm Rail Mounting		TH-T25

Note 1. Protective covers cannot be combined with saturable reactor attached types (TH-☐SR).
Note 2. UN-CV603 cannot be combined with TH-N120TAHZ.
Note 3. UN-RR☐☐6 cannot be combined with TH-N120TAHZ.
Note 4. UN-TL60 cannot be combined with TH-N120TAHZ.

Contactor Relays

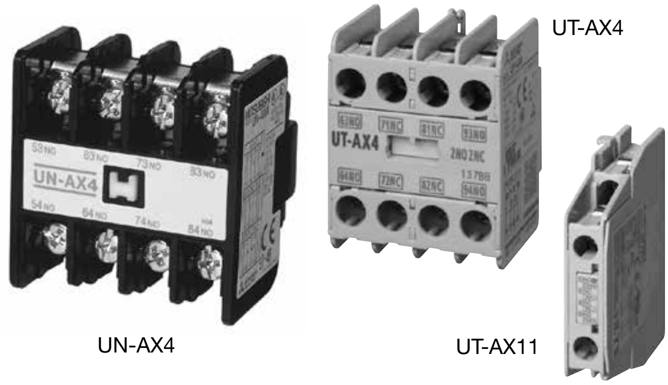
Section	Product Name	Model Name	Specifications	See Page	Applicable Models Contactor Relays AC Operated	Applicable Models Contactor Relays DC Operated	Applicable Models Contactor Relays Latched Type
1	Auxiliary Contact Units	UT-AX2	2-Pole	197	SR-T5	SRD-T5	x
		UT-AX4	4-Pole				
		UT-AX11	2-Pole 1A1B				SRL(D)-T5
3	Operation Coil Surge Absorber Units	UT-SA21	Varistor	205	SR-T5, T9 SQ	SRD-T5, T9 SQ	SRL(D)-T5 (Closing Coil)
		UT-SA22	Varistor + Indicator Lamp				
		UT-SA13	C + R		x		
		UT-SA23	C + R		SR-T5, T9 SQ	x	
		UT-SA25	Varistor + CR			SRD-T5, T9 SQ	
		UN-SA712	Varistor + Indicator Lamp		SR-K100	SRD-K100	SRL(D)-K100(Closing Coil), SRL(D)-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)
		UN-SA713	C + R		x		SRLD-K100(Closing Coil), SRLD-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)
		UN-SA721	Varistor		SR-K100		SRL(D)-K100(Closing Coil), SRL(D)-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)
		UN-SA723	C + R		SR-K100	x	SRL-K100(Closing Coil), SRL-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)
		UN-SA725	Varistor + C + R			SRD-K100	SRL(D)-K100(Closing Coil), SRL(D)-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)
5	DC/AC Interface Units for Operation Coils	UT-SY21	Triac Output	218	SR-T5, T9	x	x
		UT-SY22	Contact Output			x	x
		UN-SY11	Triac Output		SR-T5, T9 SR-K100	x	x
		UN-SY12	Contact Output			x	x
		UA-SY21	Triac Output	236	SR-K100	x	x
		UA-SY22	Contact Output			x	x
6	Protection Cover Units	UT-CV107	Operation Prevention Covers Magnetic Contactors/Contactor Relays Manual Operation Prevention	221	SR-T5 SQ	SRD-T5 SQ	x
9	Conductor Kits	UT-YD20	For 2-Pole Short-Circuit	216	SR-T5, T9	SRD-T5, T9	SRL(D)-T5, T9

8.3 UT/UN-AX☐ Auxiliary Contact Units

Auxiliary contacts can be easily expanded from compact relays to large contactors.

All contacts adopt twin contacts, providing high contact reliability.

- Auxiliary contacts can be added to almost all series of contactor relays and magnetic contactors.
- Highly effective for on-site modifications etc., as mounting does not require special tools.
- As both side clip-on and front clip-on types are thin and require less mounting area, they greatly contribute to the miniaturization of panel area.
- The use of twin contacts achieves high contact reliability and allows application for low-level signals.



Type

Unit Model Name	Contact Arrangement Per Unit	Unit Mounting Method	Model Names of Applicable Magnetic Contactors and Contactor Relays: AC Operated	DC Operated	Mechanically Latched Type	Total Number of Units That Can Be Added to Non-Reversible Type
UT-AX2 UT-AX2BC	2a 1a1b 2b	Front Clip-on	S-T10 to T50 SR-T5	SD-T12 to T50, SRD-T5	—	1
UT-AX4 UT-AX4BC	4a 3a1b 2a2b	Front Clip-on			—	1
UT-AX11 UT-AX11BC	1a1b	Side Clip-on			SL(D)-T21,T35,T50 SRL(D)-T5	2(Note 2)
UN-AX2 UN-AX2CX	2a 1a1b 2b	Front Clip-on	S-T65, T80 S-N38, N48 DU-N30 (Note 6)	SD-T65, T80 DUD-N30 (Note 6)	—	1
UN-AX4 UN-AX4CX	4a 3a1b 2a2b	Front Clip-on			—	1
UN-AX11 UN-AX11CX	1a1b	Side Clip-on	S-T65, T80 DU-N30 (Note 6)	SD-T65, T80 DUD-N30 (Note 6)	SL(D)-T65,T80 (Note 6)	2 (Note 2)
UN-AX80	1a1b	Side Clip-on	S-T100, S-N125, DU-N60	SD-T100, SD-N125, DUD-N60	SL(D)-T100 SL(D)-N125	2 (Note 4)
UN-AX150	1a1b	Side Clip-on	S-N150, S-N180, N220, S-N300, N400, DU-N120, N180, N260	SD-N150 SD-N220 SD-N300, N400, DUD-N120, N180, N260	SL(D)-N150 SL(D)-N220 SL(D)-N300, N400	2 (Note 4)
UN-AX600	2a2b	Side Clip-on	S-N600, N800	SD-N600, N800	SL(D)-N600, N800	1 (Note 5)

Note 1. Front clip-on and side clip-on cannot be mounted on the same body.
Note 2. For the reversible type, 1 unit each can be mounted on the left and right exterior, for a total of 2 units.
Note 3. UT-AX☐BC is the model name with wiring streamlining terminals, while UN-AX☐CX is with CAN terminals.
Note 4. 1 unit each can be mounted on the left and right sides for a total of 2 units. (For the reversible type, additional mounting is not possible for UN-AX150, while 1 unit each can be additionally mounted on the left and right exterior for a total of 2 units for UN-AX80.)
Note 5. Mount on the right side. (4a4b x 2 are mounted on the reversible type and additional mounting is not allowed.)
Note 6. When applied to T65 or T80, the auxiliary terminal screw size for the T65 and T80 body will be M4, and the terminal screw size of the auxiliary contact unit will be M3.5. As the screw sizes are different, they cannot be used interchangeably.

Rating

Unit Model Name		UT-AX2(BC),UT-AX4(BC)	UT-AX11(BC)	UN-AX2(CX),UN-AX4(CX),UN-AX11(CX)	UN-AX80,UN-AX150,UN-AX600
Rated Insulation Voltage [V]		690			
Applicable Standard		JIS C8201-5-1,IEC60947-5-1,EN60947-5-1,GB14048.5			
Rated Impulse Withstand Voltage [kV]		6			
Rated Frequency [Hz]		50/60			
Pollution Degree		3			
Contact Rating (Note 1): Conventional Free Air Thermal Current Ith [A]		10			
Contact Rating (Note 1): AC Rated Operational Current [A]: Category AC-15 (Coil Load) (Note 2)	AC120V AC240V AC440V AC550V	6 3 1.5 1.2		6 3 1.5 1.2	6 3 1.5 1.2
Contact Rating (Note 1): AC Rated Operational Current [A]: Category AC-12 (Resistive Load) (Note 2)	AC120V AC240V	10 8		10 8	10 8
Contact Rating (Note 1): DC Rated Operational Current [A]: Category DC-13 (Coil Load) (Note 2)	DC24V DC48V DC110V DC220V	3 1.5 0.6(2) 0.3(0.8)		3 1.5 0.6(2) 0.3(0.8)	3 1.5 0.6 0.3
Contact Rating (Note 1): DC Rated Operational Current [A]: Category DC-12 (Resistive Load) (Note 2)	DC110V DC220V	5(8) 1(3)		5(8) 1(3)	5 1
Contact Rating (Note 1): Minimum Applicable Load Level		5V 3mA	20V 3mA		

Note 1. The value in parentheses for the DC rated operational current indicates the rated operating current when switching a 2-pole load in series.
Note 2. AC-15, AC-12, DC-13 and DC-12 are the classifications of JISC8201-5-1.
Note 3. Electrical durability of 500,000 operations.
Note 4. The mechanical durability and switching frequency depend on the magnetic contactor and contactor relay to be applied.

8

8 Optional Units

Combination With Contactor Relays

Contactor relays and auxiliary contact units can be used in the contact arrangements of the following combinations.

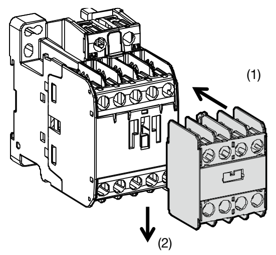
Contactor Relays \ Auxiliary Contact Unit		Front Clip-on						Side Clip-on	
		UT-AX4(BC)			UT-AX2(BC)			UT-AX11(BC)	UT-AX11(BC)
Model	Contact Arrangement	4a	3a1b	2a2b	2a	1a1b	2b	1a1b + 1a1b	1a1b
SR-T5(BC) SRD-T5(BC)	5a	9a	8a1b	7a2b	7a	6a1b	5a2b	7a2b	6a1b
	4a1b	8a1b	7a2b	6a3b	6a1b	5a2b	4a3b	6a3b	5a2b
	3a2b	7a2b	6a3b	5a4b	5a2b	4a3b	3a4b	5a4b	4a3b

Note 1. The auxiliary contact unit cannot be mounted on SR(D)-T9(BC).
Note 2. Front clip-on and side clip-on cannot be mounted simultaneously.
Note 3. The contact arrangement inside the ■ is the standard combination.

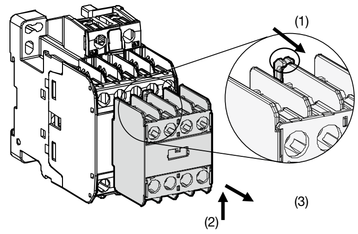
Mounting Method/Removal Method

UT-AX2(BC), UT-AX4(BC)

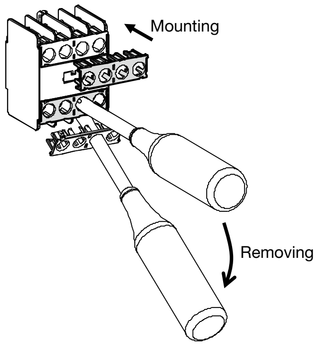
●Mounting Method



●Removal Method

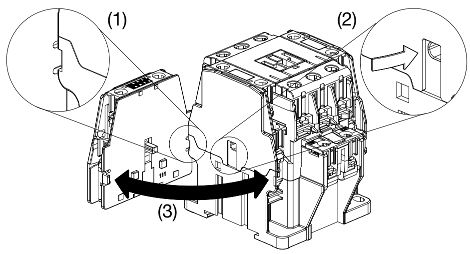


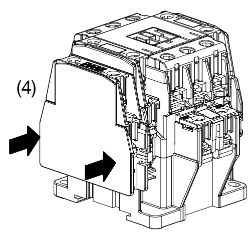
●Mounting and Removal of Terminal Covers



UT-AX11(BC)

●Mounting Method





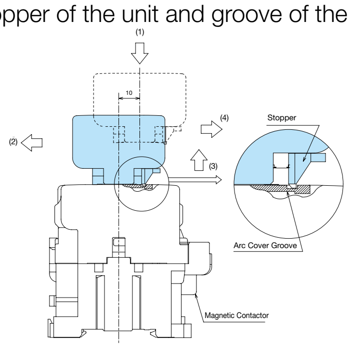
UN-AX2 (CX), UN-AX4 (CX)

●Mounting Method

Mount according to the guidelines below.

(1) Place the auxiliary contact unit on the head of the magnetic contactor, about 10 mm off center toward the power supply side.

(2) Slide the unit to the load side to engage the stopper of the unit and groove of the arc cover.



●Removal Method

(3) Pull up the stopper of the unit.

(4) Remove the unit by sliding to the power supply side.

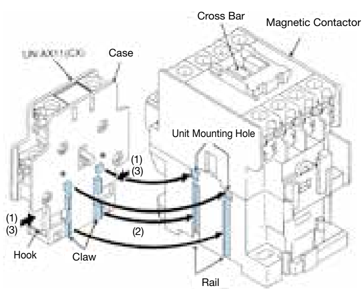
UN-AX11 (CX)

●Mounting Method

Mount according to the guidelines below.

(1) Pinch the hooks (in 2 places) with your fingers and push into the case of UN-AX11.

(2) While aligning the protrusion (✱ mark) of the UN-AX11 case with the unit mounting hole on the magnetic contactor side, engage the claw of the hook to the rail on the bottom of the magnetic contactor.



Note: Confirm the following after mounting.
1. Lightly pull the UN-AX11 body to make sure that it is securely mounted.
2. Make sure that the cross bar on the front of the magnetic contactor is pushed in.

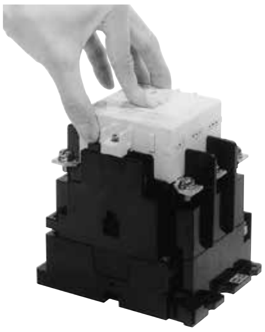
●Removal Method

(3)Remove by pinching the hooks (in 2 places) with fingers.

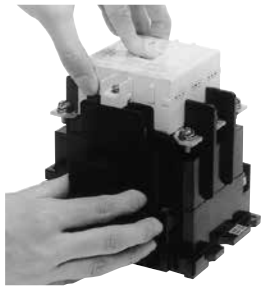
- Mounting Method

UN-AX80

(1) Press the head of the cross bar.



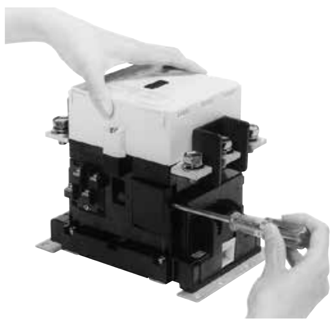
(2) Insert the lever of the auxiliary contact unit (UN-AX80) into the window of the contactor side, and bring it into close contact with the contactor.



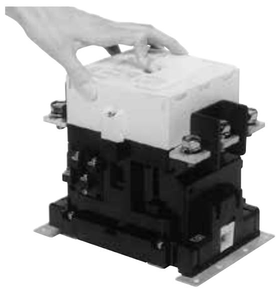
(3) Tighten the screws. Push in the cross bar after mounting.

UN-AX150

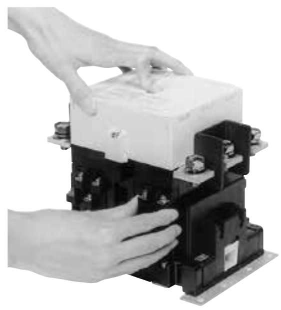
(1) Remove the dust cover from the place where additional mounting is to take place.



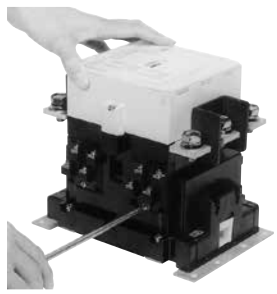
(2) Push down the head of the cross bar. (Press until the main contact touches)



(3) Push in the auxiliary contact unit (UN-AX150).

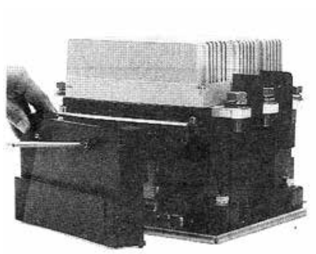


(4) Tighten the screws. Push in the cross bar after mounting.

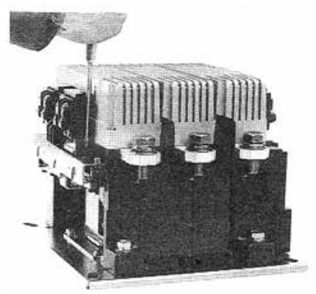


UN-AX600

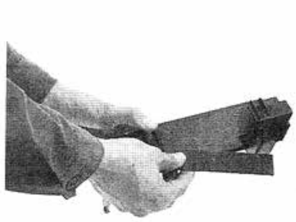
(1) Remove the 2 screws that fasten the cover on the right side of the contactor. (M4 Screw)



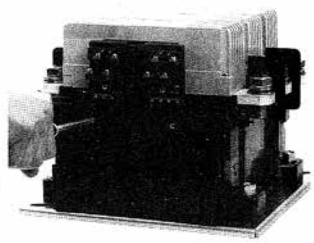
(2) Fasten the auxiliary contact unit (UN-AX600) with the attached 2 screws.



(3) Remove the dust-proof plate (127 x 28 x 1) that's fitted to the cover. (The dust-proof plate is not used)



(4) Combine the cover with the contactor and tighten with the 2 screws that were removed in (1). Push in the cross bar of the auxiliary contact unit after mounting.



- Removal Method

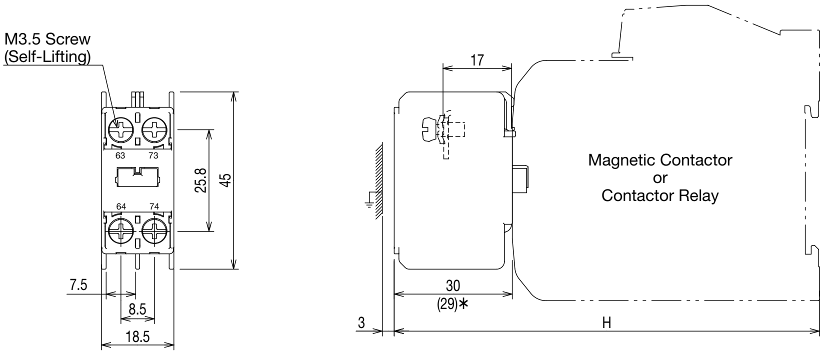
Remove in reverse order to that described above.

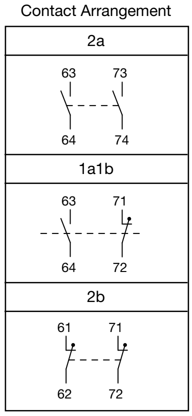
- Mounting Screw Tightening Torque

Auxiliary Contact Units	Tightening Torque (N·m)
UN-AX80	1.47 to 1.96
UN-AX150	1.18 to 1.86
UN-AX600	1.18 to 1.86

■ MS-T Series
● Outline Drawings (Figure Has No BC)

UT-AX2(BC)



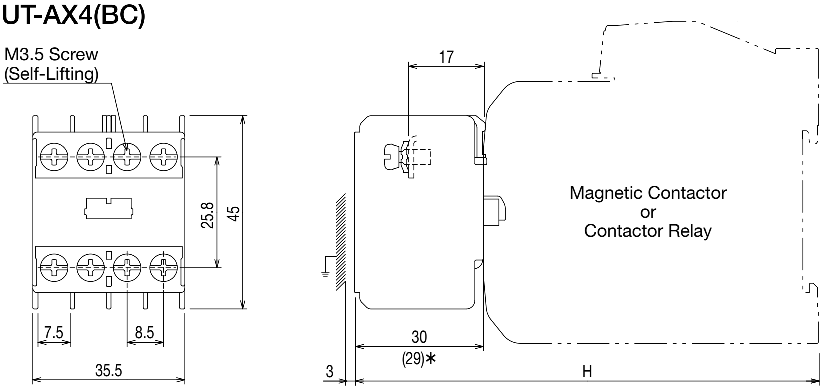


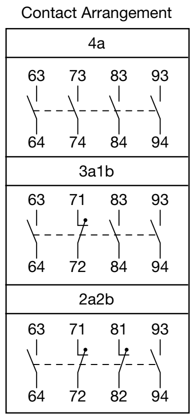
Applicable Models	H Dimension
S-T10, T12, T20	108
S-T21, T25, T32	111
S-T35, T50∗	120
SR-T5	108
SD-T12/20 SRD-T5	130
SD-T21, T32	138
SD-T35, T50∗	152

Applicable Terminal Wire Size [φmm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 0.75 to 2.5	1.25-3.5 to 2-3.5	0.9 to 1.5

0.02 kg

UT-AX4(BC)



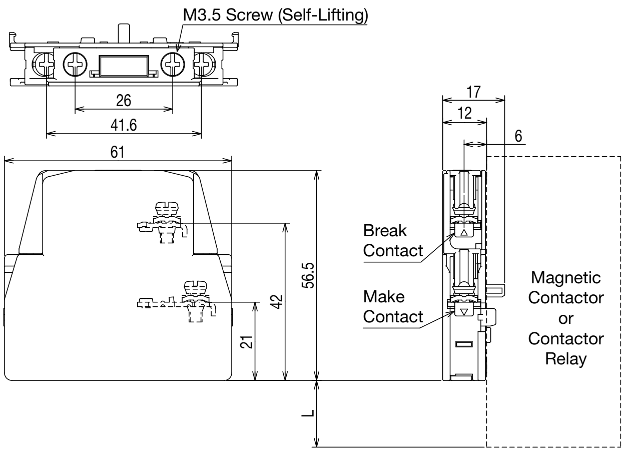


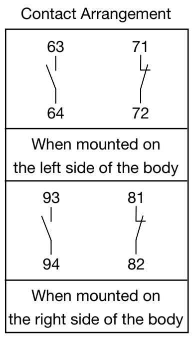
Applicable Models	H Dimension
S-T10, T12, T20	108
S-T21, T25, T32	111
S-T35, T50∗	120
SR-T5	108
SD-T12/20 SRD-T5	130
SD-T21, T32	138
SD-T35, T50∗	152

Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ1.6 0.75 to 2.5	1.25-3.5 to 2-3.5	0.9 to 1.5

0.05 kg

UT-AX11(BC)





Applicable Models	L Dimension
S-T10, T12, T20	18
S-T21, T25	19
S-T32	22.5
S-T35, T50	18.8
SR-T5	18
SD-T12/20 SRD-T5	40
SD-T21	46
SD-T32	44
SD-T35, T50	50.8

Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 0.75 to 2.5	1.25-3.5 to 2-3.5	0.9 to 1.5

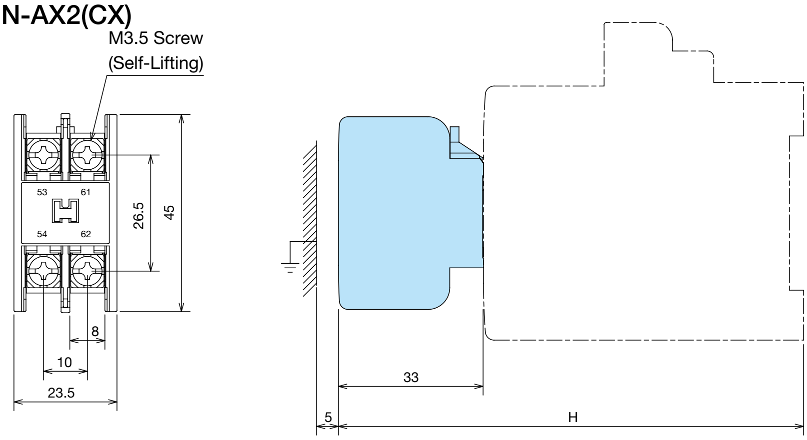
0.04kg

Model Name	Model Name
UT-AX2	UT-AX2BC
UT-AX4	UT-AX4BC
UT-AX11	UT-AX11BC

MS-N Series

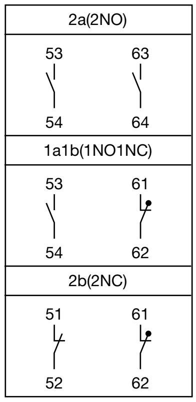
Outline Drawings (Figure Has No CX)

UN-AX2(CX)



Applicable Models	H Dimension
S-T65, T80, DU-N30	134
S-N38, N48	121
SD-T65, T80, DUD-N30	161

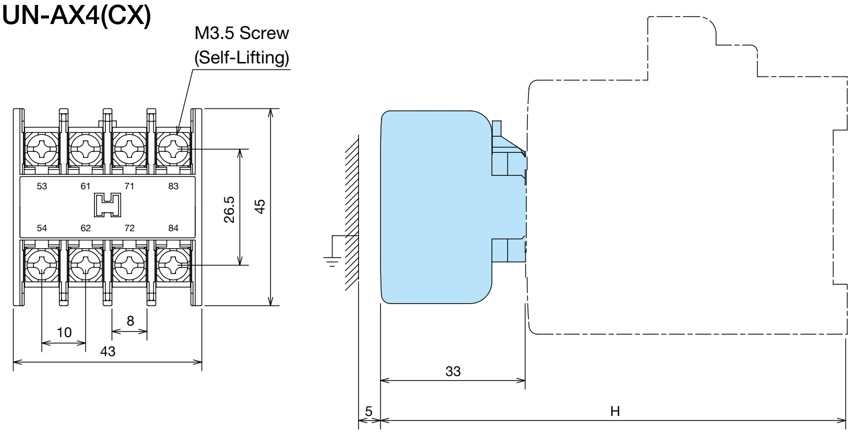
Contact Arrangement



0.03 kg

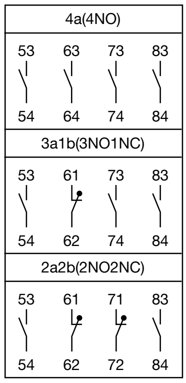
Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 1.25 to 2	1.25-3.5 to 2-3.5	0.94 to 1.51

UN-AX4(CX)



Applicable Models	H Dimension
S-T65, T80, DU-N30	134
S-N38, N48	121
SD-T65, T80, DUD-N30	161

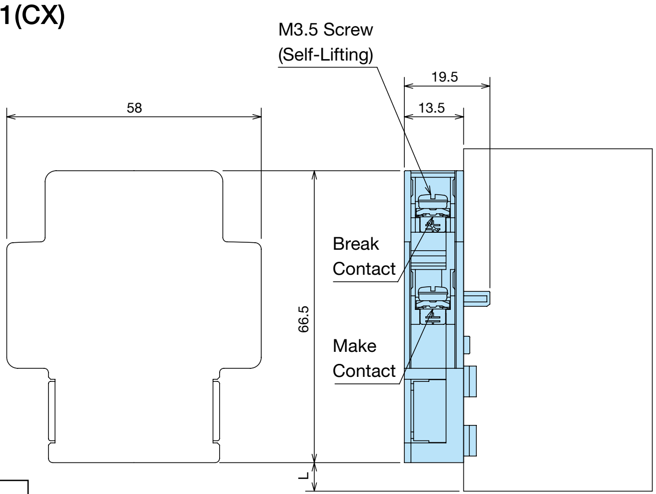
Contact Arrangement



0.05kg

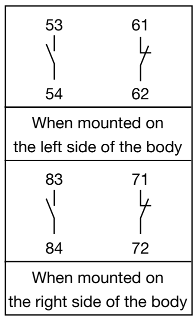
Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 1.25 to 2	1.25-3.5 to 2-3.5	0.94 to 1.51

UN-AX11(CX)



Applicable Models	L Dimension
S-T65, T80, DU-N30	16
SD-T65, T80, DUD-N30	43

Contact Arrangement



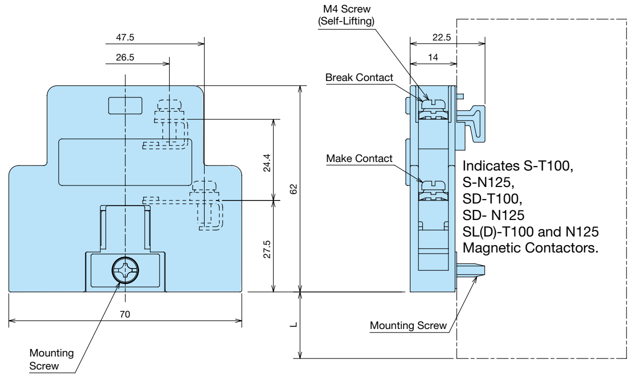
0.04kg

Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 1.25 to 2	1.25-3.5 to 2-3.5	0.94 to 1.51

Model Name	Model Name
UN-AX2	UN-AX2CX
UN-AX4	UN-AX4CX
UN-AX11	UN-AX11CX

Outline Drawings

UN-AX80



0.055kg

Applicable Models	L Dimension
S-T100	7.5
S-N125	11
SD-T100	37.5
SD-N125	36
SL(D)-T100	7.5
SL(D)-N125	11

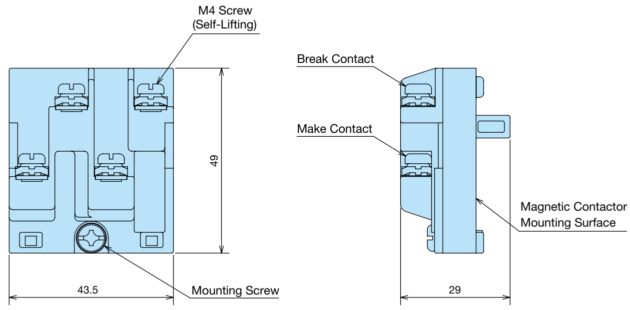
Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 1.25 to 2	1.25-4 to 2-4	1.18 to 1.86

Contact Arrangement

53 61 54 62	83 71 84 72
When additionally mounted on the left side of the magnetic contactor	When additionally mounted on the right side of the magnetic contactor

This unit can be mounted on the left and right sides of the magnetic contactor for a total of 2 units. Since this unit is mounted on the side of the magnetic contactor, each additional unit increases the width of the magnetic contactor by 14 mm.

UN-AX150



0.035kg

Applicable Models
S-N150, N180, N220, N300, N400
SD-N150, N220, N300, N400
SL(D)-N150, N220, N300, N400

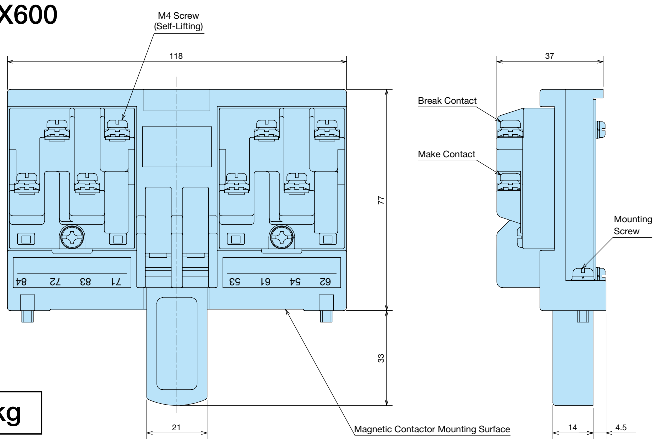
Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 1.25 to 2	1.25-4 to 2-4	1.18 to 1.86

Contact Arrangement
(The terminal number is displayed on the side of the magnetic contactor.)

53 61 54 62	83 71 84 72
When additionally mounted on the left side of the magnetic contactor	When additionally mounted on the right side of the magnetic contactor

This unit can be mounted on the left and right sides of the magnetic contactor for a total of 2 units.
The addition of this unit does not change the maximum outline drawings of the magnetic contactor.

UN-AX600



0.2kg

Applicable Models
S-N600, N800
SD-N600, N800
SL(D)-N600, N800

Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 1.25 to 2	1.25-4 to 2-4	1.18 to 1.86

Contact Arrangement

53	61	83	71
54	62	84	72

This unit is to be mounted to the right side of the magnetic contactor. The addition of this unit does not change the maximum outline drawings of the magnetic contactor.

Model Name
UN-AX80
UN-AX150
UN-AX600

8.4 UN-LL22 Auxiliary Contact Units with Contact for Low-Level Signals

Capable of controlling DC5 V 5 mA.

- This is an auxiliary contact unit with built-in low-level contacts that are capable of switching the low voltage and small current of electronic control circuits.
- It can be mounted with a single touch on a magnetic contactor or contactor relay that performs power switching of a motor or the like, eliminating the need for a relay for switching low voltage and small current, thus making it ideal for switching the electronic input circuits of PLCs etc.
- Compact micro switches are used for the low-level contacts.
- Since it has built-in 1a1b low-level contacts and 1a1b standard contacts, a single unit allows switching of AC200 V and DC24 V, for example.

UN-LL22

Type

Unit Model Name	Contact Arrangement		Unit Mounting Method	Model Names of Applicable Magnetic Contactors and Contactor Relays		Total Number of Addable Units
	Name	Contact		AC Operated	DC Operated	
UN-LL22 UN-LL22CX	Low-Level Contact	1a1b	Front Clip-on	S-T65, T80 S-N38, N48 DU-N30	SD-T65,T80 DUD-N30	1 (Note 1)
	Standard Contact	1a1b				

Note 1. UN-LL22 (CX) and UN-AX11 (CX) cannot be mounted on the same body.
Note 2. UN-LL22CX is the model name with CAN terminals.
Note 3. When applied to T65 or T80, the auxiliary contact terminal screws of the T65 and T80 body will be M4, and the terminal screws of UN-LL22 will be M3.5.
As the screw sizes are different, they cannot be used interchangeably.

Rating

			Low-Level Contact	Standard Contact
Minimum Rated Capacity 1 mil. times (Note 1)			5 V 5 mA	20 V 5 mA
Maximum Rated Capacity	Category DC-12	Resistive Load	DC24 V 100 mA, DC48 V 100 mA	DC110 V 1.5 A, DC220 V 0.25 A
	Category DC-13	Large Coil Load	-	DC110 V 0.6 A, DC220 V 0.3 A
	Category AC-12	Resistive Load	AC48 V 200 mA, AC240 V 20 mA	AC110 V 10 A, AC220 V 8 A
	Category AC-15	Large Coil Load	-	AC110 V 6 A, AC220 V 3 A
Conventional Free Air Thermal Current Ith			1 A	10 A
Rated Insulation Voltage			AC250 V	AC500 V
Switching Durability	Electrical		0.5 mil. times	0.5 mil. times
	Mechanical		2.5 mil. times	
Compliant Standards			JIS C8201-5-1	

Note 1. The contact reliability may decrease if it exceeds 1 million times.
The contact reliability when the input circuit of the PLC is switched is shown in the table below.

- Failure Rate at Confidence Rate 60% λ_{60} (No. of faults/times switching, no. of contacts)

PLC MELSEC Input Circuit Rating	Low-Level Contact	Standard Contact
DC24 V 10 mA, DC24 V 5 mA	5×10^{-8}	5×10^{-7}
DC12 V 5 mA	1×10^{-7}	—
DC 5 V 5 mA	1×10^{-6}	—
AC100 V 10 mA	1×10^{-8}	5×10^{-8}

[Conditions] 1. One million times switching.
2. In a typical environment without a large amount of dust or corrosive gas.
3. Contact failure is detected by the PLC program.

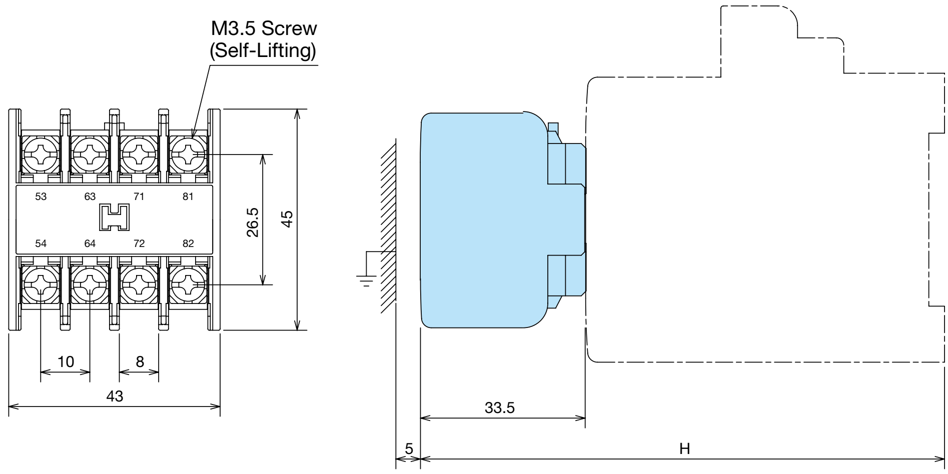
Note 2. The classification of the maximum rated capacity is the classification of JISC8201-5-1.

Mounting Method

The mounting method is the same as UN-AX4 (CX). Refer to page 198.

Outline Drawings (Figure Has No CX)

UN-LL22(CX)

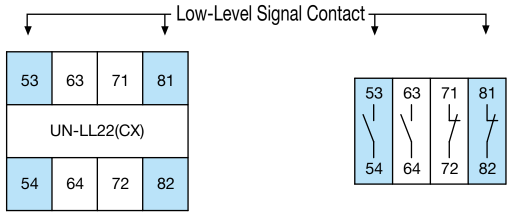


Applicable Models	H Dimension
S-N38/N48	121.5
S-T65/T80, DU-N30	134
SD-T65/T80, DUD-N30	161

0.06kg

Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ 1.6 0.75 to 2	1.25-3.5 to 2-3.5	0.94 to 1.51

Contact Arrangement



[Placement] [Contact Arrangement]

(When viewed from the front)

Name	Make Contact Terminal Number	Break Contact Terminal Number	Application
Low-Level Contact	53-54	81-82	For Low Voltages/Very Small Currents
Standard Contact	63-64	71-72	For Standard Voltage and Coil Switching

Model Name
UN-LL22
UN-LL22CX

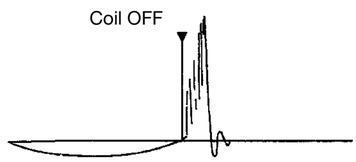
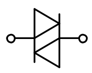
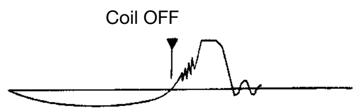
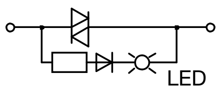
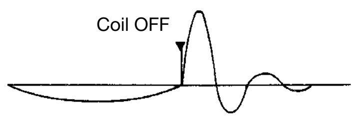
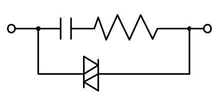
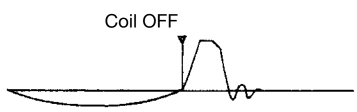
8.5 UT/UN-SA☐ Operation Coil Surge Absorber Units

It suppresses noise during coil current interruption, and reduces malfunction, damage and the like of electronic circuits.

- It can be mounted on a magnetic contactor or contactor relay with a single touch. UT-SA13 to SA25 are space-saving types that utilize the dead space of the lower side of the coil terminal.
- A wide variety is available, allowing easy selection according to the application.

UT-SA21

Proper Use

Surge Suppressing Element	Performance	Surge Waveform (Representative) Example
None	· Waveform with no surge suppressing element.	
Varistor 	· Limits the peak voltage. High-frequency components below the limit voltage cannot be limited.	
Varistor + Indicator Lamp 	· Limits the peak voltage · Displays the operation. (Indicates that voltage is applied to the operation coil.)	
CR 	· Limits the high-frequency components. (There are types for AC coils and DC coils.)	
Varistor + CR 	· Limits both the peak voltage and high-frequency components.	

8 Optional Units

Types and Ratings

Surge Absorber Element	Model	Designation	Internal Element Specifications	Applicable Voltage Range: AC 50/60Hz	Applicable Voltage Range: DC
Varistor	UT-SA21	AC24V	Varistor Voltage 47 V	12V–24V (recommended 12V–24V)	12V–24V (recommended 12V–24V)
		AC48V	Varistor Voltage 120 V	12V–50V (recommended 24V–50V)	12V–48V (recommended 24V–48V)
		AC200V	Varistor Voltage 470 V	12V–240V (recommended 100V–240V)	12V–220V (recommended 100V–220V)
		AC400V	Varistor Voltage 910 V	12V–480V (recommended 346V–480V)	
Varistor + Indicating Lamp	UT-SA22	AC200V	Varistor Voltage 470 V	50V–240V (recommended 100V–240V)	60V–220V (recommended 100V–220V)
CR	UT-SA13	DC200V	0.5 µF120 Ω		12V–220V (recommended 100V–220V)
	UT-SA23	AC200V	0.2 µF120 Ω	12V–240V (recommended 100V–240V)	
Varistor + CR	UT-SA25	AC48V	Varistor Voltage 120 V 0.1 µF47 Ω	12V–50V (recommended 24V–50V)	12V–60V (recommended 24V–60V)
		AC200V	Varistor Voltage 470 V 0.1 µF47 Ω	12V–240V (recommended 100V–240V)	12V–220V (recommended 100V–220V)
Varistor	UN-SA721	AC48V	Varistor Voltage 120 V	12V–50V (recommended 24V–50V)	12V–60V (recommended 24V–60V)
		AC100V	Varistor Voltage 270 V	12V–127V (recommended 100V–127V)	12V–125V (recommended 100V–125V)
		AC200V	Varistor Voltage 470 V	12V–240V (recommended 200V–240V)	12V–220V (recommended 200V–220V)
		AC400V	Varistor Voltage 910 V	12V–480V (recommended 346V–480V)	
Varistor + Indicator Lamp	UN-SA712 UN-SA722	AC100V	Varistor Voltage 270 V	12V–127V (recommended 100V–127V)	12V–125V (recommended 100V–125V)
		AC200V	Varistor Voltage 470 V	12V–240V (recommended 200V–240V)	12V–220V (recommended 200V–220V)
CR	UN-SA713	DC200V	0.5 µF120 Ω		12V–220V (recommended 100V–220V)
	UN-SA723	AC200V	0.2 µF120 Ω	12V–240V (recommended 100V–240V)	
Varistor + CR	UN-SA725	AC48V	Varistor Voltage 120 V 0.1 µF47 Ω	12V–50V (recommended 24V–50V)	12V–60V (recommended 24V–60V)
		AC100V	Varistor Voltage 270 V 0.1 µF47 Ω	12V–127V (recommended 100V–127V)	12V–125V (recommended 100V–125V)
		AC200V	Varistor Voltage 470 V 0.1 µF47 Ω	12V–240V (recommended 200V–240V)	12V–220V (recommended 200V–220V)

☐ Applicable Voltage ☐ Recommended Applied Voltage

Note 1. The surge suppression effect for the applied circuit is smaller in the ☐ (applicable voltage) than in the ☐ (recommended voltage) range.
2. Even in the ☐ (recommended voltage) range, the surge suppression effect may not be enough depending on the characteristics of the connected device. (Check the influence of surge using the actual device in advance.)
3. Refer to page 43 for the surge absorber mounted type and built-in magnetic contactors and contactor relays.

Application and Selection

Application / Surge Absorber Element	AC Operated	DC Operated	Mechanically Latched Type (AC Operated)		Mechanically Latched (DC Operated)	
			Closing Coil	Tripping Coil	Closing Coil	Tripping Coil
UT-SA21	S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 SQ	SD-T12 to T50, BD-T21 SRD-T5, T9 SQ	SL-T21 to T50 SRL-T5	–	SLD-T21 to T50 SRLD-T5	–
UT-SA22	S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 SQ	SD-T12 to T50, BD-T21 SRD-T5, T9 SQ	SL-T21 to T50 SRL-T5	–	SLD-T21 to T50 SRLD-T5	–
UT-SA13	–	SD-T12 to T50, BD-T21 SRD-T5, T9 SQ	–	–	SLD-T21 to T50 SRLD-T5	–
UT-SA23	S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 SQ	–	SL-T21 to T50 SRL-T5	–	–	–
UT-SA25	S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9 SQ	SD-T12 to T50, BD-T21 SRD-T5, T9 SQ	SL-T21 to T50 SRL-T5	–	SLD-T21 to T50 SRLD-T5	–
UN-SA721	SR-K100	SD-T65, T80 SRD-K100, DUD-N30	SRL-K100	SL-T21 to T80 SRL-T5, K100	SRLD-K100	SLD-T21 to T80 SRLD-T5, K100
UN-SA712	SR-K100	SRD-K100	SRL-K100	SL-T21 to T50 SRL-T5, K100	SRLD-K100	SLD-T21 to T50 SRLD-T5, K100
UN-SA722	–	SD-T65, T80 DUD-N30	–	SL-T65, T80	–	SLD-T65, T80
UN-SA713	–	SD-T65, T80 SRD-K100, DUD-N30	–	–	SRLD-K100	SLD-T21 to T80 SRLD-T5, K100
UN-SA723	SR-K100	–	SRL-K100	SL-T21 to T80 SRL-T5, K100	–	–
UN-SA725	SR-K100	SD-T65, T80 SRD-K100, DUD-N30	SRL-K100	SL-T21 to T80 SRL-T5, K100	SRLD-K100	SLD-T21 to T80 SRLD-T5, K100

Precautions for Application

(1) Connect the terminals of surge absorber units in parallel with the operation coils of magnetic contactors or contactor relays.

(2) As only the surge absorber units with operation indicators (UT-SA22, UN-SA712 and SA722) have polarity, pay attention to the polarity when applying to the DC circuit. If the wrong polarity is used, the operation indicator will not turn on. (The surge suppression function is not affected, but the magnetic contactor of UT-SA22 will not work.)

(3) When used in combination with the surge absorber, the opening time of the magnetic contactor or contactor relay may be 1.5 to 3 times longer. (Excluding the mechanically latched type.)

(4) As the bodies of magnetic contactors and contactor relays have common mounting grooves, if the additional mounting type UN-SY21, SY22, SY31 and SY32 DC/AC interface units for operation coils are mounted, surge absorber units cannot be mounted.
(However, combinations with UT-SY21, SY22 and UT-SA21, SA13, SA23 allow for mounting)

(5) Since the operation coils of the S-T65 to T100 and S-N125 to N800 AC-operated constant excitation type magnetic contactors use an AC-operated DC excitation system that does not generate switching surge, an exterior surge absorber is not required.

(6) Refer to Note 5 on page 46 for the SL-T65 to T100 and N125 to N800 mechanically latched contactors.

(7) The lead terminals of UN-SA7□ are square-tipped crimp lugs.

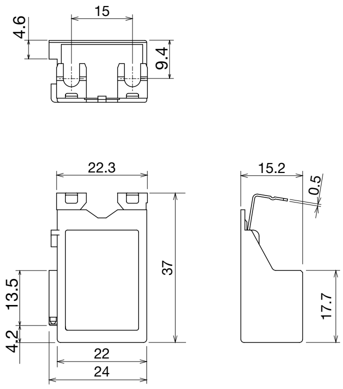
(8) The surge absorber is designed to suppress the surge from magnetic contactors. The warranty does not cover external surges. Extreme external surges may damage the product.

(9) The units that can be used with the spring clamp terminal models are marked with "SQ" in the Applicable Models column.
For the spring clamp terminal models, refer to pages 125 and 175.

8 Optional Units

Outline Drawings

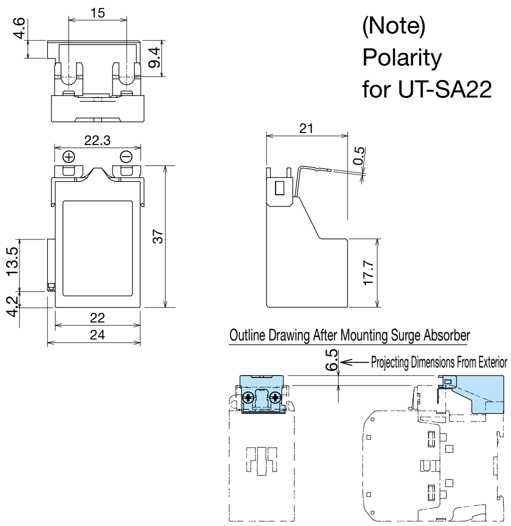
UT-SA21
UT-SA23
UT-SA13



0.013kg

The outline drawings of magnetic contactors and contactor relays do not change after mounting.

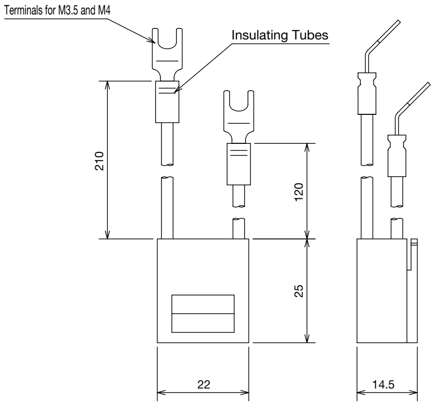
UT-SA22
UT-SA25

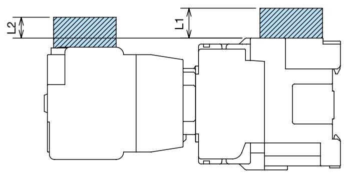


(Note)
Polarity
for UT-SA22

0.018kg

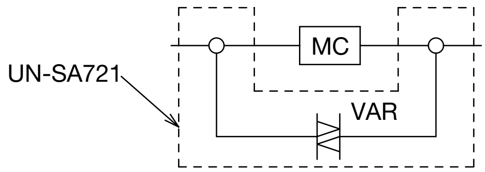
UN-SA721





0.02kg

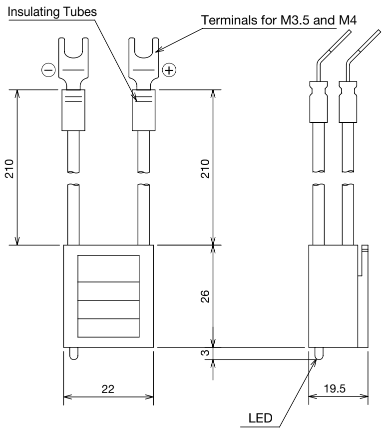
Connection Example (Connection Diagram)

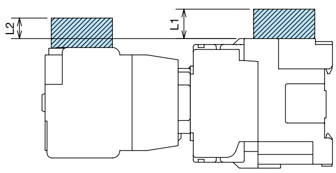


When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

Applicable Models	L1 Dimension	L2 Dimension
SL(D)-T21 to T50 (Tripping Coil) SRL(D)-T5 (Tripping Coil)		2
SD-T65, T80 DUD-N30 SL(D)-T65, T80 (Tripping Coil)	4.5	
SR-K100	12.5	
SRD-K100	6.5	
SRL(D)-K100	12.5	0.5

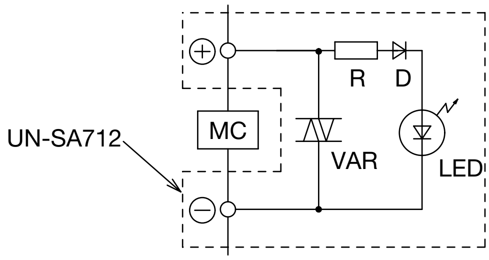
UN-SA712





0.025kg

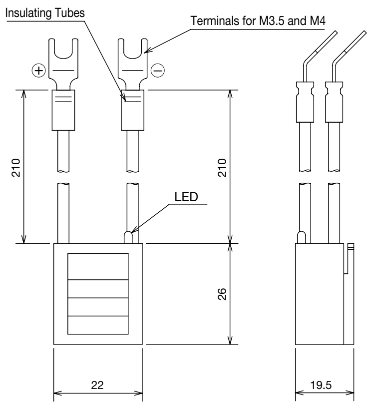
Connection Example (Connection Diagram)

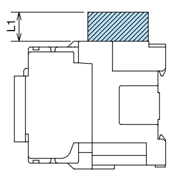


When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

Applicable Models	L1 Dimension	L2 Dimension
SL(D)-T21 to T50 (Tripping Coil) SRL(D)-T5 (Tripping Coil)		7
SR-K100	17.5	
SRD-K100	11.5	
SRL(D)-K100	17.5	5.5

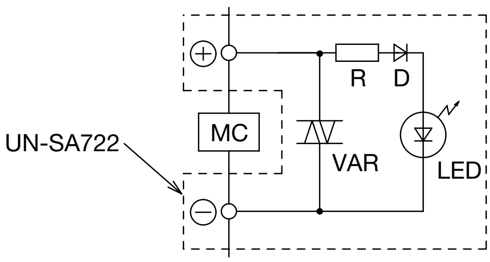
UN-SA722





0.025kg

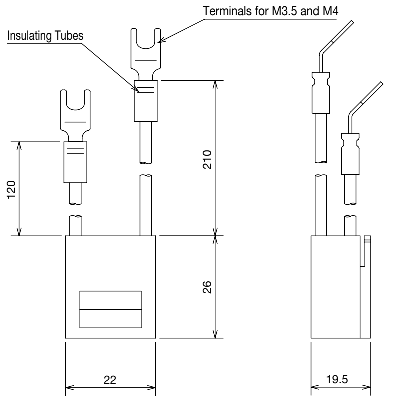
Connection Example (Connection Diagram)

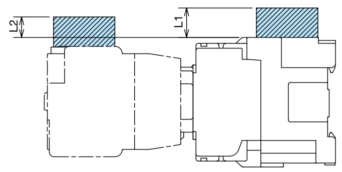


When attached to the body of a magnetic contactor, the body exterior becomes larger by the following dimensions.

Applicable Models	L1 Dimension
SD-T65, T80 DUD-N30 SL(D)-T65, T80 (Tripping Coil)	9.5

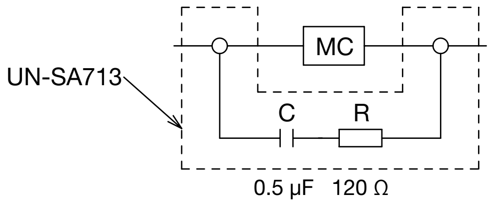
UN-SA713





0.025kg

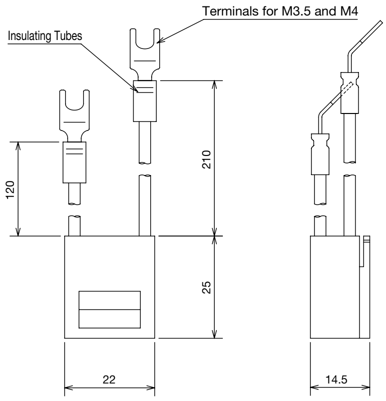
Connection Example (Connection Diagram)

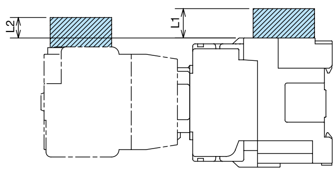


When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

Applicable Models	L1 Dimension	L2 Dimension
SL(D)-T21 to T50 (Tripping Coil) SRL(D)-T5 (Tripping Coil)		7
SD-T65, T80 DUD-N30 SL(D)-T65, T80 (Tripping Coil)	4.5	
SRD-K100	11.5	
SRLD-K100	17.5	5.5

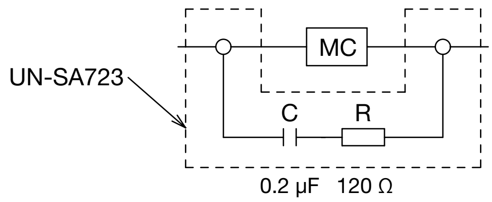
UN-SA723





0.02kg

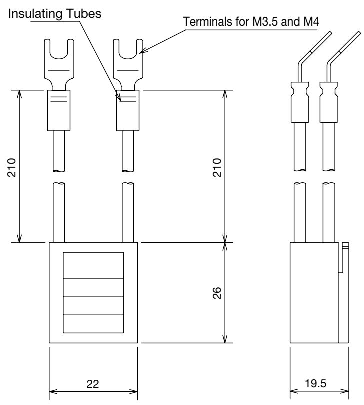
Connection Example (Connection Diagram)

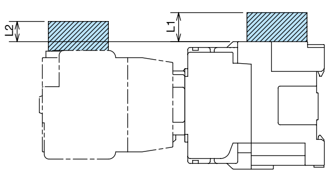


When attached to the body of a magnetic contactor or contactor relay, the body exterior becomes larger by the following dimensions.

Applicable Models	L1 Dimension	L2 Dimension
SL(D)-T21 to T50 (Tripping Coil) SRL(D)-T5 (Tripping Coil) SL(D)-T65, T80 (Tripping Coil)		2
SR-K100	12.5	
SRL-K100	12.5	0.5

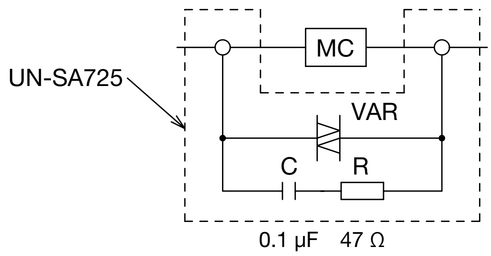
UN-SA725





0.025kg

Connection Example (Connection Diagram)



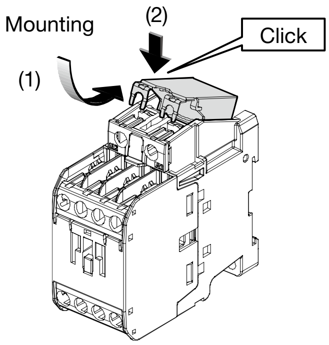
When attached to the body of a magnetic contactor, the body exterior becomes larger by the following dimensions.

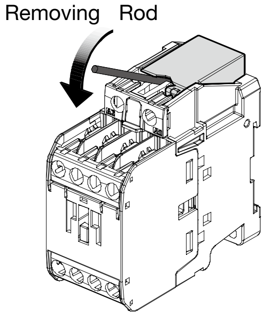
Applicable Models	L1 Dimension	L2 Dimension
SL(D)-T21 to T50 (Tripping Coil) SRL(D)-T5 (Tripping Coil)		7
SD-T65, T80 DUD-N30 SL(D)-T65, T80 (Tripping Coil)	9.5	
SR-K100	17.5	
SRD-K100	11.5	
SRL(D)-K100	17.5	5.5

Mounting Method

(1) UT-SA13, SA21, SA22, SA23, SA25

Mounting Method

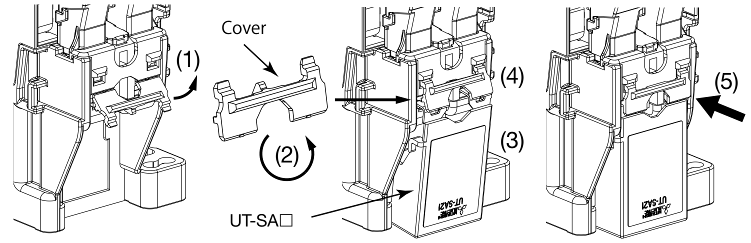


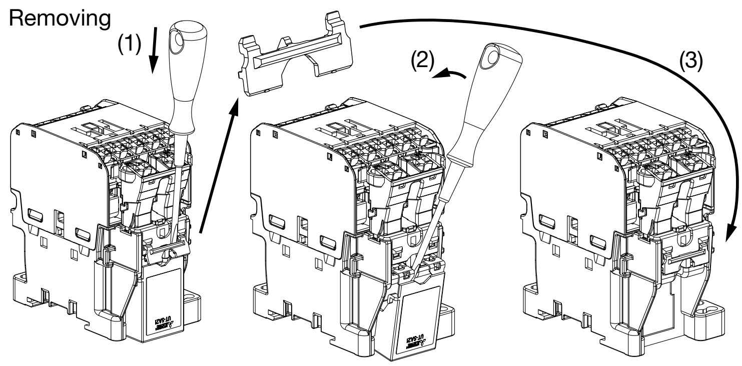


[Note]
Co-fasten the terminal of the surge absorber and the coil terminal

Note. Loosen the screws of the coil terminals A1 and A2 of the magnetic contactor or contactor relay (not necessary for models with wiring streamlining terminals (model names "BC" and "CX")), then insert in the direction of the arrow as shown in the figure above (insert the protrusion into the groove after the conductor is inserted into the coil terminal).

Spring Clamp Terminals

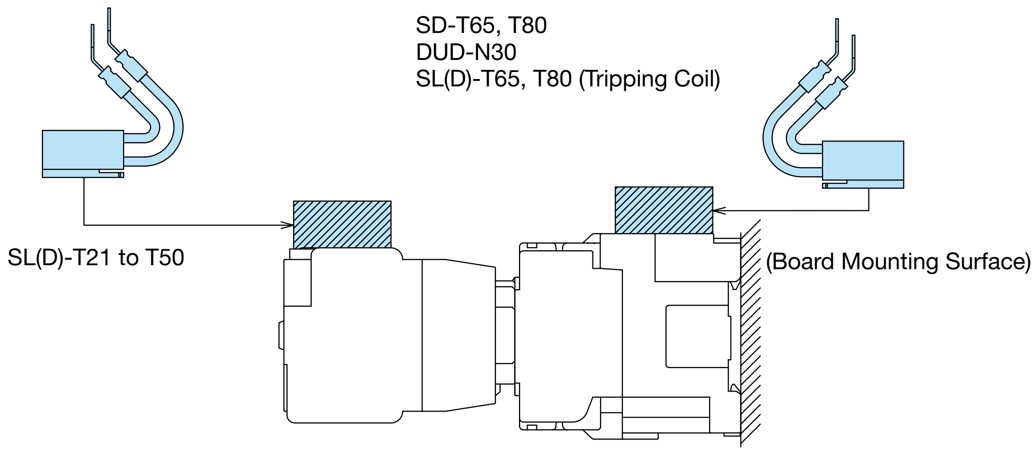




Note. If the cover removed from the product cannot be reinstalled, cover the live part with insulation tape or other items.

(2) UN-SA712, SA713, SA721, SA722, SA723, SA725

(1) The body of the surge absorber is pushed into the groove provided in the upper part of the magnetic contactor or contactor relay in the direction of the arrow as shown in the figure below.



(2) Mount the magnetic contactor or contactor relay on the mounting surface of the panel.
(3) Co-fasten the terminal of the surge absorber to the operation coil terminal. (As the lead wire of the surge absorber is made long, bundle it, etc. as needed.)

Model Name	Model Name
UT-SA13	UN-SA712
UT-SA21	UN-SA713
UT-SA22	UN-SA721
UT-SA23	UN-SA722
UT-SA25	UN-SA723
	UN-SA725

8

8.6 UT/UN-SA33□ Main Circuit Surge Absorber Units

Connect to the load side of the magnetic starter or magnetic contactor that switches a three-phase or single-phase motor to suppress the surge voltage and noise generated when switching the contact and to reduce adverse effects on electronic circuits and the like.

- Front clip-on type and independent mounting type (allows both IEC 35 mm rail mounting and screw mounting) are available.
- The Front clip-on type can be mounted on the magnetic contactor with a single touch, while the contact pin simultaneously contacts and connects to the terminal screw.

Front Clip-on
UT-SA3320

Independent
Mounting
UN-SA33

Type

Model Name	Mounting Method	Internal Element Specifications	Rated Voltage/Frequency	Applicable Models
UT-SA3320	Front Clip-on	(0.3μF + 60Ω)×3	AC240V 50/60Hz	S-T10, T12, T20(BC) SD-T12, T20(BC)
UT-SA3332	Front Clip-on	(0.3μF + 60Ω)×3		S-T21, T25, T32(BC) SD-T21, T32(BC)
UN-SA33	Independent Mounting	(0.5μF + 50Ω)×3		S-T10 to T100 SD-T12 to T100 S-N125 to N800 SD-N125 to N800 SD-Q11, SD-Q12

Specifications

Withstand Voltage		Insulation Resistance	Superimposed Pulse Conditions (Maximum)		Maximum Applied Voltage	Mechanical Durability (Front Clip-on Type)
Between Terminals	Between Terminal - Case		Peak Value	Pulse Width		
AC600 V for 1 Minute	AC2000 V for 1 Minute	300 M Ω or More	2000 V	1 μ sec.	800 V	10 mil. times

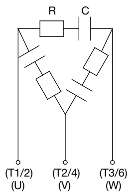
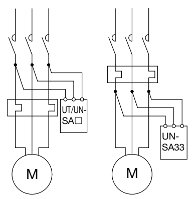
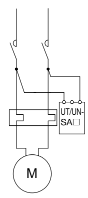
Precautions for Use

(1) Try to connect UN-SA33 near the source of surges, noise and the like.

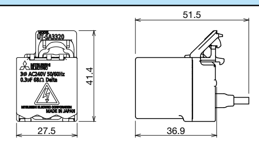
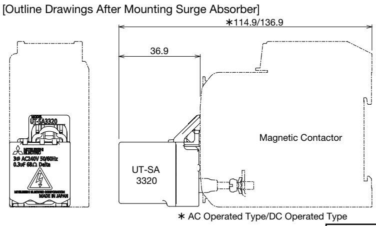
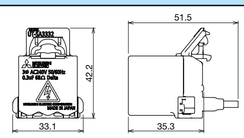
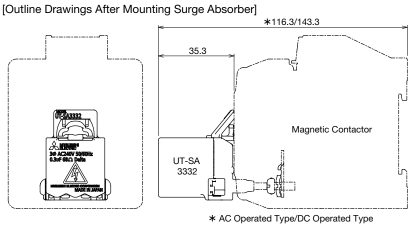
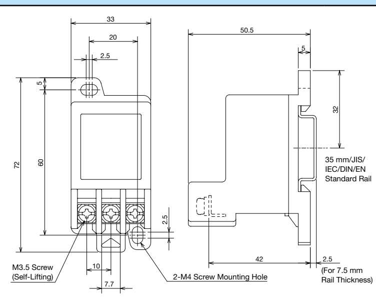
(2) Do not use it for circuits with a large amount of highfrequency components such as an inverter circuit.

(3) Do not use it on the load side of a device with a small contact capacity such as a relay.

Connecting

Internal Connection	Connection Example	
	Three-Phase Circuit	Single-Phase Circuit
		

Outline Drawings

UT-SA3320	UT-SA3332	UN-SA33
 [Outline Drawings After Mounting Surge Absorber]  0.03kg	 [Outline Drawings After Mounting Surge Absorber]  0.03kg	 0.078kg

[Applicable Terminal Wires]

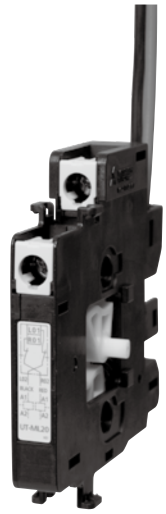
Applicable Wire Size	Applicable Ring Crimp Lug Size
φ1.2 to φ1.6mm 1.25 to 2mm²	1.25—3.5 to 2—3.5

Model Name	Model Name	Model Name
UT-SA3320	UT-SA3332	UN-SA33

8.7 UT/UN-ML□ Mechanical Interlock Units

A reversible magnetic contactor can be configured.

- The mechanical interlock prevents the simultaneous energization of 2 magnetic contactors by mechanically locking them. It can be combined with a main circuit conductor kit (UT/UN-SD□, SG□) to easily configure the reversible magnetic contactor and magnetic contactor for power switching.
- UT-ML20(BC) has 2 built-in break contacts, which can be used to configure an electrical interlock. Do not use these break contacts for applications other than the electrical interlock.
  As models other than UT-ML20(BC) have no built-in break contact, be sure to use the auxiliary break contacts of the magnetic contactor for the electrical interlock.



UT-ML20

UN-ML21

Format

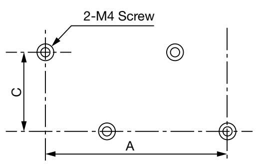
Mechanical Interlock Model Name	Applicable Magnetic Contactor Model		
	AC Operated	DC Operated	Mechanically Latched Type
UT-ML20	S-T10,T12,T20 (Note 3)	SD-T12,T20	—
UT-ML20BC	S-T10BC,T12BC,T20BC (Note 3)	SD-T12BC,T20BC	—
UN-ML21	S-T21 to T80 S-T21BC to T50BC S-N38,N48 DU-N30	SD-T21 to T80 SD-T21BC to T50BC DUD-N30	SL(D)-T21 to T80 SL(D)-T21 to T50BC
UN-ML80	S-T100 S-N125 DU-N60	SD-T100 SD-N125 DUD-N60	SL(D)-T100 SL(D)-N125
UN-ML150	S-N150,DU-N120	SD-N150,DUD-N120	SL(D)-N150
UN-ML220	S-N180,N220,N300,N400 DU-N180,N260	SD-N220,N300,N400 DUD-N180,N260	SL(D)-N220 SL(D)-N300,N400

Note 1. "-" indicates outside production range.
Note 2. UT-ML11BC and UT-ML20BC are the model names with wiring streamlining terminals.
Note 3. The units can be combined with the contactors produced in March, 2019 and later.

Mounting

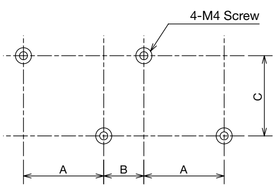
Hole Drilling Dimension

(Drilling of holes is not required when mounting the IEC 35 mm rail mountable model is mounted to the IEC 35 mm rail for reversing.)

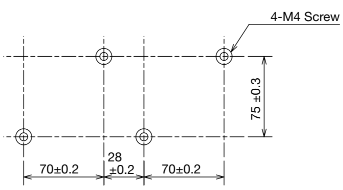


Model	Applicable Frames	Dimensions [mm]		
		A ±0.2	B ±0.2	C ±0.3
UT-ML20(BC)	T10	74	—	60
	S-T12,T20	89	—	60
	SD-T12,T20	89	—	60

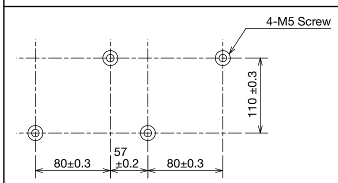
Applicable Terminal Wire Size [φ mm, mm²]	Applicable Crimp Lug Size	Terminal Screw Tightening Torque N·m
φ1.6 0.75 to 2	1.25-3.5 to 2-3.5	0.94 to 1.51



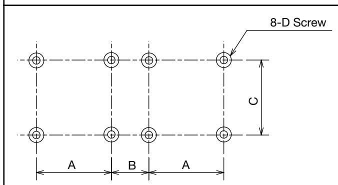
Mechanical Interlock	Applicable Frames	Dimensions [mm]		
		A±0.2	B±0.2	C±0.3
UN-ML21	T21,T25	54	19	60
	T35,T50	65	20	70
	S-T32	30	23	60
	SD-T32	32	21	67
	N38,N48	40	24	80



Mechanical Interlock	Applicable Frames
UN-ML21	T65,T80



Mechanical Interlock	Applicable Frames
UN-ML80	T100



Mechanical Interlock	Applicable Frames	Dimensions			
		A±0.2	B±0.2	C±0.3	D
UN-ML80	N125	90	49	125	M4
UN-ML150	N150	100	39.5	125	M5
UN-ML220	N180,N220	120	40	190	M6
	N300,N400	145	37	225	M8

8

8 Optional Units

● **UT-ML20(BC)**

(1) Hook the load side barrier of the magnetic contactor to the load side claw A of the interlock unit.
(2) Allot the lever (1) of the interlock unit to the lever insert hole (2) of the magnetic contactor side, and the insert protrusion (3) to the unit mounting hole (4).
(3) Press the interlock unit and magnetic contactor against each other, and hook up the power supply side claw B and power supply side barrier of the magnetic contactor.

Important Matters

In this state, make sure that the cross bar head (5) on one side moves smoothly when pressed. Similarly, check the other magnetic contactor.
If the cross bar head is constrained and does not move, rearrange.

(4) Align the rail (7) of the connecting plate in the groove (6) at the bottom of the left and right magnetic contactors, and push until you hear a click.
(5) Connect the lead wire (8) of the interlock unit to the coil terminal A1.
Lead R02 (Red) → To Right Magnetic Contactor Coil Terminal A1
Lead L02 (Black) → To Left Magnetic Contactor Coil Terminal A1
(6) Wire the control circuit as follows.

Right Coil Terminal A2	←	Right Contactor Control Circuit	→	Interlock Unit Terminal R01
Left Coil Terminal A2	←	Left Contactor Control Circuit	→	Interlock Unit Terminal L01

Important Matters

When the cross bar head (5) of one of the magnetic contactors is pushed in, if it moves smoothly and one side is pushed in, make sure for both left and right that the other side is not pushed in.

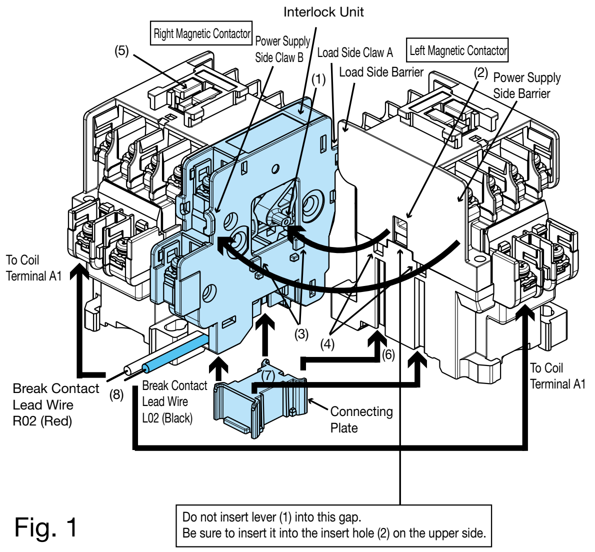


Fig. 1

Mounting Method

● UN-ML21[See Fig. 2]

(1) Allot the lever (1) of the interlock unit to the lever insert hole (2) of the magnetic contactor side, and the insert protrusion (3) to the unit mounting hole (4), then sandwich the interlock unit with the left and right magnetic contactors without a gap.

(2) Align the rail (7) of the connecting plate in the groove (6) at the bottom of the left and right magnetic contactors, and push the connecting plate until the protrusion (9) fits into the hook (8) of the interlock and you hear a click.

Important Matters

When the cross bar head (5) of one of the magnetic contactors is pushed in, if it moves smoothly and one side is pushed in, make sure for both left and right that the other side is not pushed in.

UN-ML21

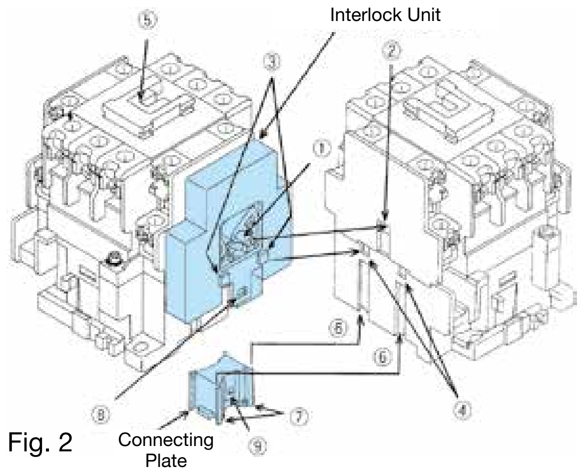


Fig. 2

● UN-ML80, ML150, ML220

(1) Drill holes for the mounting screws of the magnetic contactor in the panel.

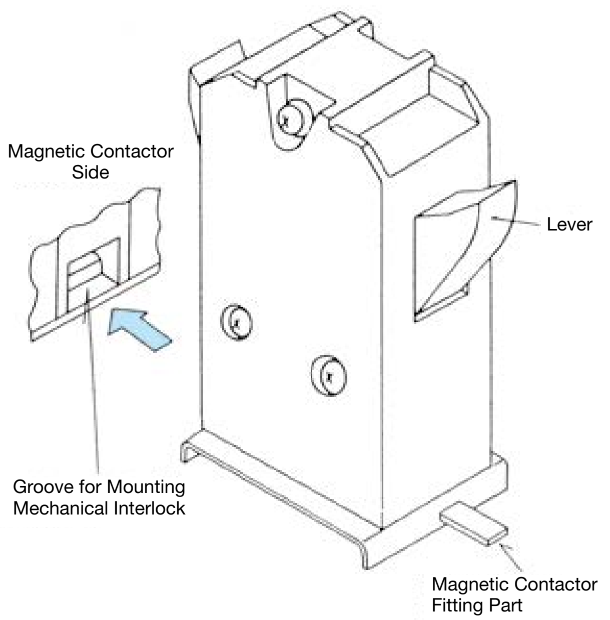
(2) Mount one of the magnetic contactors on the panel.

(3) Insert the lever of the mechanical interlock unit into the square hole provided on the magnetic contactor side, and insert the fitting portion provided at the bottom into the mounting groove of the magnetic contactor side.

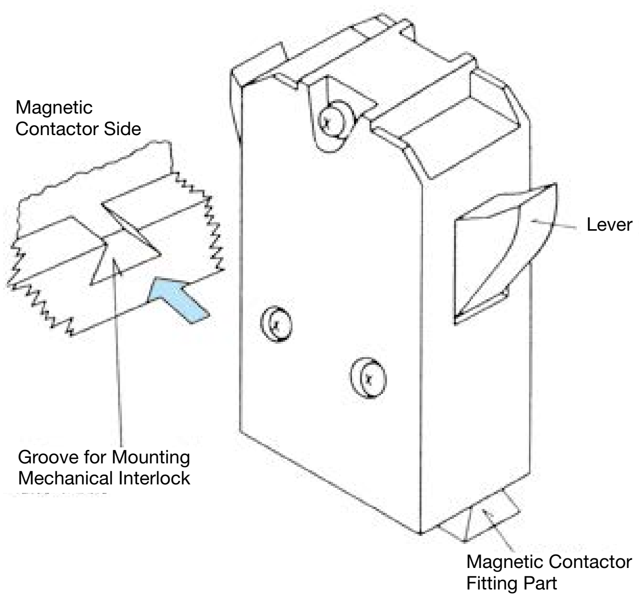
(4) Mount the panel on the other magnetic contactor to sandwich the mechanical interlock unit. Make sure that the mechanical interlock unit is sandwiched by the left and right magnetic contactors without a gap.

Important Matters

When the cross bar head of one of the magnetic contactors is pushed in, if it moves smoothly and one side is pushed in, make sure for both left and right that the other side is not pushed in.



UN-ML80



UN-ML150, ML220

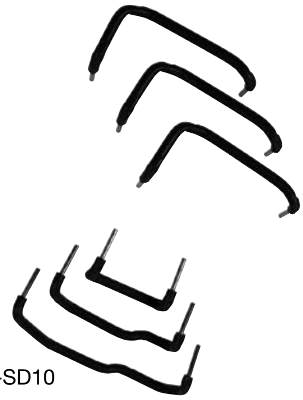
Outline Drawings

Refer to the reversible types on pages 77, 93 and 106 for the outline drawings when combined with a magnetic contactor.

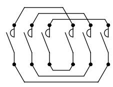
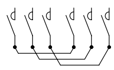
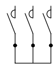
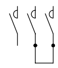
Model Name	Model Name	Model Name
UT-ML20	UN-ML21	UN-ML150
UT-ML20BC	UN-ML80	UN-ML220

8.8 UT/UN-SD□, SG□, YD□, UN-YG□ Main Circuit Conductor Kits

Main circuit conductor kits can be used for the wiring rationalization of reversible magnetic contactors, power switches, star-delta starters, etc.
Combine the mechanical interlock unit (UT/UN-ML□) and electrical interlock when configuring the reversible type.



UT-SD10

Applicable Magnetic Contactor Frame	Reversing Type 	Crossover Type 	3-Pole Short-Circuit Type 	2-Pole Short-Circuit Type 
T10	UT-SD10	UT-SG10	—	UT-YD20
T12,T20	UT-SD20	UT-SG20	—	
T21,T25	UT-SD25	UT-SG25	UN-YG21	UN-YD21
T32	UN-SD18CX	UN-SG18CX	UN-YG21	UN-YD21
T35,T50	UN-SD25CX	UN-SG25CX	UN-YG25	UN-YD25
N38,N48	—	—		
T65,T80	UN-SD50	UN-SG50	UN-YG50	UN-YD50
T100	UN-SD80	UN-SG80	UN-YG80	UN-YD80
N125	UN-SD125	UN-SG125	UN-YG80	UN-YD80
N150	UN-SD150	UN-SG150	UN-YG150	UN-YD150
N180,N220	UN-SD220	UN-SG220	UN-YG220	UN-YD220
N300,N400	UN-SD300	UN-SG300	UN-YG300	UN-YD300
N600,N800	UN-SD600	UN-SG600	—	—
Remarks	The kit contains six conductors per set. Power supply side and load side conductors are available, and therefore care should be taken when connecting.	The kit contains three conductors per set. The conductors can be connected to the power supply terminal.	2 conductors are required when configuring the 3-pole parallel circuit. When using on the power supply side, mount after wiring the coil.	2 conductors are required when configuring the 3-pole series circuit.

Note 1. For UN-SD□ CX/SG□ CX, ring crimp lugs have insulation tubes.
Note 2. UN-YG□ and UN-YD□ are to be purchased separately from the magnetic contactor and mounted by the customer. While UN-YG21 to YG80 and UN-YD21 to YD80 can be mounted directly to the magnetic contactor terminal, perform the following procedure when mounting UN-YG150 to YG300 and UN-YD150 to YD300.
(1) Loosen the arc box mounting screws (2 pcs.) and remove the arc box.
(2) Remove the insulation barrier of the terminal where the conductor will be mounted.
(3) Mount the arc box.
(4) Mount the conductor.
Note 3. UT/UN-SD□ and SG□ are for magnetic contactors. A thermal overload relay cannot be added after mounting. (Excluding UT-SD10 to SD25, UN-SD18CX, UN-SD50 and SD80)
Note 4. When using UN-YG□ and YD□, UN-CZ□ live part protection cover cannot be mounted.

Model Name	Minimum Order Unit	Model Name	Minimum Order Unit
UT-SD10	5 (for 5 Units)	UT-SG10	5
UT-SD20	5 (for 5 Units)	UT-SG20	5
UT-SD25	5 (for 5 Units)	UT-SG25	5
UN-SD18CX	5 (for 5 Units)	UN-SG18CX	5
UN-SD25CX	5 (for 5 Units)	UN-SG25CX	5
UN-SD50	1 (for 1 Unit)	UN-SG50	1
UN-SD80	1 (for 1 Unit)	UN-SG80	1
UN-SD125	1 (for 1 Unit)	UN-SG125	1
UN-SD150	1 (for 1 Unit)	UN-SG150	1
UN-SD220	1 (for 1 Unit)	UN-SG220	1
UN-SD300	1 (for 1 Unit)	UN-SG300	1
UN-SD600	1 (for 1 Unit)	UN-SG600	1
UN-YG21	20	UT-YD20	20
UN-YG25	20	UN-YD21	20
UN-YG50	10	UN-YD25	20
UN-YG80	10	UN-YD50	10
UN-YG150	10	UN-YD80	10
UN-YG220	5	UN-YD150	10
UN-YG300	5	UN-YD220	5
		UN-YD300	5

8.9 UT/UN-YY☐ 3-Pole Array Connection Units

Ideal for single-phase resistive loads of power supply devices, electric heaters, water heaters, etc.
By attaching a 3-pole array connection unit to the main circuit terminal (power supply side, load side) of the standard type magnetic contactor, it can be used as a magnetic contactor for single-phase resistive loads.

● Model Name

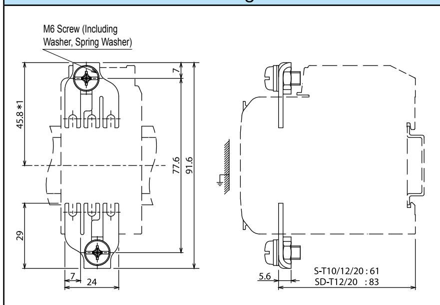
Unit Model Name	Applicable Models			Rating [A]	Terminal Screw Size	Switching Life [x 10000]
	AC Operated Product	DC Operated Product	Latched Type	AC-1 AC100 to 220 V		
UT-YY20	S-T10/T12/T20	SD-T12/T20	–	40	M6	50
UN-YY21	S-T21	SD-T21	SL(D)-T21	65		
	S-T25	–	–	80		
	S-T32	SD-T32	–	100		
UN-YY35	S-T35	SD-T35	SL(D)-T35	125	M8	
	S-T50	SD-T50	SL(D)-T50	200		25
UN-YY50	S-T65	SD-T65	SL(D)-T65	250		
	S-T80	SD-T80	SL(D)-T80	315		
UN-YY80	S-T100	SD-T100	SL(D)-T100		M8×2	
UN-YY125	S-N125	SD-N125	SL(D)-N125	400	M10×2	
UN-YY150	S-N150	SD-N150	SL(D)-N150	500	M12×2	

UN-YY35

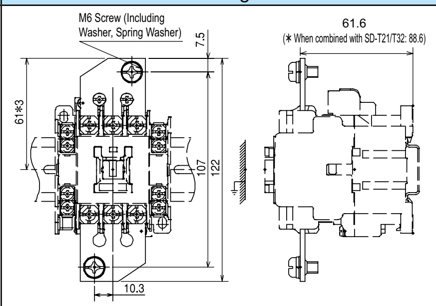
Note 1. Please consult us regarding the combination of models other than the above.
Note 2. The power supply side and load side make up a set of 2.
Note 3. When installing UN-YY150, follow the steps below.
(1) Loosen the arc box mounting screws (2 pcs.) and remove the arc box.
(2) Remove the insulation barrier of the terminal where the conductor will be mounted.
(3) Mount the arc box. (4) Mount the conductor.
Note 4. Minimum Order Unit 1 (for 1 Unit)

● Outline Drawing

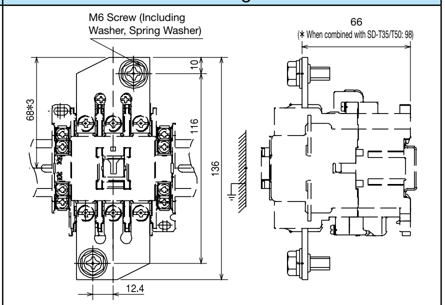
When Combining UT-YY20



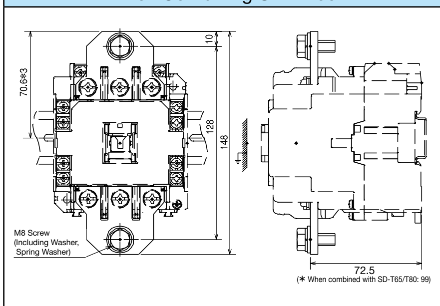
When Combining UN-YY21



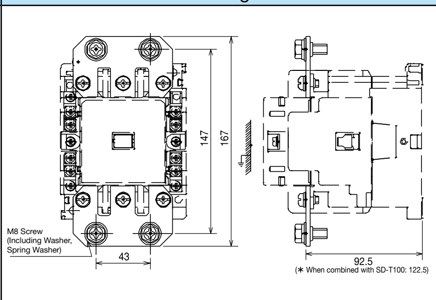
When Combining UN-YY35



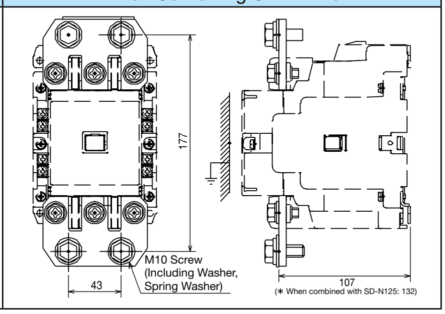
When Combining UN-YY50



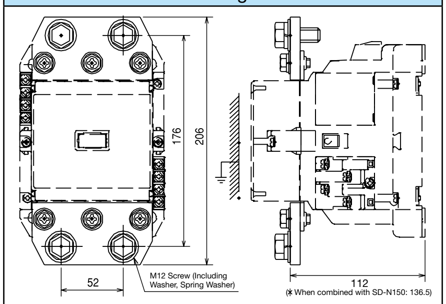
When Combining UN-YY80



When Combining UN-YY125



When Combining UN-YY150



∗1 : Install the 3-pole array connection unit once the coil terminal has been tightened.
∗2 : A live part protection cover cannot be attached.
∗3 : UN-YY21 and UN-YY35 cannot be installed together with UT-SY☐.

Model Name	Model Name
UT-YY20	UN-YY50
UN-YY21	UN-YY80
UN-YY35	UN-YY125
	UN-YY150

●Terminal Screw Tightening Torque

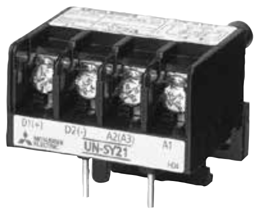
Screw Size	Tightening Torque (N·m)
M6	3.53 to 5.78
M8	6.28 to 10.29
M10	11.8 to 19.1
M12	19.6 to 31.3

8.10 UT/UN-SY□ DC/AC Interface Units for Operation Coils

DC/AC interface unit for operation coils that switches AC-operated magnetic contactors and contactor relays at the output (DC24 V) of electronics such as PLCs. Both contactless (triac) output and contact (relay) output are available.

● Model

Unit Model	Output Method	Unit Mounting Method	Applicable Magnetic Contactor, Contactor Relay Model
UT-SY21	Contactless Output (Triac Output)	Top-On Additional Mounting	S-T10 to T50 SR-T5, T9
UT-SY21BC			
UT-SY22	Contact Output (Relay Output)		
UT-SY22BC			
UN-SY11	Contactless Output (Triac Output)	Independent Mounting	S-T10 to T100 SR-T5, T9 S-N125 to N400 SR-K100
UN-SY12	Contact Output (Relay Output)		
UN-SY21	Contactless Output (Triac Output)	Top-On Additional Mounting	S-N38, N48
UN-SY21CX			S-N38CX, N48CX
UN-SY31			S-T65, T80
UN-SY22	Contact Output (Relay Output)		S-N38, N48
UN-SY22CX			S-N38CX, N48CX
UN-SY32			S-T65, T80



UN-SY21

UT-SY21

Note 1. The coil voltage designation of AC100V or AC200V can be applied for the operation coil.
Note 2. UT-SY□BC is the model name with wiring streamlining terminals.
Note 3. UN-SY□CX is the model name with CAN terminals.

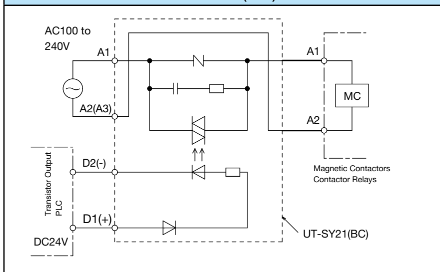
● Specifications

Model			UT-SY21(BC)	UT-SY22(BC)	UN-SY11	UN-SY21(CX)	UN-SY31	UN-SY12	UN-SY22(CX)	UN-SY32
Input Section	Rated Operational Voltage		DC24 V		DC24 V					
	Tolerable Voltage Fluctuation		85 to 110% of Rated Operational Voltage		85 to 110% of Rated Operational Voltage					
	Current		15 mA	10 mA	15 mA			10 mA		
	Power Consumption		0.4 W	0.24 W	0.4 W			0.24 W		
	Minimum Closing Voltage		18 V	18 V	18 V			18 V		
	Maximum Openning Voltage		4 V	1 V	4 V			1 V		
Output Section	Output Specifications		Contactless Output (Triac Output)	Contact Output	Contactless Output (Triac Output)			Contact Output		
	Rated working Voltage		AC100 to AC240 V 50/60 Hz		AC100 to AC240 V 50/60 Hz					
	Rated Operational Current		0.5 A, AC-15		0.5 A, AC-15					
	Leakage Current when open		5 mA/240 V	None	5 mA/240 V			None		
	Operating Time		1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit	10 ms or less	1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit			10 ms or less		
	Durability	Mechanical	—	5 mil. times	—			5 mil. times		
		Electrical	—	5 mil. times	—			1 mil. times (Note 1)	5 mil. times	1 mil. times
Working Temperature			-10℃ to 55℃		-10℃ to 55℃					
Applicable Terminal Wire	Wire		φ1.6mm, 0.75 to 2.5mm²		φ1.6mm,1.25 to 2mm²					
	Crimp minal		1.25-3.5, 2-3.5		1.25-3.5, 2-3.5					
	Tightening Torque		0.9 to 1.5 N · m		0.9 to 1.5 N · m					

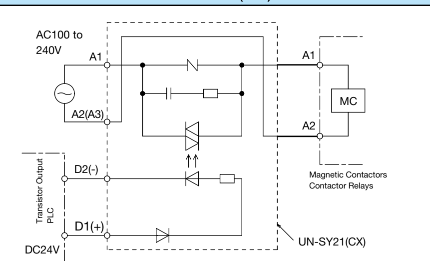
Note 1. Using UN-SY12 and SR-K100 in combination achieves 5 million times.

● Connection Example (Connection Diagram)

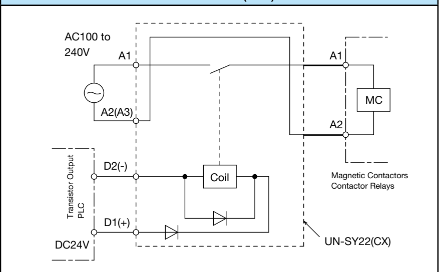
UT-SY21(BC)



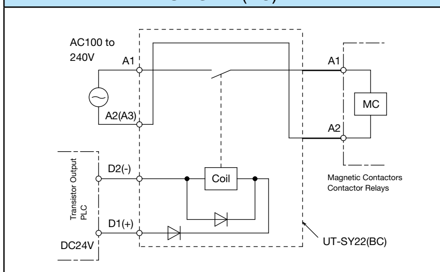
UN-SY21(CX)



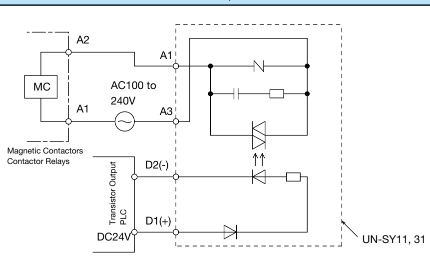
UN-SY22(CX)



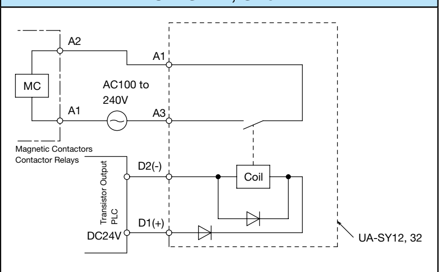
UT-SY22(BC)



UN-SY11, SY31

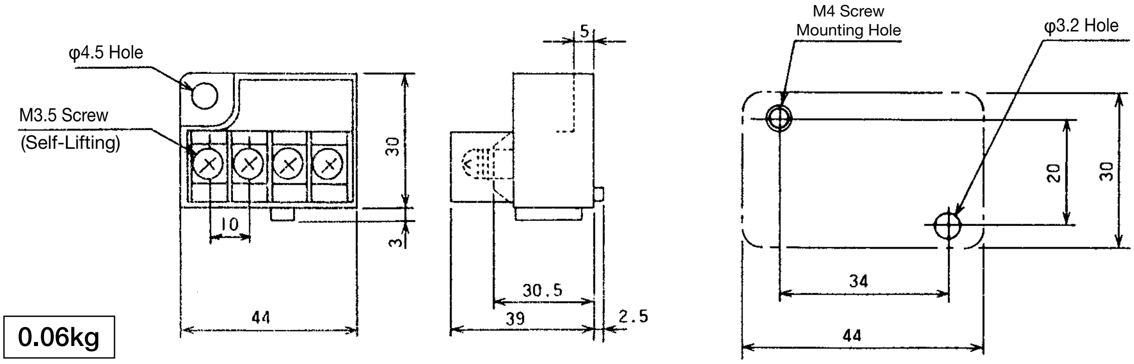


UN-SY12, SY32



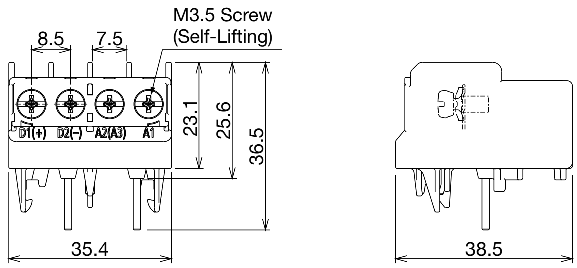
Outline Drawings/Mounting

(1) UN-SY11, SY12 (Independent Mounting)
Cannot be directly attached to a magnetic contactor or contactor relay: screw-mount into holes drilled at the following dimensions near the magnetic contactor.



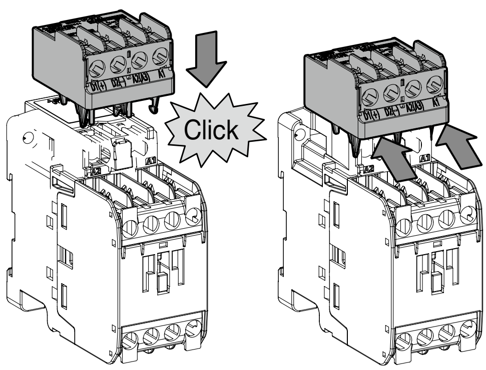
0.06kg

(2) UT-SY21, SY22



0.03kg

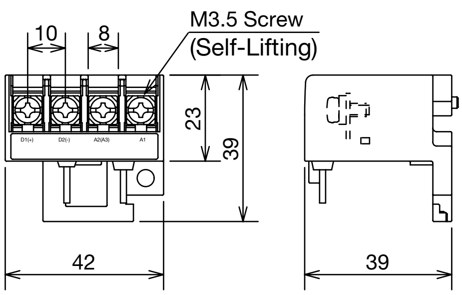
Outline Drawings

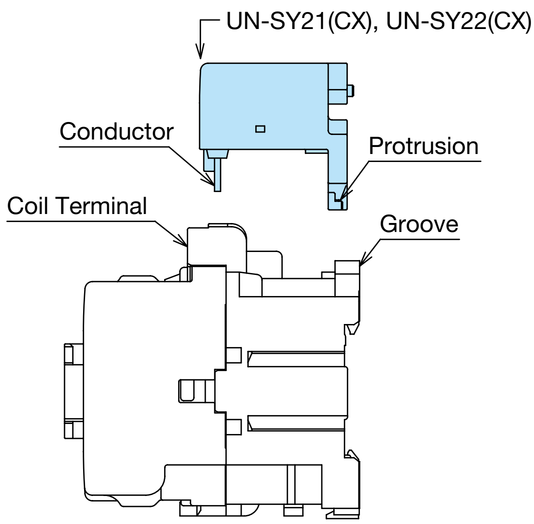


Mounting Method

Removal Method

UN-SY21(CX), SY22(CX) [Figure Has No CX]



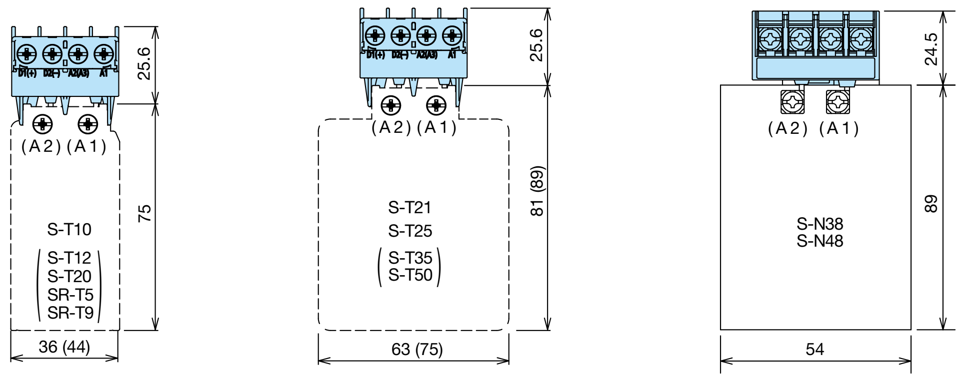


0.04kg

Outline Drawings

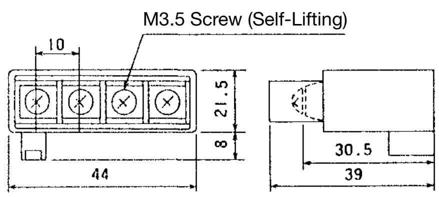
Mounting Method

<Mounting Method> Loosen the screws of the coil terminals A1 and A2 of the magnetic contactor or contactor relay, insert the protrusion of the DC/AC interface unit into the groove, then insert and fasten the conductor into the coil terminal.



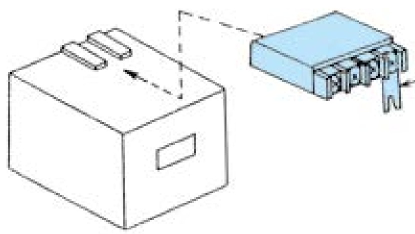
Dimensions After Additional Mounting

(3) UN-SY31, SY32



Outline Drawings

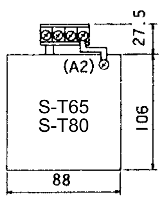
0.04kg



Mounting Method

<Mounting Method>

Remove the screws of the coil terminal A2 of the magnetic contactor, align the protrusion of the DC/AC interface unit and groove of the magnetic contactor while the supplied connecting conductor is mounted on the A1 terminal of the DC/AC interface unit, then tighten the connecting conductor with the removed coil terminal screws.



Dimensions After Additional Mounting

Model Name	Model Name	Model Name
UT-SY21	UN-SY11	UN-SY12
UT-SY21BC	UN-SY21	UN-SY21CX
UT-SY22	UN-SY22	UN-SY22CX
UT-SY22BC	UN-SY31	UN-SY32

8.11 UT/UN-CV☐ and CZ☐Live Part Protection Cover Units

Covers for preventing inadvertent contact with live parts after wiring in panel mounting.

● Applicable Models→Model Names for Live Part Protection Covers

		Applicable Models			Model Names for Live Part Protection Covers	
		AC Operated	DC Operated	Mechanically Latched Type	For Magnetic Contactors	For Thermal Overload Relays
Magnetic Starters/Magnetic Contactors	Non-Reversing	S-N38/N48	–	–	UN-CV250	–
		S-T65/T80, DU-N30	SD-T65/T80, DUD-N30	SL(D)-T65/T80	UN-CZ500 (2 Units Required for Power Supply and Load Sides) (Note 8 *1)	–
		S-T100, B-N65	SD-T100, BD-N65	SL(D)-T100	UN-CZ800 (2 Units Required for Power Supply and Load Sides) (Note 8 *2)	–
		S-N125,B-N100,DU-N60	SD-N125,BD-N100, DUD-N60	SL(D)-N125	UN-CZ1250 (2 Units Required for Power Supply and Load Sides) (Note 8 *2)	–
		S-N150,DU-N120	SD-N150,DUD-N120	SL(D)-N150	UN-CZ1500 (2 Units Required for Power Supply and Load Sides) (Note 8 *2)	–
		S-N180/N220,DU-N180	SD-N220,DUD-N180	SL(D)-N220	UN-CZ2200 (2 Units Required for Power Supply and Load Sides) (Note 8 *2)	–
		S-N300/N400,DU-N260	SD-N300/ N400,DUD-N260	SL(D)-N300/N400	UN-CZ3000 (2 Units Required for Power Supply and Load Sides)(Note 8 *2)	–
		MSO-T65/T80	MSOD-T65/T80	MSOL(D)-T65/T80	UN-CZ500 (Power Supply Side), UN-CZ501 (Load Side) (Note 8 *1)	–
		MSO-T100	MSOD-T100	MSOL(D)-T100	UN-CZ800 (Power Supply Side), UN-CZ801 (Load Side) (Note 8 *2)	–
		MSO-N125	MSOD-N125	MSOL(D)-N125	UN-CZ1250 (Power Supply Side), UN-CZ1251 (Load Side) (Note 8 *2)	–
		MSO-N150	MSOD-N150	MSOL(D)-N150	UN-CZ1500 (Power Supply Side), UN-CZ1501 (Load Side) (Note 8 *2)	–
		MSO-N180/N220	MSOD-N220	MSOL(D)-220	UN-CZ2200 (Power Supply Side), UN-CZ2201 (Load Side) (Note 8 *2)	–
		MSO-N300/N400	MSOD-N300/N400	MSOL(D)-N300/N400	UN-CZ3000 (Power Supply Side), UN-CZ3001 (Load Side) (Note 8 *2)	–
	Reversing	S-2 x T65/T80, DU-2 x N30	SD-2 x T65/T80, DUD-2 x N30	SL(D)-2 x T65/T80	UN-CZ502 (Note 8 *3)	–
		S-2 x T100	SD-2 x T100	SL(D)-2 x T100	UN-CZ802 (Note 8 *4)	–
		S-2 x N125, DU-2 x N60	SD-2 x N125, DUD-2 x N60	SL(D)-2 x N125	UN-CZ1252 (Note 8 *4)	–
		S-2 x N150, DU-2 x N120	SD-2 x N150, DUD-2 x N120	SL(D)-2 x N150	UN-CZ1502 (Note 8 *4)	–
		S-2 x N180/N220, DU-2 x N180	SD-2 x N220, DUD-2 x N180	SL(D)-2 x N220	UN-CZ2202 (Note 8 *4)	–
		S-2 x N300/N400, DU-2 x N260	SD-2 x N300/N400, DUD-2 x N260	SL(D)-2 x N300/N400	UN-CZ3002 (Note 8 *4)	–
		MSO-2 x T65/T80	MSOD-2 x T65/T80	MSOL(D)-2 x T65/T80	UN-CZ504 (Note 8 *3)	
		MSO-2 x T100	MSOD-2 x T100	MSOL(D)-2 x T100	UN-CZ804 (Note 8 *4)	
		MSO-2 x N125	MSOD-2 x N125	MSOL(D)-2 x N125	UN-CZ1254 (Note 8 *4)	
		MSO-2 x N150	MSOD-2 x N150	MSOL(D)-2 x N150	UN-CZ1504 (Note 8 *4)	
		MSO-2 x N180/N220	MSOD-2 x N220	MSOL(D)-2 x N220	UN-CZ2204 (Note 8 *4)	
		MSO-2 x N300/N400	MSOD-2 x N300/N400	MSOL(D)-2 x N300/N400	UN-CZ3004 (Note 8 *4)	
Thermal Overload Relays		TH-T65 (Not available with SR)			–	UN-CZ605 (Live Part Protection Cover)
		TH-T25/T50			–	UN-CV203 (Current Setting Dial Misoperation Prevention Cover) (Note 10)
		TH-T65/T100,TH-N120 to N600			–	UN-CV603 (Current Setting Dial Misoperation Prevention Cover) (Note 10)
		ET-N60			–	UN-CV602(Live Part Protection Cover)
Other		UN-AX2		–	UN-CV20	
		UN-AX4		–		
		UN-LL22		–		
		UN-AX80			UN-CZ808	
		S-T65/T80	SD-T65/T80	–	UN-CV117 (Magnetic Contactor Manual Operation Prevention Cover)	
		S-T10 to T50/B-T21/SR-T5 SQ	SD-T12 to T50/BD-T21/SRD-T5 SQ	–	UT-CV107 (Magnetic Contactor/Contactor Relay Manual Operation Prevention Cover)	

Note 1. Refer to page 194 for model names→applicable models for live part protection covers.
Note 2. UN-CZ☐1 collectively covers the load-side terminals and thermal overload relays of magnetic contactors. Since it is used by mounting on the magnetic contactor side, it cannot be used for the thermal overload relay alone.
Note 3. Avoid solvents such as strong alkali, aromatic hydrocarbons and chlorine, adhesion of oil or use in an excessively gaseous atmosphere.
Note 4. Since deformation may occur due to humidity, avoid use under high humidity as much as possible.
Note 5. UN-CZ☐2 and CZ☐4 come in a set as 4 covers that are necessary for the reversible magnetic contactor and reversible magnetic starter.
Note 6. When the live part protection covers UN-CV☐ and CZ☐ are used, the reset release UN-RR☐ for thermal overload relays cannot be used.
Note 7. Refer to page 343 regarding the live part protection cover UN-CV602 for ET-N60.
Note 8. Use the following live part protection covers for the mechanical latch mechanism of the mechanically latched type.
∗1: UN-CZ506 (1 pc) ∗2: UN-CZ806 (1 pc) ∗3: UN-CZ506 (2 pcs) ∗4: UN-CZ806 (2 pcs)
Note 9. UN-CV603 cannot be combined with TH-N120TAHZ.
Note 10. This is a misoperation prevention cover and not a live part protection cover.
Note 11. The units that can be used with the spring clamp terminal models are marked with "SQ" in the Applicable Models column.
For the spring clamp terminal models, refer to pages 125 and 175.

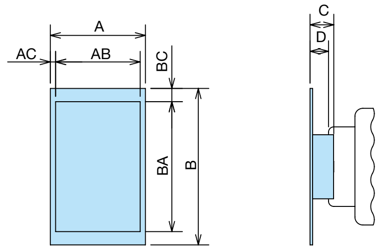
Potential Combinations of Live Part Protection Covers and Other Optional Units

Live Part Protection/Misoperation Prevention Covers		Auxiliary Contact Units (Including Low-Level Signals)				Main Circuit Surge Absorber Units	Reset Releases	Fluorescent Display Lamps	Main Circuit Conductor Kits	
Type	Model Name	UN-AX2 UN-AX4 UN-LL22	UN-AX11	UN-AX80	UN-AX150	UT-SA3320 UT-SA3332	UT/UN-RR□□	UN-TL□□	UT/UN-SD□□ UT/UN-SG□□	UN-YG□□ UT/UN-YD□□ UT/UN-YY□□
Contactor Manual Operation Prevention Cover	UT-CV107/UN-CV117	x	○	–	–	x/–	–	–	○	○
Live Part Protection Cover for UN-AX2/4	UN-CV20	○	○*1	–	–	–	x	x	–	–
Contactor Live Part Protection Cover	UN-CZ500	○*2	○*1	–	–	–	–	–	–	x
	UN-CZ800, CZ1250	–	–	○*3	–	–	–	–	–	x
	UN-CZ1500, CZ2200, CZ3000	–	–	–	○	–	–	–	–	x
Contactor/Thermal Relay Live Part Protection Cover	UN-CZ501	○*2	○*1	–	–	–	x	x	–	–
	UN-CZ801, CZ1251	–	–	○*3	–	–	x	x	–	–
	UN-CZ1501, CZ2201, CZ3001	–	–	–	○	–	x	x	–	–
Contactor Live Part Protection Cover	UN-CZ502	○*2	○*1	–	–	–	–	–	○	–
	UN-CZ802, CZ1252	–	–	○*3	–	–	–	–	○	–
	UN-CZ1502, CZ2202, CZ3002	–	–	–	○	–	–	–	○	–
Contactor/Thermal Relay Live Part Protection Cover	UN-CZ504	○*2	○*1	–	–	–	x	x	–	–
	UN-CZ804, CZ1254	–	–	○*3	–	–	x	x	–	–
	UN-CZ1504, CZ2204, CZ3004	–	–	–	○	–	x	x	–	–
Latch Mechanism Live Part Protection Cover	UN-CZ506	x	○*1	–	–	–	–	–	x	x
	UN-CZ806	–	–	○*3	–	–	–	–	x	x
TH-T65 Live Part Protection Cover	UN-CZ605	–	–	–	–	–	x	x	–	–
Thermal Dial Misoperation Prevention Cover	UN-CV203, CV603	–	–	–	–	–	x	x	–	–

Note 1. Meaning of the Symbols: ○ : Applicable, x: Not Applicable, -: Not Combinable
Note 2. Models with * have the following conditions.
*1: Since the body side is protected by a live part protection cover but UN-AX11 is not, use UN-AX11CX.
*2: Since the body side is protected by a live part protection cover but UN-AX2/4 is not, use UN-AX2/4CX or UN-CV20.
*3: Since the body side is protected by a live part protection cover but UN-AX80 is not, use the UN-CZ808 protection cover for UN-AX80.
Note 3. The following units other than the ones in the above table can be combined regardless of whether there is a live part protection cover.
(1) Operation Coil Surge Absorber Units: UN-SA721, SA712, SA722, SA713, SA723, SA725
(2) Interface Units: SY21(CX), SY31, SY22(CX), SY32
However, the live part of UN-SY21, SY22, SY31, and SY32 cannot be protected.
(3) Reversing Units: UN-ML21, ML80, ML150, ML220

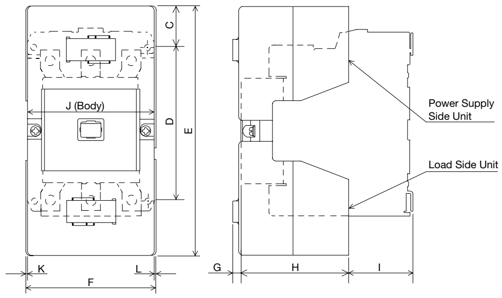
Outline Drawings

(1) UN-CV□□ (Table at right)
Cover Outline Drawings: A x B x C
Outline Drawings of Applicable Models: AB x BA
Depth that increases when the cover is attached: D
(- indicates that there is no change in the depth when the cover is attached.)

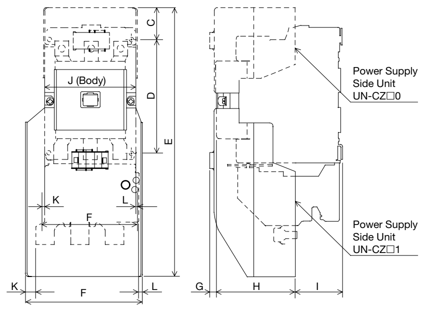


Model Name	Variable Dimensions							
	A	B	C	D	AB	BA	AC	BC
UN-CV20	43	80	6	1	43	78	0	0
UN-CV250	75	107	2.8	-	75	91	0	7.5
UN-CV203	27	28	20	5.5				
UN-CV603	29	27.5	19.2	5.5				
UN-CV117	23	29	7	2				

(2) UN-CZ500 to CZ3000 (Table at right)



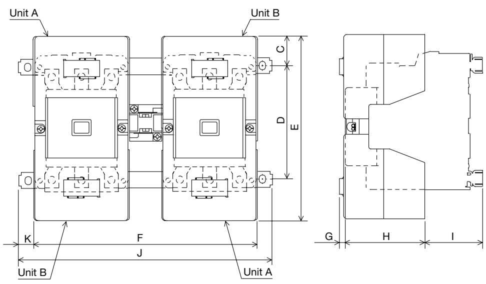
(3) UN-CZ501 to CZ3001 (Table at right)



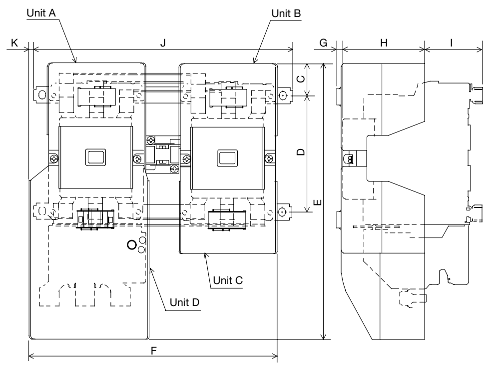
	Combined Unit Name		Outline Drawings										
	Power Supply Side Unit	Load Side Unit	C	D	E	F	G	H	I S/MSO	I SD/SMOD	J (Body)	K	L
Magnetic Contactors	UN-CZ500	UN-CZ500	32.5	75	140	92	-3.5	60.5	45.5	72.5	88	2	2
	UN-CZ800	UN-CZ800	36.5	110	183	104	2	67.5	59.5	89.5	100	2	2
	UN-CZ1250	UN-CZ1250	34.5	125	204	104	6.5	86	51	76	100	2	2
	UN-CZ1500	UN-CZ1500	49.5 to 52	125 to 130	229	154	7	96	49	73.5	120	17	17
	UN-CZ2200	UN-CZ2200	42	190	274	170	7	113	62	87.5	138	16	16
	UN-CZ3000	UN-CZ3000	46.5	225	318	192	7	126	69	95	163	14.5	14.5
Magnetic Starters	UN-CZ500	UN-CZ501	32.5	75	188	96	-3.5	60.5	45.5	72.5	90	4	2
	UN-CZ800	UN-CZ801	36.5	110	254	104	2	67.5	59.5	89.5	100	2	2
	UN-CZ1250	UN-CZ1251	34.5	125	296	125	6.5	86	51	76	*112	*9.8	*3.2
	UN-CZ1500	UN-CZ1501	49.5 to 52	125 to 130	325	154	7	96	49	73.5	120	17	17
	UN-CZ2200	UN-CZ2201	42	190	363	170	10	128	47	72.5	144	13	13
	UN-CZ3000	UN-CZ3001	46.5	225	445	192	7	135	60	86	163	14.5	14.5

∗Dimensions shown are that of TH-N120TA.

(4) UN-CZ502 to CZ3002 (Table below)



(5) UN-CZ504 to CZ3004 (Table below)



	Frame	Set Model Name	Outline Drawings									
			C	D	E	F	G	H	I S	I SD	J	K
Magnetic Contactors	T65/T80	UN-CZ502	23	100	140	190	-3.5	60.5	51.5	78.5	216	-13
	T100	UN-CZ802	58.5	100	183	241	2	67.5	69.5	99.5	270	14.5
	N125	UN-CZ1252	34.5	125	204	243	6.5	86	62	87	276	16.5
	N150	UN-CZ1502	52	125	229	294	7	96	60	84.5	296	1
	N180/N200	UN-CZ2202	42	190	274	330	7	113	76	101.5	370	-20
	N300/N400	UN-CZ3002	46.5	225	318	374	7	126	83	109	395	-10.5

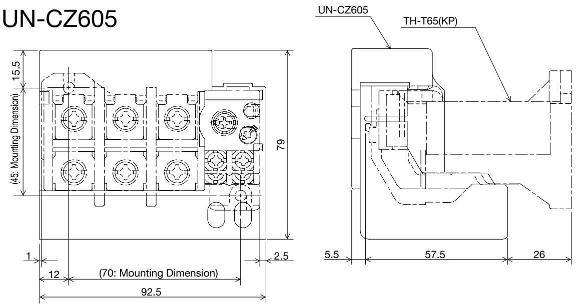
Note 1. The model name display of the units is UN-CZ□0.
Note 2. Since the mounting position of the reversing connecting conductor is processed, units A and B are respectively stamped with "A" and "B" for identification.

	Frame	Set Model Name	Outline Drawings									
			C	D	E	F	G	H	I MSO	I MSOD	J	K
Magnetic Starters	T65/T80	UN-CZ504	23	100	188	190	-3.5	60.5	51.5	78.5	216	-13
	T100	UN-CZ804	58.5	100	254	241	2	67.5	69.5	99.5	270	-14.5
	N125	UN-CZ1254	34.5	125	296	260	6.5	86	62	87	276	0.5
	N150	UN-CZ1504	52	125	325	294	7	96	60	84.5	296	1
	N180/N220	UN-CZ2204	42	190	363	330	7	113	76	101.5	370	-20
	N300/N400	UN-CZ3004	46.5	225	445	374	7	126	83	109	395	-10.5

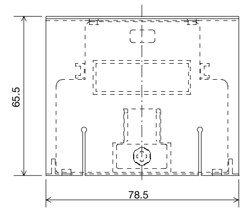
Note 1. The model name display is UN-CZ□0 for units A, B and C, and UN-CZ□1 for unit D.
Note 2. Since the mounting position of the reversing connecting conductor is processed, units A, B, C and D are respectively stamped with "A", "B", "C" and "D" for identification.

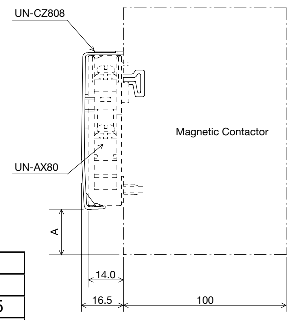
8

(6) UN-CZ605



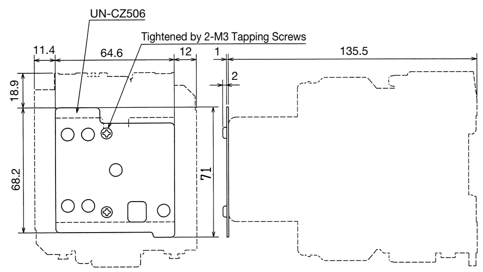
(7) UN-CZ808 (Table below)



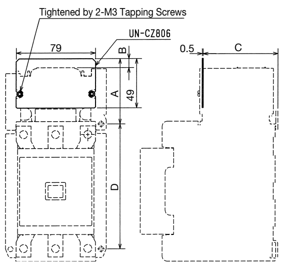


Applicable Magnetic Contactors	A
S, SL(D)-T100	7.5
SD-T100	37.5
S, SL(D)-N125	9
SD-N125	34

(8) UN-CZ506



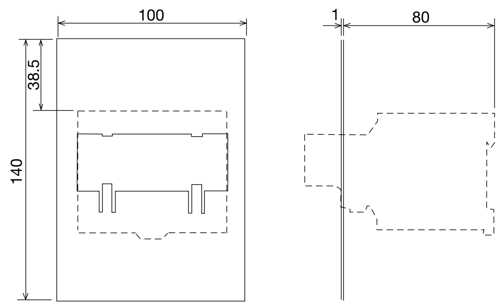
(9) UN-CZ806 (Table at right)



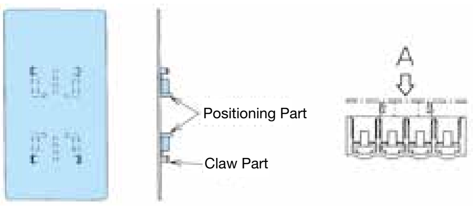
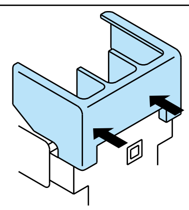
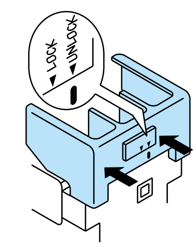
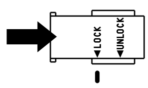
●Dimensions when mounted on the magnetic contactor (figure at left shows SL-N125.)

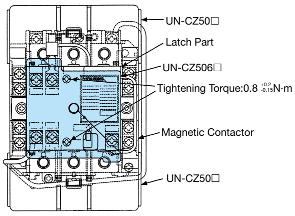
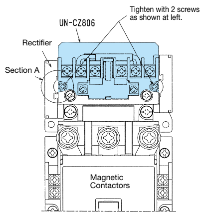
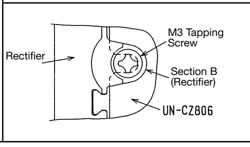
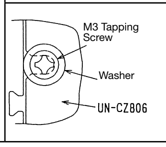
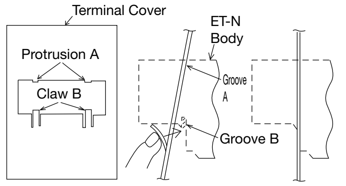
Applicable Magnetic Contactors	Outline Drawing			
	A	B	C	D
SL(D)-T100	63.5	8.5	74	101.5
SL(D)-N125	65	8.5	76	125
SL(D)-N150	67 to 69.5	8.5	76	125 to 130
SL(D)-N220	38.5	8.5	78	190
SL(D)-N300/N400	36.5	8.5	81	225

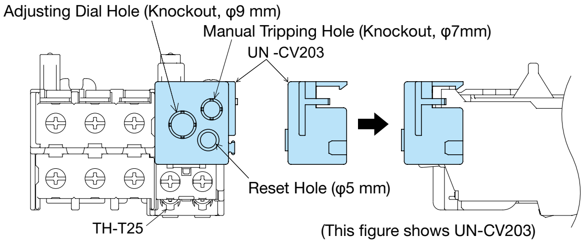
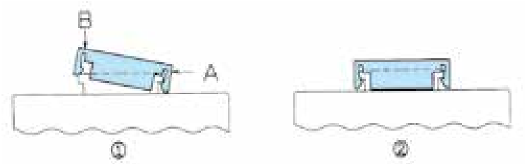
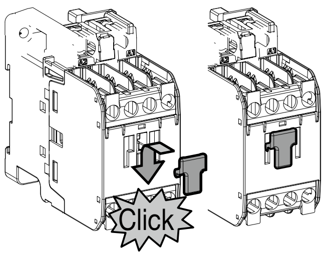
(10) UN-CV602



Mounting Method

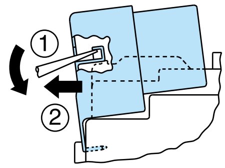
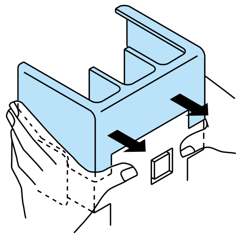
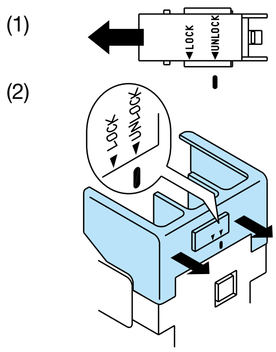
Live Part Protection Cover	Mounting Method	
UN-CV20		1.Align the positioning portion of the cover between the barriers of the body as in the dashed line. 2.Push in the direction of Arrow A, and hook the claw of the cover to the protrusion of the body barrier.
UN-CZ500 UN-CZ501 UN-CZ502 UN-CZ504 UN-CZ800 UN-CZ801 UN-CZ802 UN-CZ804 UN-CZ605		Align the position of the cover between the barriers of the body from the front and push it in. (Arrow Direction in Figure at Left)
UN-CZ1250 UN-CZ1251 UN-CZ1252 UN-CZ1254 UN-CZ1500 UN-CZ1501 UN-CZ1502 UN-CZ1504 UN-CZ2200 UN-CZ2201 UN-CZ2202 UN-CZ2204 UN-CZ3000 UN-CZ3001 UN-CZ3002 UN-CZ3004	①  ② 	Make sure that the stopper of the cover is in the UNLOCK position, then align the position of the cover to the arc box of the body from the front and push it in. (Arrow Direction in Figure at Left) After pushing in the cover to the end, slide (in the direction of the arrow on the left) the stopper to the LOCK position to secure the cover.

Live Part Protection Cover	Mounting Method	
UN-CZ506		Tighten the enclosed two M3 screws, then attach the cover.
UN-CZ806		[A Detailed View] With Rectifier  As shown at left, loosen the screws that are tightening the rectifier, place UN-CZ806 under the B section of the rectifier, then tighten the screws. Without Rectifier  Tighten using the provided screws and washers. (Place the washer between the screw and UN-CZ806.)
UN-CV602	 Fig. (1) Fig. (2) Fig. (3)	1. Insert protrusion A of the live part protection cover into groove A of the ET-N upper surface. (Figs. (1) and (2)) 2. Press the live part protection cover B claw in the direction of the arrow and insert it into the B groove of the ET-N lower surface. (Figs. (1) and (2))

Misoperation Prevention Cover	Mounting Method	
UN-CV203 UN-CV603	 (This figure shows UN-CV203)	UN-CV203 and CV603 (transparent plastic) can be mounted with one touch by pushing in from the top of the adjusting dial of the thermal overload relay. If a misoperation prevention cover with fluorescent display lamp is needed, use UN-TL20 or TL60.
UN-CV117		1. Place the cover over the notch of the central body as shown in Figure (1). 2. While pressing in the direction of Arrow A, press in the direction of Arrow B.
UT-CV107		Note. Push in the cover until you hear a click.

8

Removal Method

Live Part Protection Cover	Removal Method	
UN-CZ500 UN-CZ501 UN-CZ502 UN-CZ504		Insert a flat head screwdriver into the square hole with the UNLOCK arrow in the cover center and move the screwdriver in the direction as shown on the left to remove the cover. (Arrow Direction in Figure at Left)
UN-CZ800 UN-CZ801 UN-CZ802 UN-CZ804 UN-CZ605		Hold the cover with both hands and remove it. (Arrow Direction in Figure at Left)
UN-CZ1250 UN-CZ1251 UN-CZ1252 UN-CZ1254 UN-CZ1500 UN-CZ1501 UN-CZ1502 UN-CZ1504 UN-CZ2200 UN-CZ2201 UN-CZ2202 UN-CZ2204 UN-CZ3000 UN-CZ3001 UN-CZ3002 UN-CZ3004		Slide (in the direction of the arrow at left) the stopper to the UNLOCK position to remove the lock of the cover. Make sure that the stopper of the cover is in the UNLOCK position, then remove the cover while supporting it by hand. (Arrow Direction in Figure at Left)

Minimum Order Unit

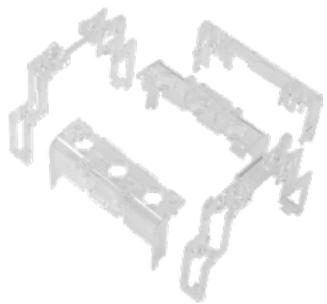
Model Name	Minimum Order Unit (Sheet or Piece)	Model Name	Minimum Order Unit (Sheet or Piece)
UN-CV20	10	UN-CZ802	1
UN-CZ500	1	UN-CZ1502	1
UN-CZ800	1	UN-CZ2202	1
UN-CZ1250	1	UN-CZ3002	1
UN-CZ1500	1	UN-CZ504	1
UN-CZ2200	1	UN-CZ804	1
UN-CZ3000	1	UN-CZ1254	1
UN-CZ501	1	UN-CZ1504	1
UN-CZ801	1	UN-CZ2204	1
UN-CZ506	1	UN-CZ3004	1
UN-CZ806	1	UN-CZ605	1
UN-CZ808	1	UN-CV203	1
UN-CZ1251	1	UN-CV603	1
UN-CZ1501	1	UN-CV117	10
UN-CZ2201	1	UT-CV107	10
UN-CZ3001	1		
UN-CZ502	1		

Note 1. Those with the minimum order unit of 10 will be shipped with 10 (sheets or pieces) per bag.
Note 2. Order those with the minimum order unit of 10 in a multiple of 10.

8.12 UT-CW☐ Terminal Cover Units

Terminal cover with high safety that can be attached later.

- Finger protection function that complies with the DIN and VDE standards, improving electric shock prevention and safety during maintenance and inspection.
- The auxiliary terminal cover of the UT-CW☐ terminal protection cover cannot be installed after wiring work. Also, ring crimp lugs wiring to the auxiliary contact terminal cannot be applied.



UT-CW800
Terminal Protection Covers

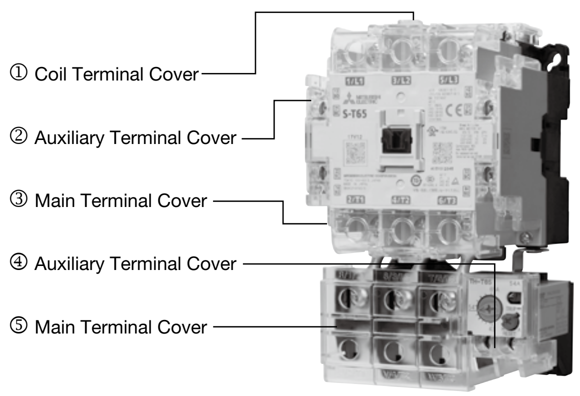
Applicable Models

Model Name	Applicable Models: Magnetic Contactors	
	AC Operated	DC Operated
UT-CW800	S-T65,T80	SD-T65,T80

Model Name	Applicable Models: Thermal Overload Relays
UT-CW655	TH-T65 (Not available with SR)

Mounting Example

Mounting Example



Packaging Type

Model Name	Package Contents (Per Set)	Minimum Order Unit
UT-CW800	Main Terminal Cover x 2, Auxiliary Terminal Cover x 2, Coil Terminal Cover x 1	1 Set

Model Name	Package Contents (Per Set)	Minimum Order Unit
UT-CW655	Main Terminal Cover x 1, Auxiliary Terminal Cover x 1	1 Set

8.13 UT/UN-RR□ Thermal Overload Relays Reset Release

Performs thermal reset from outside the control panel.

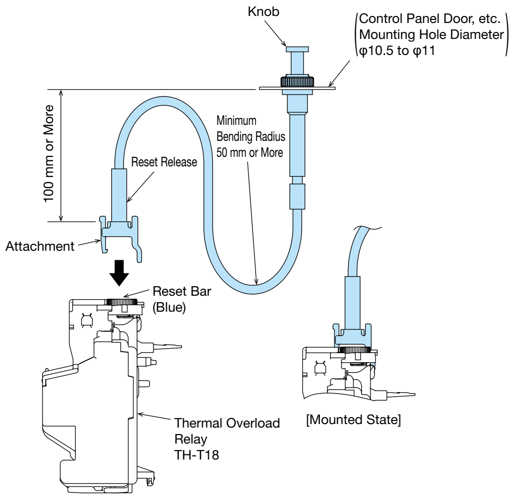
- A reset release can be additionally mounted.
  As the release length indicates the length from the back of a door or the like to the attachment, specify the length from the table below.
- Although the release can be bent, minimize the bend and keep the minimum bending radius greater than 50 mm. Although the bend is covered with an insulating material, arrange it so as not to touch the bare live parts.
- As transparent plastic is used for the attachment, it is easy to check the operation of the thermal overload relay as well as the set current value even after the reset release is attached.


UN-RR200

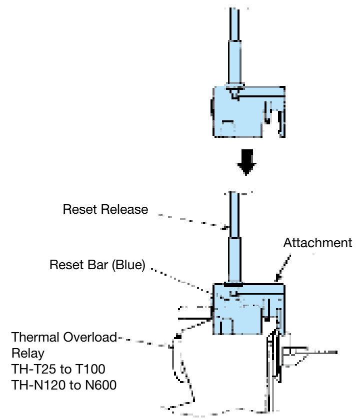
Model Name			Release Length
For TH-T18 Note 2	For TH-T25/T50	For TH-T65/T100, TH-N120 to N600	
UT-RR204	UN-RR200	UN-RR206	200 mm
UT-RR404	UN-RR400	UN-RR406	400 mm
UT-RR554	UN-RR550	UN-RR556	550 mm
UT-RR704	UN-RR700	UN-RR706	700 mm

Note 1. UN-RR206, RR406, RR556 and RR706 cannot be combined with TH-N120TAHZ.
Note 2. Cannot be combined with TH-T18 model numbers earlier than August 2017 (178W).

Mounting Method



UT-RR204 to RR704
Application to Non-Reversible Magnetic Starters



UN-RR200 to RR700, RR206 to RR706
Application to Reversible/Non-Reversible Magnetic Starters

Note 1. When using UN-RR206 to RR706, the live part terminal cover/protection cover units cannot be used.

Outline Drawings

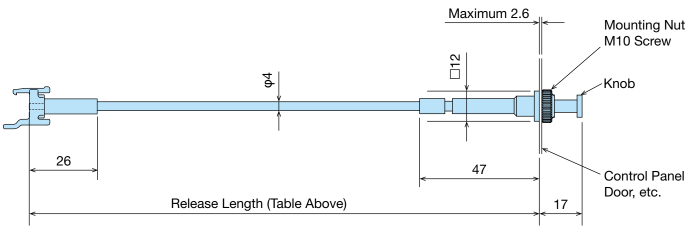


Figure shows UT-RR□□4

Model Name
UT-RR204
UT-RR404
UT-RR554
UT-RR704
UN-RR200
UN-RR400
UN-RR550
UN-RR700
UN-RR206
UN-RR406
UN-RR556
UN-RR706

8.14 UN-TL□ Fluorescent Display Lamps for Thermal Overload Relays

Displays the trip state of the thermal overload relay with a light-emitting diode.

●Can be easily mounted on thermal overload relays.

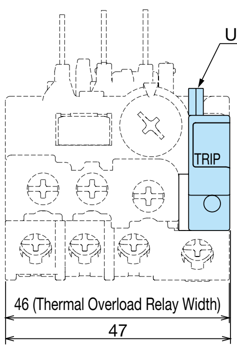
Model Name	Rated Voltage	Applicable Models	Power Consumption
UN-TL12 DC24V	AC24 V/DC24 V	TH-T18	0.2 W
UN-TL12 AC100V	AC100 to 127 V		0.18 W
UN-TL12 AC200V	AC200 to 240 V		0.2 W
UN-TL20 DC24V	AC24 V/DC24 V	TH-T25/T50	0.2 W
UN-TL20 AC100V	AC100 to 127 V		0.18 W
UN-TL20 AC200V	AC200 to 240 V		0.2 W
UN-TL60 DC24V	AC24 V/DC24 V	TH-T65/T100 TH-N120 to N600	0.2 W
UN-TL60 AC100V	AC100 to 127 V		0.18 W
UN-TL60 AC200V	AC200 to 240 V		0.2 W

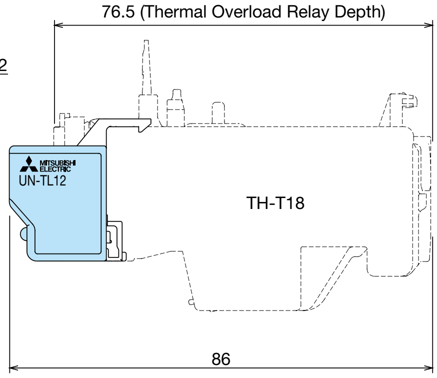
Note 1. UN-TL60 cannot be combined with TH-N120TAHZ.

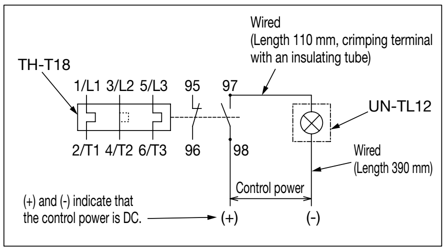
UN-TL12

● Outline Drawings

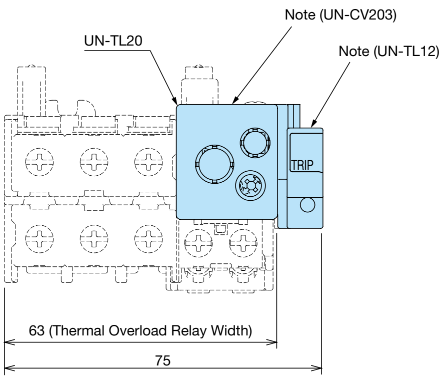
UN-TL12

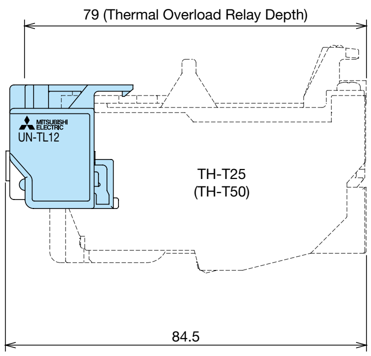






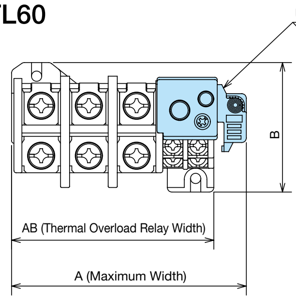
UN-TL20

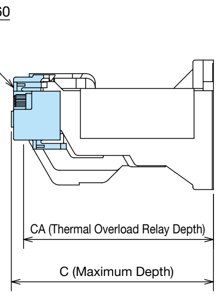




Note. UN-TL20 fluorescent display lamp is a combination of UN-TL12 and operation prevention cover (UN-CV203).

UN-TL60





Indicator Lamps Model Names	Applicable Models Thermal Overload Relays	Variable Dimensions				
		A	AB	B	C	CA
UN-TL60	TH-N220 TH-N400 TH-N600	77.5	63	42	89	83.5
	TH-T65,T100	103.5	88	53	89	83.5
	TH-N120	117.5	103	67	105	105

Model Name	Model Name
UN-TL12	UN-TL20
UN-TL60	

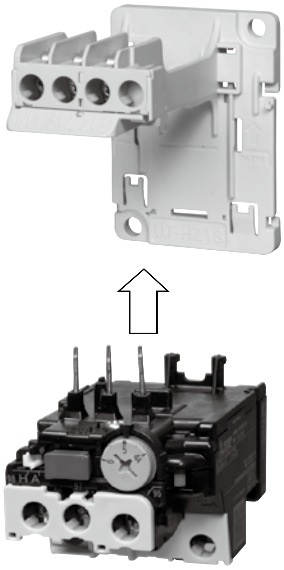
Note. Minimum Order Unit
UN-TL12, TL20 : 5 (5-Piece Set)
UN-TL60 : 1

8

8.15 UT-HZ18 and UN-RM20 Independent Mounting Units for Thermal Overload Relays

Features

Screw mounting and IEC 35 mm rail mounting are enabled by combining with a thermal overload relay.
In addition, UT-HZ18BC can be combined with TH-T18BC to form an independent mounting thermal overload relay with wiring streamlining terminals.


UT-HZ18 + TH-T18

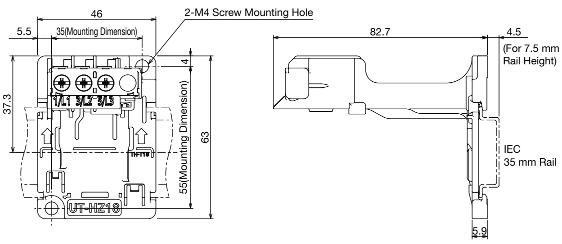
Types and Applicable Models

Model Name	Mounting	Applicable Models
UT-HZ18	Screw Mounting	TH-T18(KP), TH-T18HZSR
UT-HZ18BC	IEC 35 mm Rail Mounting	TH-T18BC(KP), TH-T18BCHZSR
UN-RM20	IEC 35 mm Rail Mounting	TH-T25(BC)(KP), TH-T25(BC)(KP)SR

Note 1. □BC is the model name with wiring streamlining terminals.

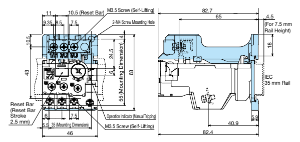
Outline Drawings

UT-HZ18
UT-HZ18BC

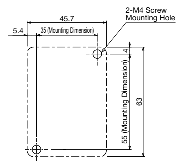


0.035 kg

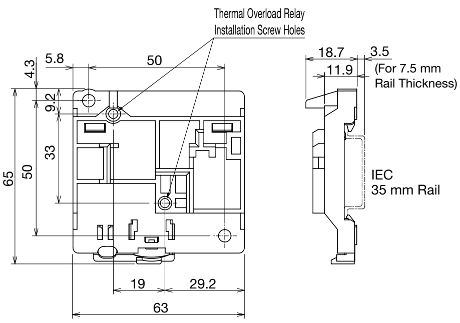
Outline Drawings When Combined With Thermal Overload Relay



Hole Drilling Dimensions

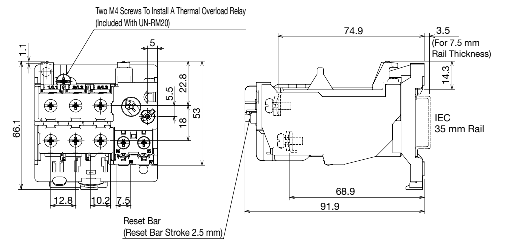


UN-RM20



0.02 kg

Outline Drawings When Combined With Thermal Overload Relay



Model Name	Model Name
UT-HZ18	UN-RM20
UT-HZ18BC	

8.16 UT/UN-TH□ Connecting Conductor Kits for Magnetic Starters

A magnetic contactor and thermal overload relay can be combined to configure the magnetic starter.

- Can be mounted on a thermal overload relay to combine with a magnetic contactor.
- Kit with connecting conductors, connecting conductor covers, terminal screws and the like needed for combination.

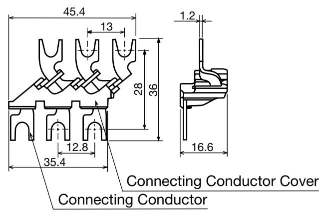
● Types and Applicable Models

Kit Model Name	Parts Included in the Kit		Model Names of Applicable Thermal Overload Relays and Magnetic Contactors			
			Thermal Overload Relays	Magnetic Contactors		
	Part Name	Quantity		AC Operated	DC Operated	Mechanically Latched Type
UN-TH21	Connecting Conductors Connecting Conductor Covers	3 1	TH-T25(BC)(FS)(KP)(SR)	S-T21(BC),T25(BC)	SD-T21(BC)	SL(D)-T21(BC)
UT-TH50	Connecting Conductors Connecting Conductor Covers	3 1	TH-T25(BC)(FS)(KP)(SR) TH-T50(BC)(FS)(KP)(SR)	S-T35(BC) S-T50(BC)	SD-T35(BC) SD-T50(BC)	SL(D)-T35(BC) SL(D)-T50(BC)

Note 1. "BC" in the model names of the applicable thermal overload relays and magnetic contactors refers to "wiring streamlining terminal".
Note 2. Since TH-T18(BC)(KP) used for magnetic contactors with T10 to T20 frames is for magnetic starters with connecting conductor and conductor cover integrated, a kit is not required.
Note 3. For connecting conductor kits of TH-T65 or higher and TH-N120 or higher, refer to the thermal overload relay outline drawings.

● Outline Drawings

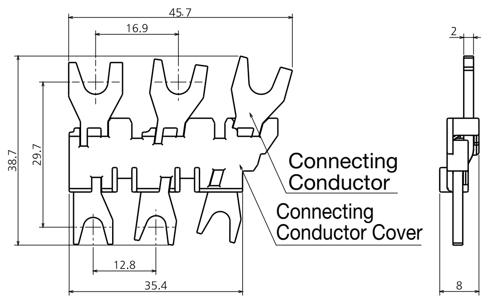
UN-TH21



Connecting Conductors and
Connecting Conductor Covers

UN-TH21: Connecting Conductor x 3, Connecting Conductor Cover x 1

UT-TH50

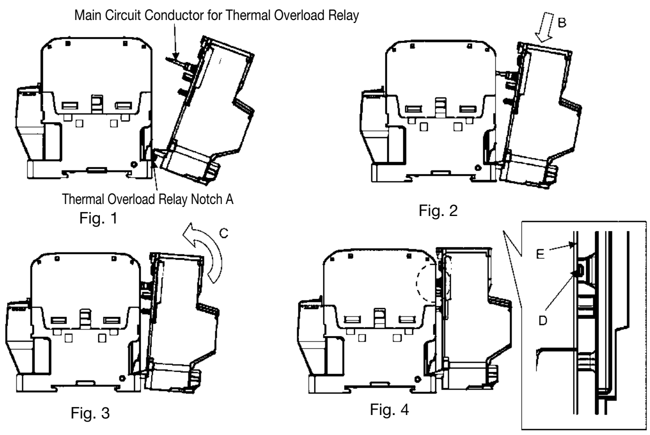


UT-TH50: Connecting Conductor x 3, Connecting Conductor Cover x 1

● Mounting Method

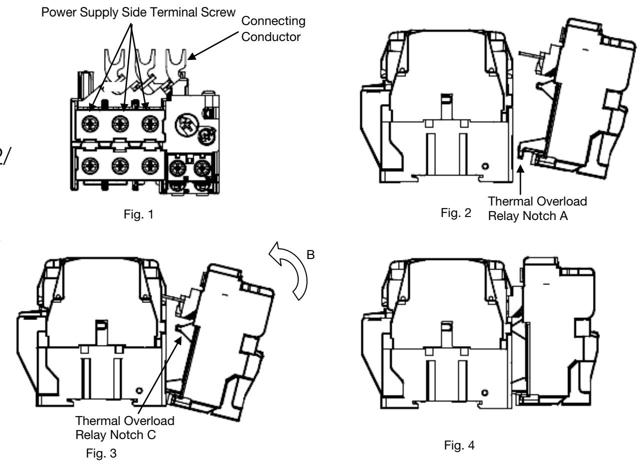
● For MSO-T10/T12/T20

(1) Loosen the 3 main terminal screws of the magnetic contactor (2/T1, 4/T2 and 6/T3).
(2) Tilt the thermal overload relay, guide the notch A of the thermal overload relay (2 places) into the indent of the magnetic contactor (2 places), then position the 3 main circuit conductors of the thermal overload relay so that they are at the left side of the main terminal screws. (Fig. 1)
(3) Push in the thermal overload relay in the B direction so that the notch A of the thermal overload relay and indent of the magnetic contactor are engaged. (Fig. 2)
(4) Rotate the thermal overload relay in the direction of Arrow C, and rotate the protrusion D of the thermal overload relay up to the E surface of the magnetic contactor. (Figs. 3, 4)
(5) While pressing the thermal overload relay to the magnetic contactor side, tighten the main terminal screws (2/T1, 4/T2 and 6/T3).



● For MSO-T21/T25/T35/T50(BC)

(1) Attach the connecting conductor (3-pole integral product) to the power supply side terminal of the thermal overload relay with screws. (Fig. 1)
(2) Loosen the 3 main terminal screws of the magnetic contactor (2/T1, 4/T2 and 6/T3).
(3) Tilt the thermal overload relay and set the notch A of the thermal overload relay (2 places) to the indent of the magnetic contactor (2 places). (Fig. 2)
(4) Rotate the thermal overload relay in the direction of Arrow B, and confirm that the notch C of the thermal overload relay (1 point) has been inserted into the square hole of the indent of the magnetic contactor. (Fig. 3)
(5) While pressing the thermal overload relay to the magnetic contactor side, tighten the main terminal screws.



Model Name	Model Name
UN-TH21	UT-TH50

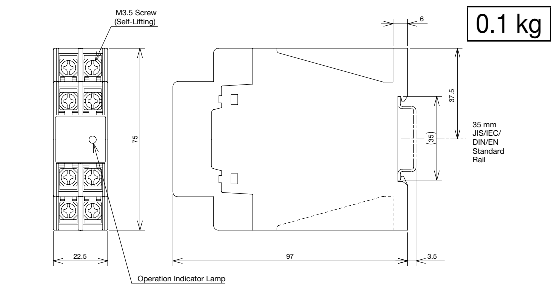
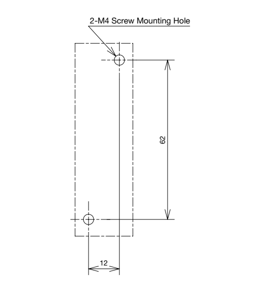
Note: Minimum Order Unit of 10 (Set for 10 Units)

8.17 UN-FD and UN-FD4 Fault Detection Units (Contact Weld Detection Relays)

Detects faults (contact welding) that occur to the main circuit contact of a magnetic starter when in conduction mode, and can be used to prevent load devices running out of control by interrupting the power supply by combining a no-fuse breaker or magnetic contactor. For fault detection units, UN-FD for the 200 V main circuit and UN-FD4 for the 400 V main circuit are available.

UN-FD4

Outline Drawings

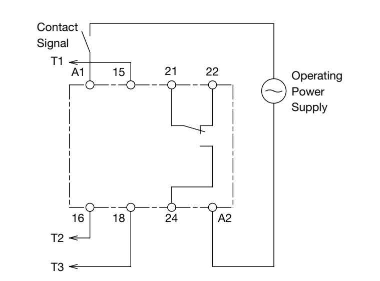
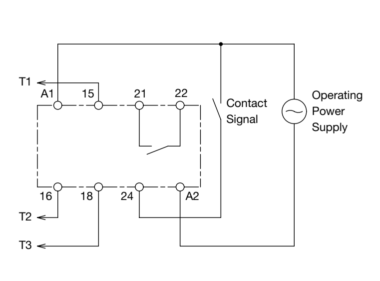
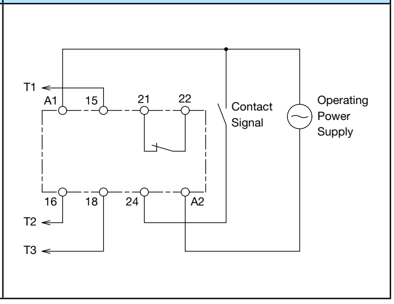
<table>
<tr><th>Outline Drawings</th><th>Hole Drilling Dimensions</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

Ratings/Specifications

Application		For 200 V Main Circuit		For 400 V Main Circuit			
Model Name		UN-FD AC100V	UN-FD AC200V	UN-FD4 AC100V 1A	UN-FD4 AC100V 1B	UN-FD4 AC200V 1A	UN-FD4 AC200V 1B
		UN-FDCX AC100V	UN-FDCX AC200V	UN-FD4CX AC100V 1A	UN-FD4CX AC100V 1B	UN-FD4CX AC200V 1A	UN-FD4CX AC200V 1B
Rated Operational Voltage (Note 1)		AC100 to 120 V 50/60 Hz	AC200 to 240 V 50/60 Hz	AC100 to 120 V 50/60 Hz		AC200 to 240 V 50/60 Hz	
Rated Main Circuit Voltage		AC200 to 240 50/60 Hz		AC380 to 440 V 50/60 Hz			
Input Current		17 mA		Operation (A1-A2): 17 mA, Signal (24): 10 mA			
Output	Contact Arrangement	1c		1a	1b	1a	1b
	Contact Rating	AC120 V 1.5 A, AC240 V 1 A (AC-15)		AC120 V 1.5 A, AC240 V 1 A (AC-15)			
Minimum Control Input Time		20 ms		20 ms			
Detection Time		0.2 to 0.5 s		0.2 to 0.5 s			
Allowable Detection Retention Time		1 s (Short Time Rating)		Continuous Rating			
Allowable Voltage Fluctuation		85 to 110% of Rated Voltage (Both Main Circuit and Control Circuit)		85 to 110% of Rated Voltage (Both Main Circuit and Control Circuit)			
Operating Temperature/Humidity		-10 to 60°C/45 to 85% RH		-10 to 50°C/45 to 85% RH			
Operation Indicator		None		Lights When Power is Applied (LED Green) Lights in Fault Condition (LED Red)			
Combined Protection Devices		· No-Fuse Breaker With Voltage Tripping Device · Magnetic Contactors		No-Fuse Breaker With Voltage Tripping Device	Magnetic Contactors	No-Fuse Breaker With Voltage Tripping Device	Magnetic Contactors
Fault Detection Retention		No Retention Function		Electric Retention via Operating Power Supply			
Fault Detection Reset		When Main Circuit Power Supply Is Open		When Operating Power Supply is Turned Off			

Note 1. The DC24 V rated operational voltage specification can also be manufactured.
Note 2. □CX is the model name with the CAN terminal.
Note 3. Refer to page 327 when using in combination with a solid state contactor.

Connecting

<table>
<tr><th>Model Name</th><th>UN-FD□</th><th>UN-FD4□1A</th><th>UN-FD4□1B</th></tr>
<tr><td>Internal Connection and Connection Method</td><td>
</td><td>
</td><td>
</td></tr>
</table>

Handling

(1) As UN-FD and UN-FD4 have different functions, take care during use.
(2) UN-FD and UN-FD4 have a fault detection time of 0.2 to 0.5 seconds. UN-FD and UN-FD4 may malfunction when applied to a magnetic starter for motors with a long residual voltage decay time. Therefore, consider using a system that allows operation input signals to be delayed or another device to detect faults.
(3) Fault detection units cannot be used for capacitor load circuits, star-delta starting circuits or inverter circuits.
(4) A no-fuse breaker or magnetic contactor should be configured to open-circuit the main circuit after fault detection. When combining with a no-fuse breaker with a voltage tripping device, use the output make contact of the fault detection unit to trip the no-fuse breaker during fault detection. When combining with a magnetic contactor, run the magnetic contactor in the self-retaining state using the self-retaining circuit, cancel the self-retaining state with the break contact of the fault detection unit during fault detection, and make a connection so that the magnetic contactor is opened.
(5) UN-FD units are rated for only short periods of time, so the detection state should not be maintained for more than 1 second.
(6) Although UN-FD is reset when the main circuit power supply is opened, UN-FD4 is not reset until the operating power supply is turned off. When resetting, turn off the operating power supply with a switch, etc.
(7) When applying to the reversing running circuit, enter the forward and reverse signals to the input circuit of the fault detection unit.

Operation

The UN-FD fault detection unit determines that the magnetic starter is abnormal when the load-side voltage and coil voltage of the magnetic starter are input and the 2 signals are mismatched, and detects contact welding failure and non-operation failure. (Inactive fault detection is only possible with UN-FD4.)

(1) If voltage is applied to the load device while the operating input signal is being input, it is determined as the normal state.
(2) Fault detection operation starts when voltage is applied (2 or more poles energized) to the load device while the operating input signal is off.
(3) For UN-FD4, fault detection operation also starts if voltage is not applied to the load device while the operating input signal is being input (non-operation of the magnetic starter).

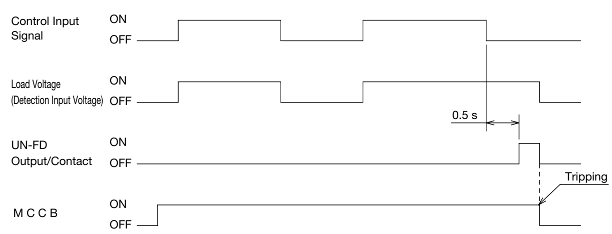
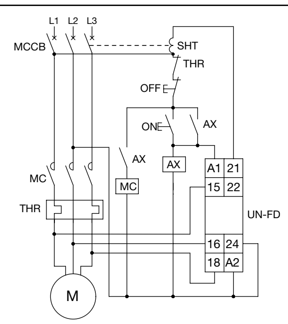


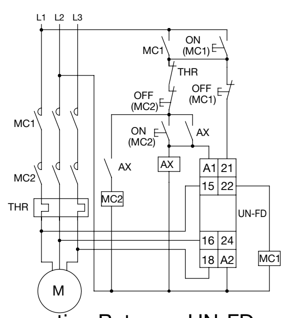
Fig. 2. Operating Pattern

Operating Circuit

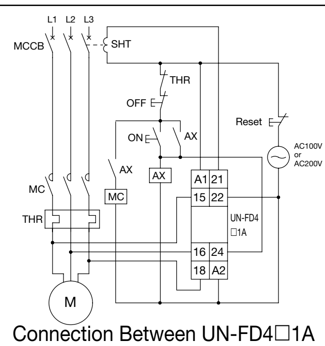
(1) Connect the input circuit (UN-FD: A1 and A2 terminals, UN-FD4: 24 and A2 terminals) in parallel with the coil of the magnetic starter.
(2) Apply the rated operational voltage to the control circuit (A1 and A2 terminals) of UN-FD4 at all times.
(3) Connect the main circuit voltage input circuit (15, 16 and 18 terminals) to the load side of the magnetic starter.



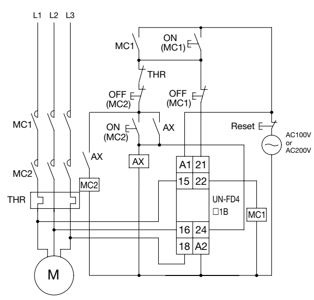
Connection Between UN-FD and No-Fuse Breaker



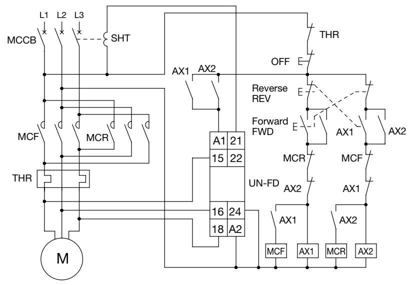
Connection Between UN-FD and Magnetic Contactor



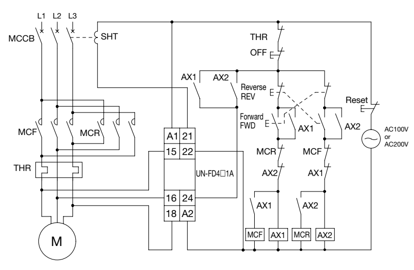
Connection Between UN-FD4□1A and No-Fuse Breaker



Connection Between UN-FD4□1B and Magnetic Contactor



Connection Between UN-FD and No-Fuse Breaker (For Reversible Magnetic Starters)



Connection Between UN-FD4□1A and No-Fuse Breaker (For Reversible Magnetic Starters)

Note 1. When applying to the reversible type, be sure to use the mechanical interlock at the same time.
Note 2. Use the auxiliary relay (AX) to configure the self-retaining circuit.

Model Name
UN-FD
UN-FDCX
UN-FD4
UN-FD4CX

8

8.18 How to Order

Follow the steps below when ordering. (Enter a space in▲.)

■ UT-AX Auxiliary Contact Units

Model Name	Contact Arrangement
UT-AX4	▲ 2A2B
Refer to page 197	For UT-AX2/AX4, specify the contact arrangement described on page 197. UT-AX11 does not need to be specified as it has fixed 1A1B.

■ UT-SA Operation Coil Surge Absorber Units

Model Name	Voltage Designation
UT-SA21	▲ AC400V
UT-SA22	▲ AC200V
UT-SA25	▲ AC48V
Refer to page 206	Select according to the control circuit voltage.

■ UT-ML Mechanical Interlock Units

Model Name
UT-ML20
Refer to page 213

■ UT-SY☐(BC) DC/AC Interface Units for Operation Coils

Model Name
UT-SY21
UT-SY21BC
Refer to page 218

■ UN-AX☐(CX) Auxiliary Contact Units

Model Name	Contact Arrangement
UN-AX4	▲ 2A2B
UN-AX11CX	▲
Refer to page 197	The default for UN-AX11(CX), AX80, AX150 is 1a1b and that for UN-AX600 is 2a2b, meaning specification is not required

■ UN-LL22(CX) Auxiliary Contact Units With Contact for Low-level Signals

Model Name	
UN-LL22	
UN-LL22CX	
Refer to page 203	Default contact arrangement is 1A1B low-level contact plus 1A1B standard contact.

■ UN-SA☐ Operation Coil Surge Absorber Units

Model Name	Voltage Designation
UN-SA721	▲ AC400V
UN-SA722	▲ AC200V
UN-SA725	▲ AC48V
Refer to page 206	Select according to the control circuit voltage

■ UT-SA33☐, UN-SA33 Main Circuit Surge Absorber Units

Model Name
UT-SA3320
UT-SA3332
UN-SA33
Refer to page 212

■ UT-SY☐(BC), UN-SY☐(CX) DC/AC Interface Units for Operation Coils

Model Name
UT-SY21
UT-SY21BC
UN-SY21
Refer to page 218

■ UT-CV☐, UN-CV☐, CZ☐ Live Part Protection Cover Units

Model Name
UN-CZ500
Refer to page 221

■ UT-CW☐Terminal Cover Units

Model Name
UT-CW800
Refer to page 227

■ UN-ML☐Mechanical Interlock Unit

Model Name
UN-ML21
Refer to page 213

■ UT/UN-☐Main Circuit Conductor Kits

Model Name
UT-SD10
UT-SD20
UN-YG50
UN-YD50
Refer to page 216

■ UT/UN-YY☐ 3-Pole Array Connection Units

Model Name
UT-YY21
UN-YY35
Refer to page 217

■ UN-FD☐(CX) Fault Detection Units

Model Name	Voltage Designation	Output Contact Arrangement
UN-FD	▲ AC100V	
UN-FD4CX	▲ AC100V	▲ 1A
Refer to page 232	Select according to the control circuit voltage	Specify a contact arrangement according to the application

■ UT/UN-RR☐Thermal Overload Relay Reset Releases

Model Name
UT-RR205
UN-RR200
Refer to page 228

■ UN-TL☐Fluorescent Display Lamps for Thermal Overload Relays

Model Name	Voltage Designation
UN-TL20	▲ AC100V
Refer to page 229	Select according to the control circuit voltage

■ UT-HZ18(BC)/UN-RM20 Independent Mounting Units for Thermal Overload Relays

Model Name
UT-HZ18
UN-RM20
Refer to page 230

8.19 Model List (for MS-K Series)

Product Name		DC/AC Interface Units for Operation Coils			
Format		UN-SY11	UN-SY12	UA-SY21	UA-SY22
Mounting		Independent Mounting		Top-On	
Specifications/ Functions		Enables AC-operated contactor relays and contactors to be operated at DC24 V			
		Triac Output Input DC24 V 15 mA	Relay Output Input DC24 V 10 mA	Triac Output Input DC24 V 15 mA	Relay Output Input DC24 V 10 mA
Acquired Standards					
Mass (g)		60		40	
Applicable Models	Contactor Relays	SR-K100		SR-K100	
	Thermal Overload Relays	—		—	
Reference Page		218			

Product Name		Operation Coil Surge Absorber Units				
Format		UN-SA721	UN-SA712	UN-SA713	UN-SA723	UN-SA725
Mounting		Top-On				
Specifications/ Functions		With Varistor For Both AC and DC Operation AC48 V/AC100 V AC200 V/AC400 V	With Varistor + Indicator Lamp For Both AC and DC Operation AC100 V AC200 V	With CR For DC Operation DC200 V	With CR For AC Operation AC200 V	With Varistor + CR For Both AC and DC Operation AC48 V/AC100 V AC200 V
Acquired Standards		UL/CSA				UL/CSA
Mass (g)		20	25	25	20	25
Applicable Models	Contactor Relays	SR(D)-K100 SRL(D)-K100	SR(D)-K100 SRL(D)-K100	SRD-K100 SRLD-K100	SR-K100 SRL-K100	SR(D)-K100 SRL(D)-K100
	Thermal Overload Relays	—	—	—	—	—
Reference Page		205				

8.20 Applicable Model List (for MS-K Series)

Section	Product Name	Model Name	Specifications	Applicable Models		
				Contactor Relays		
				AC Operated	DC Operated	Mechanically Latched Type
1	Operation Coil Surge Absorber Units	UN-SA712	Varistor + Indicator Lamp	K100	SRD-K100	SRL(D)-K100
		UN-SA713	C + R		SRD-K100	SRLD-K100
		UN-SA721	Varistor	K100	SRD-K100	SRL(D)-K100
		UN-SA723	C + R	K100		SRL-K100
		UN-SA725	Varistor + C + R	K100	SRD-K100	SRL(D)-K100
2	DC/AC Interface Units for Operation Coils	UN-SY11	Triac Output	K100		
		UN-SY12	Contact Output	K100		
		UA-SY21	Triac Output	K100		
		UA-SY22	Contact Output	K100		

Note. UN-☐ indicates shared application with MS-N Series optional units. For more information, refer to the MS-N Series optional units.

● Type Designations

UA – **SY** **21**

Symbol Indicates Unit

Symbol Indicates Unit Product Name

Indicates Unit Specifications and Applicable Models

Symbol	Product Name
SY	(Input) (Output) DC24 V → AC100 to 240 V DC/AC Interface Units for Operation Coils
CV	Live Part Protection Covers (Magnetic Starters, Contactor Relays) Current Dial Misoperation Prevention Cover (Thermal Overload Relays)
SD	Reversing Connecting Wire (Conductor) Kits
SG	Electric Wire (Conductor) Kits for Crossover

8.21 UA-SY□ DC/AC Interface Units for Operation Coils

DC/AC interface unit for operation coils that switches AC-operated contactor relays at the output (DC24 V) of electronics such as PLCs

A thin unit that can be mounted to the main body of the SR-K contactor relay and an independent mounting unit are available. Both contactless output and contact (relay) output are also available.

Model Name

Unit Model Name	Output Method	Unit Mounting Method	Model Names of Applicable Contactor Relays
UN-SY11	Contactless Output (Triac Output)	Independent Mounting	SR-K100
UA-SY21		Top-On Additional Mounting	SR-K100
UN-SY12	Contact Output	Independent Mounting	SR-K100
UA-SY22		Top-On Additional Mounting	SR-K100

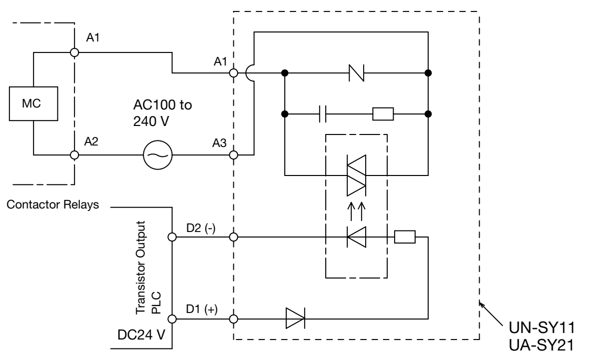
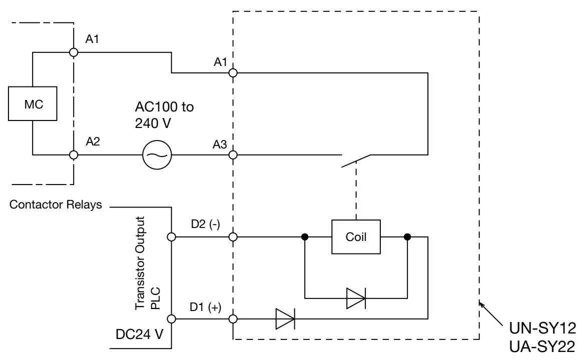
Note 1. The coil voltage designation of AC100V or AC200V can be applied for the operation coil.
Note 2. Refer to page 218 for information regarding UN-SY11 and SY12.

Specifications

Model Name			UN-SY11	UA-SY21	UN-SY12	UA-SY22
Input Unit	Rated Operational Voltage		DC24 V			
	Allowable Voltage Fluctuation		85 to 110% of Rated Operational Voltage			
	Current		15 mA		10 mA	
	Power Consumption		0.4 W		0.24 W	
	Minimum Closing Voltage		18 V		18 V	
	Maximum Openning Voltage		4 V		1 V	
Output Unit	Output Specifications		Contactless Output (Triac Output)		Contact Output	
	Rated Operational Voltage		AC100 to AC240 V 50/60 Hz			
	Output Current		0.5 A, AC-15			
	Open Circuit Leakage Current		5 mA/240 V		None	
	Operating Time		1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit		10 ms or less	
	Switching Durability	Mechanical	—		5 mil. times	
		Electrical	—		1 mil. times (Note 1)	5 mil. times
Operating Temperature			-10℃to 55℃			
Applicable Terminal Wires		Electric Wires	φ1.6 mm,1.25 to 2 mm²			
		Crimp Lugs	1.25-3.5,2-3.5			

Note 1. Using UN-SY12 and SR-K100 in combination achieves 5 million times.

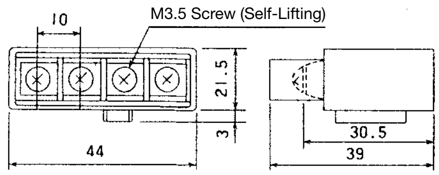
Connection Example (Connection Diagram)

UN-SY11, UA-SY21	UN-SY12, UA-SY22
	

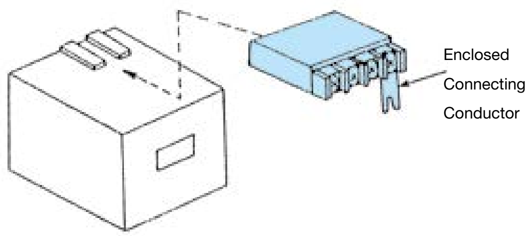
Outline Drawings/Mounting

UA-SY21, SY22 (Additional Mounting)
Mount according to the guidelines below.
Remove the screws of the coil terminal A1 of the contactor relay, align the protrusion of the DC/AC interface unit and groove of the magnetic contactor or contactor relay while the supplied connecting conductor is mounted on the A1 terminal of the DC/AC interface unit, then tighten the connecting conductor with the removed coil terminal screws.

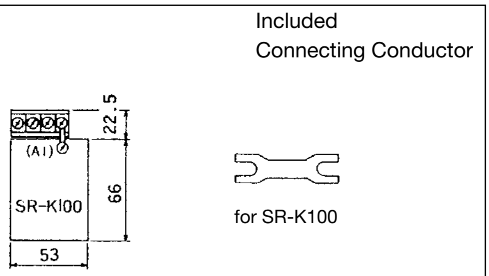
UA-SY21, SY22



Outline Drawings



Mounting Method



Dimensions After Additional Mounting

8

8.22 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

■ UN-SA☐ Operation Coil Surge Absorber Units

Model Name		Voltage Designation
UN-SA721	▲	AC24V
Refer to page 206		Select according to the control circuit voltage

■ UA-SY☐ DC/AC Interface Units for Operation Coils

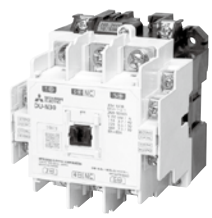
Model Name
UA-SY21
Refer to page 236

9

Magnetic Starters/Magnetic Contactors/Contactor Relays According to Application

9 Magnetic Starters/Magnetic Contactors/Contactor Relays According to Application

9.1 Model List

Series		SD-Q☐	B-T☐, B-N☐	DU-N☐	S-N☐KG
Application Based Name		DC Interface Contactors	NC Main Contact Contactors	Magnetic Contactors For DC	Magnetic Contactors For High-Frequency Switching
Application/ Function		· Capable of being directly driven by the transistor output (DC24 V 0.1 A) of PLCs etc.	· Main circuit break contact (normally closed contact) can be used for motor control and power switching for lighting circuits. · Applications · For Motor Starting Resistance Short-circuits · For Cushioned Starting of AC Motors · For Dynamic Brakes	· Can be used for applications controlling DC motors at 440 V or less and other general DC circuits. · Applications · For Variable Speed Motor Control · For Dynamic Brakes	· Ideal for applications with frequent inching operations such as with hoists and cranes. · Has reinforced main contacts.
External Appearance of Representative Model		 SD-Q11	 B-T21	 DU-N30	 S-N125KG
Type	Magnetic Starters	MSOD-Q11 MSOD-Q12 MSOD-QR11 MSOD-QR12	—	—	—
	Magnetic Contactors	SD-Q11 SD-Q12 SD-QR11 SD-QR12	B-T21(BC) B-N65 B-N100 BD-T21(BC) BD-N65 BD-N100	DU-N30 DU-N60 DU-N120 DU-N180 DU-N260 DUD-N30 DUD-N60 DUD-N120 DUD-N180 DUD-N260	S-N125KG S-N220KG Reversible types (S-2 x N☐KG) are also manufactured.
	Contactor Relays	—	—	—	—
● Listing Page		242	249	253	258

		SH-V□
	Safety Contactors	Vacuum Magnetic Contactors
	· Suitable for standard products in which the auxiliary break contact is a mirror contact. · Can be applied to mechanical safety category 4 circuits. (Can detect malfunction of break contacts)	· A large capacity magnetic contactor with a shut-off within a vacuum valve that does not arc and excellent safety.
	 S(D)-T  SD-Q  S(D)-N	 SH-V320
	(Can Be Combined With Thermal Overload Relays)	―――
	Refer to Listing Page Below	SH-V160 SHL-V160 SH-V320 SHL-V320 SH-V400 SHL-V400 SH-V600 SHLD-V160 SHD-V160 SHLD-V320 SHD-V320 SHLD-V400 SHD-V400
	―――	―――
	282	259

9

9.2 SD/MSOD-Q□ DC Interface Contactors

Compact, high-performance DC operated type contactors that are capable of being directly driven by the transistor output (DC24 V 0.1 A) of PLCs etc.

● Features

(1) **Non-reversible type:** DC interface contactors compatible with up to 3 φ 220 V 2.5 kW motor loads.
SD-Q11, SD-Q12 / With Thermal Overload Relay: MSOD-Q11, MSOD-Q12

● Direct Drive of Contactors Using Semiconductor Output (Transistor Output)
Adopts a high-sensitivity polar solenoid that allows all models to be directly driven by output of DC24 V 0.1 A rated transistors

● Minimal Load for Auxiliary Contacts DC5 V 3 mA
By doubling the auxiliary contacts, support for levels as low as DC5 V 3 mA has been made possible. (The failure rate in normal environments free of dust or corrosive gas is 5 x 10^{-7}/cycle.)

● An Extensive Line of Installable Optional Units
- Auxiliary Contact Units: (Q(R)11 Only)
  UQ-AX2 (For Left-Side of Single and Reversible Types)
  UQ-AX2KR (For Right-Side of Reversible Types)
- Indicator Lamp Unit
  UQ-PL

● Rail Mounting Standardized
Can be mounted on an IEC and DIN regulation compliant 35 mm width rail

● Provides Support for a Large Number of International Standards

Model	Model Name	Applicable Standard				Safety Certified Standard		EC Directives	Certifying Body	CCC Certification
		JIS*1 JEM	IEC	DIN VDE	BS EN	UL	CSA	CE Mark	TÜV	GB
		Japan	International	Germany	United Kingdom Europe	US	Canada	Europe	Germany	China
Magnetic Contactors	SD-Q11, Q12 SD-QR11, QR12	◎	◎	◎	◎	◎	◎	◎	◎	◎ *3
Magnetic Starters	MSOD-Q11(BC)KP to Q12(BC)KP MSOD-QR11(BC)KP to QR12(BC)KP	◎ *2	◎	◎	◎	◎ *2	◎ *2	◎	◎	◎ *2

·◎:Standard product that conforms, is compliant, or for which certification has been obtained.
·*1:If JIS conformity declaration is required, please request.
·*2:Compliance, conformity and certification have been obtained for 2-element models (MSOD-Q□(BC), MSOD-QR□(BC)) as well.
·*3:Excluding the coil designation of DC12V.
·UL(CSA) can be used in applications rated up to AC480 V and TÜV rated up to AC440 V.
·Certification mark is displayed on the product's name plate.

SD-Q11

● Achieves Large Capacity/Long Lifespan
SD-Q types have an increased conventional free air thermal current (rated continuity current).(SD-M11/M12 15A → SD-Q11/Q12 20A)
Suitable only for circuit continuity duty. Also, they can be applied to AC440 V circuits despite their compact size.

Model Name	Rated Capacity (kW) AC-3		Conventional Free Air Thermal Current (A)	Electrical Durability (x 10000)
	200 to 240 V	380 to 440 V		
SD-Q11/Q12	2.5	4	20	100

● Surge Absorber Comes Standard Built-in
- The integrated surge absorber function suppresses coil surge voltages
- Suppresses damage to peripheral electronic devices due to the harmful surge voltages generated when switching the coil OFF

● Mirror contacts (Turning off the auxiliary break contact when the main contact is welded)
Complies with requirements for "control functionality during failures" stipulated in the section "Electrical Devices of Industrial Equipment" in EN regulation EN60204-1 and can be used as an interlocking circuit contact. (TÜV Compliant Certification Acquired)

● Thermal Overload Relays Mountable Without Adapter
Can be directly mounted to contactors allowing for conversion to a magnetic starter by simply purchasing a thermal overload relay

● Magnetic Contactors Equipped With Terminal Covers As Standard
- Easily attachable terminal covers are equipped as standard, separating the body and units
- Improved maintenance and inspection safety and electric shock prevention due to the finger protection functionality

(2) **Reversible type:** Reversible integrated DC interface contactors suitable for the forward/reverse operation of three-phase motors.
SD-QR11, SD-QR12 Types / Models with Thermal Overload Relay: MSOD-QR11, MSOD-QR12 Types

● Integrated Mechanical Interlock
● Electrical Interlock Wiring Included
Capable of preventing both left and right contactors from being closed simultaneously

● 1b x 2 or 1a1b x 2 Auxiliary Contacts
Standardly equipped with an electrically interlocked break contact with twin contacts for high contact reliability auxiliary contacts

● Powerful and Compact
Has the same outline drawing as 2 SD-Q11 or SD-Q12 units and the same ratings as non-reversible types

SD-QR11

● Surge Absorber Comes Standard Built-in
- The integrated surge absorber function suppresses surge voltages
- Suppresses damage to peripheral electronic devices due to the harmful surge voltages generated when switching the coil OFF

● Magnetic Contactors Equipped With Terminal Covers As Standard
- Easily attachable terminal covers are equipped as standard, separating the body and units
- Auxiliary units can be mounted without removing the body's terminal cover

● Rail Mounting Standardized
Can be mounted on an IEC and DIN regulation compliant 35 mm width rail

Manufactured Model List

Model			Model Name Q11/Q12
Magnetic Contactors	Non-Reversible Type	Auxiliary Contact 1-Pole	SD-Q11
		Auxiliary Contact 2-Pole	SD-Q12
	Reversible Type	Auxiliary Contact 2-Pole	SD-QR11
		Auxiliary Contact 4-Pole	SD-QR12
Magnetic Starters	Non-Reversible Type	Auxiliary Contact 1-Pole	MSOD-Q11
		Auxiliary Contact 2-Pole	MSOD-Q12
		With 2E Thermal	MSOD-Q☐KP Note 1
		With Thermal Wiring Streamlining Terminal (with 2E Thermal) Note 4	MSOD-Q☐BC(KP) Note 1
	Reversible Type	Auxiliary Contact 2-Pole	MSOD-QR11
		Auxiliary Contact 4-Pole	MSOD-QR12
		With 2E Thermal	MSOD-QR☐KP Note 1
		With Thermal Wiring Streamlining Terminal (with 2E Thermal) Note 4	MSOD-QR☐BC(KP) Note 1
Units	Front Clip-on Auxiliary Contact Unit		UQ-AX2 Note 2
			UQ-AX2KR Note 3
	Indicator Lamp Unit		UQ-PL

Note 1. The ☐ in the model name column is a placeholder for 11 or 12
Note 2. Q11 or QR11 are only applicable to the left side of UQ-AX2.
Note 3. QR11 are only applicable to the right side of UQ-AX2KR.
Note 4. Thermal overload relays have wiring streamlining terminals, but contactors (SD-Q☐) use an all-pole integrated terminal cover with no wiring streamlining terminal. (Model Name: MSOD-Q☐BC(KP), MSOD-QR☐BC(KP))

Rating/Performance

(1) Ratings and Performance

Model Name	Type			Non-Reversing		Reversing	
	Magnetic Contactor SD-			Q11	Q12	QR11	QR12
	Magnetic Starter MSOD-			Q11	Q12	QR11	QR12
Rated Insulation Voltage [V]				690			
Rated Operating Current [A]	Three-Phase Squirrel-cage Motor (Category AC-3)		200 to 240 V	12			
			380 to 440 V	9			
			500 to 550 V	7			
	Single-Phase Motor (Category AC-3)		100 to 110 V	8			
			200 to 220 V	6			
	Resistive Load (Category AC-1)		100 to 220 V	10 (15)			
			380 to 440 V	10			
	DC Motor ∗ (Category DC2, DC4)	2-Pole Series	24 V	12			
			48 V	6			
			100 to 110 V	1.2			
		3-Pole Series	24 V	12			
			48 V	10			
			100 to 110 V	2.5			
	DC Solenoid (Category DC-13)	Single Pole	24 V	3			
			48 V	1.5			
			100 to 110 V	0.6			
			200 to 220 V	0.3			
		2-Pole Series	24 V	5			
			48 V	2.5			
			100 to 110 V	1.2			
			200 to 220 V	0.6			
		3-Pole Series	24 V	5			
			48 V	2.5			
			100 to 110 V	2			
			200 to 220 V	1			
Rated Capacity [kW]	Three-Phase Squirrel-cage Motor (Category AC-3)		200 to 240 V	2.5			
			380 to 440 V	4			
			500 to 550 V	4			
	Single-Phase Motor (Category AC-3)		100 to 110 V	0.2			
			200 to 220 V	0.4			
Conventional Free Air Thermal Current [A]				20			
Breaking Capacity [A]			220 V	120			
			440 V	90			
Making Current Capacity [A]			220 V	120			
			440 V	90			
Switching Frequency [Times/Hour]				1800			
Switching Durability [x 10000]	Electrical (Category AC-3)			100			
	Mechanical			1000			

Note 1. Electrical durability when operated with the following ripple rate after three-phase full-wave rectification. 0.8 mil. times for single-phase full-wave rectification. The electrical durability for three-phase cage motors (class AC-3) is listed below.
Class AC-1: 0.5 mil. times (however, the rating for 200 to 220 V resistive loads shown in parentheses is 0.25 mil. times), Class DC2/DC4: 0.5 mil. times, Class DC-13: 0.25 mil. times
Note 2. Compliant Standards: JIS C8201-4-1, JIS C8201-5-1, IEC 60947-4-1, IEC 60947-5-1 (∗ symbol indicates class DC2, DC4 are JEM 1038 only)
Note 3. Refer to page 42 for details about applications at main contact low voltage and current.

9

(2) Auxiliary Contact Rating

Type			Body	Front Clip-on Auxiliary Contact Unit
Model Name			SD-Q11/Q12/ QR11/QR12	UQ-AX2(KR)
Rated Operating Current [A]	Category AC-15	AC240V	3	3
		AC440V	1	1
	Category DC-12	DC24V	10	10
	Category DC-13	DC110V	0.6	0.6
Conventional Free Air Thermal Current [A]			10	10
Electrical Durability [x 10000]			50 (Class DC-13: 25)	25

Note 1. The minimal applicable load is 5 V, 3 mA. (Refer to page 42 for details.)
Note 2. JISC8201-5-1 classifications are class AC-15 applicable to AC inductive loads (AC coil load (exceeding 72 VA) control), class DC-12 applicable to DC resistive loads, and class DC-13 applicable to DC coil loads.

(3) No. of Installed Auxiliary Contacts and Contact Arrangement

Frame Model	Non-Reversible Type		Reversible Type	
	Q11	Q12	QR11	QR12
Standard	1a	1a1b	1b x 2	1a1b x 2
Special	1b	2a	—	—
Maximum	2a1b 1a2b	—	1a2b x 2	—

Note 1. The auxiliary break contacts of reversible types are wired as an electrical interlock.
Note 2. Auxiliary contact arrangements for reversible types are displayed by twos, in a contact arrangement combining two contactors.
Note 3. No specification needs to be made for standard contact arrangements. Specify only for special arrangements.
Note 4. The maximum number of units is shown when mounting front clip-on UQ-AX2(KR) auxiliary contact units. The body and auxiliary contact unit can be additionally installed by the customer as a separate arrangement. Refer to notes 2 and 3 of the Manufactured Model List on page 243 for details about auxiliary contact unit combination.

Properties

Model Name	Type	Non-Reversing		Reversing	
		Q11	Q12	QR11	QR12
Closing Voltage		85% or Less of Rated Voltage			
Openning Voltage		10% or More of Rated Voltage			
Operating Time	Coil ON → Main Contact ON	50 ms or less			
	Coil OFF → Main Contact OFF	20 ms or less			
Operation Coil Properties	Average Coil Current	55 mA			
	Average Power Consumption	1.3 W (1.65 W)			
	Coil Time Constant	10 ms			

Note 1. The above indicates rough property indices for DC24V coils. The values in the parentheses for the operation coil properties indicate rough property indices for DC48V coils.
Note 2. Operable Range: Applying the rated voltage to the coil at 40°C ambient temperature allows operation without trouble at 85 to 120% of rated voltage after temperature rise saturation.
Note 3. Voltage For Continuous Use: 95 to 100% of coil rated voltage
Note 4. The operating time is the value when applying DC24V at a 20°C cold state.

Rated Operation Coil

Coil Designation	Rated Voltage
DC12V	DC12 V
DC24V	DC24 V
DC48V	DC48 V

Note 1. Please note that operation coil terminals have polarity. A1 (+), A2 (-)

Thermal Overload Relay Model Names and Heater Types Combinable With Magnetic Contactors

Magnetic Starter Model Name	Compatible Thermal Overload Relay Model Name	Heater Designation [A]	Adjustment Range of Settling Current [A]	Standard Three-Phase Motor Capacity [kW]		Control Circuit (Contact)	
				200 to 220 V	380 to 440 V	Contact Arrangement	Rating
MSOD-Q11(KP) MSOD-Q12(KP) MSOD-QR11(KP) MSOD-QR12(KP)	TH-T18(KP)	0.12	0.1 to 0.16			1a1b	Class AC-15 AC110 V: 2 A AC220 V: 1 A Class DC-13 DC110 V: 0.2 A
		0.17	0.14 to 0.22				
		0.24	0.2 to 0.32	0.03	0.05		
		0.35	0.28 to 0.42	0.05	0.1		
		0.5	0.4 to 0.6	0.07			
		0.7	0.55 to 0.85	0.1	0.2		
		0.9	0.7 to 1.1				
		1.3	1 to 1.6	0.2	0.4		
		1.7	1.4 to 2		0.75		
		2.1	1.7 to 2.5	0.4			
MSOD-Q11BC(KP) MSOD-Q12BC(KP) MSOD-QR11BC(KP) MSOD-QR12BC(KP)	TH-T18BC(KP)	2.5	2 to 3		1		
		3.6	2.8 to 4.4	0.75	1.5		
		5	4 to 6	1	2.2		
		6.6	5.2 to 8	1.5	3.7		
		9	7 to 11	2.2			
		11	9 to 13				

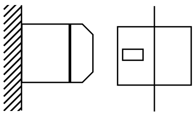
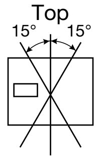
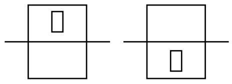
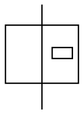
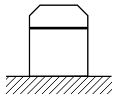
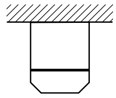
Note 1. KP includes 3-element 2E function
Note 2. Delay trip thermal overload relays are not manufactured

Handling

- Mounting

See below for the correct mounting method. Standard mounting puts the power terminal at the top and the load terminal at the bottom, but the mounting methods in the table below are also possible. Horizontal mounting is not possible. Furthermore, MSOD-Q11, Q12, QR11 and QR12 type magnetic starters use only standard, diagonal, or floor mounting. Be sure to securely fasten both the left and right of the units to the rail when rail-mounting reversible types (MSOD-QR11, QR12, SD-QR11, QR12).

Mounting Direction

Top	Top	Top	Top	Top	Top
					
Bottom	Bottom	Bottom	Bottom	Bottom	Bottom
Standard Mounting	Diagonal Mounting	Horizontal Mounting	Reverse Mounting	Floor Mounting	Ceiling Mounting
◎	○	x	○ (MSOD: x)	○	○ (MSOD: x)

- Connecting

Model Name	Main Circuit			Control Circuit		
	Applicable Wire Size	Applicable Crimp Lug Size	Tightening Torque N·m Parentheses show standard value	Applicable Wire Size	Applicable Crimp Lug Size	Tightening Torque N·m Parentheses show standard value
Q11 Q12 QR11 QR12	φ 1.6, 1.25 to 2 mm²	1.25-3.5 to 2-3.5	0.94 to 1.17 (1.0)	φ 1.6, 1.25 to 2 mm²	1.25-3.5 to 2-3.5	0.94 to 1.17 (1.0)

Note 1. Use a crimp terminal with insulation tube if using crimp lugs at voltages exceeding 380 V.
Note 2. Remove the terminal cover for wiring if using ring crimp lugs. Be sure to reattach the terminal cover once wiring is completed.
(Not required for thermal overload relays with MSOD-Q☐BC, as wiring streamlining terminals are included.)
Note 3. This is a compact product that may deform if terminal screws are tightened with a greater torque than listed above. Take care when tightening as this may affect the product's properties.

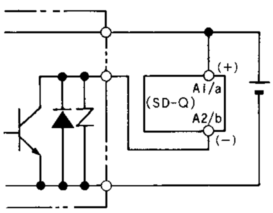
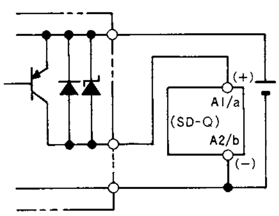
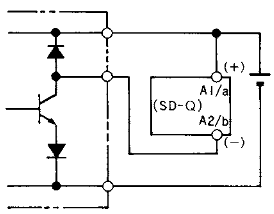
- Disassembly

SD-Q contactors are calibrated when assembled, so the coil and contacts cannot be replaced. (Do not disassemble.)

Connection Method

- Connecting Various Models

(1) SD-Q11, Q12 types have integrated surge absorber function.
(DC12V, DC24V Coil: Varistor Voltage 68 V, DC48V Coil: Varistor Voltage 100 V)
There is no need to connect external surge absorbers to regular sequence circuits.
(2) The integrated surge protection element increases the return time when connected to various DC output type devices.
The figure below shows the connections when connecting to transistor output type devices.

Output Type		Transistor Output (Sink Type)	Transistor Output (Source Type)	Transistor Output (Sink Type)
Protection Method		Zener Diode or Varistor		Protection Diode
Connection Method				
Example	Mitsubishi PLC A, Q Series (Typical)	AY50, 51, AY60 AISY40P, 41P, 42P, AISY50, AISY60 Output Unit QY40P, 41P, 42P, QY50	AY60E AISY60E, AISY80, AISY81 Output Unit QY80, QY81P	AY40, 41, 42 Output Unit
	Other	Proximity Switches Photoelectric Switches etc.	Proximity Switches Photoelectric Switches etc.	Various Programmable Controllers etc.
Return Time		Approx. 10 ms longer		Approx. 30 ms longer

(3) Operation coil terminals have polarity. Refer to the Precautions in the Outline Drawings/Contact Arrangements column.

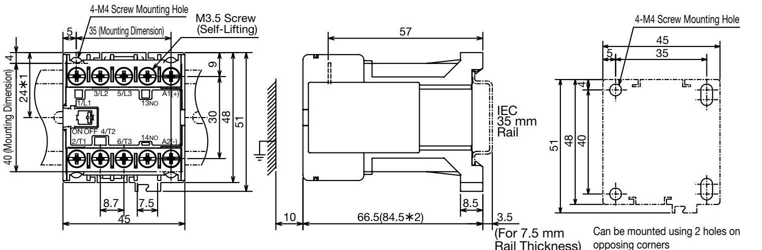
Outline Drawings

Magnetic Contactors

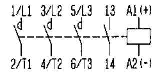
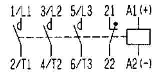
Can be mounted on IEC 35 mm rails.

SD-Q11

0.19 kg



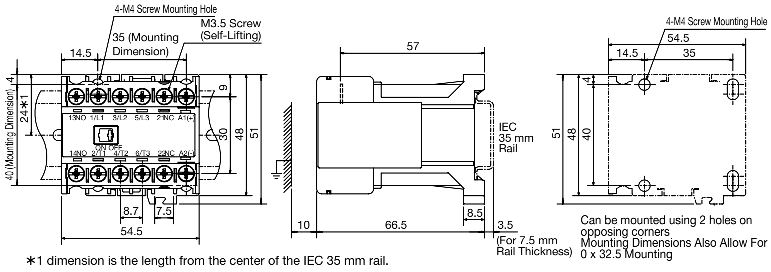
∗1 dimension is the length from the center of the IEC 35 mm rail.
∗2 dimension includes the head-on auxiliary contact unit (UQ-AX2).

Auxiliary Contact	Contact Arrangement
1a	
1b	

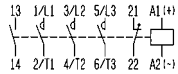
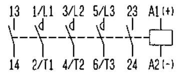
Model Name
SD-Q11

SD-Q12

0.21 kg



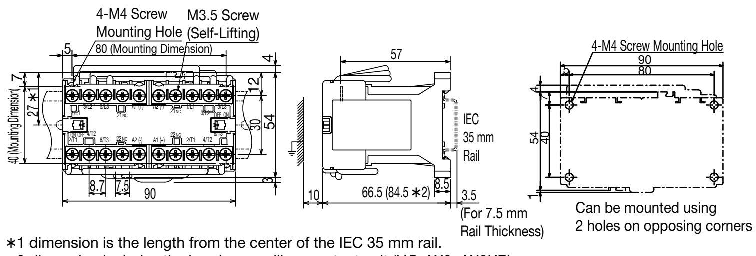
∗1 dimension is the length from the center of the IEC 35 mm rail.

Auxiliary Contact	Contact Arrangement
1a1b	
2a	

Model Name
SD-Q12

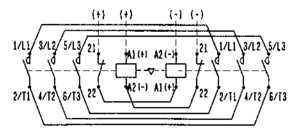
SD-QR11

0.42 kg



∗1 dimension is the length from the center of the IEC 35 mm rail.
∗2 dimension includes the head-on auxiliary contact unit (UQ-AX2, AX2KR).

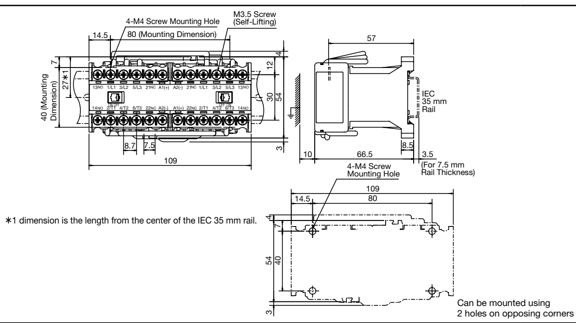
Connection Diagram



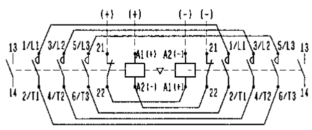
Model Name
SD-QR11

SD-QR12

0.46 kg



Connection Diagram



Model Name
SD-QR12

Note 1. The contact arrangement and coil terminal location differ between non-reversible and reversible types. **Reversible types, in particular, have reversed coil polarity so extra care should be taken when wiring.**

Note 2. The 2 auxiliary break contacts of reversible types are wired as an electrical interlock so should be used in an electrically interlocked state.

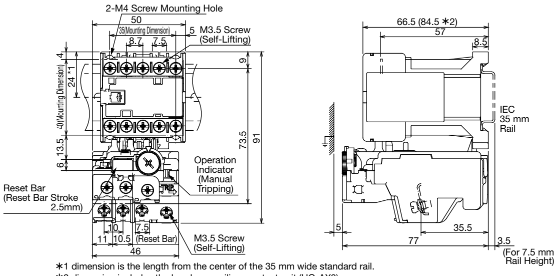
Note 3. **Operation coil terminals have polarity.**
Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.

● Magnetic Starters

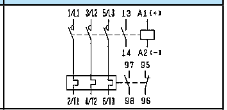
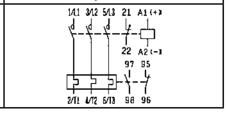
Can be mounted on IEC 35 mm rails.

MSOD-Q11KP

0.3 kg



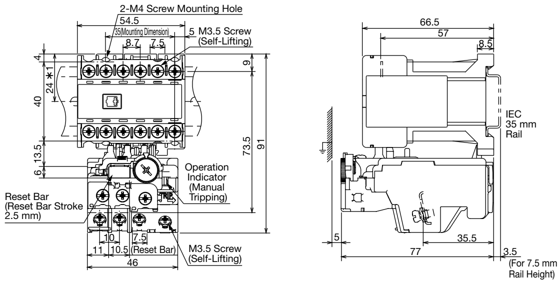
∗1 dimension is the length from the center of the 35 mm wide standard rail.
∗2 dimension includes the head-on auxiliary contact unit (UQ-AX2).

Auxiliary Contact	Contact Arrangement
1a	
1b	

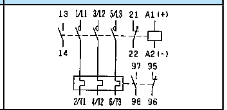
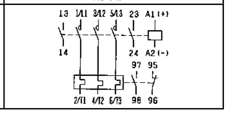
Model Name
MSOD-Q11KP

MSOD-Q12KP

0.31 kg



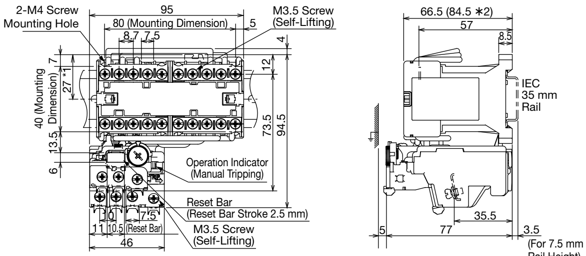
∗1 dimension is the length from the center of the 35 mm wide standard rail.

Auxiliary Contact	Contact Arrangement
1a1b	
2a	

Model Name
MSOD-Q12KP

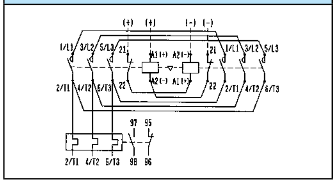
MSOD-QR11KP

0.52 kg



∗1 dimension is the length from the center of the 35 mm wide standard rail.
∗2 dimension includes the head-on auxiliary contact unit (UQ-AX2, AX2KR).

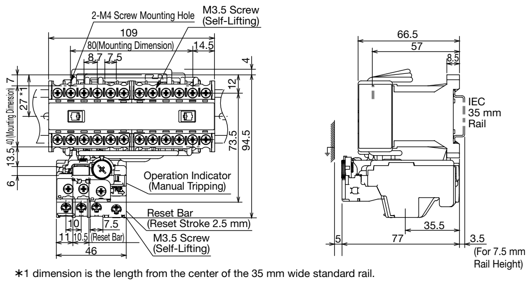
Connection Diagram



Model Name
MSOD-QR11KP

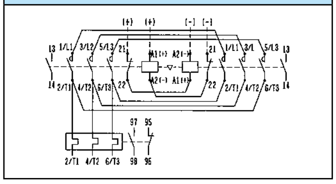
MSOD-QR12KP

0.56 kg



∗1 dimension is the length from the center of the 35 mm wide standard rail.

Connection Diagram



Model Name
MSOD-QR12KP

Note 1. The contact arrangement and coil terminal location differ between non-reversible and reversible types. **Reversible types, in particular, have reversed coil polarity so extra care should be taken when wiring.**

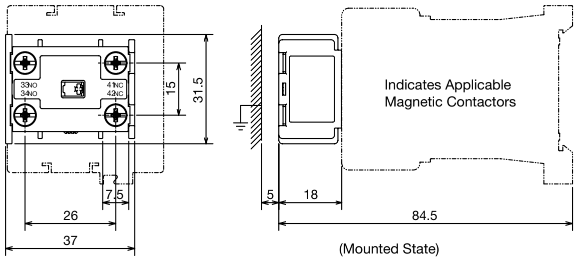
Note 2. The 2 auxiliary break contacts of reversible types are wired as an electrical interlock so should be used in an electrically interlocked state.

Note 3. **Operation coil terminals have polarity.**
Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.

● Optional

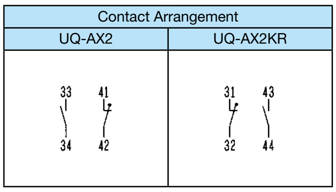
UQ-AX2
UQ-AX2KR

0.02 kg



(Mounted State)

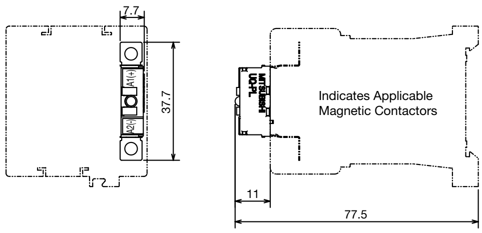
This figure shows UQ-AX2. (UQ-AX2KR also has the same outline drawings.)



Model Name
UQ-AX2
UQ-AX2KR

UQ-PL

0.003 kg



(Mounted State)

Connect terminals A1(+) and A2(-) of the main coil to terminals A1(+) and A2(-)
of the unit, respectively.

Model Name
UQ-PL

Note 1. The contact arrangement and coil terminal location differ between non-reversible and reversible types.**Reversible types, in particular, have reversed coil polarity so extra care should be taken when wiring.**

Note 2. The 2 auxiliary break contacts of reversible types are wired as an electrical interlock so should be used in an electrically interlocked state.

Note 3. **Operation coil terminals have polarity.**
Connect terminal number A1 (+) to the positive and A2 (-) to the negative sides.

9.3 B-T/N□ NC Main Contact Contactors

Can be used for motor control and power switching for lighting circuits

B-T/N type magnetic contactors have a break contact as the main contact (normally closed contact) that is suited for use shorting motor starting resistance, cushion-starting AC motors, power generation (dynamic braking) and AC/DC power switching for lighting circuits. AC operated types are B-T/N type, DC operated types are BD-T/N type.

Features

- **Compact and Space-Saving**
  Dramatically reduced outline drawings and mounting area compared to conventional products
- **Featuring an AC Operated DC Excitation Type Magnet (B-N65/N100)**
  - Completely eliminates buzzing
  - Wide range rated coil (designation AC200V: rated AC200 to 240 V 50/60 Hz)
  - Surge absorber comes built-in
  - Dramatically reduced power consumption

B-T21

- **Supports Live Part Protection**
  - Live part protection covers are standard equipment (B(D)-T21)
  - Applicable with live part protection cover units UN-CV/CZ□ (B(D)-N□)
- **Adopts Auxiliary Twin Contacts**
  All auxiliary contacts are high contact reliability twin contacts that can be applied with 20 V 5 mA loads
- **Improved Safety**
  A main circuit inter-phase barrier is equipped as standard
- **Improved Environmental Applicability**
  Materials used are indicated on main plastic components

Rating/Performance

Operating Method	Model Name	Main Contact Arrangement	DC Rated Operational Current [A] DC Motor Load (Category DC-3, DC-5, DC2, DC4) 100 to 110 V	DC Motor Load 200 to 220 V	DC Resistive Load (Category DC-1, DC1) 100 to 110 V	DC Resistive Load 200 to 220 V	Conventional Free Air Thermal Current Ith [A]	Rated Insulation Voltage [V]	Auxiliary Contact Arrangement
AC Operated	B-T21(BC)	1a2b, 3b	8 (15)	1 (5)	15 (20)	5 (10)	25	690	2a2b
	B-N65		20 (50)	3 (20)	30 (65)	10 (30)	80		2a2b
	B-N100	1a2b	30	3	40	20	120		
DC Operated	BD-T21(BC)	1a2b	8	1	15	5	25		2a2b
	BD-N65		20	3	30	10	80		2a2b
	BD-N100		30	3	40	20	120		

Note 1. The DC rating indicated is for 2-poles in series. The value in parentheses is for 3-poles in series.
Note 2. Electrical durability of 500,000 operations, mechanical durability of 5 million operations and switching frequency of 1200 times/hour
Note 3. Auxiliary contact ratings are the same as N35 to N800 types or greater. (Refer to page 41)
Note 4. Use the following table when applying AC to main circuit contacts.

Operating Method	Model Name	Main Contact Arrangement	AC Rated Operational Current [A] Break Contact Three-Phase 200 to 220 V	Break Contact Three-Phase 380 to 440 V	Break Contact 2-Pole Series Single Phase 200 to 220 V	Break Contact 1-Pole Single Phase 200 to 220 V	Make Contact 1-Pole Single Phase 200 to 220 V
AC Operated	B-T21(BC)	1a2b, 3b	18	13	18	18	18
	B-N65		50	35	50	50	50
	B-N100	1a2b	80	55	80	80	80
DC Operated	BD-T21(BC)	1a2b	18	13	18	18	18
	BD-N65		50	35	50	50	50
	BD-N100		80	55	80	80	80
Making/Breaking Duty Conditions/ Switching Durability			Making Only, Without Breaking/ 500,000 Times		Making and Breaking/ 500,000 Times	Making Only, Without Breaking/500,000 Times	Making and Breaking/ 500,000 Times

Note 1. Switching durability is the value when making at 6 times the rated current, breaking at 1 time the rated current or without breaking.

Related Reference Page	Item	Reference Page	Remarks
	· Auxiliary Contact Rating	Page 41	—
	· Operation Coil	Pages 43, 44	—
	· How to Order	Page 263	—
	· Combining with Optional Units	Page 194	—

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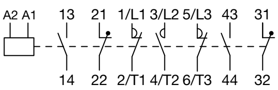
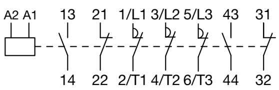
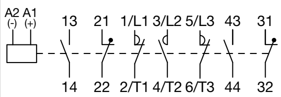
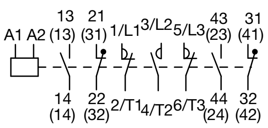
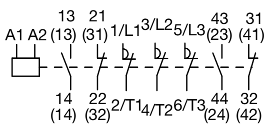
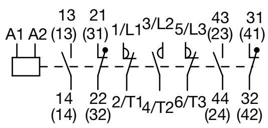
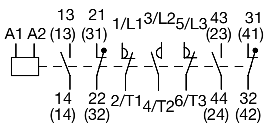
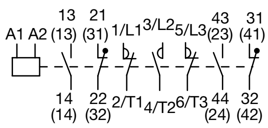
Properties

Model Name	Input [VA]		Power Consumption [W]	Operating Voltage [V]		Coil Current [mA]	Operating Time [ms]	
	Inrush	Normal		Close	Open		Coil ON→Main Break OFF	Coil OFF→Main Break ON
B-T21	75	7	2.4	125 to 155	75 to 110	30	7 to 15	13 to 25
B-N65	210	23	2.8	110 to 140	50 to 100	85	12 to 28	45 to 105
B-N100	270	24	2.9	110 to 140	60 to 130	100	20 to 25	110 to 130
BD-T21	—		3.3 (2.2)	50 to 65	10 to 30	33	45 to 60 (70 to 85)	10 to 30
BD-N65	—		24	55 to 65	12 to 30	240	68 to 92	13 to 29
BD-N100	—		31	50 to 65	12 to 30	310	104 to 156	30 to 70

Note 1. The above indicates rough property indices for AC200V coils under AC operation (B-T/N□) and for DC100V coils under DC operation (BD-T/N□).
The values in the parentheses for BD-T21 indicate rough property indices for DC12V or DC24V coils.
Note 2. The operating voltage is the value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC100V can be calculated proportionately.
Note 3. The input and power consumption indicated are average values. These are almost the same for coils other than AC200V or DC100V.
Note 4. The coil current is the average normal value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types. Divide the regular input for coils other than AC200V, or the power consumption for coils other than DC100V, by the coil voltage.
Note 5. The operating time is the value with 220 V 60 Hz applied for AC operated types and DC100 V applied for DC operated types. These are almost the same for coils other than AC200V or DC100V.

Contact Arrangement

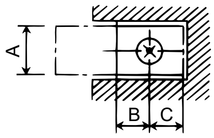
Model Name	Main 1a2b	Main 3b	Model Name	Main 1a2b	Main 3b
B-T21	 Aux. 2a2b	 Aux. 2a2b	BD-T21	 Aux. 2a2b	—
B-N65	 Aux. 2a2b	 Aux. 2a2b	BD-N65	 Aux. 2a2b	—
B-N100	 Aux. 2a2b	—	BD-N100	 Aux. 2a2b	—

Handling

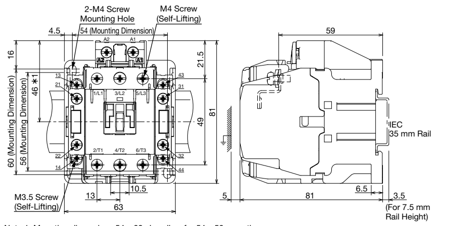
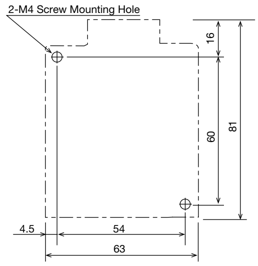
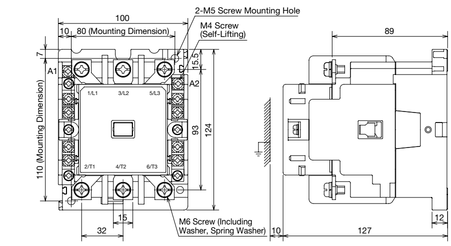
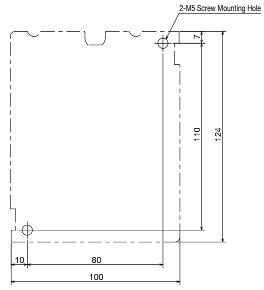
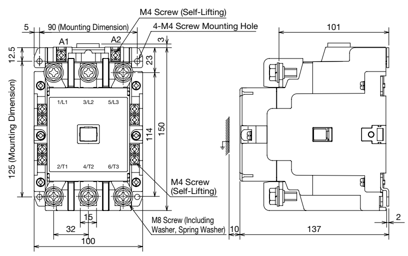
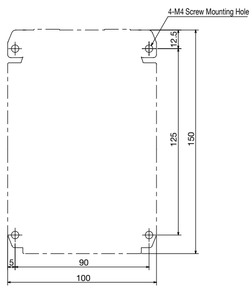
- Applicable Wire Size and Terminal Screw Tightening Torque

Model Name	Terminal Dimensions: Main Circuit Screw Size	Terminal Dimensions: Main Circuit Terminal Dimensions A x B x C [mm]	Terminal Dimensions: Control Circuit Screw Size	Applicable Wire Size [mm²]: Main Circuit	Applicable Wire Size [mm²]: Control Circuit	Applicable Crimp Lug Size: Main Circuit	Applicable Crimp Lug Size: Control Circuit	Terminal Screw Tightening Torque N·m Parentheses show standard value: Main Circuit	Terminal Screw Tightening Torque N·m Parentheses show standard value: Control Circuit
B-T21, BD-T21	M4	10.5 x 5.2 x 5.5	M3.5	φ 1.6 to 2.6, 1.25 to 6	φ 1.6, 0.75 to 2.5	1.25-4 to 5.5-4	1.25-3.5 to 2-3.5	1.2 to 1.9	0.9 to 1.5
B-N65, BD-N65	M6	15 x 7.5 x 11.5	M4	—	φ 1.6 1.25 to 2	1.25-6 to 60-6	1.25-4 to 2-4 5.5-S4	3.53 to 5.78(4.41)	1.18 to 1.86(1.47)
B-N100, BD-N100	M8	15 x 8.5 x 16	M4	—		5.5-8 to 60-8		6.28 to 10.29(7.84)	1.18 to 1.86(1.47)

Note 1. The terminal dimension is a dimension for bus bar connection. (Refer to the figure on the right)
Note 2. Control circuits are auxiliary contact terminals or coil terminals of magnetic contactors.
Note 3. In each terminal, a wire or two crimp lugs may be connected.



Outline Drawings

Model Name/Appearance	Outline Drawings	Hole Drilling Dimensions	Weight [kg]
B-T21 	 Note 1. Mounting dimensions 54 x 60 also allow for 54 x 56 mounting. 2. ✱1 dimension is the length from the center of the 35 mm wide standard rail. 3. Auxiliary contact units (UT-AX2, UT-AX4, UT-AX11) are not applicable. 4. Please read "Mitsubishi Electric Magnetic Starters MS-T/N Series" [L (NA) 02031] carefully before using the product.	 Mounting Dimensions Also Allow For 54 x 56 Mounting	0.41
B-N65 	 Auxiliary contact units are not applicable.		1.7
B-N100 	 Auxiliary contact units are not applicable.		2.7

9

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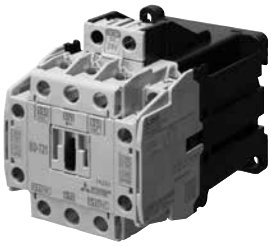
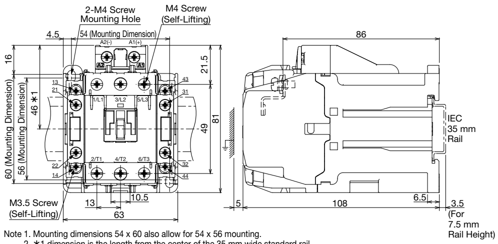
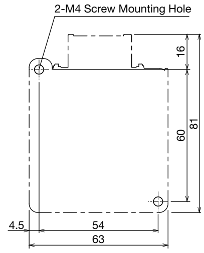
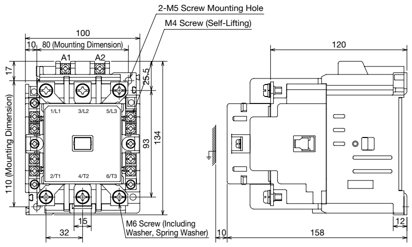
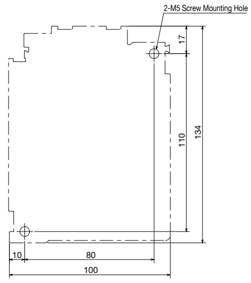
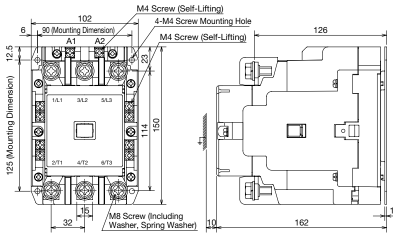
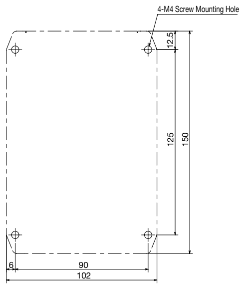
<tr><th>Model Name/Appearance</th><th>Outline Drawings</th><th>Hole Drilling Dimensions</th><th>Weight [kg]</th></tr>
<tr><td>BD-T21
</td><td>

Note 1. Mounting dimensions 54 x 60 also allow for 54 x 56 mounting.
2. ∗1 dimension is the length from the center of the 35 mm wide standard rail.
3. Auxiliary contact units (UT-AX2, UT-AX4, UT-AX11) are not applicable.
4. Please read "Mitsubishi Electric Magnetic Starters MS-T/N Series" [L (NA) 02031] carefully before using the product.</td><td>
</td><td>0.59</td></tr>
<tr><td>BD-N65
</td><td>

Auxiliary contact units are not applicable.</td><td>
</td><td>3.0</td></tr>
<tr><td>BD-N100
</td><td>

Auxiliary contact units are not applicable.</td><td>
</td><td>4.3</td></tr>
</table>

9.4 DU-N□ Magnetic Contactors for DC

Ideal for controlling DC motors of 440 V or less, or for switching general DC circuits

DU-N types are compact, high-performance DC contactors applicable with voltages DC440 V or less. Can be used for variable speed DC motor control and other general DC circuits and available as AC operated type DU-N (main contact 2a1b) and DC operated type DUD-N (main contact 2a).

Features

●Compact and Space-Saving
Dramatically reduced outline drawings and mounting area compared to conventional products

●Featuring an AC Operated DC Excitation Type Magnet (DU-N□)
- Completely eliminates buzzing
- Wide range rated coil (designation AC200V: rated AC200 to 240 V 50/60 Hz)
- Surge absorber comes built-in
- Dramatically reduced power consumption (DU-N30: 2.2 W, DU-N120: 2.9 W)

●Supports Finger Protection
Applicable with live part protection cover units UN-CZ□ used by MS-N series

DU-N30

●Adopts Auxiliary Twin Contacts
Auxiliary contacts are high contact reliability twin contacts that can be applied with DC20 V 5 mA loads

●Additional Auxiliary Contact Units Applicable
Applicable with auxiliary contact units UN-AX□ used by MS-N series

●Improved Environmental Applicability
Materials used are indicated on main plastic components

●Improved Plastic Component Strength (DU/DUD-N30)
Adopts thermoplastic resin around the terminals

Rating

Operating Method	Model Name	Main Contact Arrangement	Main Contact Series Connection		Rated Operating Current [A]: Variable Speed Motor Control: Make Contact / Dynamic Braking: Break Contact			Rated Operating Current [A]: General DC Motors (Category DC2 and DC4)			Rated Capacity [kW]: General DC Motors (Category DC2 and DC4)			Conventional Free Air Thermal Current Ith [A]	Rated Insulation Voltage	Auxiliary Contact Arrangement
					DC110V	DC220V	DC440V	DC110V	DC220V	DC440V	DC110V	DC220V	DC440V			
AC Operated	DU-N30	2a1b	Make Contact	Single Pole	40	40	15	30	20	—	2.2	3.7	—	60	660V	2a2b
				2-Pole	50	50	40	40	30	20	3.7	5.5	7.5			
			Break Contact	Single-Pole	120 ∗1	120 ∗1	120 ∗1	20	15	—	1.5	2.2	—	50		
	DU-N60		Make Contact	Single Pole	80	80	30	60	40	—	5.5	7.5	—	120		
				2-Pole	90	90	80	80	60	40	7.5	11	15			
			Break Contact	Single-Pole	240 ∗1	240 ∗1	240 ∗1	40	30	—	3.7	5.5	—	100		
	DU-N120		Make Contact	Single Pole	160	160	60	120	80	—	11	15	—	160		
				2-Pole	160	160	160	160	120	80	15	22	30			
			Break Contact	Single-Pole	480 ∗1	480 ∗1	480 ∗1	80	60	—	7.5	11	—			
	DU-N180		Make Contact	Single Pole	260	260	90	180	120	—	15	22	—	270		
				2-Pole	260	260	260	240	180	120	22	35	45			
			Break Contact	Single-Pole	720 ∗1	720 ∗1	720 ∗1	100	75	—	7.5	11	—	260		
	DU-N260		Make Contact	Single Pole	360	360	130	260	175	—	22	30	—	360		
				2-Pole	360	360	360	350	260	175	30	45	55			
			Break Contact	Single-Pole	1040 ∗1	1040 ∗1	1040 ∗1	150	100	—	11	18.5	—			
DC Operated	DUD-N30	2a	Make Contact	Single Pole	40	40	15	30	20	—	2.2	3.7	—	60	660V	2a2b
				2-Pole	50	50	40	40	30	20	3.7	5.5	7.5			
	DUD-N60		Make Contact	Single Pole	80	80	30	60	40	—	5.5	7.5	—	120		
				2-Pole	90	90	80	80	60	40	7.5	11	15			
	DUD-N120		Make Contact	Single Pole	160	160	60	120	80	—	11	15	—	160		
				2-Pole	160	160	160	160	120	80	15	22	30			
	DUD-N180		Make Contact	Single Pole	260	260	90	180	120	—	15	22	—	270		
				2-Pole	260	260	260	240	180	120	22	35	45			
	DUD-N260		Make Contact	Single Pole	360	360	130	260	175	—	22	30	—	360		
				2-Pole	360	360	360	350	260	175	30	45	55			

Note 1. Variable speed motor control (make contact) duty applied 2 times tripping/no voltage open-circuit, dynamic braking (break contact) duty applied 1 times tripping/no voltage open-circuit.
Note 2. General DC motors are applicable with JEM1038 class DC2 (shunt motor starting/stopping), class DC4 (series-wound motor starting/stopping) motor loads.
Note 3. Allowable continuity current of ∗1 is for 30 seconds. Inching operations should be conducted at the rated operating current of general DC motors.
Note 4. Auxiliary contact ratings are the same as N125 to N800 types. (Refer to page 41)
Note 5. Reversible types (DU-2xN□, DUD-2xN□) can also be manufactured.

9

Performance

Model Name	Main Contact Series Connection		Breaking Capacities [A] Note 1			Making Current Capacity [A] Note 2	Switching Frequency [Times/Hour]	Switching Durability [x 10000]	
			DC110 V	DC220 V	DC440 V			Mechanical	Electrical
DUD-N30	Make Contact	Single Pole	120	80	—	160	1200	250	50
		2-Pole	160	120	80				
DU-N30	Break Contact Single-Pole		80	60	—				
DUD-N60	Make Contact	Single Pole	240	160	—	320			
		2-Pole	320	240	160				
DU-N60	Break Contact Single-Pole		160	120	—				
DUD-N120	Make Contact	Single Pole	480	320	—	640			
		2-Pole	640	480	320				
DU-N120	Break Contact Single-Pole		320	240	—				
DUD-N180	Make Contact	Single Pole	720	480	—	960			
		2-Pole	960	720	480				
DU-N180	Break Contact Single-Pole		400	300	—				
DUD-N260	Make Contact	Single Pole	1040	700	—	1400			
		2-Pole	1400	1040	700				
DU-N260	Break Contact Single-Pole		600	400	—				

Note 1. Time constant L/R = 15 ms, 25 shut-off transitions.
Note 2. Time constant L/R = 15 ms, 100 closings

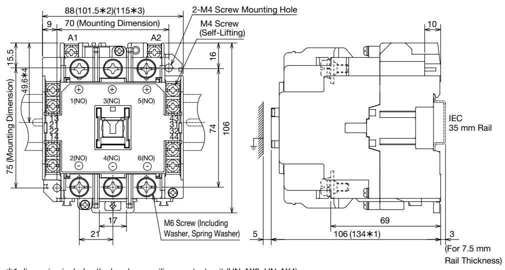
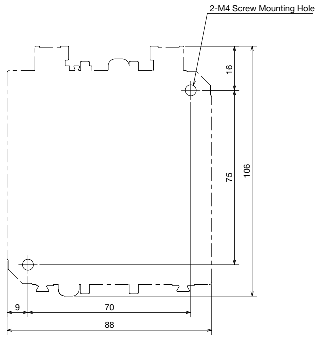
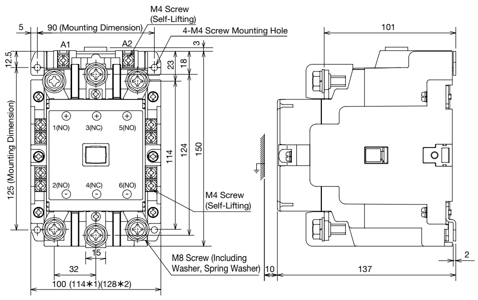
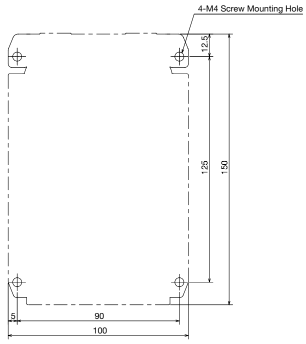
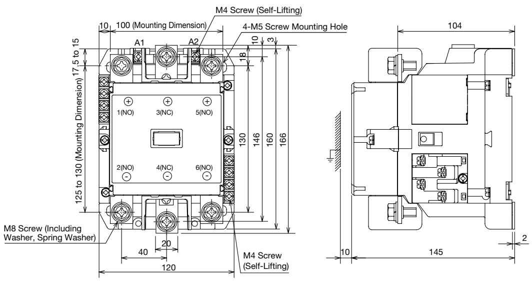
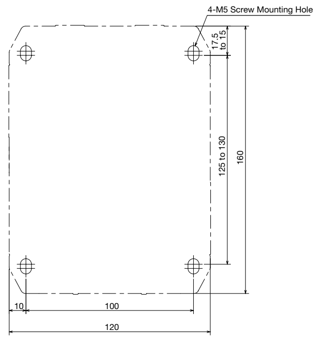
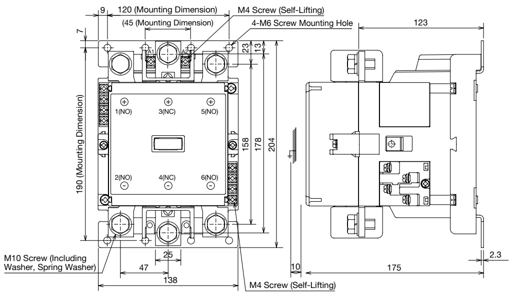
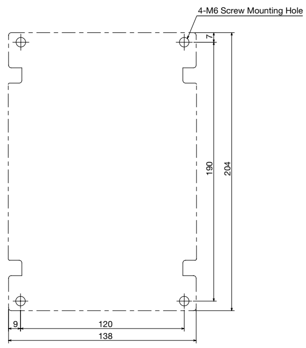
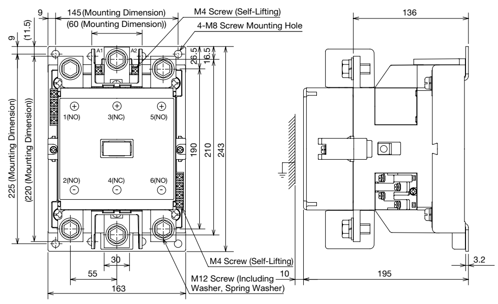
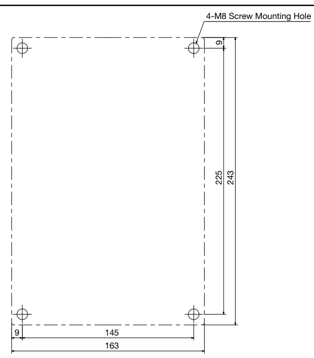
Properties

Model Name	Input [VA]		Power Consumption [W]	Operating Voltage [V]		Coil Current [mA]	Operating Time [ms]			
	Inrush	Normal		Close	Open		Coil ON→Main Make ON	Coil ON→Main Break OFF	Coil OFF→Main Make OFF	Coil OFF→Main Break ON
DU-N30	115	20	2.2	133	57	67	12 to 15	10 to 13	66 to 72	65 to 76
DU-N60	270	24	2.9	112	68	100	20 to 23	17 to 20	75 to 103	78 to 108
DU-N120	270	24	2.9	125	76	100	25 to 27	20 to 22	75 to 103	80 to 110
DU-N180	440	40	4.2	109	76	165	32 to 34	24 to 26	85 to 105	90 to 140
DU-N260	440	50	6.1	112	58	200	37 to 39	29 to 31	100 to 130	105 to 140
DUD-N30	—	—	18	61	22	180	42 to 52	—	14 to 17	—
DUD-N60	—	—	31	52	18	310	100 to 103	—	16 to 18	—
DUD-N120	—	—	31	54	16	310	102 to 110	—	18 to 20	—
DUD-N180	—	—	41	56	15	410	112 to 120	—	20 to 25	—
DUD-N260	—	—	55	54	13	550	140 to 150	—	30 to 50	—

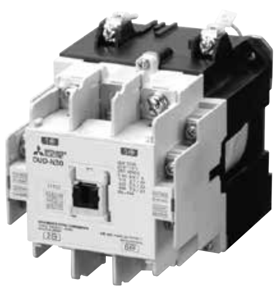
Note 1. The above indicates rough property indices for AC200V coils under AC operation (DU-N☐) and for DC100V coils under DC operation (DUD-N☐).
Note 2. The operating voltage is the average value at a 20°C cold state for both AC (at 60 Hz) and DC operation. Voltages for coils other than AC200V or DC100V can be calculated proportionately.
Note 3. The input and power consumption indicated are average values. These are almost the same for coils other than AC200V or DC100V.
Note 4. The coil current is the average value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types. Divide the regular input for coils other than AC200V, or the power consumption for coils other than DC100V, by the coil voltage.
Note 5. The operating time is the value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types. These are almost the same for coils other than AC200V or DC100V.

Related Reference Page	Item	Reference Page	Remarks
	· Auxiliary Contact Rating	Page 41	—
	· Operation Coil	Pages 43, 44	—
	· How to Order	Page 263	—
	· Combining with Optional Units	Page 194	—

Outline Drawings

Model Name/Appearance	Outline Drawings	Hole Drilling Dimensions	Weight [kg]
DU-N30 	 ∗1 dimension includes the head-on auxiliary contact unit (UN-AX2, UN-AX4). ∗2, ∗3 dimensions indicate when using a side-on auxiliary contact unit (UN-AX11) - ∗2 indicates 1 piece, ∗3 indicates 2 pieces (both sides). It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time. ∗4 dimension is the length from the center of the 35 mm wide standard rail.		0.77
DU-N60 	 ∗1, ∗2 dimensions indicate when using a side-on auxiliary contact unit (UN-AX80) - ∗1 indicates 1 piece, ∗2 indicates 2 pieces (both sides).		2.6
DU-N120 	 2 auxiliary contact units (UN-AX150) can be installed.		3.2
DU-N180 	 2 auxiliary contact units (UN-AX150) can be installed.		5.3
DU-N260 	 2 auxiliary contact units (UN-AX150) can be installed.		9.0

<table>
<tr><th>Model Name/Appearance</th><th>Outline Drawings</th><th>Hole Drilling Dimensions</th><th>Weight [kg]</th></tr>
<tr><td>DUD-N30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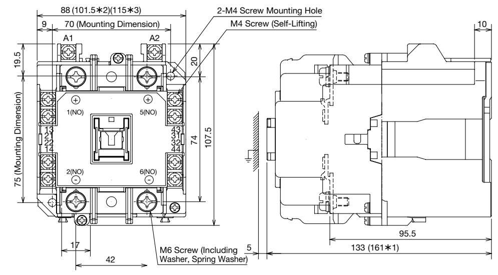
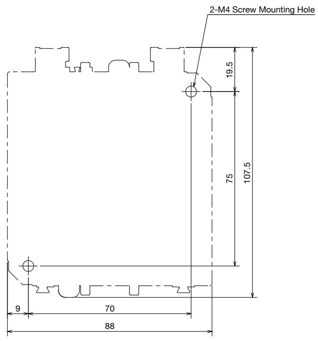


∗1 dimension includes the head-on auxiliary contact unit (UN-AX2, AX4).
∗2, ∗3 dimensions indicate when using a side-on auxiliary contact unit (UN-AX11) - ∗2 indicates 1 piece,
∗3 indicates 2 pieces (both sides). It should be noted that it cannot be used with the head-on and side-on auxiliary contact units mounted at the same time.
</td><td>


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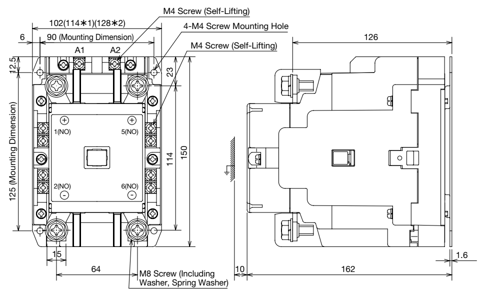
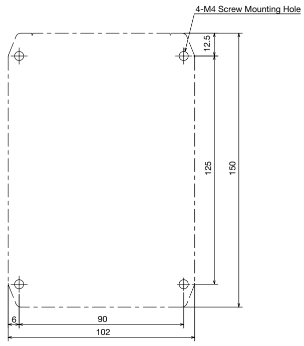
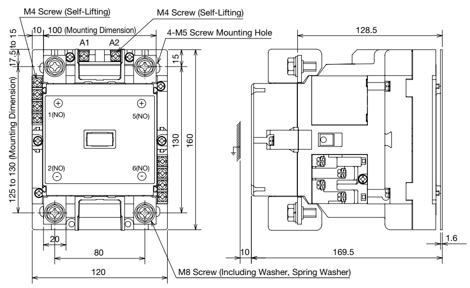
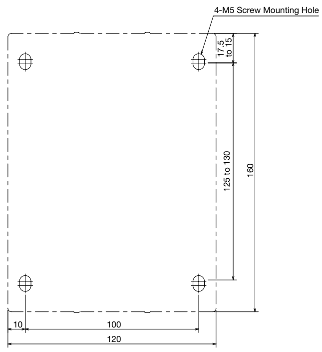
<tr><td>DUD-N60


</td><td>


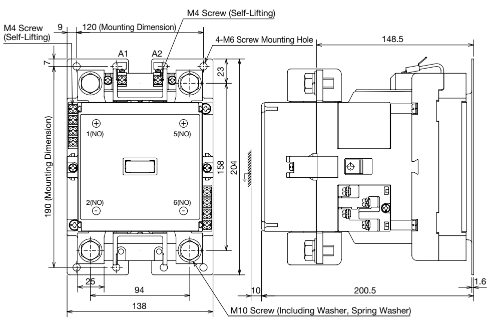
∗1,∗2 dimensions indicate when using a side-on auxiliary contact unit (UN-AX80) -∗1 indicates 1 piece,
∗2 indicates 2 pieces (both sides).
</td><td>


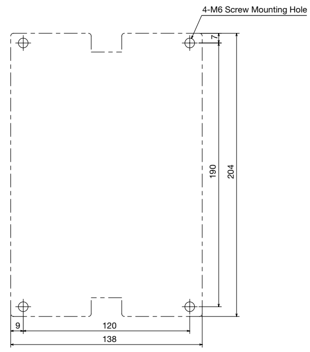
</td><td>4.3</td></tr>
<tr><td>DUD-N120


</td><td>


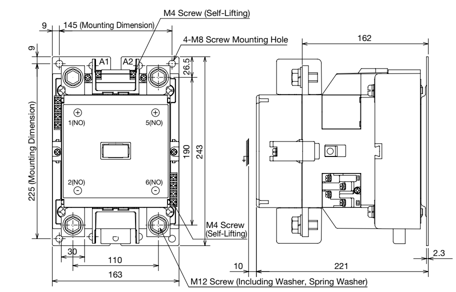
2 auxiliary contact units (UN-AX150) can be installed.
</td><td>


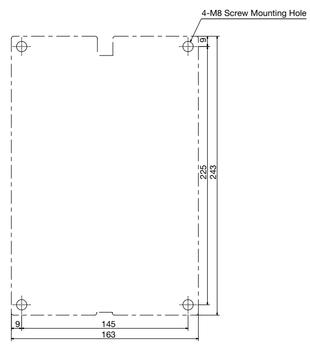
</td><td>4.9</td></tr>
<tr><td>DUD-N180


</td><td>


2 auxiliary contact units (UN-AX150) can be installed.
</td><td>


</td><td>7.4</td></tr>
<tr><td>DUD-N260


</td><td>


2 auxiliary contact units (UN-AX150) can be installed.
</td><td>


</td><td>12.3</td></tr>
</table>

Contact Arrangement/Connection Diagram

Main 2a1b + Aux. 2a2b

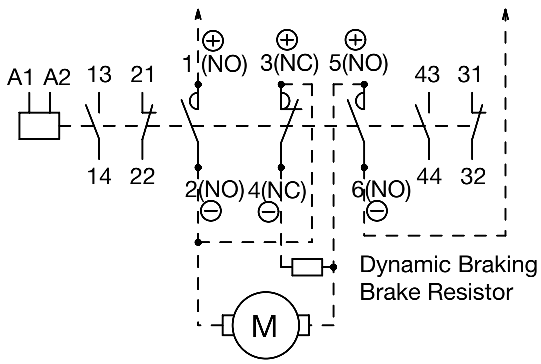


Fig. 1. DU-N30, N60, N120
DU-N180, N260

Main 2a + Aux. 2a2b

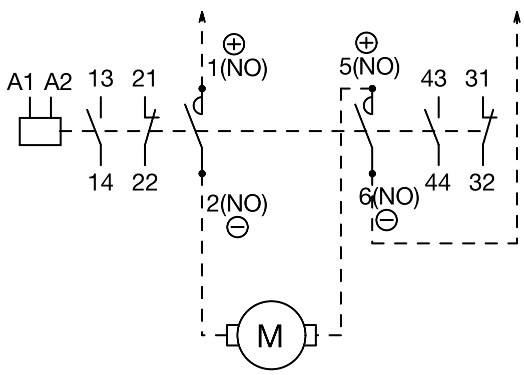


Fig. 2. DUD-N30, N60, N120
DUD-N180, N260

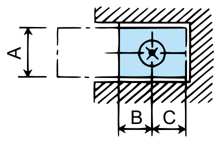
Note 1. The main contact terminals have ⊖negative or ⊕positive polarity. Be sure tomake connections with the correct polarity. If the polarity is incorrect then breaking isn't possible.

Handling

● Applicable Wire Size and Terminal Screw Tightening Torque

Model Name	Terminal Dimensions			Applicable Wire Size [mm^2]		Applicable Crimp Lug Size		Terminal Screw Tightening Torque N·m Parentheses show standard value	
	Main Circuit		Control Circuit						
	Screw Size	Terminal Dimensions A x B x C [mm]	Screw Size	Main Circuit	Control Circuit	Main Circuit	Control Circuit	Main Circuit	Control Circuit
DU-N30, DUD-N30	M6	15 x 7 x 8.5	M4	—	φ 1.6 1.25 to 2	1.25-6 to 22-6 38-S6	1.25-4 to 2-4, 5.5-S4	3.53 to 5.78(4.41)	1.18 to 1.86 (1.47)
DU-N60, DUD-N60	M8	15 x 8.5 x 16	M4	—		5.5-8 to 60-8		6.28 to 10.29(7.84)	
DU-N120, DUD-N120	M8	20 x 10 x 16	M4	—		8-8 to 100-8		6.28 to 10.29(7.84)	
DU-N180, DUD-N180	M10	25 x 12.5 x 18	M4	—		14-10 to 150-10		11.8 to 19.1(14.7)	
DU-N260, DUD-N260	M12	30 x 15 x 22.5	M4	—		22-12 to 200-12		19.6 to 31.3(24.5)	

Note 1. The terminal dimension is a dimension for bus bar connection. (Refer to the figure on the right)
Note 2. Control circuits are auxiliary contact terminals or coil terminals of magnetic contactors.
Note 3. In each terminal, a wire or two crimp lugs may be connected.



9

9.5 S-N☐KG Magnetic Contactors for High-Frequency Switching

Ideal for applications with frequent inching operations such as hoists and cranes

S-N☐KG type magnetic contactors have a reinforced main contact compared to standard magnetic contactors (adopts a large, hardened silver alloy contact) to be suitable for applications with frequent inching operations such as hoists and cranes.

● Rated Capacity, Rated Operating Current and Rated Continuity Current (JISC8201-4-1)

Model Name \ Application	Inching Duty - Category AC-4				Standard Duty - Category AC-3				Conventional Free Air Thermal Current Ith [A]
	Rated Capacity [kW]		Rated Operating Current [A]		Rated Capacity [kW]		Rated Operating Current [A]		
	200 to 220 V	380 to 440 V	200 to 220 V	380 to 440 V	200 to 220 V	380 to 440 V	200 to 220 V	380 to 440 V	
S-N125KG	15	22	65	47	30	60	125	120	150
S-N220KG	30	45	125	90	55	110	220	220	260

Note 1. Reversible types are also manufactured. In this case, the model name is S-2xN☐KG.
Note 2. Electrical durability of Class AC-4 is 100,000 operations.
Electrical durability of Class AC-3 is 1.5 mil. operations.
Note 3. Magnetic starters (combined with thermal overload relay: MSO-N☐KG) can also be manufactured.
Note 4. DC operated types can also be manufactured.

Model Name
S-N125KG
S-N220KG

● Operation Coil/Properties/Contact Arrangement/Outline Drawings

The above are the same as the standard product, so refer to pages 41, 43 and 43 for the operation coil, properties and contact arrangements, and page 84, 86 for outline drawings.

9.6 SH-V□ Vacuum Magnetic Contactors

Large capacity vacuum magnetic contactors with excellent safety properties

A large-capacity vacuum magnetic contactor boasting high-performance, long lifespan and maintenance-free characteristics through combination of a vacuum switch and AC operated, DC energizing solenoid. SH-V160 to V600 types are UL standard recognized and CSA standard accredited products.

● Features

SH-V320

- **High-Performance, Long Lifespan**
- **Large Capacitor Switching Capacity**
- **Latched Types Available (Excluding V600)**
- **Compact**
  Allows for more compact panels without requiring any arc clearance.
- **Excellent Operational Reliability and High Frequency Switching Capacity**
  Combination of a vacuum switch with a DC solenoid.
- **Zero Noise**
  No buzzing or current shut-off noise.
- **Extremely Easy Maintenance and Inspection**
- **High Degree of Safety**
  Zero arc ejection allowing for safe use in atmospheres with poor ambient conditions.

● Rating/Performance

Rating/Performance			Frame / Model Name	160		320		400		600
			Model Name	SH-V160 SHD-V160	SHL-V160 SHLD-V160	SH-V320 SHD-V320	SHL-V320 SHLD-V320	SH-V400 SHD-V400	SHL-V400 SHLD-V400	SH-V600
Main Contact	Rated Insulation Voltage [V]			1500 (Three-Phase 50/60 Hz)						
Main Contact	Rating	Three-Phase Motor Category AC-3 Rated Operating Current [A] ( ) Shows Rated Capacity [kW]	AC220V	180 (45)		320 (75)		400 (95)		630 (160)
			AC440V	180 (90)		320 (150)		400 (200)		630 (300)
			AC550V	180 (110)		320 (200)		400 (250)		630 (350)
			AC1000V	160 (220)		320 (400)		400 (500)		600 (750)
			AC1500V	160 (315)		320 (600)		400 (750)		600 (1000)
		Three-Phase Capacitor Rated Capacity A [kVA]	AC220V	150 (50)		250 (75)		300 (100)		580 (200)
			AC440V	150 (100)		250 (150)		300 (200)		580 (400)
			AC550V	150 (125)		250 (200)		300 (250)		580 (500)
	Conventional Free Air Thermal Current Ith [A]			200		350		450		750
	Switching Frequency [Times/Hour]			1200						
	Switching Durability [x 10000]	Electrical	Three-Phase Motor (Category AC-3)	50	25	50	25	50	25	25
			Three-Phase Capacitor	10	10	10	10	10	10	5
		Mechanical		250	25	250	25	250	25	250
	Compliant Standards			JISC8201-4-1, JEM 1038, IEC 60947-4-1						
Auxiliary Contact	Rated Operating Current [A]	Category AC-15	AC220V	5						
			AC440V	3						
		Category DC-13	DC110V	0.6						
			DC220V	0.2						
	Compliant Standards			JIS C4531 (1994)						

Note 1. Surge absorbers are not required for SH-V series models with motor loads of 7.5 kW or more, but should be used for motor loads of 5.5 kW or less.

Properties

(1) Constant Excitation Type

Model Name / Operating Method			SH-V160 SH-V320 SH-V400	SHD-V160 SHD-V320 SHD-V400	SH-V600
			AC Operated Constant Excitation Type	DC Operated Constant Excitation Type	AC Operated Constant Excitation Type
Operating Voltage	Close		85% or Less of Rated Voltage (40°C Ambient Temperature, After Coil Temperature Rise Saturation)		
	Open		10% or More of Rated Voltage (20°C Ambient Temperature)		
Operating Time (Average) [ms]	Main Contact ON		40	40	65
	Main Contact OFF		130	130	80
Operation Coil Input [VA]	Operating Or Tripping	Inrush	480	480	1,150
		Normal	44	40	55

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SH-V☐) and for DC100V coils under DC operation (SHD-V☐).
Note 2. The input indicates the average value. These are almost the same for coils other than AC200V or DC100V.
Note 3. The operating time is the average value with 220 V 60 Hz applied for AC operated types and DC100V applied for DC operated types.
These are almost the same for coils other than AC200V or DC100V.

(2) Mechanically Latched Type

Properties / Model Name / Operating Method		SHL-V160, SHLD-V160 SHL-V320, SHLD-V320 SHL-V400, SHLD-V400	
		AC Operation	DC Operation
Operating Voltage	Close	85% or Less of Rated Voltage (40°C Ambient Temperature)	
	Trip		
Operating Time (Average) [ms]	Main Contact ON	40	
	Main Contact OFF	30	
Inrush Coil Input [VA]	Closing	480	480
	Tripping	650	300

Note 1. The above indicates rough property indices for AC200V coils under AC operation (SHL-V☐) and for DC100V coils under DC operation (SHLD-V☐).
Note 2. The momentary input indicates the average value. These are almost the same for coils other than AC200V or DC100V.
Note 3. The drive time is the time taken from when the closing coil or tripping coil is excited until the main contact transitions (ON or OFF) when 220 V, 60 Hz is applied for AC operation or DC100V is applied for DC operation. These are almost the same for coils other than AC200V or DC100V.

Rated Operation Coil

(1) SH-V AC Operation Coils, SHL-V Closing/Tripping Coils

SH-V160, 320, 400 AC Operation Coils SH-V160, 320, 400 Closing/Tripping Coils			
Coil Designation	Rated Voltage [V] 50Hz	Rated Voltage [V] 60Hz	Coil Indicator
AC100V	100 to 127	100 to 127	Rated Voltage/ Frequency
AC200V	200 to 240	200 to 240	
AC300V	260 to 350	260 to 350	
AC400V	380 to 440	380 to 440	
AC500V	460 to 550	460 to 550	

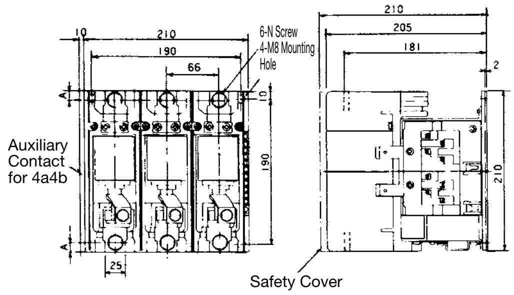
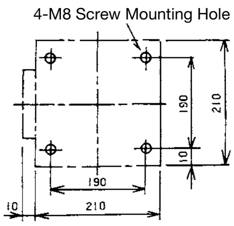
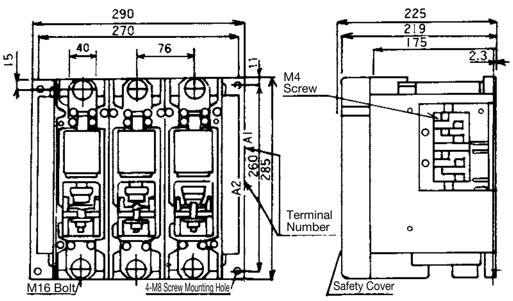
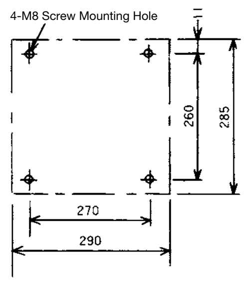
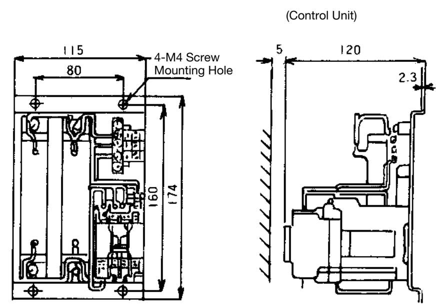
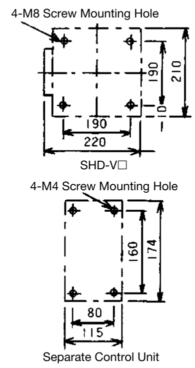
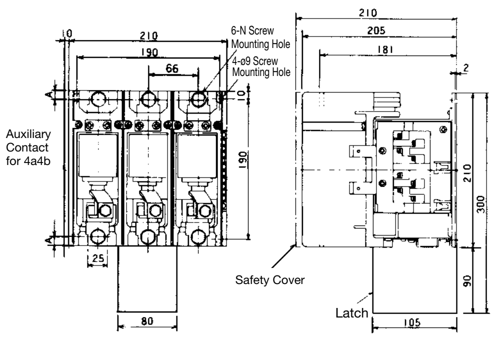
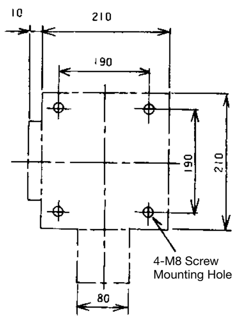
SH-V600 AC Operation Coil			
Coil Designation	Rated Voltage [V] 50Hz	Rated Voltage [V] 60Hz	Coil Indicator
AC100V	100 to 127	100 to 127	Rated Voltage/ Frequency
AC200V	200 to 240	200 to 240	

(2) SHD-V160, 320, 400 DC Operation Coils SHLD-V160, 320, 400 Closing/Tripping Coils

Coil Designation	Rated Voltage	Coil Indicator
DC100V	DC100 to 110V	Rated Voltage
DC200V	DC200 to 220V	

The designation is a symbol to be specified when ordering.

Outline Drawings

<table>
<tr><th colspan="2">Model Name</th><th>Outline Drawings</th><th>Hole Drilling Dimensions</th><th>Weight [kg]</th></tr>
<tr><td rowspan="2">AC Operated Constant Excitation Type</td><td>SH-V160
SH-V320
SH-V400
<table><tr><th rowspan="2">Model Name</th><th colspan="2">Variable Dimensions</th></tr><tr><th>N</th><th>A</th></tr><tr><td>SH-V160</td><td>M8</td><td>10</td></tr><tr><td>SH-V320</td><td>M10</td><td>12.5</td></tr><tr><td>SH-V400</td><td>M10</td><td>12.5</td></tr></table></td><td>
</td><td>
</td><td>11</td></tr>
<tr><td>SH-V600</td><td>
</td><td>
</td><td>22</td></tr>
<tr><td>DC Operated Constant Excitation Type</td><td>SHD-V160
SHD-V320
SHD-V400
A separate control unit is installed with the same outline drawings (above figure) as SH-V160/V320/V400 types is installed to the body as per the figure to the right.</td><td>
</td><td>
</td><td>13</td></tr>
<tr><td>With Latch</td><td>SHL-V160, SHLD-V160
SHL-V320, SHLD-V320
SHL-V400, SHLD-V400
<table><tr><th rowspan="2">Model Name</th><th colspan="2">Variable Dimensions</th></tr><tr><th>N</th><th>A</th></tr><tr><td>SHL(D)-V160</td><td>M8</td><td>10</td></tr><tr><td>SHL(D)-V320</td><td>M10</td><td>12.5</td></tr><tr><td>SHL(D)-V400</td><td>M10</td><td>12.5</td></tr></table></td><td>
</td><td>
</td><td>13</td></tr>
</table>

Contact Arrangement/Connection Diagram

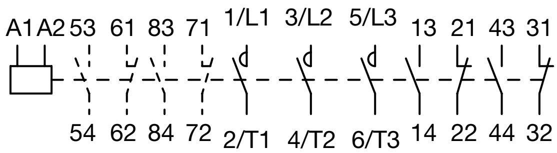


Fig. 1. SH-V160, SH-V320, SH-V400, SH-V600 Types

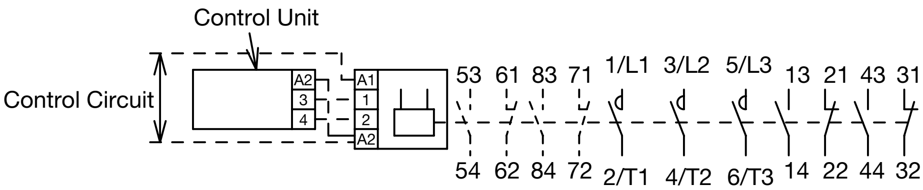


Fig. 2. SHD-V160, SHD-V320, SHD-V400 Types

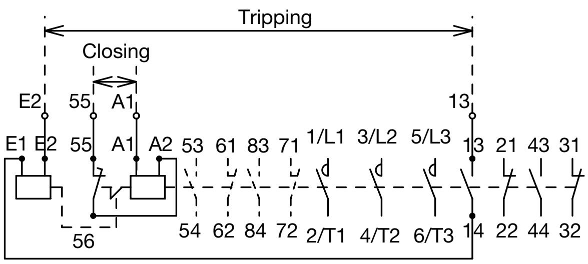


Fig. 3. SHL-V160, SHL-V320, SHL-V400 Types

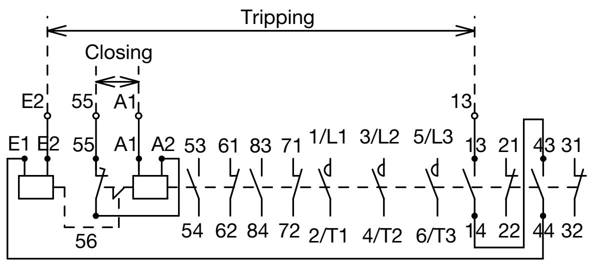


Fig. 4. SHLD-V160, SHLD-V320, SHLD-V400 Types

Note. Auxiliary contact arrangements are 2a2b as standard but can be manufactured as 4a4b (broken line in figure above) upon request. (Excluding SHLD-V. SHLD-V auxiliary contact arrangement is fixed as 2a4b)

Model Name Structure/Production Range

SH – V160 ▲ Operation Coil Designation or Control Circuit Voltage and Frequency

Symbol	
SH	AC Constant Excitation Type
SHD	DC Constant Excitation Type
SHL	Mechanically Latched Type
SHLD	Mechanically Latched Type (Closing Current)

Symbol	Current Frame
V160	160A
V320	320A
V400	400A
V600	600A

● Production Range

Frame		160A	320A	400A	600A
Constant Excitation Type	AC Operated	○ (Note 3)	○ (Note 3)	○ (Note 3)	○ (Note 2)
	DC Operated	○ (Note 3)	○ (Note 3)	○ (Note 3)	—
Latched Type	AC Operated	○	○	○	—
	DC Operated	○	○	○	—

Note 1. ○ : Manufactured, -: Not Manufactured
Note 2. Coil designation AC100V or AC200V only can be manufactured.
Note 3. Reversible types can also be manufactured for constant excitation types with 160, 320 and 400 A frames.

9.7 How to Order

Follow the steps below when ordering. (Enter a space in ▲.)

1. DC Interface Contactors

SD-Q□ Type

Model Name	Operation Coil Designation or Control Circuit Voltage	(Note) Auxiliary Contact
SD-Q11	▲ DC24V	
SD-QR12	▲ DC24V	
Refer to page 242.	Select the coil designation from page 244 or specify the control circuit voltage used.	Specify if using a special contact arrangement. If not specified, then the standard contact arrangement will be used. Refer to page 244.

MSOD-Q□ Type

Model Name	Motor Capacity or Heater Designation (Knob Setpoint)	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage	(Note) Auxiliary Contact
MSOD-Q11KP	▲ 9A	▲ 200V	▲ DC24V	
MSOD-QR12KP	▲ 9A	▲ 200V	▲ DC24V	
Refer to page 242.	Select from page 244.	Do not apply AC voltage to the main circuit. (To distinguish it from the control circuit voltage.)	Select the coil designation from page 244 or specify the control circuit voltage used.	Specify if using a special contact arrangement. If not specified, then the standard contact arrangement will be used. Refer to page 244.

UQ-AX2□ Type (Auxiliary Contact Units for DC Interface Contactors)

Model Name
UQ-AX2
Refer to page 243.

UQ-PL Type (Indicator Lamp Units for DC Interface Contactors)

Model Name	Operation Coil Designation or Control Circuit Voltage
UQ-PL	▲ DC24V
Refer to page 243.	Specify the coil designation from page 244.

2. NC Main Contact Contactors

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency	(Note) Main Contact
B-T21	▲ AC200V	▲ 3B
BD-N100	▲ DC100V	▲
Refer to page 249.	Refer to pages 43, 44.	B-T21 or B-N65 type contactors are available with 1A2B and 3B main contacts. If not specified then the 1A2B contact arrangement will be used. Refer to page 249.

3. DC Contactors

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency
DU-N30	▲ AC200V
DUD-N180	▲ DC110V
Refer to page 253.	Select the coil designation from the ratings on page 43 for AC coils or page 44 for DC coils, or else specify the control circuit voltage and frequency used.

4. Magnetic Contactors For High Frequency Switching

■ S-N☐KG Type

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency	(Note) Auxiliary Contact
S-N125KG	▲ AC200V	▲
Refer to page 258.	Select the coil designation from page 43 or specify the control circuit voltage and frequency used.	Specify if using a special contact arrangement. Refer to page 41.

5. Vacuum Magnetic Contactors

■ SH-V☐ , SHD-V☐ Types

Model Name	Operation Coil Designation or Control Circuit Voltage and Frequency	(Note) Auxiliary Contact
SH-V400 SHD-V320	▲ AC100V ▲ DC100V	▲
Refer to page 259.	Specify the operation coil designation or control circuit voltage and frequency from the ratings on page 260.	Specify only if using the 4a4b contact arrangement. If not specified then 2a2b will be used.

■ SHL-V☐ , SHLD-V☐ Types

Model Name	Closing Coil Designation	Tripping Coil Designation	(Note) Auxiliary Contact
SHL-V160 SHLD-V320	▲ MC-AC200V ▲ MC-DC100V	▲ MT-AC200V ▲ MT-DC100V	▲
Refer to page 259. The model name is SHLD if using a DC operated closing coil.	Specify the closing (MC) and tripping (MT) operation coil designation from the ratings on page 260.		Specify only if using the 4a4b contact arrangement. If not specified then 2a2b will be used.

10

Application to Domestic and International Standards

10 Application to Domestic and International Standards

10.1 Standards Application List

● Application to Domestic and International Standards

Series	Model		Format	Compliance and Applicable Standards					Safety Certification Standards Note 5				EC Directives	Third Party Certification Body Note 5	Note 5 CCC Certification	Marine Certification Standards Note 5					Heat Resistance Note 5 Certification Standards
				Note 4 JIS	JEM	IEC	DIN VDE	BS EN	Electrical Appliance	UL		CSA	CE Mark	TÜV	GB	NK	KR	BV	LR	CCS	Class 2 Heat Resistant
				Japan	Japan	International	Germany	United Kingdom Europe	Japan	US		Canada	Europe		China	Japan	South Korea	France	United Kingdom	China	Japan
MSIT Series	Magnetic Contactors	Non-Reversing	S-T10 to T100	○	–	○	○	○	∗	–	◎	◎	○	◎	◎	◎	◎	◎	◎	–	☆
		Reversing	S-2xT10 to T100	○	–	○	○	○	∗	–	Note 7	Note 7	○	–	◎	–	–	–	–	–	☆
		DC Operated	SD-T12 to T100	○	–	○	○	○	∗	–	◎	◎	○	◎	◎	◎	–	◎	◎	○	–
		Mechanically Latched Type	SL(D)-T21 to T100	○	–	○	○	○	∗	–	☆	☆	–	–	◎	–	–	–	–	–	☆
	Open Type Magnetic Starters	Non-Reversing 2-Element	MSO-T10 to T100	○	–	○	○	○	∗	–	–	–	–	–	–	–	–	–	–	–	–
		Non-Reversing 3-Element (2E)	MSO-T10KP to T100KP	○	–	○	○	○	∗	–	–	–	○	–	◎	–	–	–	–	–	–
		Reversing 2-Element	MSO-2xT10 to T100	○	–	○	○	○	∗	–	–	–	–	–	–	–	–	–	–	–	–
		Reversing 3-Element (2E)	MSO-2xT10KP to T100KP	○	–	○	○	○	∗	–	–	–	○	–	◎	–	–	–	–	–	–
		DC Operated Type 2-Element	MSOD-T12 to T100	○	–	○	○	○	∗	–	–	–	–	–	–	–	–	–	–	–	–
		DC Operated Type 2-Element (2E)	MSOD-T12KP to T100KP	○	–	○	○	○	∗	–	–	–	○	–	◎	–	–	–	–	–	–
	Enclosed Magnetic Starters	Non-Reversing 2-Element	MS-T10 to T100	○	–	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–
		Non-Reversing 3-Element (2E)	MS-T10KP to T100KP	○	–	○	○	○	○	–	–	–	–	–	–	–	–	–	–	–	–
	Thermal Overload Relays	2-Element	TH-T18 to T100	○	–	○	○	○	∗	–	–	–	–	–	–	∗	∗	–	–	–	–
		3-Element (2E)	TH-T18KP to T50KP	○	–	○	○	○	∗	–	◎	◎	○	◎	◎	∗	∗	◎	◎	–	–
			TH-T65KP to T100KP	○	–	○	○	○	∗	–	◎	◎	○	◎	◎	∗	∗	◎	◎	○	–
	Contactor Relays	AC Operated	SR-T5/T9	○	–	○	○	○	∗	–	Note 7	Note 7	○	◎	◎	∗	∗	◎	◎	–	☆
		DC Operated	SRD-T5/T9	○	–	○	○	○	∗	–	Note 7	Note 7	○	◎	◎	∗	∗	◎	◎	–	–
		Mechanically Latched Type	SRL(D)-T5	○	–	○	○	○	∗	–	–	–	–	–	◎	–	–	–	–	–	☆
	Optional Units	Additional Auxiliary Contact	UT-AX2, 4, 11	○	–	○	○	○	∗	Note 7	–	–	○	◎	◎	∗	∗	◎	◎	○	–
		Surge Absorber	UT-SA13 to 25	○	–	○	○	○	∗	◎	–	–	–	–	∗	∗	∗	–	–	–	–
		Mechanical Interlock	UT-ML20	○	–	○	○	○	∗	◎	–	–	○	–	∗	∗	∗	–	–	–	–
Specific Use	NC Main Contact Type	AC Operated	B-T	○	○	○	○	○	∗	–	–	–	–	–	◎	–	–	–	–	–	–
		DC Operated	BD-T	○	○	○	○	○	∗	–	–	–	–	–	◎	–	–	–	–	–	–
MSIN Series	Magnetic Contactors	Non-Reversing	S-N125 to N400	○	○	○	○	○	∗	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	○	☆
		Reversing	S-2xN125 to N400	○	○	○	○	○	∗	◎	◎	◎	○	–	◎	–	–	–	–	–	☆
		DC Operated	SD-N125 to N400	○	○	○	○	○	∗	◎	◎	◎	○	◎	◎	◎	–	◎	◎	○	–
		Mechanically Latched Type	SL-N125 to N400	○	○	○	○	○	∗	☆	–	–	–	–	◎	☆	–	–	–	–	☆
	Open Type Magnetic Starters	Non-Reversing 2-Element	MSO-N125 to N400	○	○	○	○	○	∗	–	–	–	–	–	–	–	–	–	–	–	–
		Non-Reversing 3-Element (2E)	MSO-N125KP to N400KP	○	○	○	○	○	∗	◎	◎	◎	○	–	◎	–	–	◎	◎	–	–
		Reversing 2-Element	MSO-2xN125 to N400	○	○	○	○	○	∗	–	–	–	–	–	–	–	–	–	–	–	–
		Reversing 3-Element (2E)	MSO-2×N125KP to N400KP	○	○	○	○	○	∗	☆	☆	☆	○	–	◎	–	–	–	–	–	–
		DC Operated Type 2-Element	MSOD-N125 to N400	○	○	○	○	○	∗	–	–	–	–	–	–	–	–	◎	◎	–	–
		DC Operated Type 3-Element (2E)	MSOD-N125KP to N400KP	○	○	○	○	○	∗	–	–	–	○	–	◎	–	–	◎	◎	–	–
	Enclosed Magnetic Starters	Non-Reversing 2-Element	MS-N125 to N400	○	○	○	○	○	∗	–	–	–	–	–	–	–	–	–	–	–	–
		Non-Reversing 3-Element (2E)	MS-N125KP to N400KP	○	○	○	○	○	∗	–	–	–	–	–	◎	–	–	–	–	–	–
	Thermal Overload Relays	Standard 2-Element	TH-N120 to N400	○	○	○	○	○	∗	–	–	–	–	–	–	∗	∗	–	–	–	–
		3-Element (2E)	TH-N120KP to N400KP	○	○	○	○	○	∗	–	◎	◎	○	◎	◎	∗	∗	◎	◎	○	–
	Optional Units	Additional Auxiliary Contact	UN-AX2, 4, 11/80, 150	○	○	○	○	○	∗	◎	–	–	○	◎	◉	∗	∗	◎	◎	○	–
		Surge Absorber	UN-SA	○	○	○	○	○	∗	◎	–	–	–	–	∗	∗	∗	–	–	–	–
		Mechanical Interlock	UN-ML	○	○	○	○	○	∗	◎	–	–	∗	–	∗	∗	∗	–	–	–	–
Specific Use	DC Interface Contactors	Non-Reversing	SD-Q	○	○	○	○	○	∗	◎	◎	◎	○	◎	◎	–	–	–	–	–	–
		Reversing	SD-QR	○	○	○	○	○	∗	◎	◎	◎	○	◎	◎	–	–	–	–	–	–
	Magnetic Contactors for DC	Non-Reversing	DU(D)-N	○	○	○	○	○	∗	–	–	–	–	–	◉	–	–	–	–	–	–
		Reversing	DU(D)-2XN	○	○	○	○	○	∗	–	–	–	–	–	◉	–	–	–	–	–	–
	NC Main Contact Type	AC Operated	B-N	○	○	○	○	○	∗	–	–	–	–	–	◉	–	–	–	–	–	–
		DC Operated	BD-N	○	○	○	○	○	∗	–	–	–	–	–	◉	–	–	–	–	–	–
Reference Page									267	269		269 270 275	280	282	285	301	301	301	301		
Product Marking (is displayed on the product)			Standard Number																		
			Certification Mark							Note 2	Note 2		Note 3	Note 2	Note 2						
			Certification Number																		

Note 1. ○: Complies or conforms as standard product　◉: Certified (add “CN” at the end of the model name when ordering)
◎: Standard product and certified　◇: Certification (pending) scheduled model　–: Models not yet certified (non-pending)
☆: Dedicated product and certified　∗: Standard certification non-applicable model

Note 2. Refer to page 268 for details regarding the standard certification marks and product model names. Consult us with any questions.

Note 3. Mark display by self-declaration rather than certification standard

Note 4. If JIS conformity declaration is required, make a request.

Note 5. For the MS-T series with its standard terminal cover removed, safety certification standards (UL certification, CSA certification), third-party certification standards, CCC certification, marine certification standards, and heat resistance certification standards are not valid.

Note 6. For information on MMP-T32 motor circuit breakers that meet domestic and international standards, refer to chapter 12.

Note 7. S(D)-2×T32, SR(D)-T9, and UT-AX2, 4 are not UL-certified. The other models are certified as standard.

10.2 Applicable Standard

National Standards (Compliance, Regulatory Compliance and Model Names)

Type	Model Name	Standards	Application
Magnetic Starters	MS-T/N, MSO-T/N	JIS C8201-4-1	Applicable with standard products
Magnetic Contactors	S-T/N, SD-T/N		
Thermal Overload Relays	TH-T/N		
Contactor Relays	SR-T/K	JIS C8201-5-1	

International Standards (Standards and Conformance Methods)

Model	NEMA Standards	IEC Standards	EN Standards	BS Standards	VDE Standards
Magnetic Contactor S-T/N	Applicable with standard products. (600 V or less) The selection is outlined below. (However, since the applicable capacity is slightly different from the size, select from the UL/CSA certified product page.) Size 00 : S-T12 0 : S-T20 1 : S-T25 2 : S-T50 Size 3 : S-T100 4 : S-N150 5 : S-N300 6 : S-N600	Applicable with standard product (690 V or less)	IEC 60947-4-1 EN 60947-4-1 BS EN 60947-4-1 DIN EN 60947-4-1(VDE 0660-102)		
Thermal Overload Relay TH-T/N Note 1	Applicable with the standard selection.	IEC 60947-4-1 EN 60947-4-1 BS EN 60947-4-1 DIN EN 60947-4-1(VDE 0660-102)			
Contactor Relay SR-T	Standard products are compliant with A600 and Q300	Applicable with classes AC-15 and DC-13 The rated current is the same as the standard (see page 160)	IEC 60947-5-1 EN 60947-5-1 BS EN 60947-5-1 DIN EN 60947-5-1(VDE 0660-200)		

Note 1. Apply the 2-element thermal overload relay to single-phase (1 φ), and 3-element (3 φ) load to three-phase.

10.3 Electrical Appliances and Materials Safety Act

In the law, enclosed magnetic starters and motor circuit breakers are items other than the specific electrical appliances.
The manufacturer is obliged to register the business, self-validate compliance, and display the PS-E mark on the products.
The applicable enclosed magnetic starters are shown in Table 1, and the applicable motor circuit breakers in Table 2.

Table 1. Enclosed Magnetic Starter

Circuit	Three-Phase 200 to 220 V									
Model Name	MS-☐ (Thermal Overload Relay with 2 Elements)					MS-☐KP (Thermal Overload Relay with 3 Elements)				
Model Name \ Capacity [kW]	0.75 or Less	Over 0.75 and 2.2 or Less	Over 2.2 and 3.7 or Less	Over 3.7 and 7.5 or Less	Over 7.5 and 12 or Less	0.75 or Less	Over 0.75 and 2.2 or Less	Over 2.2 and 3.7 or Less	Over 3.7 and 7.5 or Less	Over 7.5 and 12 or Less
MS-T10	PSE	PSE	—	—	—	PSE	PSE	—	—	—
MS-T12	PSE	PSE	PSE (2.7 kW or Less)	—	—	PSE	PSE	PSE (2.7 kW or Less)	—	—
MS-T21	PSE	PSE	PSE	—	—	PSE	PSE	PSE	—	—
MS-T35	PSE	PSE	PSE	PSE	—	PSE	PSE	PSE	PSE	—
MS-T50	—	—	PSE	PSE	PSE	—	—	PSE	PSE	PSE
MS-T65	—	—	PSE	PSE	PSE	—	—	PSE	PSE	PSE
MS-T80	—	—	PSE	PSE	PSE	—	—	PSE	PSE	PSE
MS-T100	—	—	PSE	PSE	PSE	—	—	PSE	PSE	PSE

Circuit	Single-Phase 100 to 110 V			
Model Name	MS-☐DP (Thermal Overload Relay with 2 Elements)			
Model Name \ Capacity [kW]	0.2 or Less	Over 0.2 and 0.4 or Less	Over 0.4 and 0.75 or Less	Over 0.75 and 1.5 or Less
MS-T10DP	PSE	PSE	—	—
MS-T12DP	PSE	PSE	—	—
MS-T21DP	PSE	PSE	PSE	—
MS-T35DP	—	—	PSE	PSE

Note 1. The single-phase reversible type and 200 V class cannot be manufactured.

Note 2. In the table, the PSE mark indicates that the " PSE mark is displayed on the product", whereas "—" indicates that there is no product with the targeted capacity.

Table 2. Motor Circuit Breakers

Circuit		Single-Phase 200 to 220 V			
	Capacity [kW]	0.75 or Less	Over 0.75 and 3.7 or Less	Over 3.7	
Model Name	Rated Current [A] \ Heater Designation	30 or Less			30 or More
MMP-T32	0.75 to 4A	PSE	—	—	—
	6.3 to 18A	—	PSE	—	—
	25A	—	—	PSE	—
	32A	—	—	—	PSE

10.4 MS-T/N series Certification Standards/CE Mark List

<table>
<tr><th rowspan="3" colspan="2">Format</th><th colspan="2">Europe</th><th colspan="4">North America/UL</th><th>China</th><th colspan="5">Steel Ship Standards</th></tr>
<tr><th rowspan="2">CE Mark</th><th rowspan="2">TÜV</th><th colspan="2">Listing</th><th colspan="2">Recognition</th><th rowspan="2">CCC Certification</th><th rowspan="2">United Kingdom
Lloyd's Register of Shipping</th><th rowspan="2">France
Bureau Veritas</th><th rowspan="2">South Korea
Korean Register of Shipping</th><th rowspan="2">Japan
Class NK</th><th rowspan="2">China
China Classification Society</th></tr>
<tr><th>US</th><th>Canada</th><th>US</th><th>Canada</th></tr>
<tr><td rowspan="17">AC Operated Magnetic Contactors</td><td>S-T10(BC)</td><td rowspan="5">◎ (Note 2)</td><td rowspan="5">◎ (Note 2)</td><td rowspan="5" colspan="2">◎ (Note 2)</td><td rowspan="7" colspan="2">–</td><td rowspan="5">◎ (Note 2, 4)</td><td rowspan="4">○ (Note 2, 4)</td><td rowspan="4">○ (Note 2, 4)</td><td rowspan="4">○ (Note 2, 4)</td><td rowspan="4">◎ (Note 2, 4)</td><td rowspan="9">–</td></tr>
<tr><td>S-T12(BC)(SQ)/T20(BC)(SQ)</td></tr>
<tr><td>S-T21(BC)/T25(BC)</td></tr>
<tr><td>S-T32(BC)</td></tr>
<tr><td>S-T35(BC)/T50(BC)</td><td rowspan="3">○</td><td rowspan="3">○</td><td rowspan="3">○</td><td rowspan="3">◎</td></tr>
<tr><td>S-T65(CW)/T80(CW)</td><td rowspan="2">◎</td><td rowspan="2">◎</td><td rowspan="2" colspan="2">◎</td><td rowspan="2">◎</td></tr>
<tr><td>S-T100</td></tr>
<tr><td>S-N38(CX)</td><td rowspan="2">◎ (Note 2)</td><td rowspan="2">◎ (Note 2)</td><td rowspan="2" colspan="2">◎ (Note 2)</td><td rowspan="8" colspan="2">◎ (c UL us Mark)</td><td rowspan="2">◎ (Note 2)</td><td rowspan="2">–</td><td rowspan="2">–</td><td rowspan="2">–</td><td rowspan="2">◎ (Note 2)</td></tr>
<tr><td>S-N48(CX)</td></tr>
<tr><td>S-N125</td><td rowspan="8">◎</td><td rowspan="6">◎</td><td rowspan="6" colspan="2">◎</td><td rowspan="8">◎</td><td rowspan="8">○</td><td rowspan="8">○</td><td rowspan="6">○</td><td rowspan="8">◎</td><td rowspan="8">○</td></tr>
<tr><td>S-N150</td></tr>
<tr><td>S-N180</td></tr>
<tr><td>S-N220</td></tr>
<tr><td>S-N300</td></tr>
<tr><td>S-N400</td></tr>
<tr><td>S-N600</td><td rowspan="2">–</td><td rowspan="2" colspan="2">–</td><td colspan="2">◎</td><td rowspan="2">–</td></tr>
<tr><td>S-N800</td><td colspan="2">☆</td></tr>
<tr><td rowspan="8">Thermal Overload Relays</td><td>TH-T18(BC)KP</td><td rowspan="8">◎</td><td rowspan="5">◎</td><td rowspan="8" colspan="2">◎</td><td rowspan="5" colspan="2">–</td><td rowspan="8">◎</td><td rowspan="2">○</td><td rowspan="2">○</td><td rowspan="8">–</td><td rowspan="8">–</td><td rowspan="3">–</td></tr>
<tr><td>TH-T25(BC)KP</td></tr>
<tr><td>TH-T50(BC)KP</td><td rowspan="3">○</td><td rowspan="3">○</td></tr>
<tr><td>TH-T65(CW)KP</td><td rowspan="2">○</td></tr>
<tr><td>TH-T100KP</td></tr>
<tr><td>TH-N120(TA)KP</td><td rowspan="3">○</td><td rowspan="3" colspan="2">◎ (c UL us Mark)</td><td rowspan="3">○</td><td rowspan="3">○</td><td rowspan="3">–</td></tr>
<tr><td>TH-N220RHKP/HZKP</td></tr>
<tr><td>TH-N400RHKP/HZKP</td></tr>
<tr><td rowspan="16">DC Operated Magnetic Contactors</td><td>SD-T12(BC)(SQ)</td><td rowspan="6">◎ (Note 2)</td><td rowspan="6">◎ (Note 2)</td><td rowspan="6" colspan="2">◎ (Note 2)</td><td rowspan="9" colspan="2">–</td><td rowspan="6">◎ (Note 2)</td><td rowspan="6">○ (Note 2, 4)</td><td rowspan="6">○ (Note 2, 4)</td><td rowspan="9">–</td><td rowspan="6">◎ (Note 2, 4)</td><td rowspan="16">○</td></tr>
<tr><td>SD-T20(BC)(SQ)</td></tr>
<tr><td>SD-T21(BC)</td></tr>
<tr><td>SD-T32(BC)</td></tr>
<tr><td>SD-T35(BC)</td></tr>
<tr><td>SD-T50(BC)</td></tr>
<tr><td>SD-T65(CW)</td><td rowspan="10">◎</td><td rowspan="8">◎</td><td rowspan="8" colspan="2">◎</td><td rowspan="3">◎</td><td rowspan="3">○</td><td rowspan="3">○</td><td rowspan="3">◎</td></tr>
<tr><td>SD-T80(CW)</td></tr>
<tr><td>SD-T100</td></tr>
<tr><td>SD-N125</td><td rowspan="5" colspan="2">◎ (c UL us Mark)</td><td rowspan="7">◎</td><td rowspan="7">○</td><td rowspan="7">○</td><td rowspan="7">–</td><td rowspan="7">◎</td></tr>
<tr><td>SD-N150</td></tr>
<tr><td>SD-N220</td></tr>
<tr><td>SD-N300</td></tr>
<tr><td>SD-N400</td></tr>
<tr><td>SD-N600</td><td rowspan="2">–</td><td rowspan="2" colspan="2">–</td><td rowspan="2" colspan="2">–</td></tr>
<tr><td>SD-N800</td></tr>
<tr><td rowspan="2">AC Operated Contactor Relays</td><td>SR-T5(BC)(SQ)</td><td rowspan="2">◎ (Note 2)</td><td rowspan="2">◎ (Note 2)</td><td colspan="2">◎ (Note 2)</td><td rowspan="2" colspan="2">–</td><td rowspan="2">◎ (Note 2)</td><td rowspan="2">○ (Note 2, 4)</td><td rowspan="2">○ (Note 2, 4)</td><td rowspan="2">–</td><td rowspan="2">–</td><td rowspan="2">–</td></tr>
<tr><td>SR-T9(BC)</td><td colspan="2">–</td></tr>
<tr><td rowspan="2">DC Operated Contactor Relays</td><td>SRD-T5(BC)(SQ)</td><td rowspan="2">◎ (Note 2)</td><td rowspan="2">◎ (Note 2)</td><td colspan="2">◎ (Note 2)</td><td rowspan="2" colspan="2">–</td><td rowspan="2">◎ (Note 2)</td><td rowspan="2">○ (Note 2, 4)</td><td rowspan="2">○ (Note 2, 4)</td><td rowspan="2">–</td><td rowspan="2">–</td><td rowspan="2">–</td></tr>
<tr><td>SRD-T9(BC)</td><td colspan="2">–</td></tr>
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Class NK</th></tr>
<tr><th>US</th><th>Canada</th><th>US</th><th>Canada</th></tr>
<tr><td rowspan="8">Auxiliary Contact Unit</td><td>UT-AX2(BC)</td><td rowspan="8">◎</td><td rowspan="8">○</td><td rowspan="8" colspan="2">–</td><td rowspan="2" colspan="2">–</td><td rowspan="6">◎</td><td rowspan="8">○</td><td rowspan="8">○</td><td rowspan="8">–</td><td rowspan="8">–</td></tr>
<tr><td>UT-AX4(BC)</td></tr>
<tr><td>UT-AX11(BC)</td><td rowspan="4" colspan="2">◎</td></tr>
<tr><td>UN-AX2(CX)</td></tr>
<tr><td>UN-AX4(CX)</td></tr>
<tr><td>UN-AX11(CX)</td></tr>
<tr><td>UN-AX80</td><td rowspan="2">○</td><td rowspan="2">–</td><td rowspan="2">◉</td></tr>
<tr><td>UN-AX150</td></tr>
</table>

Note 1. ◎: CE Mark (Self-Declaration) = Standard Product and Displayed on the Product, UL Standards/CSA Standards, TÜV Certification, CCC Certification = Standard Product with Certification Mark Displayed
NK Standards = Standard Product with Certification Number Displayed
◉: Certified with the certification mark. Always add “CN” at the end of the model name to specify when ordering. The certification mark is affixed to the product or displayed on the product.
○: Standard product with no certification or certification mark.
☆: Dedicated product with certification and certification mark. Add “UL” (listing) or “UR” (recognition) at the end of the model name to specify when ordering.
—: Standard certification non-applicable model or no schedule for acquisition.
Note 2. The SA specification (the model name is □-□SA for magnetic contactors and contactor relays) is equipped with a surge absorber and has been certified.
Note 3. For the applicable rating, see individual standard documents.
Note 4. Excluding the SQ specification.

10.5 UL/CSA Standards Certified Products

The MS-T/MS-N series magnetic contactors and thermal overload relays have acquired the certification of the United States UL Standards and Canada CSA Standards, making them optimal for export to North America.
The UL/CSA certification status of this product can be verified by entering and searching for the UL file number in the "UL Product iQ™" in the UL online site of Underwriters Laboratories, Inc.

● UL Standards (Underwriter's Laboratories) United States Safety Standards

UL is an institution of the United States that has established the UL standards as safety standards, conducts safety confirmation tests based on the UL standards, issues certificates for certified products and recognizes certification marks.
The UL certification mark is widely used throughout the United States. UL certification is mandated depending on the state and city, and therefore required when exporting devices, control panels and equipment to the United States.
The MS-T/N series complies with the Controller UL Standards and has acquired the UL Component Certification (recognition) or UL Product Certification (listing), and can be incorporated in control panels, equipment or the like for export to the United States.

: UL Recognition
This product is referred to as component certified, and is intended to be incorporated into other products and equipment. In other words, for incorporation into control panels, machine tools, control devices or the like, a component certified product can be used.

LISTED : UL Listing
This product is referred to as product certified, allowing direct sales to final consumers and use by final consumers. It can also be used for incorporation into control panels, machine tools, control devices or the like. As there are models whose outline drawings and terminal structure differ from standard products, refer to the UL/CSA safety standards certified product catalog for more information.

● CSA Standards (Canadian Standard Association) Canadian Standards

The CSA standards are product safety standards that have been established by the CSA (Canadian Standard Association). In Canada, the safety of electrical products has been prescribed by state laws, some of which require that the product be CSA standards certified. Therefore, the CSA standards certification is required when exporting devices, control panels, equipment and the like to Canada.
The MS-T/N series has acquired the CSA standards certification given by the UL testing organization and can be incorporated into control panels, equipment or the like for export to Canada. In addition, UL has been recognized by SCC (Standards Council of Canada) as a testing, certification and quality certification body, and CSA standards certified products as determined by UL are recognized by the safety regulations of all Canadian provinces.

:Recognition for Canada
CSA standards component certification by the UL testing organization.

:Listing for Canada
LISTED
CSA standards product certification by the UL testing organization.

For the UL/CSA standards compliant certified products, the following certification marks have been recognized. (As usual, separate marks for the United States and Canada are also recognized.)

:Recognition for both United States and Canada
UL/CSA standards component certification by the UL testing organization

:Listing for both United States and Canada
LISTED
UL/CSA standards product certification by the UL testing organization

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10.5.1 UL/CSA Certified Model List

T Series: UL60947-4-1, CSA C22.2 No.60947-4-1
N Series: UL508, CSA C22.2 No.14

● Magnetic Contactors/Starters

Frame Size	AC Operated Magnetic Contactors				DC Operated Magnetic Contactors		Mechanically Latched Contactors		AC Operated Magnetic Starters (Open Type)	
	Non-Reversing (S-)		Reversing (S-2x)		Non-Reversing (SD-)	Reversing (SD-2x)	Non-Reversing (SL, SLD-)		Non-Reversing (MSO-☐KP)	Reversing (MSO-2x☐KP)
	c RU us	c UL us LISTED	c RU us	c UL us LISTED	c UL us LISTED	c UL us LISTED	c RU us	c UL us LISTED	c UL us LISTED	c UL us LISTED
T10	–	◎	–	◎	–	–	–	–	(4)	(4) (Note 1)
T12	–	◎	–	◎	◎	◎	–	–	(4)	(4) (Note 1)
T20	–	◎	–	◎	◎	◎	–	–	(4)	(4) (Note 1)
T21	–	◎	–	◎	◎	◎	–	(3)	(4)	(4) (Note 1)
T25	–	◎	–	◎	–	–	–	–	(4)	(4) (Note 1)
T32	–	◎	–	–	◎	–	–	–	–	–
T35	–	◎	–	◎	◎	◎	–	(3)	(4)	(4) (Note 1)
T50	–	◎	–	◎	◎	◎	–	(3)	(4)	(4) (Note 1)
T65	–	◎	–	◎	◎	◎	–	(3)	(4)	(4) (Note 1)
T80	–	◎	–	◎	◎	◎	–	(3)	(4)	(4) (Note 1)
T100	–	◎	–	◎	◎	◎	–	(3)	(4)	(4) (Note 1)
N125	◎(Note 2)		◎(Note 2)		◎	◎	(1)	–	◎(Note 2)	●(Note 1)(Note 2)
N150	◎(Note 2)		◎(Note 2)		◎	◎	(1)	–	◎(Note 2)	●(Note 1)(Note 2)
N180	◎(Note 2)		◎(Note 2)		–	–	–	–	◎(Note 2)	●(Note 1)(Note 2)
N220	◎(Note 2)		◎(Note 2)		◎	◎	(1)	–	◎(Note 2)	●(Note 1)(Note 2)
N300	◎(Note 2)		◎(Note 2)		◎	◎	(1)	–	◎(Note 2)	●(Note 1)(Note 2)
N400	◎(Note 2)		◎(Note 2)		◎	◎	(1)	–	◎(Note 2)	●(Note 1)(Note 2)
N600	◎	–	◎	–	–	–	–	–	–	–
N800	(2)	–	–	–	–	–	–	–	–	–

c RU us : UL/CSA Component Certification (Recognition)

c UL us LISTED : UL/CSA Product Certification (Listing)

◎ : Standard Product and Certified
● : Dedicated Product (MSO-2xN☐KPCS) and Certified (no model name on the product)
(1): Dedicated Product (SL(D)-N☐UR) and Certified
(2): Dedicated Product (S-N800UR) and Certified
(3): Dedicated Product (SL(D)-T☐UL) and Certified
(4): It is possible to meet the UL standards since the products are composed of UL/CSA listed S-T☐ magnetic contactors and TH-T☐KP thermal overload relays.

Note 1. To meet the UL standards, replace control circuit wires of MSO-2×T☐KP/MSO-2×N☐KP types with UL listed wires and main circuit connection wires and conductors with UL listed products.
Note 2. As there are also certified products with solderless terminal structure, order with "UL" added at the end of the model name if the product requires solderless terminal structure.

10.5.2 UL Standards Certified Products

(1) AC Operating Magnetic Contactor (Non-Reversing) T Series (Certification Standard UL60947-4-1) cULus LISTED (File No. E58968)

Model	Rated Capacity [HP]						Rated Energizing Current	Auxiliary Contact		Remarks
Magnetic Contactors	Single-Phase (Non Reversible Type)		Three-Phase				[A]	Rating		
	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-T10(BC)(SA)	$\frac{1}{2}$	$1\frac{1}{2}$	3	3	5	5	13	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus.
S-T12(BC)(SA)(SQ)	$\frac{1}{2}$	$1\frac{1}{2}$	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-T20(BC)(SA)(SQ	1	2	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-T21(BC)(SA)	1	3	5	5	10	10	30			
S-T25(BC)(SA)	2	3	$7\frac{1}{2}$	$7\frac{1}{2}$	15	15	30			
S-T32(BC)(SA)	2	5	10	10	20	15	32.5			
S-T35(BC)(SA)	2	5	10	10	20	20	40			
S-T50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65			
S-T65(CW)	3	10	15	20	40	40	95			
S-T80(CW)	5	15	20	25	50	50	100			
S-T100	$7\frac{1}{2}$	15	25	30	60	60	100			

(2) AC Operating Magnetic Contactor (Non-Reversing) N Series (Certification Standard UL508) cULus LISTED (File No. E58968)

Model	Rated Capacity [HP]						Rated Energizing Current	Auxiliary Contact		Remarks
Magnetic Contactors	Single-Phase (Non Reversible Type)		Three-Phase				[A]	Rating		
	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-N125	10	20	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The standard product is certified with cULus.
S-N150	15	25	40	50	100	100	150			
S-N180	15	30	60	60	125	125	220			
S-N220	15	40	60	75	150	150	220			
S-N300	50	100	100	100	200	200	300			
S-N400	50	150	125	150	300	300	400			
S-N600	—	—	150	200	400	400	680			Standard product and cURus certified.
S-N800UR	—	—	250	300	600	600	910			Dedicated product and cURus certified.

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are cULus LISTED certified for solderless terminal structure.

(3) AC Operating Magnetic Contactor (Reversing) T Series (Certification Standard UL60947-4-1) cULus LISTED (File No. E58968)

Model	Rated Capacity [HP]				Rated Energizing Current	Auxiliary Contact		Remarks
Magnetic Contactors	Three-Phase				[A]	Rating		
	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-2xT10(BC)(SA)	3	3	5	5	13	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus.
S-2xT12(BC)(SA)	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-2xT20(BC)(SA)	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-2xT21(BC)(SA)	5	5	10	10	30			
S-2xT25(BC)(SA)	$7\frac{1}{2}$	$7\frac{1}{2}$	15	15	30			
S-2xT35(BC)(SA)	10	10	20	20	40			
S-2xT50(BC)(SA)	15	15	30	30	65			
S-2xT65(CW)	15	20	40	40	95			
S-2xT80(CW)	20	25	50	50	100			
S-2xT100	25	30	60	60	100			

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(4) AC Operating Magnetic Contactor (Reversing) N Series (Certification Standard UL508) cULus LISTED (File No. E58968)

Model	Rated Capacity [HP]				Rated Energizing Current	Auxiliary Contact		Remarks
Magnetic Contactors	Three-Phase				[A]	Rating		
	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-2xN125	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The magnetic contactor is certified as a cULus standard product.
S-2xN150	40	50	100	100	150			
S-2xN180	60	60	125	125	220			
S-2xN220	60	75	150	150	220			
S-2xN300	100	100	200	200	300			
S-2xN400	125	150	300	300	400			
S-2xN600	150	200	400	400	680			Standard products are applicable to cURus.

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are cULus LISTED certified for solderless terminal structure.

(5) DC Operated Magnetic Contactor (Non-Reversing/Reversing) T Series (Certification Standard UL60947-4-1) cULus LISTED (File No. E58968)

Model		Rated Capacity [HP]						Rated Energizing Current [A]	Auxiliary Contact Rating		Remarks
Non-Reversing	Reversing (2)	Single-Phase (Non Reversible Type) 110 to 120 V	Single-Phase (Non Reversible Type) 220 to 240 V	Three-Phase 200 V	Three-Phase 220 to 240 V	Three-Phase 440 to 480 V	Three-Phase 550 to 600 V				
SD-T12(BC)(SA)(SQ)	SD-2×T12(BC)(SA)	$\frac{1}{2}$	$1\frac{1}{2}$	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus.
SD-T20(BC)(SA)(SQ)	SD-2×T20(BC)(SA)	1	2	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
SD-T21(BC)(SA)	SD-2xT21(BC)(SA)	1	3	5	5	10	10	30			
SD-T32(BC)(SA)	—	2	5	10	10	20	15	32.5			
SD-T35(BC)(SA)	SD-2xT35(BC)(SA)	2	5	10	10	20	20	40			
SD-T50(BC)(SA)	SD-2xT50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65			
SD-T65(CW)	SD-2xT65(CW)	3	10	15	20	40	40	95			
SD-T80(CW)	SD-2xT80(CW)	5	15	20	25	50	50	100			
SD-T100	SD-2xT100	$7\frac{1}{2}$	15	25	30	60	60	100			

(6) DC Operated Magnetic Contactor (Non-Reversing/Reversing) N Series (Certification Standard UL508) cULus LISTED (File No. E58968)

Model		Rated Capacity [HP]						Rated Energizing Current [A]	Auxiliary Contact Rating		Remarks
Non-Reversing	Reversing (2)	Single-Phase (Non Reversible Type) 110 to 120 V	Single-Phase (Non Reversible Type) 220 to 240 V	Three-Phase 200 V	Three-Phase 220 to 240 V	Three-Phase 440 to 480 V	Three-Phase 550 to 600 V				
SD-N125	SD-2xN125	10	20	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The standard product is certified with cULus.
SD-N150	SD-2xN150	15	25	40	50	100	100	150			
SD-N220	SD-2xN220	15	40	60	75	150	150	220			
SD-N300	SD-2xN300	50	100	100	100	200	200	300			
SD-N400	SD-2xN400	50	150	125	150	300	300	400			

Note 1. 125 A frames or higher with “UL” at the end of the model name are cULus LISTED certified for solderless terminal structure.

(7) Mechanically Latched Magnetic Contactor T Series (Certification Standard UL60947-4-1) cULus LISTED (File No. E58968)

Model		Rated Capacity [HP]						Rated Energizing Current [A]	Auxiliary Contact Rating		Remarks
Non-Reversing	Reversing	Single-Phase (Non Reversible Type) 110 to 120 V	Single-Phase (Non Reversible Type) 220 to 240 V	Three-Phase 200 V	Three-Phase 220 to 240 V	Three-Phase 440 to 480 V	Three-Phase 550 to 600 V				
SL(D)-T21UL(BC)(SA)	SL(D)-2xT21UL(BC)(SA)	1	3	5	5	10	10	30	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The dedicated product is certified with cULus.
SL(D)-T35UL(BC)(SA)	SL(D)-2xT35UL(BC)(SA)	2	5	10	10	20	20	40			
SL(D)-T50UL(BC)(SA)	SL(D)-2xT50UL(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65			
SL(D)-T65UL	SL(D)-2xT65UL	3	10	15	20	40	40	95			
SL(D)-T80UL	SL(D)-2xT80UL	5	15	20	25	50	50	100			
SL(D)-T100UL	SL(D)-2xT100UL	$7\frac{1}{2}$	15	25	30	60	60	100			

(8) Mechanically Latched Magnetic Contactor N Series (Certification Standard UL508) cURus® (File No. E58968)

Model		Rated Capacity [HP]						Rated Energizing Current [A]	Auxiliary Contact Rating		Remarks
Non-Reversing	Reversing	Single-Phase (Non Reversible Type) 110 to 120 V	Single-Phase (Non Reversible Type) 220 to 240 V	Three-Phase 200 V	Three-Phase 220 to 240 V	Three-Phase 440 to 480 V	Three-Phase 550 to 600 V				
SL(D)-N125UR	SL(D)-2xN125UR	10	20	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The dedicated product is certified with cURus®.
SL(D)-N150UR	SL(D)-2xN150UR	15	25	40	50	100	100	150			
SL(D)-N220UR	SL(D)-2xN220UR	15	40	60	75	150	150	220			
SL(D)-N300UR	SL(D)-2xN300UR	—	—	100	100	200	200	300			
SL(D)-N400UR	SL(D)-2xN400UR	—	—	125	150	300	300	400			

(9) Thermal Overload Relays T Series (Certification Standard UL60947-4-1) cULus LISTED (File No. E58969)

Model	Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]	Auxiliary Contact
TH-T18(BC)KP	0.12A (0.1 to 0.16), 0.17 (0.14 to 0.22), 0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18) Note 2	Rating Code: C600 AC600 Vmax Making: 1800 VA (15 A max) Breaking: 180 VA (1.5 A max)
TH-T25(BC)KP	0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18), 22A (18 to 26)	Rating Code: B600 AC600 Vmax Making: 3600 VA (30 A max) Breaking: 360 VA (3 A max)
TH-T50(BC)KP	29A (24 to 34), 35A (30 to 40), 42A (34 to 50)	
TH-T65(CW)KP	15A (12 to 18), 22A (18 to 26), 29A (24 to 34), 35A (30 to 40), 42A (34 to 50), 54A (43 to 65)	
TH-T100KP	67A (54 to 80), 82A (65 to 100)	

Note 1. The maximum applicable current is 16 A.
The maximum applicable current other than the heater designation of 15 A is the largest current value within the adjustment range of settling current.

(10) Thermal Overload Relays N Series (Certification Standard UL508)

cULus LISTED (File No. E58969)

Model	Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]	Auxiliary Contact
TH-N120KP	42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100)	Rating Code: B600 AC600 Vmax
TH-N120TAKP ☆ TH-N120TAHZKP ★	105A (85 to 125)	Making: 3600 VA (30 A max)
	125A (100 to 150)	Breaking: 360 VA (3 A max)
TH-N220RHKP ☆ TH-N220HZKP ★	82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180)	
	180A (140 to 220)	
TH-N400RHKP ☆ TH-N400HZKP ★	105A (85 to 125), 125A (100 to 150), 150A (120 to 180), 180A (140 to 220), 250A (200 to 300)	
	330A (260 to 400)	

Note 1. ☆is for combination with the magnetic contactor and cannot be independently mounted. ★is exclusively for independent mounting.
Note 2. The symbol "KP" in the model name indicates 3-element 2E, and HZ indicates the independent mounting type.
Note 3. Frame N120 or higher with "UL" at the end of the model name is cULus LISTED certified for solderless terminal structure.

(11) Contactor Relays T Series (Certification Standard UL60947-4-1)

cULus LISTED (File No. E58969)

Model				Rated		Remarks
AC Operating		DC Operating				
cULus LISTED	SR-T5(BC)(SA)(SQ)	cULus LISTED	SRD-T5(BC)(SA)(SQ)	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus LISTED.

(12) Optional Unit T Series (Certification Standard UL60947-4-1) (File No. E58969)

Model	cRUus®
UT-AX11(BC) Note 2	◎
UT-ML20(BC)	(1)
UT-SA13, SA21, SA22, SA23, SA25	◎

Note 1. ◎: Standard product and certified. (Mark displayed on the product)
(1): Certified as a contactor component.
(mark not displayed on the product)

Note 2.

Rated	
A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA

(13) Optional Unit N Series

(File No. E58969)
(File No. E58968 (AX80/AX150/AX600/UN-ML21 to ML220))

Model Name	cRUus®
UN-AX2 (CX), AX4 (CX), AX11 (CX) Note 3	◎
UN-AX80, AX150, AX600	(1)
UQ-AX2(KR) Note 4	◎
UN-ML21, ML80, ML150, ML220	(1)
UN-SA721, SA725	◎
UN-SA33	◎

Note 1. ◎: Standard product and certified. (mark displayed on the product)
(1): Certified as a contactor component. (mark not displayed on the product)
Note 2. Products used in isolation from live parts (live part protection cover, reset release, etc.) are not subject to certification.

Note 3.

Rating	
A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA

Note 4.

Rating	
A300 AC240 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA

(14) DC Interface Contactors (Certification Standard UL508)

c UL us LISTED (File No. E58968)

Model Name		Rated Capacity [HP]					Rated Continuity Current [A]	Auxiliary Contact		Remarks
		Single-Phase (Non-Reversible Type Only)		Three-Phase						
Non-Reversible Type	Reversible Type	110 to 120 V	220 to 240 V	200 to 208 V	220 to 240 V	440 to 480 V		Rating		
SD-Q11 SD-Q12	SD-QR11 SD-QR12	$\frac{1}{3}$	1	3	3	5	20	A300 AC240 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with c UL us LISTED.
MSOD-Q11(KP) MSOD-Q12(KP)	MSOD-QR11(KP) MSOD-QR12(KP)						13			

(15) Vacuum Magnetic Contactors (Certification Standard UL508)

c RU us ® (File No. E58968)

Model Name	Rated Capacity [HP]				Rated Continuity Current [A]	Auxiliary Contact	Remarks
	Three-Phase						
	200 V	220 to 240 V	440 to 480 V	550 to 600 V		Rating	
SH-V160	60	60	150	150	200	A600 AC600 V max Making 7200 VA Breaking 720 VA	The standard product is certified with c RU us ®.
SH-V320	100	125	250	300	350		
SH-V400	125	150	350	400	450		
SH-V600	200	250	500	600	610		

(16) Solid State Contactors for Motor/Heater Loads (Certification Standard UL508)

c UL us LISTED (File No. E144063)

Model Name		Rated Capacity [HP]				Rated Continuity Current [A]	Remarks
3-Pole 2-Element Type	3-Pole 3-Element Type	Single-Phase		Three-Phase			
		110 to 120 V	220 to 240 V	220 to 240 V	440 to 480 V		
US-N5SS	US-N5SSTE	$\frac{1}{10}$	$\frac{1}{4}$	$\frac{3}{4}$	—	5	The standard product is certified with c UL us LISTED.
US-N8SS	US-N8SSTE	$\frac{1}{10}$	$\frac{1}{4}$	$\frac{3}{4}$	—	8	
US-N20(CX)(RM)	US-N20TE(CX)(RM)	$\frac{1}{2}$	$1\frac{1}{2}$	3	5	20	
US-N30(CX)	US-N30TE(CX)	1	3	5	10	30	
US-N40(CX)	US-N40TE(CX)	2	3	$7\frac{1}{2}$	20	40	
US-N50(CX)	US-N50TE(CX)	2	3	$7\frac{1}{2}$	20	50	
US-N70NS	US-N70NSTE	3	$7\frac{1}{2}$	15	—	70	
US-N80NS	US-N80NSTE	3	$7\frac{1}{2}$	15	—	80	
US-NH70NS	US-NH70NSTE	3	$7\frac{1}{2}$	15	30	70	
US-NH80NS	US-NH80NSTE	3	$7\frac{1}{2}$	15	30	80	

(17) Solid State Contactors for Heater Loads (Certification Standard UL508)

c UL us LISTED (File No. E144063)

Model Name		Rated Continuity Current [A]	Remarks
Batch Control Type	Individual Control Type		
US-H20(RM)(HZ)(UF)	US-H20DD(RM)(HZ)(UF)	20	The standard product is certified with c UL us LISTED.
US-H30(RM)(HZ)(UF)	US-H30DD(RM)(HZ)(UF)	30(27) (Note 4)	
US-H40(HZ)	US-H40DD(HZ)	40	
US-H50 Note 3	US-H50DD Note 3	50	

Note 1. (HZ) has no cooling fin. (RM) can be rail-mounted.
Note 2. US-H☐ (DD) HZ is certified at the rated continuity current when combined with the fin used for US-H☐ (DD).
Note 3. US-H50 (DD) HZ has UR certification only.
Note 4. ( ) is the rating for US-H30 (DD) UF.

10.5.3 CSA Standards Certified Product

There are the following 2 types of certification marks.

cULus LISTED, cRUus: CSA Standards Certification by the UL Testing Organization

(1) AC Operated Magnetic Contactor (Non-Reversible) T Series (Certification Standard CSA C22.2 No.60947-4-1) cULus LISTED (File No. E58968)

Model Name	Rated Capacity [HP]						Rated Continuity Current [A]	Auxiliary Contact Rating		Remarks
Magnetic Contactors	Single-Phase (Non-Reversible Type Only)		Three-Phase							
	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-T10(BC)(SA)	$\frac{1}{2}$	$1\frac{1}{2}$	3	3	5	5	13	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus LISTED.
S-T12(BC)(SA)(SQ)	$\frac{1}{2}$	$1\frac{1}{2}$	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-T20(BC)(SA)(SQ)	1	2	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-T21(BC)(SA)	1	3	5	5	10	10	30			
S-T25(BC)(SA)	2	3	$7\frac{1}{2}$	$7\frac{1}{2}$	15	15	30			
S-T32(BC)(SA)	2	5	10	10	20	15	32.5			
S-T35(BC)(SA)	2	5	10	10	20	20	40			
S-T50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65			
S-T65(CW)	3	10	15	20	40	40	95			
S-T80(CW)	5	15	20	25	50	50	100			
S-T100	$7\frac{1}{2}$	15	25	30	60	60	100			

(2) AC Operated Magnetic Contactor (Non-Reversible) N Series (Certification Standard CSA C22.2 No.14) cULus LISTED (File No. E58968)

Model Name	Rated Capacity [HP]						Rated Continuity Current [A]	Auxiliary Contact Rating		Remarks
Magnetic Contactors	Single-Phase (Non-Reversible Type Only)		Three-Phase							
	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-N125	10	20	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The standard product is certified with cULus LISTED.
S-N150	15	25	40	50	100	100	150			
S-N180	15	30	60	60	125	125	220			
S-N220	15	40	60	75	150	150	220			
S-N300	—	—	100	100	200	200	300			
S-N400	—	—	125	150	300	300	400			
S-N600	—	—	150	200	400	400	680			Standard product and cRUus certified.
S-N800UR	—	—	250	300	600	600	910			Dedicated product and cRUus certified.

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are cULus LISTED certified for solderless terminal structure.

(3) AC Operated Magnetic Contactor (Reversible) T Series (Certification Standard CSA C22.2 No.60947-4-1) cULus LISTED (File No. E58968)

Model Name	Rated Capacity [HP]				Rated Continuity Current [A]	Auxiliary Contact Rating		Remarks
Magnetic Contactors	Three-Phase							
	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-2xT10(BC)(SA)	3	3	5	5	13	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus LISTED.
S-2xT12(BC)(SA)	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-2xT20(BC)(SA)	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-2xT21(BC)(SA)	5	5	10	10	30			
S-2xT25(BC)(SA)	$7\frac{1}{2}$	$7\frac{1}{2}$	15	15	30			
S-2xT35(BC)(SA)	10	10	20	20	40			
S-2xT50(BC)(SA)	15	15	30	30	65			
S-2xT65(CW)	15	20	40	40	95			
S-2xT80(CW)	20	25	50	50	100			
S-2xT100	25	30	60	60	100			

(4) AC Operated Magnetic Contactor (Reversible) N Series (Certification Standard CSA C22.2 No.14) cULus LISTED (File No. E58968)

Model Name	Rated Capacity [HP]				Rated Continuity Current [A]	Auxiliary Contact Rating		Remarks
Magnetic Contactors	Three-Phase							
	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
S-2xN125	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The magnetic contactor is certified as a cULus LISTED standard product.
S-2xN150	40	50	100	100	150			
S-2xN180	60	60	125	125	180			
S-2xN220	60	75	150	150	220			
S-2xN300	100	100	200	200	300			
S-2xN400	125	150	300	300	400			
S-2xN600	150	200	400	400	680			Standard product and cRUus certified.

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are cULus LISTED certified for solderless terminal structure.

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(5) DC Operated Magnetic Contactor (Non-Reversible/Reversible) T Series (Certification Standard CSA C22.2 No.60947-4-1) cULus LISTED (File No. E58968)

Model Name		Rated Capacity [HP]						Rated Continuity Current [A]	Auxiliary Contact		Remarks
Non-Reversible Type	Reversible Type (2)	Single-Phase (Non-Reversible Type Only)		Three-Phase					Rating		
		110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
SD-T12(BC)(SA)(SQ)	SD-2×T12(BC)(SA)	$\frac{1}{2}$	$1\frac{1}{2}$	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus.
SD-T20(BC)(SA)(SQ)	SD-2×T20(BC)(SA)	1	2	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
SD-T21(BC)(SA)	SD-2xT21(BC)(SA)	1	3	5	5	10	10	30			
SD-T32(BC)(SA)	—	2	5	10	10	20	15	32.5			
SD-T35(BC)(SA)	SD-2xT35(BC)(SA)	2	5	10	10	20	20	40			
SD-T50(BC)(SA)	SD-2xT50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65			
SD-T65(CW)	SD-2xT65(CW)	3	10	15	20	40	40	95			
SD-T80(CW)	SD-2xT80(CW)	5	15	20	25	50	50	100			
SD-T100	SD-2xT100	$7\frac{1}{2}$	15	25	30	60	60	100			

(6) DC Operated Magnetic Contactor (Non-Reversible/Reversible) N Series (Certification Standard CSA C22.2 No.14) cULus LISTED (File No. E58968)

Model Name		Rated Capacity [HP]						Rated Continuity Current [A]	Auxiliary Contact		Remarks
Non-Reversible Type	Reversible Type (2)	Single-Phase (Non-Reversible Type Only)		Three-Phase					Rating		
		110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
SD-N125	SD-2xN125	10	20	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The standard product is certified with cULus.
SD-N150	SD-2xN150	15	25	40	50	100	100	150			
SD-N220	SD-2xN220	15	40	60	75	150	150	220			
SD-N300	SD-2xN300	—	—	100	100	200	200	300			
SD-N400	SD-2xN400	—	—	125	150	300	300	400			

Note 1. 125 A frames or higher with "UL" at the end of the model name are cULus LISTED certified for solderless terminal structure.

(7) Mechanically Latched Contactor T Series (Certification Standard CSA C22.2 No.60947-4-1) cULus LISTED (File No. E58968)

Model Name		Rated Capacity [HP]						Rated Continuity Current [A]	Auxiliary Contact		Remarks
Non-Reversible Type	Reversible Type	Single-Phase (Non-Reversible Type Only)		Three-Phase					Rating		
		110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
SL(D)-T21UL(BC)(SA)	SL(D)-2xT21UL(BC)(SA)	1	3	5	5	10	10	30	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The dedicated product is certified with cULus.
SL(D)-T35UL(BC)(SA)	SL(D)-2xT35UL(BC)(SA)	2	5	10	10	20	20	40			
SL(D)-T50UL(BC)(SA)	SL(D)-2xT50UL(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65			
SL(D)-T65UL	SL(D)-2xT65UL	3	10	15	20	40	40	95			
SL(D)-T80UL	SL(D)-2xT80UL	5	15	20	25	50	50	100			
SL(D)-T100UL	SL(D)-2xT100UL	$7\frac{1}{2}$	15	25	30	60	60	100			

(8) Mechanically Latched Contactor N Series (Certification Standard CSA C22.2 No.14) cURus (File No. E58968)

Model Name		Rated Capacity [HP]						Rated Continuity Current [A]	Auxiliary Contact		Remarks
Non-Reversible Type	Reversible Type	Single-Phase (Non-Reversible Type Only)		Three-Phase					Rating		
		110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V				
SL(D)-N125UR	SL(D)-2xN125UR	10	20	40	40	75	75	125	A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA	The dedicated product is certified with cURus.
SL(D)-N150UR	SL(D)-2xN150UR	15	25	40	50	100	100	150			
SL(D)-N220UR	SL(D)-2xN220UR	15	40	60	75	150	150	220			
SL(D)-N300UR	SL(D)-2xN300UR	—	—	100	100	200	200	300			
SL(D)-N400UR	SL(D)-2xN400UR	—	—	125	150	300	300	400			

(9) Thermal Overload Relay T Series (Certification Standard CSA C22.2 No.60947-4-1) cULus LISTED (File No. E58969)

Model Name	Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]	Auxiliary Contact
TH-T18(BC)KP	0.12A (0.1 to 0.16), 0.17 (0.14 to 0.22), 0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18) Note 2	Rating Code: C600 AC600 Vmax Making: 1800 VA (15 A max) Breaking: 180 VA (1.5 A max)
TH-T25(BC)KP	0.24A (0.2 to 0.32), 0.35A (0.28 to 0.42), 0.5A (0.4 to 0.6), 0.7A (0.55 to 0.85), 0.9A (0.7 to 1.1), 1.3A (1 to 1.6), 1.7A (1.4 to 2), 2.1A (1.7 to 2.5), 2.5A (2 to 3), 3.6A (2.8 to 4.4), 5A (4 to 6), 6.6A (5.2 to 8), 9A (7 to 11), 11A (9 to 13), 15A (12 to 18), 22A (18 to 26)	Rating Code: B600 AC600 Vmax Making: 3600 VA (30 A max) Breaking: 360 VA (3 A max)
TH-T50(BC)KP	29A (24 to 34), 35A (30 to 40), 42A (34 to 50)	
TH-T65(CW)KP	15A (12 to 18), 22A (18 to 26), 29A (24 to 34), 35A (30 to 40), 42A (34 to 50), 54A (43 to 65)	
TH-T100KP	67A (54 to 80), 82A (65 to 100)	

Note 1. The maximum applicable current is 16 A.
The maximum applicable current other than the heater designation of 15 A is the largest current value within the adjustment range of settling current.

(10) Thermal Overload Relay N Series (Certification Standard CSA C22.2 No.14) cULus LISTED (File No. E58969)

Model Name	Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]	Auxiliary Contact
TH-N120KP	42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100)	Rating Code: B600 AC600 Vmax Making: 3600 VA (30 A max) Breaking: 360 VA (3 A max)
TH-N120TAKP ☆ TH-N120TAHZKP ★	105A (85 to 125)	
	125A (100 to 150)	
TH-N220RHKP ☆ TH-N220HZKP ★	82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180)	
	180A (140 to 220)	
TH-N400RHKP ☆ TH-N400HZKP ★	105A (85 to 125), 125A (100 to 150), 150A (120 to 180), 180A (140 to 220), 250A (200 to 300)	
	330A (260 to 400)	

Note 1. ☆is for combination with the magnetic contactor and cannot be independently mounted. ★is exclusively for independent mounting.
Note 2. The symbol "KP" in the model name indicates 3-element 2E, and HZ indicates the independent mounting type.
Note 3. Frame N120 or higher with "UL" at the end of the model name is cULus LISTED certified for solderless terminal structure.

(11) Contactor Relay T Series (Certification Standard CSA C22.2 No.60947-4-1) cULus LISTED (File No. E58969)

Model Name				Rating		Remarks
AC Operated		DC Operated				
cULus LISTED	SR-T5(BC)(SA)(SQ)	cULus LISTED	SRD-T5(BC)(SA)(SQ)	A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with cULus LISTED.

(12) Optional Unit T Series (Certification Standard CSA C22.2 No.60947-4-1) (File No. E58969)

Model Name	cURus
UT-AX11(BC) Note 2	◎
UT-ML20(BC)	(1)
UT-SA13, SA21, SA22, SA23, SA25	◎

Note 1.◎: Standard product and certified. (mark displayed on the product)
(1): Certified as a contactor component. (mark not displayed on the product)

Note 2.

Rating	
A600 AC600 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA

(13) Optional Unit N Series (Certification Standard CSA C22.2 No.14) (File No. E58969)
(File No. E58968 (AX80/AX150/AX600/UN-ML11(CX), ML21 to ML220))

Model Name	cURus
UN-AX2 (CX), AX4 (CX), AX11 (CX) Note 3	◎
UN-AX80, AX150, AX600	(1)
UQ-AX2(KR) Note 4	◎
UN-ML21	(1)
UN-ML21, ML80, ML150, ML220	(1)
UN-SA721, SA725	◎
UN-SA33	◎

Note 1. ◎: Standard product and certified. (mark displayed on the product)
(1): Certified as a contactor component. (mark not displayed on the product)
Note 2. Products used in isolation from live parts (live part protection cover, reset release, etc.) are not subject to certification.

Note 3.

Rating	
A600 AC600 V max Making 7200 VA Breaking 720 VA	R300 DC250 V max Making 28 VA Breaking 28 VA

Note 4.

Rating	
A300 AC240 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA

(14) DC Interface Contactors (Certification Standard CSA C22.2 No.14)

(File No. E58968)

Model Name		Rated Capacity [HP]					Rated Continuity Current [A]	Auxiliary Contact		Remarks
		Single-Phase (Non-Reversible Type Only)		Three-Phase						
Non-Reversible Type	Reversible Type	110 to 120 V	220 to 240 V	200 to 208 V	220 to 240 V	440 to 480 V		Rating		
SD-Q11 SD-Q12	SD-QR11 SD-QR12	$\frac{1}{3}$	1	3	3	5	20	A300 AC240 V max Making 7200 VA Breaking 720 VA	Q300 DC250 V max Making 69 VA Breaking 69 VA	The standard product is certified with .
MSOD-Q11(KP) MSOD-Q12(KP)	MSOD-QR11(KP) MSOD-QR12(KP)						13			

(15) Vacuum Magnetic Contactors (Certification Standard CSA C22.2 No.14)

(File No. E58968)

Model Name	Rated Capacity [HP]				Rated Continuity Current [A]	Auxiliary Contact	Remarks
	Three-Phase						
	200 V	220 to 240 V	440 to 480 V	550 to 600 V		Rating	
SH-V160	60	60	150	150	200	A600 AC600 V max Making 7200 VA Breaking 720 VA	The standard product is certified with .
SH-V320	100	125	250	300	350		
SH-V400	125	150	350	400	450		
SH-V600	200	250	500	600	610		

(16) Solid State Contactors for Motor/Heater Loads (Certification Standard CSA C22.2 No.14)

(File No. E144063)

Model Name		Rated Capacity [HP]				Rated Continuity Current [A]	Remarks
3-Pole 2-Element Type	3-Pole 3-Element Type	Single-Phase		Three-Phase			
		110 to 120 V	220 to 240 V	220 to 240 V	440 to 480 V		
US-N5SS	US-N5SSTE	$\frac{1}{10}$	$\frac{1}{4}$	$\frac{3}{4}$	—	5	The standard product is certified with .
US-N8SS	US-N8SSTE	$\frac{1}{10}$	$\frac{1}{4}$	$\frac{3}{4}$	—	8	
US-N20(CX)(RM)	US-N20TE(CX)(RM)	$\frac{1}{2}$	$1\frac{1}{2}$	3	5	20	
US-N30(CX)	US-N30TE(CX)	1	3	5	10	30	
US-N40(CX)	US-N40TE(CX)	2	3	$7\frac{1}{2}$	20	40	
US-N50(CX)	US-N50TE(CX)	2	3	$7\frac{1}{2}$	20	50	
US-N70NS	US-N70NSTE	3	$7\frac{1}{2}$	15	—	70	
US-N80NS	US-N80NSTE	3	$7\frac{1}{2}$	15	—	80	
US-NH70NS	US-NH70NSTE	3	$7\frac{1}{2}$	15	30	70	
US-NH80NS	US-NH80NSTE	3	$7\frac{1}{2}$	15	30	80	

(17) Solid State Contactors for Heater Loads (Certification Standard CSA C22.2 No.14)

(File No. E144063)

Model Name		Rated Continuity Current [A]	Remarks
Batch Control Type	Individual Control Type		
US-H20(RM)(HZ)(UF)	US-H20DD(RM)(HZ)(UF)	20	The standard product is certified with .
US-H30(RM)(HZ)(UF)	US-H30DD(RM)(HZ)(UF)	30(27) (Note 4)	
US-H40(HZ)	US-H40DD(HZ)	40	
US-H50(HZ)	US-H50DD(HZ)	50	

Note 1. (HZ) has no cooling fin. (RM) can be rail-mounted.
Note 2. US-H□ (DD) HZ is certified at the rated continuity current when combined with the fin used for US-H□ (DD).
Note 3. US-H50 (DD) HZ has UR certification only.
Note 4. ( ) is the rating for US-H30 (DD) UF.

10.5.4 Applicable Wire Size, Lug Size and Tightening Torques under UL Certification

Model	S-T10/S(D)-T12/T20			S(D)-T21/S-T25				S(D)-T32	
Terminal	Main	Auxiliary	Control	Main		Auxiliary	Control	Main	Control
Screw Size	M3.5	M3.5	M3.5	M4		M3.5	M3.5	M4	M3.5
Wire Strip Length L	10 mm	10 mm	9 mm	11.5 mm		11.5 mm	9 mm	11.5 mm	9 mm
Wire Size (60/75°C) (copper only) (Sol./Str.)	14 - 12 AWG	14 AWG	14 AWG	14 - 10 AWG	14 - 8 AWG	14 AWG	14 AWG	14-10 AWG 8 AWG Note 1	14 AWG
Recommended Crimp Lug Size (JST Cat No.) Note 2	1.25-3.5 to 2-3.5 5.5-S3	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.25-4 to 5.5-4	1.25-4 to 5.5-4 8-NK4	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.25-4 to 5-5.4 8-NK4	1.25-3.5 to 2-3.5
Connection to Terminal Max. qty.	Each Terminal - 2 Wires or 2 Crimp Lugs Note 3								
Tightening Torque	10.3 lb-in (1.17 N·m)	10.3 lb-in (1.17N·m)	10.3 lb-in (1.17N·m)	15 lb-in (1.69N·m)		10.3 lb-in (1.17N·m)	10.3 lb-in (1.17N·m)	15 lb-in (1.69N·m)	10.3 lb-in (1.17N·m)

Note 1. When using 8 AWG with a three-phase AC200 to 208 V, use a copper wire with wire temperature rating of 75°C.
Note 2. Please use swaging tool which is recommended by JST.
Note 3. 2 conductors of the same size can be connected.

Model	S(D)-T35/T50			S(D)-T65/T80				S(D)-T100		
Terminal	Main	Auxiliary	Control	Main		Auxiliary	Control	Main	Auxiliary	Control
Screw Size	M5	M3.5	M3.5	M6		M4	M4	M6	M4	M4
Wire Strip Length L	15 mm	11.5mm	9 mm	—		11 mm	11 mm	—	11 mm	11 mm
Wire Size (60/75°C) (copper only) (Sol./Str.)	14-6 AWG Note 1	14 AWG	14 AWG	14-2 AWG	14-1 AWG Note 2	14 AWG	14 AWG	14-1/0 AWG Note 3	14 AWG	14 AWG
Recommended Crimp Lug Size (JST Cat No.) Note 4	1.25-5 to 14-5	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5	1.25-6 to 22-6	1.25-6 to 22-6 38-S6	1.25-4 to 2-4	1.25-4 to 2-4	1.25-6 to 22-6 38-S6, 60-6	1.25-4 to 2-4	1.25-4 to 2-4
Connection to Terminal Max. qty.	Each Terminal - 2 Wires or 2 Crimp Lugs Note 5									
Tightening Torque	22.5 lb-in (2.54 N·m)	10.3 lb-in (1.17 N·m)	10.3 lb-in (1.17 N·m)	39.1 lb-in (4.41 N·m)		15 lb-in (1.69 N·m)	15 lb-in (1.69 N·m)	39.1 lb-in (4.41 N·m)	15 lb-in (1.69 N·m)	15 lb-in (1.69 N·m)

Note 1. When using 6 AWG, use a copper wire with wire temperature rating of 75°C.
Note 2. When using 1 AWG, use a copper wire with wire temperature rating of 75°C.
Note 3. When using 1/0 AWG, use a copper wire with wire temperature rating of 75°C.
Note 4. Please use swaging tool which is recommended by JST.
Note 5. Two conductors of the same size can be connected.

Model	TH-T18KP		TH-T25KP		TH-T50KP		TH-T65KP		TH-T100KP		SR(D)-T5	
Terminal	Main	Auxiliary	Main	Auxiliary	Main	Auxiliary	Main	Auxiliary	Main	Auxiliary	Auxiliary	Control
Screw Size	M3.5	M3.5	M4	M3.5	M5	M3.5	M6	M4	M6	M4	M3.5	M3.5
Wire Strip Length L	10.5 mm	10.5 mm	10 mm	10.5 mm	13.5 mm	10.5 mm	—	11 mm	—	11 mm	10 mm	9 mm
Wire Size (60/75°C) (copper only) (Sol./Str.)	14 - 12 AWG Note 1	14 AWG	14 - 8 AWG	14 AWG	14-6 AWG Note 2	14 AWG	14-3 AWG	14 AWG	14-1 AWG Note 3	14 AWG	14 AWG	14 AWG
Recommended Crimp Lug Size (JST Cat No.) Note 4	1.25-3.5 to 2-3.5 5.5-S3	1.25-3.5 to 2-3.5	1.25-4 to 5.5-4 8-NK4	1.25-3.5 to 2-3.5	1.25-5 to 14-5	1.25-3.5 to 2-3.5	2-6 to 22-6	1.25-4 to 2-4	2-6 to 22-6	1.25-4 to 2-4	1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5
Connection to Terminal Max. qty.	Each Terminal - 2 Wires or 2 Crimp Lugs Note 5											
Tightening Torque	10.3 lb-in (1.17 N·m)	10.3 lb-in (1.17 N·m)	15 lb-in (1.69 N·m)	10.3 lb-in (1.17 N·m)	22.5 lb-in (2.54 N·m)	10.3 lb-in (1.17 N·m)	39.1 lb-in (4.41 N·m)	15 lb-in (1.69 N·m)	39.1 lb-in (4.41 N·m)	15 lb-in (1.69 N·m)	10.3 lb-in (1.17 N·m)	10.3 lb-in (1.17 N·m)

Note 1. The applicable current for the heater designation 15A is 16A or less.
Note 2. When using 6 AWG, use a copper wire with wire temperature rating of 75°C.
Note 3. Use copper wire with wire temperature rating of 75°C.
Note 4. Please use swaging tool which is recommended by JST.
Note 5. 2 conductors of the same size can be connected.

10.6 Compliance with EC Directives

Compliance with EC Directives of Magnetic Starters Used as Components

Although the CE marking is required in order to distribute the magnetic starter within the EU for component use compliant with the EC Directives, when displaying the CE marking on machine tools, control devices or the like, it is not required for the magnetic starter as an embedded component.

When displaying the CE marking on machine tools, control devices or the like, the use of third party certification (TÜV certification) is recommended for the magnetic starter. As shown on page 282, the MS-T/N Series magnetic starters, SD-Q Series DC interface contactors and the like are TÜV certified.

● Compliance with Low Voltage Directive

Compliance of Magnetic Starters in Single Exports

In single exports to the EU, magnetic starters are subject to the Low Voltage Directive. The Low Voltage Directive is module A and the compliance certificate is basically carried out by self-declaration; the applicable product specifications are as follows.

EN-60947-4-1 Magnetic Starter Standards

EN-60947-5-1 Contactor Relay Standards

As shown on page 281, MS-T/N series magnetic starters, SD-Q Series DC interface contactors and the like are standard products and comply with the Low Voltage Directive.

● Compliance with EMC Directives

As the MS-T/N series magnetic starter does not incorporate an internal electronic circuit, it is outside the scope of the EMC Directive.

(As the DC exciting circuits of S-T65 to T100 and S-N125 to N800 are simple rectifier circuits, they are EMC-excluded items.)

The solid state contactor US-N/H is subject to the EMC Directive.

● Compliance with RoHS Directive

In single exports to the EU, magnetic starters are subject to the RoHS Directive. (Category 9 "Monitoring and control equipment" of the RoHS Directive applies to the products). Six substances (lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE) are restricted under the revised RoHS Directive (2011/65/EU commonly known as RoHS 2). As shown on page 281, MS-T/N series magnetic starters, SD-Q Series DC interface contactors, and the like are standard products and comply with the RoHS Directive.

Note that, US-N(H)70/N(H)80(TE) types containing restricted substances, cannot be exported as single products, but can be exported as spare parts to which the RoHS Directive does not apply.

In the official gazette Directive (EU) 2015/863 published in June 2015, four phthalates were newly added, totaling 10 substances under restriction. Magnetic starters are subject to RoHS 2 from July 22, 2021. However, to meet the needs of the customers who manufacture the products of category 1 to 7, 10, and 11, such as household appliances, to which RoHS 2 starts to apply from July 22, 2019, we have been manufacturing products not containing the four additional substances since January, 2019. For the models compliant with RoHS 2, consult with your dealer or with us.

● Compliance with Machinery Directive

(1) The MS-T/N series magnetic starter is a component used in equipment such as machine tools and control devices, and is outside the scope of the Machinery Directive.

(2) With respect to EN60204-2, the safety standards for mechanical equipment, compliances are as below.

Item	Requirements	Request Content	Support
Control Function in Case of Failure	9.4	If the failure of an electrical device would lead to hazardous conditions, take appropriate measures to minimize the probability of such risks.	A magnetic contactor with mirror contact (safety separation function) is available (∗)
	9.4.2.2	Provide redundancy. The probability of a single failure of an electric circuit causing a serious risk can be minimized by providing partial or total redundancy. (The safety circuit will turn off if one of the relays fails. The relay status (normal or otherwise) will be checked at each on/off cycle of the machine. Cannot restart when one of the relays fails.)	

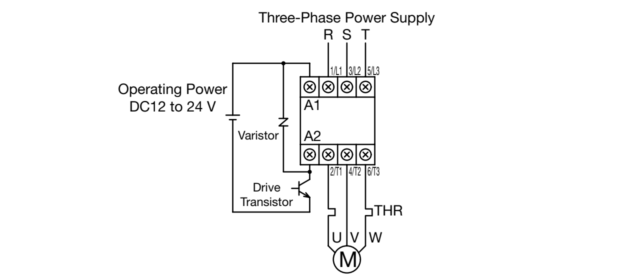
∗ The mirror contact is a function in which even if the main contact is welded, the auxiliary break contact withstands the impulse voltage of 2500 V without contact.

Low Voltage Directive/RoHS Directive Compatible Models and CE Marking Display Locations

Model	Model Name	Display Location
Magnetic Contactors (AC Operated)	S-(2x)T10(BC)(SA), S-(2x)T12(BC)(SA)(SQ) S-(2x)T20(BC)(SA)(SQ), S-(2x)T21(BC)(SA) S-(2x)T25(BC)(SA), S-(2x)T32(BC)(SA) S-(2x)T35(BC)(SA), S-(2x)T50(BC)(SA) S-(2x)T65, S-(2x)T80, S-(2x)T100 S-(2x)N38(CX)(SA), S-(2x)N48(CX)(SA) S-(2x)N125, S-(2x)N150 S-(2x)N180, S-(2x)N220, S-(2x)N300, S-(2x)N400, S-(2x)N600, S-(2x)N800	Displayed on the product name plate (Note 2)
Magnetic Starters (AC Operated)	MSO-(2x)T10(BC)KP(SA), MSO-(2x)T12(BC)KP(SA) MSO-(2x)T20(BC)KP(SA), MSO-(2x)T21(BC)KP(SA) MSO-(2x)T25(BC)KP(SA) MSO-(2x)T35(BC)KP(SA), MSO-(2x)T50(BC)KP(SA) MSO-(2x)T65KP, MSO-(2x)T80KP, MSO-(2x)T100KP MSO-(2x)N125KP, MSO-(2x)N150KP, MSO-(2x)N180KP, MSO-(2x)N220KP, MSO-(2x)N300KP, MSO-(2x)N400KP	
Thermal Overload Relays	TH-T18(BC)KP, TH-T25(BC)KP, TH-T50(BC)KP, TH-T65KP, TH-T100KP TH-N120KP, TH-N120TAKP, TH-N220RHKP, TH-N220HZKP, TH-N400RHKP, TH-N400HZKP	
Contactor Relays (AC Operated)	SR-T5(BC)(SA)(SQ), SR-T9(BC)(SA)	
Auxiliary Contact Unit	UT-AX2(BC), UT-AX4(BC), UT-AX11(BC) UN-AX2(CX), UN-AX4(CX), UN-AX11(CX), UN-AX80, UN-AX150, UQ-AX2(KR)	
Magnetic Contactors (DC Operated)	SD-(2x)T12(BC)(SA)(SQ), SD-(2x)T20(BC)(SA)(SQ), SD-(2x)T21(BC)(SA), SD-(2x)T32(BC)(SA), SD-(2x)T35(BC)(SA), SD-(2x)T50(BC)(SA), SD-(2x)T65, SD-(2x)T80, SD-(2x)T100 SD-(2x)N125, SD-(2x)N150, SD-(2x)N220, SD-(2x)N300, SD-(2x)N400, SD-(2x)N600, SD-(2x)N800	
Magnetic Starters (DC Operated)	MSOD-(2x)T12(BC)KP(SA), MSOD-(2x)T20(BC)KP(SA), MSOD-(2x)T21(BC)KP(SA), MSOD-(2x)T35(BC)KP(SA), MSOD-(2x)T50(BC)KP(SA) MSOD-(2x)T65KP, MSOD-(2x)T80KP, MSOD-(2x)T100KP MSOD-(2x)N125KP, MSOD-(2x)N150KP, MSOD-(2x)N220KP, MSOD-(2x)N300KP, MSOD-(2x)N400KP	
Contactor Relays (DC Operated)	SRD-T5 (BC) (SA)(SQ), SRD-T9 (BC) (SA)	
DC Interface Contactors	SD-Q11, SD-Q12, SD-QR11, SD-QR12	
	MSOD-Q(R)11KP, MSOD-Q(R)12KP	
Solid State Contactors for Motor/Heater Loads	US-N5SS(TE), US-N8SS(TE), US-N20(TE), US-N30(TE), US-N40(TE), US-N50(TE), US-N70NS(TE), US-N80NS(TE), US-NH70NS(TE), US-NH80NS(TE), US-N20(TE)CX, US-N30(TE)CX, US-N40(TE)CX, US-N50(TE)CX US-N20(TE)RM	
Solid State Contactors for Heater Loads	US-H20(DD), US-H30(DD), US-H40(DD), US-H50(DD), US-H20(DD)RM, US-H30(DD)RM, US-H20(DD)UF, US-H30(DD)UF	

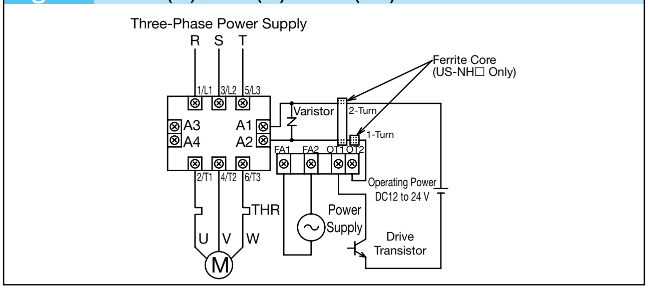
Note 1. Standard products are compliant. The outline drawings, contact arrangement, rating, order model name and the like are the same as the standard product.
Note 2. As UN-AX80 and UN-AX150 have no product name plate, it is displayed on the individual product packaging.
Note 3. To keep the US-N5/N8SS (TE) and US-N (H) 70/N (H) 80NS (TE) compliant with the CE mark, use by connecting as shown in the figure below.
Note 4. US-N(H)70/N(H)80NS(TE) types contain substances restricted by the RoHS Directive and are dedicated as spare parts products within the EU region. They display CE markings as products for which the RoHS Directive does not apply.

Fig.1 US-N5/N8SS (TE) Type



Note: Connect the varistor (NVD05UCD039 [KOA]) in the location shown in the figure above.

Fig.2 US-N(H)70/N(H)80NS(TE)



Note: Connect the varistor (NVD05UCD039 [KOA]) and ferrite core (ZCAT3035-1330 [TDK]) in the locations shown in the figure above. (Ferrite core mounting is not required for US-N70/N80□)

10.7 TÜV Certified Products

● TÜV Rheinland Inspection Association Certified Product

TÜV Rheinland

(1) TÜV Certified Magnetic Contactor T Series (Certification Standard EN60947-4-1)

Model Name	Certified Rating [A] (AC-3)		Certification Number	Mirror Contact (Safety Separation Function) (Note 3)		Remarks
	220 to 240 V	380 to 440 V		Body Built-In Auxiliary Break Contact	Auxiliary Contact Unit Auxiliary Break Contact	
S-T10(BC)(SA)	11	9	R50255938	○(Note 4)	○ (UT-AX2(BC), UT-AX4(BC))	Standard product with the certification mark.
S-T12(BC)(SA)(SQ)	13	12		○		
S-T20(BC)(SA)(SQ)	18	18				
S-T21(BC)(SA)	25	23	R50255941			
S-T25(BC)(SA)	30	30				
S-T32(BC)(SA)	32	32		—		
S-T35(BC)(SA)	40	40	R50319775	○		
S-T50(BC)(SA)	55	50				
S-T65(CW)	65	65	R50319817		○ (UN-AX2(BC), UN-AX4(BC))	
S-T80(CW)	85	85				
S-T100	105	105	R9851138	○	—	
SD-T12(BC)(SA)(SQ)	13	12	R50255938	○	○ (UT-AX2(BC), UT-AX4(BC))	
SD-T20(BC)(SA)(SQ)	18	18				
SD-T21(BC)(SA)	25	23	R50255941			
SD-T32(BC)(SA)	32	32		—		
SD-T35(BC)(SA)	40	40	R50319775	○		
SD-T50(BC)(SA)	55	50				
SD-T65(CW)	65	65	R50319817		○ (UN-AX2(BC), UN-AX4(BC))	
SD-T80(CW)	85	85				
SD-T100	105	105	R9851138	○	—	

Note 1. Certification Rating: Certified in the following range.
Main Circuit Contact : 440 V or Less at AC-3 Rating and Rated Continuity Current
Auxiliary Contact : 550 V or Less at AC-15 Rating and Rated Continuity Current
Operation Coil : AC Operation S-T10 to T80 : AC24V Coil to AC500V Coil
S-T100 : AC24V Coil to AC500V Coil
DC Operation : DC12V Coil to DC220V Coil
Note 2. The specification of the surge absorber mounting type (with "SA" in the model name) is also TÜV certified.
Note 3. Mirror contact compliance acquired from TÜV, making it optimal for the interlock circuit of machine tools. The mirror contact indicates a function in which even if the main contact is welded, the auxiliary break contact withstands impulse voltage of 2,500 V without contact.
Note 4. When ordering S-T10(BC)(SA) with 1b, indicate that it is with 1b.

(2) TÜV Certified Magnetic Contactor N Series (Certification Standard EN60947-4-1)

Model Name	Certified Rating [A] (AC-3)		Certification Number	Mirror Contact (Safety Separation Function) (Note 3)		Remarks
	220 to 240 V	380 to 440 V		Body Built-In Auxiliary Break Contact	Auxiliary Contact Unit Auxiliary Break Contact	
S-N38(CX)(SA)	39	32	R9651189	—	—	Standard product with the certification mark.
S-N48(CX)(SA)	50	40				
S-N125	125	120	R9851169	○	—	
S-N150	150	150	R9851167	○	○ (UN-AX150)	
S-N180	180	180	R9851164			
S-N220	250	250				
S-N300	300	300	R9851171			
S-N400	400	400				
SD-N125	125	120	R9851169	○	—	
SD-N150	150	150	R9851167	○	○ (UN-AX150)	
SD-N220	250	250	R9851164			
SD-N300	300	300	R9851171			
SD-N400	400	400				

Note 1. Certification Rating: Certified in the following range.
Main Circuit Contact : 440 V or Less at AC-3 Rating and Rated Continuity Current
Auxiliary Contact : 550 V or Less at AC-15 Rating and Rated Continuity Current
Operation Coil : AC Operation S-N38, N48 : AC24V Coil to AC440V Coil
S-N125 to N150 : AC24V Coil to AC500V Coil
S-N180 to N400 : AC48V Coil to AC500V Coil
DC Operation : DC12V Coil to DC220V Coil
Note 2. The specification of the surge absorber mounted type (with "SA" in the model name) is also TÜV certified.
Note 3. Mirror contact compliance acquired from TÜV, making it optimal for the interlock circuit of machine tools. The mirror contact indicates a function in which even if the main contact is welded, the auxiliary break contact withstands impulse voltage of 2,500 V without contact.

(3) TÜV Certified DC Interface Contactor (Certification Standard: EN60947-4-1)

Model Name	Certified Rating [A] (AC-3)		Certification Number	Mirror Contact (Safety Separation Function) (Note 2)		Remarks
	220 to 240 V	380 to 440 V		Body Built-In Auxiliary Break Contact	Auxiliary Contact Unit Auxiliary Break Contact	
SD-Q11	12	9	R50004919	○(Note 1)	○(UQ-AX2)	Standard product and certified.
SD-Q12	12	9	R50004919	○	—	
SD-QR11	12	9	R50004919	—	—	
SD-QR12	12	9	R50004919	—	—	

Note 1. When ordering SD-Q11 with 1b, indicate that it is with 1b.

Note 2. The ○ marked products have acquired mirror contact compliance from TÜV, making them optimal for the interlock circuit of machine tools. The mirror contact indicates a function in which even if the main contact is welded, the auxiliary break contact withstands impulse voltage of 2,500 V without contact.

(4) TÜV Certified Thermal Overload Relay T Series (Certification Standard EN60947-4-1)

Model Name	Certification Number	Remarks
TH-T18(AR)(BC)KP(YS)	R50257058	Standard product and certified.
TH-T25(AR)(BC)KP(YS)	R50257062	
TH-T50(AR)(BC)KP(YS)	R50319830	
TH-T65KP	J9851140	
TH-T100KP	J9851140	

(5) TÜV Certified Thermal Overload Relay N Series (Certification Standard EN60947-4-1)

Model Name	Certification Number	Remarks
TH-N120KP	J9851168	Standard product and certified.
TH-N120TAKP	J9851168	
TH-N220RHKP	J9851166	
TH-N220HZKP	J9851166	
TH-N400RHKP	J9851172	
TH-N400HZKP	J9851172	

Note 1. The thermal overload relay is TÜV certified for use in combination with magnetic contactors. (Excluding TH-N220/N400HZKP)

Note 2. TH-N120KP and N120TAKP are certified in combination with the UN-CZ live part protection cover.

(6) TÜV Certified Auxiliary Contact Unit T Series (Certification Standard EN60947-5-1)

Model Name	Certification Number	Remarks
UT-AX2(BC)	R50255937	Standard product and certified.
UT-AX4(BC)	R50255937	
UT-AX11(BC)	R50255937	

Note 1. The AC-15 rating of 550 V or less and conventional free air thermal current are certified.

(7) TÜV Certified Auxiliary Contact Unit N Series (Certification Standard EN60947-5-1)

Model Name	Certification Number	Remarks
UN-AX2(CX)	J9551337	Standard product and certified.
UN-AX4(CX)	J9551337	
UN-AX11(CX)	J9551337	
UN-AX80	R9851225	
UN-AX150	R9851225	
UQ-AX2	R50004919	

Note 1. The AC-15 rating of 550 V or less (440 V or less for UQ-AX2) and conventional free air thermal current are certified.

Note 2. The auxiliary contact unit is TÜV certified for use in combination with magnetic contactors (or contactor relays).

(8) TÜV Certified Contactor Relay T Series (Certification Standard EN60947-5-1)

Model Name	Certification Number	Remarks	Model Name	Certification Number	Remarks
SR-T5(BC)(SA)(SQ)	R50255933	Standard product and certified.	SRD-T5(BC)(SA)(SQ)	R50255933	Standard product and certified.
SR-T9(BC)(SA)	R50255933		SRD-T9(BC)(SA)	R50255933	

Note 1. The AC-15 rating of 550 V or less and conventional free air thermal current are certified.
Note 2. The operation coil designations to be applied are AC24V to AC500V (alternating current) and DC12V to DC220V (direct current).
Note 3. The specification of the surge absorber mounted type (with "SA" in the model name) is also TÜV certified.

(9) TÜV Certified Solid State Contactor for Motor/Heater Loads (Certification Standards EN60947-4-2/EN60947-4-3)

Frame					N5SS (TE)	N8SS (TE)	N20 (TE)	N30 (TE)	N40 (TE)	N50 (TE)	N70NS (TE)	N80NS (TE)	NH70NS (TE)	NH80NS (TE)
	Load	Category	Voltage	Ambient Temperature										
Certified Rating (A)	Heater	AC-51	AC100 to 240 V	40°C	5	8	20	30	40	50(45)	70	80	—	—
				60°C	3	4.8	12	18	24	30(27)	42	48	—	—
			AC200 to 440 V	40°C	—	—	20	30	40	50(45)	—	—	65	75
				60°C	—	—	12	18	24	30(27)	—	—	39	45
	Motor	AC-53	AC200 to 240V	40°C	3.2	3.2	11.1	17.4	26	26	48	48	48	48
			AC400 to 440V	40°C	—	—	11.1	17.4	26	26	—	—	48	48
Type	Standard Product		US-□		R50037627		R50037628				R50037629		R50037630	
	CAN Terminal Product		US-□CX		—		R50037628				—			
	Rail Mounting Product		US-□RM		—		R50037628	—			—			

Note 1. The number in the Type column represents the certification number and "—" indicates no corresponding model.
Note 2. The value in the certified rating column ( ) represents the rating for US-N50TE.
Note 3. The frame column (TE) represents the main circuit 3-pole 3-element type.
Note 4. TÜV mark is displayed on the product body (name plate).

(10) TÜV Certified Solid State Contactor for Heater Load (Certification Standards EN60947-4-3)

Frame					H20(DD)	H30(DD)	H40(DD)	H50(DD)
	Load	Category	Voltage	Ambient Temperature				
Certified Rating (A)	Heater	AC-51	AC24 to 480 V	40°C	20	30	40	50
				60°C	12	18	24	30
Type	Standard Product		US-□		R50018958			
	No Cooling Fin		US-□HZ		R50018958			
	Rail Mounting Product		US-□RM		R50018958		–	
	Width Reduced Product		US-□UF		R50018958		–	

Note 1. The number in the Type column represents the certification number and "—" indicates no corresponding model.
Note 2. The frame column (DD) represents the individual control.
Note 3. TÜV mark is displayed on the product body (name plate).

10.8 CCC Certified Products (China)

Magnetic starters are specified as a China Compulsory Certification Practice product, which requires CCC certification for export from Japan to China and for marketing in China.

For the detailed specifications of combinable symbols (application range field of the model name ∗∗) shown on page 289, refer to page 34. When ordering standard products other than certified models (◉ marked products in the table below), always add "CN" at the end of the model name to specify. The solid state contactor US-H□ for heater load and optional units (UN-CV, ML, RR, SA, etc.) that are used by attaching to a magnetic starter and are without load switching function are not subject to CCC certification.

In China, the "Energy Efficiency Labeling Management Regulation" has been implemented for the purpose of improving energy efficiency, which applies to the AC operated AC magnetic contactor (rated operational vpltage: 380 V (400 V), rated operating current: 6 to 630 A).

Export to China and/or sale of these products in China will require an energy efficiency label.

If these products are to be indirectly exported to China, consult with your dealer or with us.

10.8.1 CCC Certified Model Name List

● Non-Reversible Magnetic Starter, Magnetic Contactor T Series

◎: Standard product and certified, ▢ : Out of production range

	Product Specifications	Model Name	Frame Size										
			T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100
Open Type Magnetic Starters	With 2E Thermal	MSO-□KP	◎	◎	◎		◎		◎	◎	◎	◎	◎
	Wiring Streamlining Terminal, With 2E Thermal	MSO-□BCKP	◎	◎	◎		◎		◎	◎			
	Surge Absorber Built-in Type with 2E Thermal	MSO-□KPSA	◎	◎	◎		◎		◎	◎			
	With Terminal Cover, With 2E Thermal	MSO-□CWKP									◎	◎	
	Drop Time Shortened Type, With 2E Thermal	MSO-□KPQM									◎	◎	◎
	DC Operated Type, With 2E Thermal	MSOD-□KP		◎	◎				◎	◎	◎	◎	◎
	DC Operated, Wiring Streamlining Terminal, With 2E Thermal	MSOD-□BCKP		◎	◎				◎	◎			
	DC Operated Surge Absorber Built-in Type, With 2E Thermal	MSOD-□KPSA		◎	◎				◎	◎			
	DC Operated Type With Terminal Cover and 2E Thermal	MSOD-□CWKP									◎	◎	
Magnetic Contactors	Standard Specifications	S-□	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Wiring Streamlining Terminal	S-□BC	◎	◎	◎	◎	◎	◎	◎	◎			
	Surge Absorber Built-in Type	S-□SA	◎	◎	◎	◎	◎	◎	◎	◎			
	With Terminal Cover	S-□CW									◎	◎	◎
	Drop Time Shortened Type	S-□QM									◎	◎	◎
	DC Operated	SD-□		◎	◎	◎		◎	◎	◎	◎	◎	◎
	DC Operated, Wiring Streamlining Terminal	SD-□BC		◎	◎	◎		◎	◎	◎			
	DC Operated Surge Absorber Built-in Type	SD-□SA		◎	◎	◎		◎	◎	◎			
	DC Operated Type with Terminal Cover	SD-□CW									◎	◎	◎
	Spring Clamp Terminals	S(D)-□SQ		◎	◎								
	Mechanically Latched Type	SL(D)-□				◎			◎	◎	◎	◎	◎
	Mechanically Latched, Wiring Streamlining Terminal	SL(D)-□BC				◎			◎	◎			
	Mechanically Latched, Surge Absorber Built-in Type	SL(D)-□SA				◎			◎	◎			
	NC Main Contact Type	B(D)-□				◎							
	NC Main Contact, Wiring Streamlining Terminal	B(D)-□BC				◎							
	NC Main Contact, Surge Absorber Built-in Type	B(D)-□SA				◎							

Note 1. The delay open types MSO-T□DL and S-T□DL and mechanically latched type MSOL(D)-T□(KP) are not certified.

● Non-Reversible Magnetic Starter, Magnetic Contactor N Series

◎: Certified as standard product,◉: Certified (add "CN" at the end of the model name when ordering), ▢ : Out of production range

	Product Specifications	Model Name	Frame Size											
			N38	N48	N65	N100	N125	N150	N180	N220	N300	N400	N600	N800
Enclosed Magnetic Starters	With 2E Thermal	MS-□KP					◉	◉	◉	◉	◉	◉		
	Surge Absorber Built-in Type	MS-□SA												
	With Push Button, with ON/OFF/Reset	MS-□PM												
	With Push Button, with ON/OFF/Reset	MS-□KPPM												
	With Push Button, with ON/OFF	MS-□PS												
	With Push Button, with ON/OFF	MS-□KPPS												
	Drop Time Shortened Type	MS-□KPQM					◉	◉	◉	◉	◉	◉		
Open Type Magnetic Starters	With 2E Thermal	MSO-□KP					◎	◎	◎	◎	◎	◎		
	With Saturable Reactor with 2E	MSO-□KPSR					◎	◎	◎	◎	◎	◎		
	Drop Time Shortened Type with 2E Thermal	MSO-□KPQM					◎	◎	◎	◎	◎	◎		
	DC Operated	MSOD-□												
	DC Operated Type with 2E Thermal	MSOD-□KP					◎	◎		◎	◎	◎		
Magnetic Contactors	Standard Specifications	S-□	◎	◎			◎	◎	◎	◎	◎	◎	◎	◎
	Drop Time Shortened Type	S-□QM					◎	◎	◎	◎	◎	◎		
	DC Operated	SD-□					◎	◎		◎	◎	◎	◎	◎
	Mechanically Latched Type	SL (D)-□					◎	◎		◎	◎	◎	◉	◉
	NC Main Contact Type	B(D)-□			◉	◉								

Note 1. The delay open types MSO-N□DL and S-N□DL and mechanically latched type MSOL(D)-N□(KP) are not certified.

Application to Domestic and International Standards

● Reversible Magnetic Starter, Magnetic Contactor T Series

◎ : Standard product and certified, ▭ : Out of production range

	Product Specifications	Model Name	Frame Size T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100
Open Type Magnetic Starters	With 2E Thermal	MSO-2x☐KP	◎	◎	◎	◎	◎		◎	◎	◎	◎	◎
	Wiring Streamlining Terminal, With 2E Thermal	MSO-2x☐BCKP	◎	◎	◎	◎	◎		◎	◎			
	Surge Absorber Built-in Type with 2E Thermal	MSO-2x☐KPSA	◎	◎	◎	◎	◎		◎	◎			
	With Terminal Cover, With 2E Thermal	MSO-2x☐CWKP									◎	◎	
	Drop Time Shortened Type, With 2E Thermal	MSO-2x☐KPQM									◎	◎	◎
	DC Operated Type, With 2E Thermal	MSOD-2x☐KP		◎	◎	◎			◎	◎	◎	◎	◎
	DC Operated, Wiring Streamlining Terminal, With 2E Thermal	MSOD-2x☐BCKP		◎	◎	◎			◎	◎			
	DC Operated Surge Absorber Built-in Type, With 2E Thermal	MSOD-2x☐KPSA		◎	◎	◎			◎	◎			
	DC Operated Type With Terminal Cover and 2E Thermal	MSOD-2x☐CWKP									◎	◎	◎
Magnetic Contactors	Standard Specifications	S-2x☐	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Wiring Streamlining Terminal	S-2x☐BC	◎	◎	◎	◎	◎	◎	◎	◎			
	Surge Absorber Built-in Type	S-2x☐SA	◎	◎	◎	◎	◎	◎	◎	◎			
	With Terminal Cover	S-2x☐CW									◎	◎	
	Drop Time Shortened Type	S-2x☐QM									◎	◎	◎
	DC Operated	SD-2x☐		◎	◎	◎		◎	◎	◎	◎	◎	◎
	DC Operated, Wiring Streamlining Terminal	SD-2x☐BC		◎	◎	◎		◎	◎	◎			
	DC Operated Surge Absorber Built-in Type	SD-2x☐SA		◎	◎	◎		◎	◎	◎			
	DC Operated Type with Terminal Cover	SD-2x☐CW									◎	◎	◎
	Spring Clamp Terminals	S(D)-2x☐SQ		◎	◎								
	Mechanically Latched Type	SL(D)-2x☐				◎			◎	◎	◎	◎	◎
	Mechanically Latched, Wiring Streamlining Terminal	SL(D)-2x☐BC				◎			◎	◎			
	Mechanically Latched, Surge Absorber Built-in Type	SL(D)-2x☐SA				◎			◎	◎			

Note 1. The enclosed type MS-2 x T☐ and mechanically latched type MSOL(D)-2 x T☐(KP) are not certified.

● Reversible Magnetic Starter, Magnetic Contactor N Series

◎: Certified as standard product, ◉: Certified (add "CN" at the end of the model name when ordering), ▭ : Out of production range

	Product Specifications	Model Name	Frame Size N125	N150	N180	N220	N300	N400	N600	N800	N38	N48
Reversible Open Type Magnetic Starter	With 2E Thermal	MSO-2x☐KP	◎	◎	◎	◎	◎	◎				
	With Saturable Reactor with 2E	MSO-2x☐KPSR	◎	◎	◎	◎	◎	◎				
	Drop Time Shortened Type with 2E Thermal	MSO-2x☐KPQM	◎	◎	◎	◎	◎	◎				
	DC Operated Type with 2E Thermal	MSOD-2x☐KP	◎	◎		◎	◎	◎				
Reversible Magnetic Contactors	Standard Specifications	S-2x☐	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Drop Time Shortened Type	S-2x☐QM	◎	◎	◎	◎	◎	◎				
	DC Operated	SD-2x☐	◎	◎		◎	◎	◎	◎	◎		
	Mechanically Latched Type	SL(D)-2x☐	◎	◎		◎	◎	◎	◉	◉		

Note 1. The enclosed type MS-2xN☐ and mechanically latched type MSOL(D)-2xN☐(KP) are not certified.

● Thermal Overload Relay T Series

◎: Standard product and certified, ▭ : Out of production range

Product Specifications	Model Name	Frame Size T18	T25	T50	T65	T100
Open-Phase Protection (2E)	TH-☐KP	◎	◎	◎	◎	◎
2E with Automatic Reset	TH-☐ARKP	◎	◎	◎	◎	◎
2E with Wiring Streamlining Terminal	TH-☐BCKP	◎	◎	◎		
2E with Anti corrosion Treated Terminal	TH-☐KPYS	◎	◎	◎	◎	◎

● Thermal Overload Relay N Series

◎: Certified as standard product, ◉: Certified (add "CN" at the end of the model name when ordering), ▭ : Out of production range

Product Specifications	Model Name	Frame Size N120	N120TA	N220RH	N220HZ	N400RH	N400HZ	N600
Overload and Open-Phase Protection (2E)	TH-☐KP	◎	◎	◎	◎	◎	◎	◉
Overload and Open-Phase Protection (for Independent Mounting)	TH-☐HZKP		◎					
2E With Saturable Reactor	TH-☐KPSR	◎	◎	◎	◎	◎	◎	◉
2E with Automatic Reset	TH-☐ARKP	◎	◎	◎	◎	◎	◎	◎

● Solid State Contactors

◎: Standard product and certified, ▭ : Out of production range

Product Specifications		Model Name	Frame Size									
			N5SS	N8SS	N20	N30	N40	N50	N70NS	N80NS	NH70NS	NH80NS
2-Element Type	Standard Specifications	US-□	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	With Terminal Cover	US-□CX			◎	◎	◎	◎				
	IEC Rail Mounting	US-□RM	Standard Equipment		◎							
3-Element Type	Standard Specifications	US-□TE	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	With Terminal Cover	US-□TECX			◎	◎	◎	◎				
	IEC Rail Mounting	US-□TERM	Standard Equipment		◎							

Note 1. US-H□ for heater load is non-certified.
Note 2. The following optional units of the solid state contactor are not subject to certification.
UA-DR1, UA-SH1, UA-SH8, UA-PC, UA-RE, UA-CVDR1, UA-CVSH-8, UA-CV501US

● Contactor Relay T Series

◎: Standard product and certified, ▭ : Out of production range

Product Specifications		Model Name	Frame Size	
			T5	T9
AC Operated Type	Standard Specifications	SR-□	◎	◎
	Wiring Streamlining Terminal	SR-□BC	◎	◎
	Surge Absorber Mounted Type	SR-□SA	◎	◎
	Spring Clamp Terminals	SR-□SQ	◎	
DC Operated Type	DC Operated	SRD-□	◎	◎
	Wiring Streamlining Terminal	SRD-□BC	◎	◎
	Surge Absorber Mounted Type	SRD-□SA	◎	◎
	Spring Clamp Terminals	SRD-□SQ	◎	
Mechanically Latched Type	Mechanically Latched Type	SRL(D)-□	◎	
	Wiring Streamlining Terminal	SRL(D)-□BC	◎	
	Surge Absorber Mounted Type	SRL(D)-□SA	◎	

● Contactor Relay K Series

◎: Standard product and certified, ▭ : Out of production range

Product Specifications		Model Name	Frame Size
			K100
Mechanically Latched Type	Mechanically Latched Type	SRL(D)-□	◎
	With Terminal Cover	SRL(D)-□CX	

Note 1. The delay open type SR-N□DL, SR(D)-N□JH with large rated auxiliary contact, and SR(D)-N□LC with overlap contact are not certified.

● Auxiliary Contact Unit T Series

◎: Standard product and certified

Product Specifications	Model Name	Frame Size		
		2	4	11
Standard Specifications	UT-AX□	◎	◎	◎
Wiring Streamlining Terminal	UT-AX□BC	◎	◎	◎

● Auxiliary Contact Unit N Series

◎: Standard product and certified, ●: Certified (add "CN" at the end of the model name when ordering), ▭ : Out of production range

Product Specifications	Model Name	Frame Size						
		2	22	4	11	80	150	600
Standard Specifications	UN-AX□	◎		◎	◎	●	●	●
With Terminal Cover	UN-AX□CX	◎		◎	◎			
With Low-Level Signal Contact	UN-LL□		◎					

● DC Interface Contactors

◎: Standard product and certified

Product Specifications	Model Name	Frame Size			
		Non-Reversible Type		Reversible Type	
		Q11	Q12	QR11	QR12
Standard Specification - Magnetic Starter	MSOD-□	◎	◎	◎	◎
With 2E Thermal	MSOD-□KP	◎	◎	◎	◎
Wiring Streamlining Terminal	MSOD-□BC	◎	◎	◎	◎
Wiring Streamlining Terminal, With 2E Thermal	MSOD-□BCKP	◎	◎	◎	◎
Standard Specifications - Magnetic Contactor	SD-□	◎	◎	◎	◎

Note 1. The DC12 V coil voltage designation is not certified.

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Application to Domestic and International Standards

● Auxiliary Contact Units for DC Interface Contactors

◎: Standard product and certified

Product Specifications	Model Name	Frame Size	
		2	2KR
Standard Specifications	UQ-AX□	◎	◎

● Magnetic Contactors for DC

◉: Certified (add “CN” at the end of the model name when ordering)

Product Specifications	Model Name	Frame Size				
		N30	N60	N120	N180	N260
Standard Specifications	DU(D)-□	◉	◉	◉	◉	◉

● Vacuum Magnetic Contactors

◉: Certified (add “CN” at the end of the model name when ordering), ▭: Out of production range

Product Specifications		Model Name	Frame Size			
			V160	V320	V400	V600
AC Operated Type		SH-□	◉	◉	◉	◉
DC Operated Type		SHD-□	◉	◉	◉	
Mechanically Latched Type	AC Operated Type	SHL-□	◉	◉	◉	
	DC Operated Type	SHLD-□	◉	◉	◉	

● Voltage Detection Relays

◉: Certified (add “CN” at the end of the model name when ordering)

Product Specifications		Model Name	Application
For Standard Detection	Operating Voltage AC100 to 110, 200 to 220 V for 50/60 Hz	SRE-AA	◉
	Operating Voltage AC115 to 120, 230 to 240 V for 50/60 Hz	SRE-AAU	◉
For Power Detection	Set Value (Scale) is OFF Voltage	SRE-K	◉
	Set Value (Scale) is ON Voltage	SRE-KT	◉

● Instantaneous Stop/Restart Relays

◉: Certified (add “CN” at the end of the model name when ordering)

Product Specifications	Model Name	Application
Standard Specifications	UA-DL2	◉

● Fault Detection Units

◉: Certified (add “CN” at the end of the model name when ordering)

Product Specifications		Model Name	Application
For 200 V Main Circuit	Standard Specifications	UN-FD	◉
	With Terminal Cover	UN-FDCX	◉
For 400 V Main Circuit	Standard Specifications	UN-FD4	◉
	With Terminal Cover	UN-FD4CX	◉

Note 1. The DC24 V rated operational voltage specification is not certified.

● DC/AC Interface Units for Operation Coils

◉: Certified (add “CN” at the end of the model name when ordering), ▭ : Out of production range

Product Specifications	Model Name	Frame Size		
		12	22	32
Standard Specifications	UN-SY	◉	◉	◉
With Terminal Cover	UN-SY□CX		◉	

Note 1. The following optional units for contactless output (triac output) are not subject to certification.
UN-SY11, UN-SY21(CX), UN-SY31

10.8.2 Rating, Specification and Certification Number

● **Magnetic Starters (Certification Standard: GB/T14048.4)**

<Enclosed Type>

Model Name MS: AC Operated	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V)		Heater Designation Range	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement Standard	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)					
MS-N125CNKP	37/60	125/120	42 to 105A	AC24V to AC500V	AR, QM	2a2b	20030103 04093067
MS-N150CNKP	45/75	150/150	42 to 125A			2a2b	20030103 04093079
MS-N180CNKP	55/90	180/180	82 to 150A	AC48V to AC500V		2a2b	20030103 04093070
MS-N220CNKP	75/132	250/250	82 to 180A			2a2b	
MS-N300CNKP	90/160	300/300	105 to 250A			2a2b	20030103 04093066
MS-N400CNKP	125/220	400/400	105 to 330A			2a2b	

<Open Type>

Model Name MSO: AC Operated MSOD: DC Operated 2x: Reversible	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V)		Heater Designation Range	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)					
MSO-(2x)T10KP∗∗	2.5/4	11/9	0.12 to 9A	AC24V to AC500V	AR, BC, SA, FS	1a/1a x 2 + 2b	2015010304817542
MSO(D)-(2x)T12KP∗∗	3.5/5.5	13/12	0.12 to 11A	AC24V to AC500V DC12V to DC220V		1a1b/1a1b x 2 + 2b	
MSO(D)-(2x)T20KP∗∗	4.5/7.5	18/18	0.12 to 15A				
MSO(D)-(2x)T21KP∗∗	5.5/11	25/23	0.24 to 15A			2a2b/2a2b x 2	2015010304817518
MSO-(2x)T25KP∗∗	7.5/15	30/30	0.24 to 22A	AC24V to AC500V			
MSO(D)-(2x)T35KP∗∗	11/18.5	40/40	0.24 to 29A	AC24V to AC500V DC12V to DC220V			2016010304835055
MSO(D)-(2x)T50KP∗∗	15/22	55/50	0.24 to 42A				
MSO(D)-(2x)T65KP∗∗	18.5/30	65/65	15 to 54A		AR,CW,FS,QM (AC Operation Only)		2016010304835278
MSO(D)-(2x)T80KP∗∗	22/45	85/85	15 to 67A				
MSO(D)-(2x)T100KP∗∗	30/55	105/105	15 to 82A		AR,FS,QM (AC Operation Only)		2016010304835279
MSO(D)-(2x)N125KP∗∗	37/60	125/120	42 to 105A	AC24V to AC500V DC12V to DC220V	AR, QM (AC Operation Only), SR		20030103 04093067
MSO(D)-(2x)N150KP∗∗	45/75	150/150	42 to 125A	AC48V to AC500V DC12V to DC220V		2a2b/3a3b x 2	20030103 04093079
MSO-(2x)N180KP∗∗	55/90	180/180	82 to 150A				20030103 04093070
MSO(D)-(2x)N220KP∗∗	75/132	250/250	82 to 180A				
MSO(D)-(2x)N300KP∗∗	90/160	300/300	105 to 250A				20030103 04093066
MSO(D)-(2x)N400KP∗∗	125/220	400/400	105 to 330A				

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● **Magnetic Contactors (Certification Standard: GB/T14048.4)**

<Standard Type>

Model Name S: AC Operated SD: DC Operated 2x: Reversible	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V)		Conventional Free Air Thermal Current Ith (A)	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)					
S-(2x)T10∗∗	2.5/4	11/9	20	AC24V to AC500V DC12V to DC220V	BC, SA	1a/1a x 2 + 2b	20130103 04604263
S(D)-(2x)T12∗∗	3.5/5.5	13/12	20		BC, SA, SQ	1a1b/1a1b x 2 + 2b	
S(D)-(2x)T20∗∗	4.5/7.5	18/18	20				
S(D)-(2x)T21∗∗	5.5/11	25/23	32		BC, SA	2a2b/2a2b x 2	20130103 04604262
S-(2x)T25∗∗	7.5/15	30/30	32				
S(D)-(2x)T32∗∗	7.5/15	32/32	32			- /2a2b x 2	
S(D)-(2x)T35∗∗	11/18.5	40/40	60			2a2b/2a2b x 2	20150103 04790992
S(D)-(2x)T50∗∗	15/22	55/50	80				
S(D)-(2x)T65∗∗	18.5/30	65/65	100		QM (AC Operation Only), CW		20150103 04790996
S(D)-(2x)T80∗∗	22/45	85/85	135				
S(D)-(2x)T100∗∗	30/55	105/105	150		QM (AC Operation Only)		20150103 04790995
S(D)-(2x)N125∗∗	37/60	125/120	150	AC24V to AC500V DC12V to DC220V	QM (AC Operation Only)		20020103 04024706
S(D)-(2x)N150∗∗	45/75	150/150	200			2a2b/3a3b x 2	20020103 04024707
S-(2x)N180∗∗	55/90	180/180	260	AC48V to AC500V DC12V to DC220V			20020103 04024708
S(D)-(2x)N220∗∗	75/132	250/250	260				
S(D)-(2x)N300∗∗	90/160	300/300	350				20020103 04024709
S(D)-(2x)N400∗∗	125/220	400/400	450				
S(D)-(2x)N600	190/330	630/630	660	AC100V to AC500V DC24V to DC220V	—	2a2b/4a4b x 2	20030103 04095569
S(D)-(2x)N800	220/440	800/800	800				

<Mechanically Latched Type>

Model Name SL: AC Operated SLD: DC Operated 2x: Reversible	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V)		Conventional Free Air Thermal Current Ith (A)	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard (Effective Contact)	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)					
SL(D)-(2x)T21∗∗	5.5/11	25/23	32	AC24V to AC500V DC12V to DC200V	BC, SA	2a2b/2a2b x 2	20130103 04604262
SL(D)-(2x)T35∗∗	11/18.5	40/40	60				20150103 04790992
SL(D)-(2x)T50∗∗	15/22	55/50	80				
SL(D)-(2x)T65	18.5/30	65/65	100		—		20150103 04790996
SL(D)-(2x)T80	22/45	85/85	135				
SL(D)-(2x)T100	30/55	105/105	150		—		20150103 04790995
SL(D)-(2x)N125	37/60	125/120	150	AC100V to AC500V DC12V to DC200V		1a2b/1a2b x 2	20020103 04024706
SL(D)-(2x)N150	45/75	150/150	200			1a2b/2a3b x 2	20020103 04024707
SL(D)-(2x)N220	75/132	250/250	260				20020103 04024708
SL(D)-(2x)N300	90/160	300/300	350				20020103 04024709
SL(D)-(2x)N400	125/220	400/400	450				
SL(D)-(2x)N600CN	190/330	630/630	660	AC100V to AC500V DC24V to DC200V	—	1a2b/3a4b x 2	20020103 04095569
SL(D)-(2x)N800CN	220/440	800/800	800				

<Main Circuit 3-Pole>

Model Name S: AC Operated 2x: Reversible	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V)		Conventional Free Air Thermal Current Ith (A)	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)					
S-(2x)N38∗∗	11/15	39/32	60	AC24V to AC500V	CX, SA	—/2a2b x 2	20020103 04024684
S-(2x)N48∗∗	15/18.5	50/40	80			—/2a2b x 2	

● Special Purpose Magnetic Contactors (Certification Standard: GB/T14048.4)

<DC>

Model Name DU: AC Operated DUD: DC Operated	Main Contact Arrangement	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement	Certification Number
DU(D)-N30CN∗∗	DU: 2a1b DUD: 2a	AC24V to AC500V DC12V to DC220V	QM (AC Operation Only)	2a2b	20020103 04024704
DU(D)-N60CN∗∗				2a2b	20020103 04024706
DU(D)-N120CN∗∗				2a2b	20020103 04024707
DU(D)-N180CN∗∗		AC48V to AC500V DC12V to DC220V		2a2b	20020103 04024708
DU(D)-N260CN∗∗				2a2b	20020103 04024709

Note 1. Refer to page 253 for ratings.

<NC Main Contact Type>

Model Name B: AC Operated BD: DC Operated	Main Contact Arrangement	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement	Certification Number
B(D)-T21∗∗	B: 1a2b, 3b	AC24V to AC500V DC12V to DC220V	SA	2a	20130103 04604262
B(D)-N65CN∗∗	BD: 1a2b		QM (AC Operation Only)	2a2b	20020103 04024705
B(D)-N100CN∗∗	B: 1a2b BD: 1a2b			2a2b	20020103 04024706

Note 1. Refer to page 249 for ratings.

● Thermal Overload Relays (Certification Standard: GB/T14048.4)

<With 3-Element (2E)>

Model Name	Heater Designation	Applicable Range of Model Name ∗∗ (Combinable)	Combination Magnetic Contactor	Certification Numbe
TH-T18KP∗∗	0.12A, 0.17A, 0.24A, 0.35A, 0.5A, 0.7A, 0.9A, 1.3A, 1.7A, 2.1A, 2.5A, 3.6A, 5A, 6.6A, 9A, 11A, 15A	AR, BC, FS, YS	S-T10 to T20	20130103 09620822
TH-T25KP∗∗	0.24A, 0.35A, 0.5A, 0.7A, 0.9A, 1.3A, 1.7A, 2.1A, 2.5A, 3.6A, 5A, 6.6A, 9A, 11A, 15A, 22A		S-T21, T25	20130103 09620821
TH-T50KP∗∗	29A, 35A, 42A	AR, BC, FS, YS	S-T21 to T50	2015010309794365
TH-T65KP∗∗	15A, 22A, 29A, 35A, 42A, 54A	AR, CW, FS, YS	S-T65 to T100	2015010309794371
TH-T100KP∗∗	67A, 82A	AR, FS, YS	S-T65 to T100	2015010309794379
TH-N120KP∗∗	42A, 54A, 67A, 82A	AR, HZ, SR	S-N125, N150	20020103 09024724
TH-N120TAKP∗∗	105A, 125A	AR, SR	S-N125, N150	
TH-N120TAHZKP∗∗		AR	Independent Mounting Only	
TH-N220RHKP∗∗	82A, 105A, 125A, 150A, 180A	AR, SR	S-N180, N220	20020103 09024719
TH-N220HZKP∗∗			Independent Mounting Only	
TH-N400RHKP∗∗	105A, 125A, 150A, 180A, 250A, 330A		S-N300, N400	
TH-N400HZKP∗∗			Independent Mounting Only	
TH-N600KPCN∗∗	250A, 330A, 500A, 660A		For Independent Mounting	20020103 04095454

Note 1. TH-N☐ becomes the quick trip type when changed from KP to KF.

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10 Application to Domestic and International Standards

● Contactor Relays (Certification Standard: GB/T14048.5)

<Standard Type>

Model Name SR: AC Operated SRD: DC Operated	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Contact Arrangement	Certification Number
SR(D)-T5∗∗	AC24V to AC500V	BC, SA, SQ	5a, 4a1b, 3a2b	20130103 03604260
SR(D)-T9∗∗	DC12V to DC220V	BC, SA	9a, 7a2b, 5a4b	

<Mechanically Latched Type>

Model Name SRL: AC Operated SRLD: DC Operated	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Contact Arrangement	Certification Number
SRL(D)-T5∗∗	AC24V to AC500V DC12V to DC200V	BC, SA	5a, 4a1b, 3a2b	20130103 03604260
SRL (D)-K100	AC24V to AC440V DC12V to DC200V	—	9a, 8a1b, 7a2b, 6a3b, 5a4b, 4a5b	20020103 03024696

● Auxiliary Contact Units (Certification Standard: GB/T14048.5)

Model Name	Contact Arrangement	Applicable Range of Model Name ∗∗ (Combinable)	Applicable Magnetic Contactors	Certification Number
UT-AX2∗∗	2a, 1a1b, 2b	BC	S-T10 to T32	20130103 04608269
UT-AX4∗∗	4a, 3a1b, 2a2b			
UT-AX11∗∗	1a1b			
UN-AX2∗∗	2a, 1a1b, 2b	CX	S-T65, T80, S-N38, N48	20020103 03024700
UN-AX4∗∗	4a, 3a1b, 2a2b		S-T65, T80, S-N38, N48	
UN-AX11∗∗	1a1b		S-T65,T80	
UN-AX80CN	1a1b	—	S-T100, S-N125	20020103 03024720
UN-AX150CN	1a1b		S-N150 to N400	20020103 03024722
UN-AX600CN	2a2b		S-N600CN, N800CN	
UQ-AX2∗∗	1a1b	—	SD-Q11, SD-QR11 (Left Side)	20050103 04149321
UQ-AX2KR∗∗	1a1b	—	SD-QR11 (Right Side)	
UN-LL22∗∗	Low-Level Contact: 1a1b Standard Contact: 1a1b	CX	S-T65, T80, S-N38, N48	20020103 03024700

● DC Interface Contactors (Certification Standard: GB/T14048.4)

<Magnetic Starters>

Model Name Q: Non-Reversible QR: Reversible	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V)		Heater Designation Range (Note 1)	Coil Designation Range	Applicable Range of Model Name ∗∗ (Combinable)	Auxiliary Contact Arrangement Standard	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)		DC Operated			
MSOD-Q11∗∗	3/4	12/9	0.12 to 11A	DC24V	AR,BC,KP	1a	20030103 04093069
MSOD-Q12∗∗						1a1b	
MSOD-QR11∗∗	3/4	12/9	0.12 to 11A	DC24V	AR,BC,KP	1b x 2	20030103 04093069
MSOD-QR12∗∗						1a1b x 2	

<Magnetic Contactors>

Model Name Q: Non-Reversible QR: Reversible	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V)		Conventional Free Air Thermal Current Ith (A)	Coil Designation Range	Auxiliary Contact Arrangement Standard	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)		DC Operated		
SD-Q11	3/4	12/9	20	DC24V	1a	20030103 04095567
SD-Q12					1a1b	
SD-QR11	3/4	12/9	20	DC24V	2b	20030103 04095567
SD-QR12					2a2b	

● Solid State Contactors (Certification Standard: GB/T14048.6)

<3-Pole 2-Element Type>

Model Name	3 φ Motor Capacity 200/400 V AC-53a (kW(A))	Rated Operational Voltage	Applicable Range of Model Name ∗∗ (Combinable)	Certification Number
US-N5SS	0.4(3.2)/—	DC12 V to 24V	—	20060103 04174448
US-N8SS	0.4(3.2)/—			
US-N20∗∗	2.2(11.1)/3.7(8.7)		CX, RM	20050103 04162980
US-N30∗∗	3.7(17.4)/7.5(17.4)		CX	
US-N40∗∗	5.5(26)/11(26)			
US-N50∗∗	5.5(26)/11(26)			
US-N70NS	11(48)/—		—	20060103 04174451
US-N80NS	11(48)/—			
US-NH70NS	11(48)/22(48)			
US-NH80NS	11(48)/22(48)			

<3-Pole 3-Element Type>

Model Name	3 φ Motor Capacity 200/400 V AC-53a (kW(A))	Rated Operational Voltage	Applicable Range of Model Name ∗∗ (Combinable)	Certification Number
US-N5SSTE	0.4(3.2)/—	DC12 V to 24V	—	20060103 04174448
US-N8SSTE	0.4(3.2)/—			
US-N20TE∗∗	2.2(11.1)/3.7(8.7)		CX, RM	20050103 04162980
US-N30TE∗∗	3.7(17.4)/7.5(17.4)		CX	
US-N40TE∗∗	5.5(26)/11(26)			
US-N50TE∗∗	5.5(26)/11(26)			
US-N70NSTE	11(48)/—		—	20060103 04174451
US-N80NSTE	11(48)/—			
US-NH70NSTE	11(48)/22(48)			
US-NH80NSTE	11(48)/22(48)			

● Vacuum Magnetic Contactors

Model Name SH: AC Operated SHD: DC Operated SL: Mechanically Latched (AC Operated) SLD: Mechanically Latched (DC Operated)	Certified Rating Category AC-3 (220 to 240 V/380 to 440 V/1,000 V)		Conventional Free Air Thermal Current Ith (A)	Coil Designation Range	Auxiliary Contact Arrangement Standard	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)				
SH(D)-V160CN	45 /90/ 220	180 /180/ 160	200	AC100V to AC500V DC100V, DC200V	2a2b	20060103 04201618
SH(D)-V320CN	75 /150/ 400	320 /320/ 320	350			
SH(D)-V400CN	95 /200/ 500	400 /400/ 400	450			
SHL(D)-V160CN	45 /90/ 220	180 /180/ 160	200	AC100V to AC500V DC100V, DC200V	SHL: 2a2b SHLD: 2a4b	20060103 04201618
SHL(D)-V320CN	75 /150/ 400	320 /320/ 320	350			
SHL(D)-V400CN	95 /200/ 500	400 /400/ 400	450			
SH-V600CN	160 /300/ 750	630 /630/ 600	750	AC100V, AC200V	2a2b	20070103 04229815

● Voltage Detection Relays (Certification Standard: GB/T14048.5)

Model Name	Detection Voltage Setting Range Minimum to Maximum	Output Contact	Certification Number
SRE-AACN	AC3V to 250V DC0.1V to 250V	1c	20070103 03224330
SRE-AAUCN			
SRE-KCN	AC75V to 250V, DC9V to 105V		
SRE-KTCN	AC80V to 260V, DC10V to 115V		

● Instantaneous Stop/Restart Relays (Certification Standard: GB/T14048.5)

Model Name	Designation	Certification Number
UA-DL2CN	AC100V, AC200V	20090103 03329883

● Fault Detection Units (Certification Standard: GB/T14048.5)

Model Name	Rated Operational Voltage	Applicable Range of Model Name ∗∗	Contact Arrangement	Certification Number
UN-FDCN∗∗	AC100V, AC200V	CX	1c	20090103 03329892
UN-FD4CN∗∗	AC100V, AC200V		1a, 1b	

● DC/AC Interface Units for Operation Coils (Certification Standard: GB14048.5)

Model Name	Applicable Range of Model Name ∗∗	Applicable Magnetic Contactors	Certification Number
UN-SY12CN	–	For Independent Mounting	20090103 03329884
UN-SY22CN∗∗	CX	S-N38, N48	
UN-SY32CN	–	S-T65, T80	

Note 1. The following contactless output (triac output) optional units are not subject to certification.
UN-SY11, UN-SY21(CX), UN-SY31

10.9 KC Certified Products (South Korea)

● South Korea Electrical Appliance and Material Safety Management Act Target Certified Products (Certification Standard: K60947-4-1)

Model Name	Certified Rating (A) 440 V AC-3	Certification Number
S-T10(BC)(SA)	9	HU02021-13022A
S-T12(BC)(SA)	12	HU02021-13023A
SD-T12(BC)(SA)	12	HU02021-15035A
S-T20(BC)(SA)	18	HU02021-13024A
SD-T20(BC)(SA)	18	HU02021-15036A
S-T21(BC)(SA), SL-T21	23	HU02021-13025B
SD-T21(BC)(SA), SLD-T21	23	HU02021-15037B
S-T25(BC)(SA)	30	HU02021-13025B
S-T32(BC)(SA)	32	HU02021-13026A
S-T35(BC)(SA), SL-T35	40	HU02021-16044A
SD-T35(BC)(SA), SLD-T35	40	HU02021-16039A
S-T50(BC)(SA), SL-T50	50	HU02021-16045A
SD-T50(BC)(SA), SLD-T50	50	HU02021-16040A
S-T65(CW), SL-T65	85	HU02021-16046A
SD-T65(CW), SLD-T65	85	HU02021-16041A
S-T80(CW), SL-T80	85	HU02021-16046A
SD-T80(CW), SLD-T80	85	HU02021-16041A
S-T100, SL-T100	105	HU02021-16048A
SD-T100, SLD-T100	105	HU02021-16043A

Note 1. Always add “KK” at the end of the model name to specify when ordering.

Certification Standard: KC60947-5-1, KS C IEC60947-5-1

Model Name	Certified Rating (A) 220 V AC-15	Certification Number
SR-T5(BC)(SA), SRL-T5(BC)(SA)	3	HU02021-13030
SRD-T5(BC)(SA), SRL-D-T5(BC)(SA)	3	HU02021-15033
SR-T9(BC)(SA)	3	HU02021-18057
SRD-T9(BC)(SA)	3	HU02021-18034
SR-K100, SRL-K100	5	HU02021-18055
SRD-K100, SRLD-K100	5	HU02021-18056
UA-DL2	1	HU02021-18054
UT-AX2(BC)	3	HU02021-18049
UT-AX4(BC)	3	HU02021-13032
UT-AX11(BC)	3	HU02021-18050
UN-AX2(CX)	3	HU02021-18049
UN-AX4(CX)	3	HU02021-13031
UN-AX11(CX)	3	HU02021-18050
UN-AX80	3	HU02021-18051
UN-AX150	3	HU02021-18052
UN-AX600	3	HU02021-18053

Note 1. When ordering a KC certified product, make sure to add "KK" at the end of the model name.

10.10 Selection by Global Rating

The table below is the global rating selection table of the S-T/N series magnetic contactor.
Although the ratings of the S-T/N series differ as different standards (JIS/JEM, EN (IEC), UL) are applicable in Japan, Europe and North America, selection from the table below allows worldwide application.

<table>
<tr><th rowspan="2">Model Name</th><th colspan="3">Global Rating (3-Phase Motor) (Note 1, Note 2)</th><th rowspan="2">Electrical Durability (Note 3)</th><th colspan="2">Selection by Electrical Durability of 2 mil. times (Rating is the same as indicated at left)</th></tr>
<tr><th>200 V</th><th>220 to 240 V</th><th>380 to 440 V</th><th>Model Name</th><th>Electrical Durability (Note 3)</th></tr>
<tr><td>S-T10</td><td>11 A</td><td>9.6 A</td><td>7 A *3</td><td rowspan="9">2 mil. times</td><td>S-T10</td><td rowspan="11">2 mil. times</td></tr>
<tr><td>S-T12</td><td>11 A</td><td>9.6 A</td><td>9 A *3</td><td>S-T12</td></tr>
<tr><td>S-T20</td><td>15.2 A *1</td><td>15.2 A</td><td>14 A</td><td>S-T20</td></tr>
<tr><td>S-T21</td><td>17.5 A</td><td>15.2 A</td><td>18 A</td><td>S-T21</td></tr>
<tr><td>S-T25</td><td>25 A</td><td>22 A</td><td>27 A</td><td>S-T25</td></tr>
<tr><td>S-T32</td><td>32 A</td><td>28 A</td><td>32 A</td><td>S-T32</td></tr>
<tr><td>S-T35</td><td>32 A</td><td>28 A</td><td>27 A</td><td>S-T35</td></tr>
<tr><td>S-T50</td><td>48 A</td><td>42 A</td><td>40 A</td><td>S-T50</td></tr>
<tr><td>S-T65</td><td>54 A *1</td><td>54 A</td><td>52 A</td><td>S-T65</td></tr>
<tr><td>S-T80</td><td>68 A *1</td><td>68 A</td><td>65 A</td><td rowspan="2">1 mil. times</td><td rowspan="2">S-N125</td></tr>
<tr><td>S-T100</td><td>80 A *1</td><td>80 A</td><td>77 A</td></tr>
<tr><td>S-N125</td><td>119 A</td><td>104 A</td><td>96 A</td><td rowspan="5">1 mil. times</td><td rowspan="2">S-N180</td><td rowspan="5">2 mil. times</td></tr>
<tr><td>S-N150</td><td>130 A *1</td><td>130 A</td><td>124 A</td></tr>
<tr><td>S-N180</td><td>177 A</td><td>156 A *2</td><td>156 A</td><td rowspan="2">S-N300</td></tr>
<tr><td>S-N220</td><td>192 A *1</td><td>192 A</td><td>180 A</td></tr>
<tr><td>S-N300</td><td>285 A</td><td>248 A</td><td>240 A</td><td>S-N600</td></tr>
</table>

Note 1. Shown as an integer (figure after decimal point discarded) with the current value converted from the UL horsepower rating (normal start and stop of the three-phase motor) as reference.
However, T21 and below are represented by the lower 1 digit with the lower two digits rounded off.
However, ∗1 to ∗3 are as follows.
∗ 1: Shows the current value converted from the UL horsepower rating of 220 V.
∗ 2: Shows the current value converted from the UL horsepower rating of 440 V.
∗ 3: UL Standards do not regulate switching durability. The durability shows the confirmation results based on the JIS Standards (JEM standard).

Note 2. Compatible with UL Certification (cULus), TÜV Certification ( ), and CE Mark (CE).
Note 3. UL Standards do not regulate switching durability. Shows the confirmation results according to the JIS Standards (JEM standard).

(Commentary)

The rated current value of the S-T/N☐ series magnetic contactor differs for each rating in Japan, Europe and North America. Therefore, the selection of JIS rating (JEM rating) standards (page 39) does not apply to North America.
In this way, the selection differs by location in accordance with the rating, requiring special attention when applying the same product to multiple regions such as Japan, Europe and North America.
The solution to this problem is the global rating selection table (above) for worldwide application. The above table shows the smallest values of rated current in Japan, Europe and North America as the global rating according to the model name of each magnetic contactor.
It should be noted that for switching durability, standards for both 1 million and 2 million times can be selected in the above table. (For S-T10 to S-T65, only 2 million times can be selected)

10

10.11 Short-Circuit Current Rating (SCCR) UL Standards Certified Products

● US Export Control Panel SCCR

1. SCCR

Initials for the Short Circuit Current Rating, it refers to the magnitude of the short-circuit current that the device or equipment can withstand.

2. Short-Circuit Performance of Control Panels and SCCR

(1) Short-Circuit Performance of Control Panels
On the name plate of a control panel, the value that represents the short-circuit performance of the control panel is given along with the manufacturer's name, rated voltage, number of phases, frequency, full load current, etc. When using the control panel, the estimated short-circuit current at the panel entry must be smaller than the short-circuit performance displayed on the name plate.

(2) Control Panel SCCR
Conventionally, the breaking capacity of overcurrent protection devices such as circuit breakers and fuses to be installed on the inlet port has been used as the short circuit performance of control panels (Figure 1 a) reference). However, due to the revision of the NEC (National Electric Code: the US equivalent of electrical equipment standards) in 2005, SCCR is now displayed as the short circuit performance of control panels rather than the breaking capacity of overcurrent protection devices of the inlet port.
Typically, some sort of “coordination” between devices (“protection coordination” when including a protection device) is required when constructing an electrical system by combining several electrical devices. When considering the coordination of the entire control panel and especially during a short circuit, exactly what indicators are appropriate? Can the breaking capacity of the overcurrent protection device on the inlet port explain the short circuit coordination of the control panel? One of the solutions to such questions is SCCR.

3. Method of Determining SCCR

(1) Method of Determining SCCR
The method of determining SCCR is defined in Section 409 of NEC, but SCCR is commonly determined using the UL508A Supplement SB.

(2) UL508A SB
UL508A SB regulates the next steps.

- ◆ Determine SCCR for individual power circuit components.
- ◆ Correct SCCR for each current-limiting element.
- ◆ Determine SCCR for the entire control panel.

Details for each are described below.

(1) Determine SCCR for power circuit components.
Power circuit refers to circuits of motors, heaters, lighting, etc. Power transformers, reactors, CTs and the like are not included.
SCCR of individual components is determined by one of the following methods.
· Values displayed in rating plates, instruction manuals, etc.
· Default values in SB Table 4.1
 ∗ For example, Circuit Breaker: 5 kA, Magnetic Starter (for motors with 50 hp or less): 5 kA, etc.
· For load controllers, motor overload relays and combination motor controllers, the values verified in the performance requirements in accordance with the provisions of UL60947-4-1A or UL508, and mentioned in the procedure of the manufacturer

(2) Correction for Transformer Capacity and Secondary Side SCCR
For SCCR of target circuits of the following cases, this is SCCR of devices on the transformer primary side.
a) In cases where the short-circuit current ratings and breaking ratings of all components of the secondary side are larger than the calculated value of the short-circuit current directly below the power transformer secondary side. For impedance, use either what is known or calculate by assuming that the impedance is 2.1%.
b) In cases where the short-circuit current ratings and breaking ratings of all components of the secondary side are larger than the values on the table as specified in UL 508A SB
c) If it does not correspond to a/b above, the smallest SCCR of the transformer secondary side will be SCCR of the transformer primary side.

(3) Correction for Current Limiting Circuit Breaker and Current Limiting Fuse
When the feeder circuit has a current-limiting circuit breaker or current-limiting fuse, SCCR will be one of the following depending on the conditions of the branch circuit.
a) If SCCR of all components of the branch circuit is equal to or greater than the passing current peak value Ip of the current-limiting circuit breaker or current-limiting fuse and SCCR of the branch circuit protection devices is equal to or greater than SCCR of the current-limiting circuit breaker or current-limiting fuse, SCCR of the current-limiting circuit breaker or current-limiting fuse of the feeder circuit will be SCCR of the branch circuit.
b) If SCCR of all components of the branch circuit is equal to or greater than the passing current peak value Ip of the current-limiting circuit breaker or current-limiting fuse and SCCR of the branch circuit protection devices is less than SCCR of the current-limiting circuit breaker or current-limiting fuse, the smallest SCCR of the branch circuit protection device will be SCCR of the branch circuit.
c) In conditions other than a/b above, the smallest SCCR of all components of the branch circuit will be SCCR of the branch circuit.

(4) Determination of SCCR for the Entire Control Panel
After determining SCCR of each circuit and component by the steps mentioned above, the minimum value of SCCR will be SCCR of the entire control panel. Looking at Fig. 1 b) as an example, 5 kA of the magnetic starter will be the minimum value, and the name plate of the control panel will display SCCR 5kA.

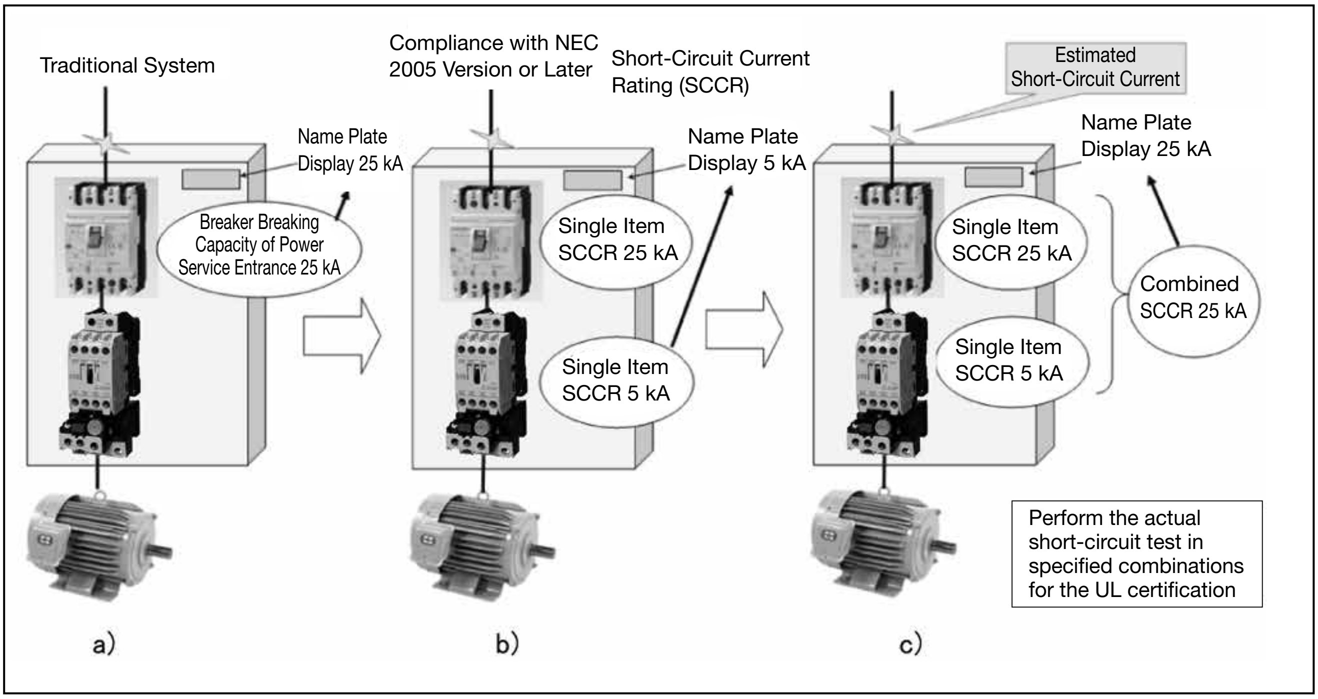

Fig. 1 SCCR of Control Plate

4. SCCR Problem Points

Although there is no general recommended value for SCCR of the control panel, in order to increase the degree of freedom in control panel application, relatively large SCCR is desirable. Given this perspective, SCCR 5 kA and the like of the magnetic starter applicable to motor load of 50 horsepower or less may become a problem.
However, it is generally difficult to improve SCCR by magnetic starter alone.

5. Our Countermeasures Against SCCR Problem Points

We have acquired UL certification to enable large SCCR to be applied when combining breakers and magnetic starters (combination motor controllers) (Fig. 1 c) reference).
This shows the combination of a UL certified breaker (no fuse breaker) and magnetic starter. For example, although individual SCCR of the S-T10 magnetic contactor and TH-T18KP thermal overload relay is 5 kA, SCCR is improved to 25 kA at AC240 V when in combination with the NF100-SRU no-fuse breaker.

10 Application to Domestic and International Standards

● UL Certified Standard Products

1. Short-Circuit Current Rating (SCCR) of Magnetic Contactors

By using with a fuse or low voltage breaker that satisfies the rated current and rated breaking current shown in the table below, the short-circuit current rating (SCCR) in the table below can be applied to magnetic contactors.

Magnetic Contactor Model	Main Circuit Voltage: AC600 V Maximum		Main Circuit Voltage: AC240 V Maximum				Main Circuit Voltage: AC480 V Maximum			
	Short Circuit Current Rating (SCCR)	Maximum Rated Current of Fuse (Class K5)	Short Circuit Current Rating (SCCR)	Voltage Circuit Breakers			Short Circuit Current Rating (SCCR)	Circuit Breakers		
				Maximum Rated Current	Minimum Breaking Current	Recommended Model Name (Note 1)		Maximum Rated Current	Minimum Breaking Current	Recommended Model Name (Note 1)
S-(2x)T10 S(D)-(2x)T12	5 kA	30 A	10 kA	30 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	10 kA	30 A	18 kA	NF100-HRU, NV100-HRU NF125-SVU, NV125-SVU
			25 kA		35 kA	NF100-SRU, NV100-SRU				
				15 A	25 kA					
SD-(2x)T12			14 kA	20 A	14 kA	NF50-SVFU, NV50-SVFU		15 A	10 kA	
S(D)-(2x)T20		70 A	10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU		30 A	18 kA	
			25 kA		35 kA	NF100-SRU, NV100-SRU				
				15 A	25 kA					
SD-(2x)T20			14 kA	30 A	14 kA	NF50-SVFU, NV50-SVFU		15 A	10 kA	
S(D)-(2x)T21 SL(D)-(2x)T21UL			10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	35 kA	50 A	50 kA	NF125-HVU, NV125-HVU
			35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU				
SD-(2x)T21			14 kA	40 A	14 kA	NF50-SVFU, NV50-SVFU				
S-(2x)T25		100 A	10 kA	75 A	14 kA	NF100-CVFU, NV100-CVFU		75 A		
			35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU				
S(D)-T32			10 kA		14 kA	NF100-CVFU, NV100-CVFU				
			35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU				
S(D)-(2x)T35 SL(D)-(2x)T35UL		125 A	10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	18 kA	75 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
			14 kA	40 A	14 kA	NF50-SVFU, NV50-SVFU				
			18 kA	75 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	35 kA		50 kA	NF125-HVU, NV125-HVU
			25 kA		35 kA					
			35 kA		50 kA	NF100-HRU, NV100-HRU				
S(D)-(2x)T50 SL(D)-(2x)T50UL		200 A	10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
			14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU				
			18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	35 kA		50 kA	NF125-HVU, NV125-HVU
			25 kA		35 kA					
			35 kA		50 kA	NF100-HRU, NV100-HRU				
S(D)-(2x)T65 SL(D)-(2x)T65UL		250 A	14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
			18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU				
			25 kA	225 A	35 kA	NF250-SVU, NV250-SVU	25 kA	225 A	35 kA	NF250-SVU, NV250-SVU
S(D)-(2x)T80 SL(D)-(2x)T80UL		300 A	14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
			18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU				
			25 kA	225 A	35 kA	NF250-SVU, NV250-SVU	25 kA	225 A	35 kA	NF250-SVU, NV250-SVU
S(D)-(2x)T100 SL(D)-(2x)T100UL	10 kA	225 A	18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
			25 kA	225 A	35 kA	NF250-SVU, NV250-SVU	25 kA	225 A	35 kA	NF250-SVU, NV250-SVU
S(D)-(2x)N125 S(D)-(2x)N150	10 kA	350 A	25 kA	250 A	35 kA	NF250-CVU, NV250-CVU NF250-SVU, NV250-SVU	25 kA	250 A	35 kA	NF250-SVU, NV250-SVU
S(D)-(2x)N150							50 kA	150 A	50 kA	NF250-HVU, NV250-HVU
S-(2x)N180 S(D)-(2x)N220		500 A		350 A		NF400-SWU, NV400-SWU NF400-HWU, NV400-HWU	25 kA	350 A	35 kA	NF400-SWU, NV400-SWU NF400-HWU, NV400-HWU
S(D)-(2x)N220							50 kA	250 A	50 kA	NF250-HVU, NV250-HVU
S(D)-(2x)N300		600 A		600 A		NF630-SWU, NF630-HWU	25 kA	600 A	35 kA	NF630-SWU, NF630-HWU
							50 kA	400 A	65 kA	NF400-HWU, NV400-HWU
S(D)-(2x)N400	18 kA	500 A					25 kA	600 A	35 kA	NF630-SWU, NF630-HWU
							50 kA	400 A	65 kA	NF400-HWU, NV400-HWU
SD-Q(R)11 SD-Q(R)12	5 kA	40 A	5 kA	30 A	10 kA	NF50-SMU	—	—	—	—
			14 kA	20 A	14 kA	NF50-SVFU, NV50-SVFU				
			25 kA	15 A	25 kA	NF100-SRU, NV100-SRU				
			25 kA	30 A	35 kA					

Note 1. Examples of the recommended low-voltage breakers are given. UL489-listed low-voltage breakers that satisfy the ratings given above can be used.
Note that some 3-pole UL489-listed low-voltage breakers cannot be used in single-phase circuits.

2. Short-Circuit Current Rating (SCCR) of Thermal Overload Relays

By using with a fuse or low voltage breaker that satisfies the rated current and rated breaking current shown in the table below, the short-circuit current rating (SCCR) in the table below can be applied to thermal overload relays.

Thermal Overload Relay Model		Main Circuit Voltage: AC600 V Maximum		Main Circuit Voltage: AC240 V Maximum				Main Circuit Voltage: AC480 V Maximum			
	Heater Designation	Short Circuit Current Rating (SCCR)	Maximum Rated Current of Fuse (Class K5)	Short Circuit Current Rating (SCCR)	Circuit Breakers: Maximum Rated Current	Circuit Breakers: Minimum Breaking Current	Circuit Breakers: Recommended Model Name (Note 1)	Short Circuit Current Rating (SCCR)	Circuit Breakers: Maximum Rated Current	Circuit Breakers: Minimum Breaking Current	Circuit Breakers: Recommended Model Name (Note 1)
TH-T18KP	0.12A	5 kA	15 A	10 kA / 25 kA	15 A	10 kA / 25 kA	NF50-SMU NF50-SVFU, NV50-SVFU / NF100-SRU, NV100-SRU	10 kA	15 A	10 kA	NF100-HRU NV100-HRU NF125-SVU NV125-SVU
	0.17A										
	0.24A										
	0.35A										
	0.5A										
	0.7A										
	0.9A										
	1.3A										
	1.7A										
	2.1A										
	2.5A										
	3.6A										
	5A		20 A								
	6.6A		30 A		30 A	10 kA / 35 kA			30 A	18 kA	
	9A										
	11A										
	15A		40 A		50 A				50 A		
TH-T25KP	0.24A	5 kA	15 A	10 kA / 35 kA	15 A	10 kA / 50 kA	NF50-SMU NF50-SVFU, NV50-SVFU / NF100-HRU, NV100-HRU NF125-SVU, NV125-SVU	35 kA	15 A	50 kA	NF125-HVU NV125-HVU
	0.35A										
	0.5A										
	0.7A										
	0.9A										
	1.3A										
	1.7A										
	2.1A										
	2.5A										
	3.6A										
	5A		20 A								
	6.6A		30 A		30 A				30 A		
	9A		40 A								
	11A		50 A								
	15A		70 A		50 A				50 A		
	22A		100 A		75 A	14 kA / 50 kA	NF100-CVFU, NV100-CVFU / NF100-HRU, NV100-HRU NF125-SVU, NV125-SVU		75 A		
TH-T50KP	29A	5 kA	125 A	10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	18 kA	75 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				14 kA	40 A	14 kA	NF50-SVFU, NV50-SVFU				
				18 kA	75 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU				
				25 kA		35 kA		35 kA		50 kA	NF125-HVU, NV125-HVU
				35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU				
	35A		150 A	10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU				
				18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU				
				25 kA		35 kA		35 kA		50 kA	NF125-HVU, NV125-HVU
				35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU				
	42A		200 A	10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	18 kA		18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU				
				18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU				
				25 kA		35 kA		35 kA		50 kA	NF125-HVU, NV125-HVU
				35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU				

Note 1. Examples of the recommended low-voltage breakers are given. UL489-listed low-voltage breakers that satisfy the ratings given above can be used.
Note that some 3-pole UL489-listed low-voltage breakers cannot be used in single-phase circuits.

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Thermal Overload Relay Model	Heater Designation	Main Circuit Voltage: AC600 V Maximum — Short Circuit Current Rating (SCCR)	Main Circuit Voltage: AC600 V Maximum — Maximum Rated Current of Fuse (Class K5)	Main Circuit Voltage: AC240 V Maximum — Short Circuit Current Rating (SCCR)	AC240 V — Circuit Breakers — Maximum Rated Current	AC240 V — Circuit Breakers — Minimum Breaking Current	AC240 V — Circuit Breakers — Recommended Model Name (Note 1)	Main Circuit Voltage: AC480 V Maximum — Short Circuit Current Rating (SCCR)	AC480 V — Circuit Breakers — Maximum Rated Current	AC480 V — Circuit Breakers — Minimum Breaking Current	AC480 V — Circuit Breakers — Recommended Model Name (Note 1)
TH-T65KP	15A	5 kA	70 A	14 kA	75 A	14 kA	NF100-CVFU	18 kA	50 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				18 kA	50 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
				25 kA		30 kA					
	22A		100 A	14 kA	75 A	14 kA	NF100-CVFU	18 kA	60 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				18 kA	60 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
				25 kA		30 kA					
	29A		125 A	14 kA	75 A	14 kA	NF100-CVFU	18 kA	75 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				18 kA		18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
				25 kA		30 kA					
	35A		150 A	14 kA	100 A	14 kA	NF100-CVFU	18 kA	75 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				18 kA	75 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
				25 kA		30 kA					
	42A		200 A	14 kA	100 A	14 kA	NF100-CVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				18 kA		18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
				25 kA		30 kA					
	54A		250 A	14 kA	100 A	14 kA	NF100-CVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				18 kA		18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
						30 kA					
		10 kA	225 A	25 kA	150 A	35 kA	NF250-SVU		150 A	35 kA	NF250-SVU
TH-T100KP	64A	5 kA	300 A	18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
		10 kA	225 A	25 kA	225 A	35 kA	NF250-SVU, NV250-SVU	25 kA	225 A	35 kA	NF250-SVU, NV250-SVU
	82A	10 kA	225 A	18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
				25 kA	225 A	35 kA	NF250-SVU, NV250-SVU	25 kA	225 A	35 kA	NF250-SVU, NV250-SVU
TH-N120KP	42A	10 kA	200 A	25 kA	100 A	35 kA	NF125-HVU	25 kA	100 A	35 kA	NF125-HVU
	54A		250 A		100 A						
	67A		300 A		225 A		NF225-CWU NF250-SVU		225 A		NF250-SVU
	82A		350 A		225 A						
TH-N120TAKP	105A		350 A		250 A				250 A		
	125A		350 A		250 A						
TH-N220RHKP	82A	10 kA	400 A	–				–			
	105A		500 A								
	125A										
	150A										
	180A										
TH-N400RHKP	105A	10 kA	500 A	–				–			
	125A		600 A								
	150A										
	180A										
	250A										
	330A	18 kA	500 A								

Note 1. Examples of the recommended low-voltage breakers are given. UL489-listed low-voltage breakers that satisfy the ratings given above can be used.
Note that some 3-pole UL489-listed low-voltage breakers cannot be used in single-phase circuits.

10.12 Marine Certification Standard Products

● NK Standards (ClassNK Steel Ship Regulations) Certified Magnetic Contactors

Magnetic Contactor Model		Certification Number	Magnetic Contactor Model		Certification Number	Magnetic Contactor Model	Certification Number
S-T10(BC)(SA)	—	14T401	S-N125	SD-N125	98T407	SL(D)-N125NK	98T417
S-T12(BC)(SA)	SD-T12(BC)(SA)	14T402	S-N150	SD-N150	98T408	SL(D)-N150NK	98T418
S-T20(BC)(SA)	SD-T20(BC)(SA)	14T403	S-N180	—	98T409	SL(D)-N220NK	98T419
S-T21(BC)(SA)	SD-T21(BC)(SA)	14T404	S-N220	SD-N220	98T410	SL(D)-N300NK	98T420
S-T25(BC)(SA)	—	14T405	S-N300	SD-N300	98T411	SL(D)-N400NK	98T421
S-T32(BC)(SA)	SD-T32(BC)(SA)	14T406	S-N400	SD-N400	98T412	SL(D)-N600NK	85T408
S-T35(BC)(SA)	SD-T35(BC)(SA)	15T405	S-N600	SD-N600	85T406	SL(D)-N800NK	85T409
S-T50(BC)(SA)	SD-T50(BC)(SA)	15T406	S-N800	SD-N800	85T407		
S-T65(CW)	SD-T65(CW)	15T407	S-N38(CX)(SA)	—	96T402		
S-T80(CW)	SD-T80(CW)	15T408	S-N48(CX)(SA)	—	96T403		
S-T100	SD-T100	15T410	B-N65	BD-N65	01T401		
B-T21	BD-T21	17T402	B-N100	BD-N100	01T402		

Note 1. S-T, S-N, SD-N, B-N and BD-N can be used as NK standards certified products
(Applicable with class AC-3 rating at 440 V or less. Model names with “BC” come with wiring streamlining terminals, “CX” and “CW” with terminal covers, and “SA” with built-in surge absorbers).

Note 2. The thermal overload relay is not covered by the standards.

Note 3. For SL(D)-N□NK, there is no product display of “NK” in the model name. (SL(D) uses NK certified wires for connection)

● KR Standards (Korean Register of Shipping, South Korea Steel Ship Standards) Certified Magnetic Contactors

Magnetic Contactor Model	Certification Number	Magnetic Contactor Model	Certification Number	Magnetic Contactor Model	Certification Number
S-T10(BC)(SA)	TKY02571-EL021	S-T35(BC)(SA)	TKY02571-EL021	S-N125	KOB02571-EL020
S-T12(BC)(SA)	TKY02571-EL021	S-T50(BC)(SA)	TKY02571-EL021	S-N150	KOB02571-EL020
S-T20(BC)(SA)	TKY02571-EL021	S-T65(CW)	TKY02571-EL021	S-N180	KOB02571-EL020
S-T21(BC)(SA)	TKY02571-EL021	S-T80(CW)	TKY02571-EL021	S-N220	KOB02571-EL020
S-T25(BC)(SA)	TKY02571-EL021	S-T100	TKY02571-EL021	S-N300	KOB02571-EL020
S-T32(BC)(SA)	TKY02571-EL021			S-N400	KOB02571-EL020

Note 1. The standard types of the model names above can also be used as KR Standard products. (Applicable with class AC-3 rating at 440 V or less.)
Note 2. The thermal overload relay is not covered by the standards.

● Lloyd Standards (Lloyd's Register of Shipping), BV Standards (Bureau Veritas, France Steel Ship Standards) Certified Magnetic Contactors, Thermal Overload Relays

Model	Model Name	Lloyd Certification Number	BV Certification Number	Remarks
Magnetic Contactors	S-T10(BC)(SA), T12(BC)(SA), T20(BC)(SA), T21(BC)(SA), S-T25(BC)(SA), T32(BC)(SA), SD-T12(BC)(SA), T20(BC)(SA), T21(BC)(SA), T32(BC)(SA)	14/10008	38175	Applicable with class AC-3 standard product at 440 V or less.
	S-T35(BC)(SA), T50(BC)(SA), T65(CW), T80(CW), T100 SD-T35(BC)(SA), T50(BC)(SA), T65(CW), T80(CW), T100	16/10003		
	S-N125, N150, N180, N220, N300, N400, N600, N800 SD-N125, N150, N220, N300, N400, N600, N800	98/10016	07095	Applicable with class AC-3 standard product at 690 V or less. (Note 2)
Thermal Overload Relays	TH-T18(AR)(BC)KP(YS), T25(AR)(BC)KP(YS)	14/10010	38176	Applicable with standard product at 440 V or less.
	TH-T50(AR)(BC)KP(YS), T65KP, T100KP	16/10004		
	TH-N120(KP), N120TA(KP) TH-N220RH(KP), N220HZ(KP), N400RH(KP), N400HZ(KP), N600(KP)	98/10017	07905	Applicable with standard product at 690 V or less.
Contactor Relays	SR-T5(BC)(SA), T9(BC)(SA) SRD-T5(BC)(SA), T9(BC)(SA)	14/10009	38177	Applicable with class AC-15 standard product at 550 V or less.
Auxiliary Contact Unit	UT-AX2(BC), AX4(BC), AX11(BC)	14/10009	38174	
	UN-AX2 (CX), AX4 (CX), AX11 (CX)	95/10010	06139	
	UN-AX80, AX150, AX600	98/10016	07905	

Note 1. MSO is also applicable as standard.
Note 2. The control circuit contact is applicable at 550 V or less.

● Magnetic Contactors and Thermal Overload Relays Certified by China Classification Society (CCS)

Model	Model Name	CCS Certification Number
Magnetic Contactors	SD-T12, T20, T21, T32, T35, T50, T65, T80, T100 S-N125, N150, N180, N220, N300, N400, N600, N800 SD-N125, N150, N220, N300, N400, N600, N800	DB18T00165
Thermal Overload Relays	TH-T65KP, T100KP TH-N120KP, N120TAKP, N220RHKP, N220HZKP TH-N400RHKP, N400HZKP, N600KP	DB18T00166
Auxiliary Contact Unit	UT-AX2, AX4, AX11 UN-AX2, AX4, AX11, AX80, AX150, AX600	DB18T00165

10.13 How to Order

1. Targeted Electrical Appliances

Enclosed magnetic starters applicable to three-phase 200 V and single-phase 100 V. Same as standard products, except for single-phase circuit use. Refer to the section (page 267) of MS (enclosed type). When ordering the single-phase circuit use type, add “DP” at the end of the model name.

MS-T10DP ▲ 0.2 kW ▲ 110 V ▲ AC100V

2. NK Standard Products

- Standard products are applied as they are for S-T, S-N, SD-N, B-T, B-N and BD-T, BD-N.
- When ordering SL(D)-N, add “NK” at the end of the model name as it uses NK certified wires.
  The rest are the same as the standard product. Refer to page 301.
  SL-N125NK ▲ MC-AC400V ▲ MT-AC400V

3. UL/CSA Standard Products

Other than the model name, the ordering method is the same as that of standard products. For model names (standard or dedicated products), refer to page 269.

4. CCC Certified Products

- Referring to page 285, always add “CN” at the end of the model name when ordering products marked “ ⦿ Certified (add “CN” at the end of the model name when ordering).”
  S-N600CN ▲ AC200V
  It should be noted that although “CN” is displayed in the model name on the packaging box, it is not displayed on the product.

5. KC Certified Products

- Referring to page 294, always add “KK” at the end of the model name when ordering.
  S-T10KK ▲ AC200V

6. Other International Standards

- Standard products are compliant with KR Standards (certified products), Lloyd Standards (certified products), BV Standards (certified product), NEMA Standards, IEC Standards, BS Standards, EN Standards and VDE Standards. Refer to pages 267 and 301 regarding application.
- If EAC certified products (for Russia) are needed, consult with your dealer or with us.

11

Related Equipment

11 Related Equipment

11.1 Model List (US-N, US-H Series)

● US-N□ Solid State Contactors (Standard Models)

Type	Item									
AC200 V Type	Category AC-1 Rated Operating Current (A) (Note 6)		5	8	20	30	40	50	70	80
	Heater Capacity (kW)	1φ 200 V (Note 1)	1	1.6	4	6	8	10	14	16
		3φ 200 V	1.7	2.7	6.9	10.3	13.8	17.3	24.2	27.7
	Maximum Applicable Motor Capacity (kW) 3φ 200 V (Note 2)		0.4	0.4	2.2	3.7	5.5	5.5	11	11
	For 3-Phase Loads US-N□		 US-N5SS US-N5SSTE	 US-N8SS US-N8SSTE	 US-N20 US-N20TE	 US-N30 US-N30TE (Note 3)	 US-N40 US-N40TE	 US-N50 US-N50TE (Note 3)	 US-N70NS US-N70NSTE	 US-N80NS US-N80NSTE
AC400 V Type	Category AC-1 Rated Operating Current (A) (Note 6)				20	30	40	50	70	80
	Heater Capacity (kW)	1φ 400 V (Note 1)			8	12	16	20	28	32
		3φ 400 V			13.8	20.7	27.7	34.6	48.5	55.4
	Maximum Applicable Motor Capacity (kW) 3φ 400 V (Note 2)				3.7	7.5	11	11	22	22
	For 3-Phase Loads US-N□ US-NH□				 US-N20 US-N20TE	 US-N30 US-N30TE (Note 3)	 US-N40 US-N40TE	 US-N50 US-N50TE (Note 3)	 US-NH70NS US-NH70NSTE	 US-NH80NS US-NH80NSTE

Item	5 / 8		20	30 / 40 / 50 / 70 / 80
IEC 35 mm Rail Mounting	Possible With Standard Products		(Note 5)	
Live Part Protection Cover Units	Equipped With Standard Products			
Drive Units			UA-DR1	
Drive Units with Outputs	UA-SH8 (Note 9)		UA-SH1	
Reversing Units	UA-RE			
Fault Detection Units	UN-FD (For 200 V Main Circuits)/UN-FD4 (For 400 V Main Circuits)			
Power Control Units	UA-PC			

Options (Note 4)					
 UA-SH8	 UA-DR1	 UA-SH1	 UA-RE	 UN-FD	 UA-PC

● US-H☐ Solid State Contactors

Category AC-1 Rated Operating Current (A) (-10 to 40°C) (Note 6)		20	30	40	50
Heater Capacity (kW) (-10 to 40°C) (Note 6, Note 7)	1φ 200 V	4	6	8	10
	3φ 200 V	6.9	10.3	13.8	17.3
	3φ 400 V	13.8	20.7	27.7	34.6
US-H☐		 US-H20 US-H20DD	 US-H30 US-H30DD	 US-H40 US-H40DD	 US-H50 US-H50DD
US-H☐UF (Width Reduced Product)		 US-H20UF US-H20DDUF	 US-H30UF US-H30DDUF	–	–
IEC 35 mm Rail Mounting	US-H☐	(Note 5)		–	
	US-H☐UF	Standard Equipment		–	
Optional	Fault Detection Units	UN-FD (For 200 V Main Circuits)/UN-FD4 (For 400 V Main Circuits)			
	Power Control Units	UA-PC			
	Live Part Protection Cover Units	UN-CV501US			

Note 1. Indicates the capacity per pole.
Note 2. The applicable motor load capacities differ depending on operating conditions. Refer to page 315 for details.
Note 3. The photo shows a US-N☐TE type model. The outline drawings are smaller for US-N☐ types. Refer to page 337 for details regarding outline drawings.
Note 4. ☐ in the optional unit column indicates the applicable range.
Note 5. Possible with a dedicated product (US-☐RM).
Note 6. If the ambient temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in figure 1 on page 318.
Note 7. Indicates the value when using batch control as the main circuit control method.
Note 8. Refer to page 335 for optional live part protection covers.
Note 9. When mounting UA-SH8 drive units with outputs to US-N5SS/N8SS(TE) types, first remove the US-N☐ type body cover.

11.2 US-N□(For Motor/Heater Loads), US-H□ (For Heater Loads) Solid State Contactors

A combined series consisting of US-N series types for motor and heater loads together with US-H series types dedicated for heater loads.
US-N series are solid state contactors that are ideal for frequently switched motor loads such as on conveyor lines, and can be used for both motor and heater loads.
US-H series are dedicated heater load solid state contactors that are ideal for heater loads such as injection molding machinery or semiconductor manufacturing equipment.

Features

- **Realizes a Long Product Lifetime When Used for High-frequency Switching Applications**
  Realizes a long product lifetime when used for frequently switching applications by using a power semiconductor element.
- **Applicable for a Wide Range of Main Circuit Voltages (US-N, US-H)**
  Can be used over a wide range of main circuit voltages with US-N20 type supporting AC100 to 480 V and US-H20 to H50 types supporting AC24 to 480 V.
- **Compatible with a Large Number of International Standards (US-N, US-H)**
  Our standard products comply with the domestic standards as well as various overseas standards and are certified as meeting all of the standards.
  - JEM Standards
  - IEC Standards
  - UL, CSA Standards
  - EC Directives
  - TÜV Certified
  - CCC Certification

  (US-H types are not subject to CCC certification)

US-N20TE

- **No Noise and Clean Running**
  Zero switching noise and clean running without generating dust due to wear.
- **Live Part Protection Covers for Improved Safety (US-N, US-H)**
  Live part protection covers with finger protection functionality and compliance with DIN and VDE regulations have been made standard equipment for US-N series models and an optional add-on (UN-CV501US) for US-H series models.
- **Indicator Lamps for Confirmation of Operation Standardized**
  With indicator lamps on the front surface, the operating voltage input status can be checked at a glance.
- **A Wide Selection of Optional Units**
  The range of solid state contactor application is expanded greatly by using in combination with an abundant range of optional parts including drive units (UA-DR1) and reversing units (UA-RE).

Type Designations

(1) US-N Solid State Contactors (3-Pole Type)

US — N20 TE CX RM

Symbol	Rated Voltage	Rated Operating Current (Category AC-1)
N5SS	AC100 to 240 V	5A
N8SS		8A
N20	AC100 to 480 V	20A
N30		30A
N40		40A
N50		50A
N70NS	AC100 to 240 V	70A
N80NS		80A
NH70NS	AC200 to 480 V	70A
NH80NS		80A

Symbol	Main Circuit Structure
None	3-Pole 2-Element Type
TE	3-Pole 3-Element Type

Symbol	Terminal Cover
None	With Live Part Protection Cover
CX	With CAN Terminal (N20(TE) to N50(TE))

Symbol	Specifications
None	Standard
RM	Rail Mounting Only (N20(TE) Only)

Note 1. N5SS(TE) and N8SS (TE) types can be rail mounted as the standard product.

(2) US-H Solid State Contactors

US — H20 DD HZ

Symbol	Rated Voltage	Rated Operating Current (Category AC-1)
H20	AC24 to 480 V	20A
H30		30A
H40		40A
H50		50A

Symbol	Circuit Control Method
None	Batch Control
DD	Individual Control

Symbol	Specifications
None	Standard Specifications
HZ	No Cooling Fin
RM	Rail Mounting Only (20 A, 30 A Only)
UF	Width Reduced Product (20 A, 30 A Only)

(3) Optional Units

UA — DR1 AC100V

Symbol	Unit Name
DR1	Drive Units
SH1	Drive Units with Outputs
SH8	Drive Units with Outputs (For US-N5/N8SS(TE) Only)

Symbol	Rated Operational Voltage
AC100V	AC100 to 120 V 50/60 Hz
AC200V	AC200 to 240 V 50/60 Hz

Symbol	Unit Name
RE	Reversing Unit

Symbol	Rated Operational Voltage
AC100V	AC100 to 120 V 50/60 Hz
AC200V	AC200 to 240 V 50/60 Hz
DC24V	DC24 V

Symbol	Unit Name
PC	Power Control Units

Symbol	Rated Operational Voltage
AC100V	AC100 to 120 V 50/60 Hz
AC200V	AC200 to 240 V 50/60 Hz

Symbol	Resistor/Application
VR10	10 kΩ/Gradient Setter
VR1	1 kΩ/Main Setter

Symbol	Unit Name
CVDR1	UA-DR1/UA-SH1 Live Part Protection Cover Unit
CVSH8	UA-SH8 Live Part Protection Cover Unit

UN — FD AC100V

Symbol	Unit Name
FD	200 V Main Circuit Fault Detection Units
FD4	400 V Main Circuit Fault Detection Units

Symbol	Rated Operational Voltage
AC100V	AC100 to 120 V 50/60 Hz
AC200V	AC200 to 240 V 50/60 Hz
DC24V	DC24 V

Symbol	Output Contact Arrangement (Note 1)
1 A	1a Make Contact
1B	1b Break Contact

Symbol	Unit Name
CV501US	US-H☐ Live Part Protection Cover Unit

Note 1. Output contact arrangement must be specified only for UN-FD4.

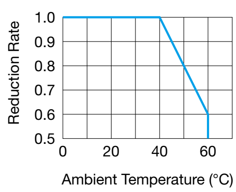
11

11.2.1 US-N☐ Solid State Contactors

● Ratings/Specifications

			US-N5SS	US-N8SS	US-N20	US-N30
			3-Pole Type			
Appearance						
Model Name	Standard	Single-Pole Type	—	—	—	—
		3-Pole 2-Element Type	US-N5SS	US-N8SS	US-N20	US-N30
		3-Pole 3-Element Type	US-N5SSTE	US-N8SSTE	US-N20TE	US-N30TE
	With CAN Terminal	3-Pole 2-Element Type	—	—	US-N20CX	US-N30CX
		3-Pole 3-Element Type	—	—	US-N20TECX	US-N30TECX
	IEC 35 mm Rail Mounting	3-Pole 2-Element Type	(Note 1)	(Note 1)	US-N20RM	—
		3-Pole 3-Element Type	(Note 1)	(Note 1)	US-N20TERM	—
Rating	Rated Operating Current (-10 to 40°C) (Note 2)	JEM (Category AC-1)	5 A	8 A	20 A	30 A
		IEC (Category AC-51)	5 A	8 A	20 A	30 A
	Applicable Heater Capacity (-10 to 40°C)	1φ200 V (Note 4)	1 kW	1.6 kW	4 kW	6 kW
		3φ200 V	1.7 kW	2.7 kW	6.9 kW	10.3 kW
		1φ400 V (Note 4)	—	—	8 kW	12 kW
		3φ400 V	—	—	13.8 kW	20.7 kW
	Maximum Applicable Motor Capacity (Maximum Operating Current (Note 5))	3φ200 V	0.4 kW (3.2 A)	0.4 kW (3.2 A)	2.2 kW (11.1 A)	3.7 kW (17.4 A)
		3φ400 V	—	—	3.7 kW (8.7 A)	7.5 kW (17.4 A)
	Minimum Load Current		150 mA		300 mA	
Main Circuit Specifications	Main Circuit Control Method		Batch Control			
	Rated Operational Voltage		AC100 to 240 V 50/60 Hz		AC100 to 480 V 50/60 Hz	
	Operating Voltage		85 to 110% of Rated Operational Voltage			
	Rated Insulation Voltage		AC250 V		AC500 V	
	Making Voltage Drop		1.5 V/Phase			
	Open Circuit Leakage Current		15 mA or Less (AC240 V 60 Hz)		30 mA or Less (AC480 V 60 Hz)	
	Surge ON Current (60 Hz, 1 Half-Wave Cycle Peak Value)		160 A		800 A	1300 A
	Tolerance I^2t (A^2s)		106		2600	7000
	Trigger System		Zero Voltage Trigger System			
	Making and Breaking Capacities		32 A	50 A	111 A	174 A
Control Circuit Specifications	Rated Operational Voltage		DC12 to 24 V (10% or Less Voltage Ripple)			
	Operating Voltage Fluctuation Range		85 to 110% of Rated Operational Voltage			
	Control Circuit Maximum Applied Voltage		DC26.4 V			
	Control Circuit Input Current		20 mA (DC12 to 24 V)		5 mA (DC12 to 24 V)	
	Input Impedance		0.6 to 1.2 kΩ		2.4 to 4.8 kΩ	
	Closing Voltage		DC9 V or Less			
	Openning Voltage		DC3 V or More			
	Response Time		Max. 1 ms + 1/2 Cycle			
	Operation Indicator		LED Indicator (Lights When Operating Voltage Applied)			
	Cooling Fan Rated operational Voltage (Note 6)		—			
	Fan Fault Detection Output	Contact Arrangement	—			
		Contact Capacity	—			
Common Specifications	Withstand Voltage		2 kV		2.5 kV	
	Insulation Resistance		100 MΩ			
	Rated Impulse Withstand Voltage (Note 7)		4 kV		6 kV	
	Operating Ambient Temperature		-10 to 60°C (Use at Reduced Current When 40°C or More)			
	Relative Temperature		45% to 85% RH			
	Altitude		2,000 m or below			
	Vibration-Resistant		10 to 55 Hz 19.6 m/s^2			
	Shock-Resistant		98 m/s^2			

Note 1. Applicable with standard products.
Note 2. If the ambient temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in the figure at right.
Note 3. The value in [ ] indicates the IEC (class AC-51) rating for US-N50TE(CX) types.
Note 4. Indicates the capacity per element.
Note 5. Indicates the applicable capacities when selecting solid state contactors by their element capacities.
The applicable motor capacities differ depending on motor operating conditions. Refer to page 315 for information regarding selection.
Note 6. Special fan products with rated voltages of AC100 to 110 V can also be manufactured.
Note 7. In accordance with IEC60947-1.
Note 8. Consult with us separately if information on the amount of heat generated by the main circuit is required.



3-Pole Type			
			
—	—	—	—
US-N40	US-N50	US-N70NS	US-N80NS
US-N40TE	US-N50TE	US-N70NSTE	US-N80NSTE
US-N40CX	US-N50CX	—	—
US-N40TECX	US-N50TECX	—	—
—	—	—	—
—	—	—	—
40 A	50 A	70 A	80 A
40 A	50 A [45 A] Note 3	70 A	80 A
8 kW	10 kW [9 kW] Note 3	14 kW	16 kW
13.8 kW	17.3 kW [15.5 kW] Note 3	24.2 kW	27.7 kW
16 kW	20 kW [18 kW] Note 3	—	—
27.7 kW	34.6 kW [31.1 kW] Note 3	—	—
5.5 kW (26 A)	5.5 kW (26 A)	11 kW (48 A)	11 kW (48 A)
11 kW (26 A)	11 kW (26 A)		
300 mA			
Batch Control			
AC100 to 480 V 50/60 Hz		AC100 to 240 V 50/60 Hz	
85 to 110% of Rated Operational Voltage			
AC500 V		AC250 V	
1.5 V/Phase			
30 mA or Less (AC480 V 60 Hz)		30 mA or Less (AC240 V 60 Hz)	
1800 A			
13500			
Zero Voltage Trigger System			
260 A		480 A	
DC12 to 24 V (10% or Less Voltage Ripple)			
85 to 110% of Rated Operational Voltage			
DC26.4 V			
5 mA (DC12 to 24 V)		20 mA (DC12 to 24 V)	
2.4 to 4.8 kΩ		0.6 to 1.2 kΩ	
DC9 V or Less			
DC3 V or More			
Max. 1 ms + 1/2 Cycle			
LED Indicator (Lights When Operating Voltage Applied)			
—		AC200 to 240 V 50/60 Hz	
—		Break Contact	
—		DC5 to 24 V/AC100 to 240 V 0.1 A	
2.5 kV		2 kV	
100 MΩ			
6 kV		4 kV	
-10 to 60°C (Use at Reduced Current When 40°C or More)			
45% to 85% RH			
2,000 m or below			
10 to 55 Hz 19.6 m/s^2			
98 m/s^2			

Circuits

Figures 1 to 4 show the block circuit diagrams for US-N(H)☐ types.

Fig. 1 US-N5/N8SS (3-Pole 2-Element Type)

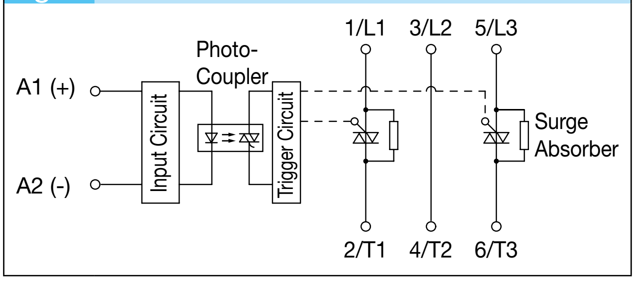


Fig. 2 US-N5/N8SSTE (3-Pole 3-Element Type)

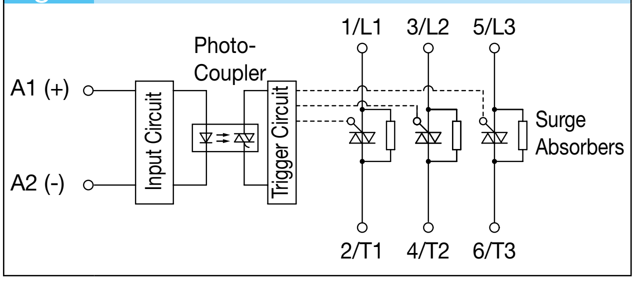


Fig. 3 US-N20/N30/N40/N50, US-N(H)70/N(H)80NS (3-Pole 2-Element Type)

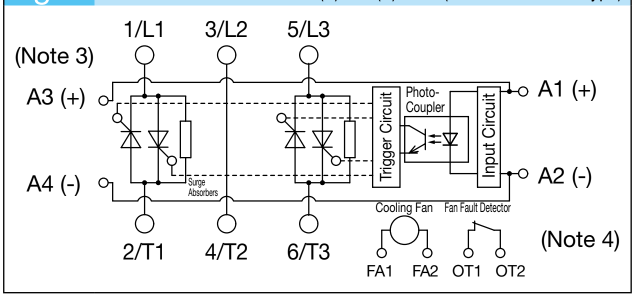
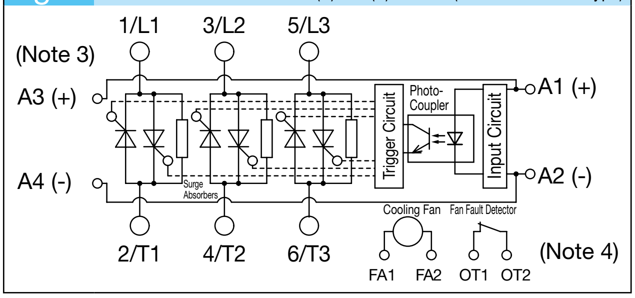


Fig. 4 US-N20/N30/N40/50TE, US-N(H)70/N(H)80NSTE (3-Pole 3-Element Type)



Note 1. The main circuit and control circuit are isolated via a photocoupler.
Note 2. US-N(H)☐ types adopt a zero voltage trigger system.
Note 3. US-N20/N30/N40/N50(TE) types do not have A3 and A4 terminals.
Note 4. A cooling fan and fan fault detector are integrated into US-N(H)70/N(H)80NS(TE) types.
Note 5. Control circuit wiring (FA1, FA2, OT1 and OT2 terminals) must be used for models with an integrated cooling fan and fan fault detector. (Refer to the Connections section)
Refer to "Application Precautions" for information regarding handling of cooling fans.

Connecting

Figures 5 to 7 show sample circuit connections for US-N(H) ☐ types.
Use a low signal contact if using a contact in place of a transistor as the drive signal for US-N(H) ☐ /K(H) ☐ types.

Fig. 5 US-N5/N8SS (TE) Type

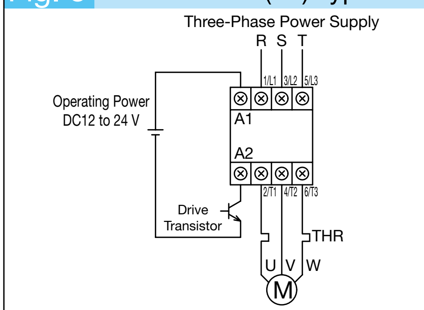


Fig. 6 US-N20/N30/N40/N50(TE)

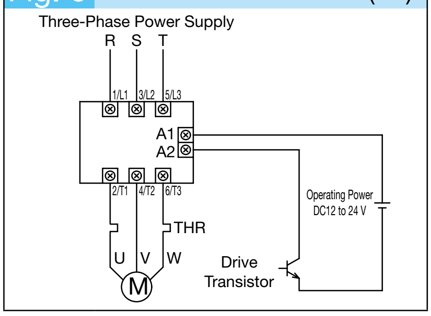
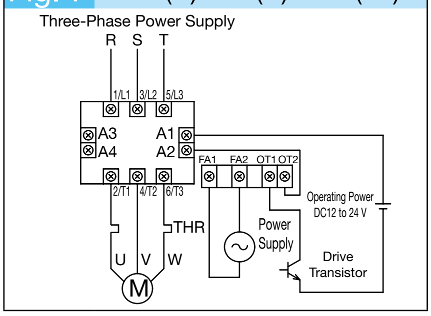


Fig. 7 US-N(H)70/N(H)80NS(TE)



Note. Refer to page 281 for information regarding CE Mark compliance.

Note. Refer to page 281 for information regarding CE Mark compliance.

11.2.2 US-H□ Solid State Contactors

● Ratings/Specifications

Appearance	US-H□									
	US-H□UF				—	—			—	—
Model Name	Standard		US-H20	US-H30	US-H40	US-H50	US-H20DD	US-H30DD	US-H40DD	US-H50DD
	IEC 35 mm Rail Mounting		US-H20RM	US-H30RM	—	—	US-H20DDRM	US-H30DDRM	—	—
	Width Reduced Product		US-H20UF	US-H30UF	—	—	US-H20DDUF	US-H30DDUF	—	—
Rating	Rated Operating Current (-10 to 40°C) (Note 1)	JEM (Category AC-1)	20A	30A	40A	50A	20A	30A	40A	50A
		IEC (Category AC-51)	20A	30A	40A	50A	20A	30A	40A	50A
	Applicable Heater Capacity (-10 to 40°C)	1φ200 V	4kW	6kW	8kW	10kW	4kW	6kW	8kW	10kW
		3φ200 V	6.9kW	10.3kW	13.8kW	17.3kW	—	—	—	—
		1φ400 V	8kW	12kW	16kW	20kW	8kW	12kW	16kW	20kW
		3φ400 V	13.8kW	20.7kW	27.7kW	34.6kW	—	—	—	—
	Minimum Load Current		0.3 A							
Main Circuit Specifications	Main Circuit Control Method		Batch Control				Individual Control			
	Rated Operational Voltage		AC24 to 480 V 50/60 Hz							
	Operating Voltage		85 to 110% of Rated Operational Voltage							
	Rated Insulation Voltage		AC500 V							
	Making Voltage Drop		1.8 V (At Rated Continuity Current)							
	Open Circuit Leakage Current		Max. 30 mA (AC480 V 60 Hz)							
	Surge ON Current (60 Hz, 1 Half-Wave Cycle Peak Value)		330 A	800 A	1000 A	1300 A	330 A	800 A	1000 A	1300 A
	Tolerance I^2t (A^2s)		450	2600	4100	7000	450	2600	4100	7000
	Trigger System		Zero Voltage Trigger System							
	Making and Breaking Capacities		28 A	42 A	56 A	70 A	28 A	42 A	56 A	70 A
Operating Circuit Specifications	Rated Operational Voltage		DC12 to 24 V (10% or Less Voltage Ripple)							
	Operating Voltage Fluctuation Range		85 to 110% of Rated Operational Voltage							
	Control Circuit Maximum Applied Voltage		DC26.4 V							
	Control Circuit Input Current		10 mA or Less (DC12 to 24 V)							
	Input Impedance		1.2 to 2.4 kΩ							
	Closing Voltage		DC9 V or Less							
	Openning Voltage		DC3 V or More							
	Response Time		Max. (1 ms + 1/2 Cycle)							
	Operation Indicator		LED Indicator (Lights When Operating Voltage Applied)							
Common Specifications	Withstand Voltage		2.5 kV							
	Insulation Resistance		100 MΩ							
	Rated Impulse Withstand Voltage		6 kV							
	Operating Ambient Temperature		-10 to 60°C (Use at Reduced Current If 40°C or More)							
	Relative Temperature		45% to 85% RH							
	Altitude		2,000 m or below							
	Vibration-Resistant		10 to 55 Hz 19.6 m/s^2							
	Shock-Resistant		98 m/s^2							

Note 1. If the ambient temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in figure 1 on page 318.
Note 2. US-H□HZ types without cooling fins can also be manufactured. Refer to the Applications column on page 313 for information regarding US-H□HZ type application.
Note 3. US-H□ types are solid state contactors for heater loads. Do not use with motor loads, as they are not applicable.

● Circuit

Fig. 1 US-H20/H30/H40/H50 (Batch Control)

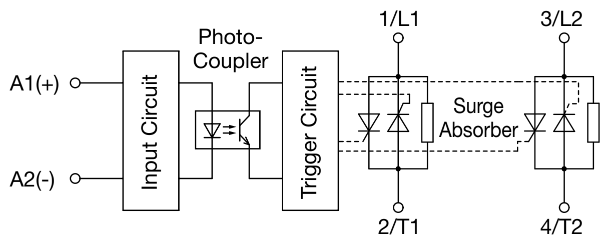
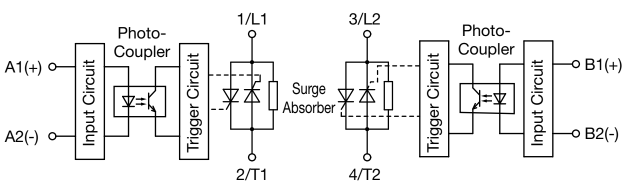
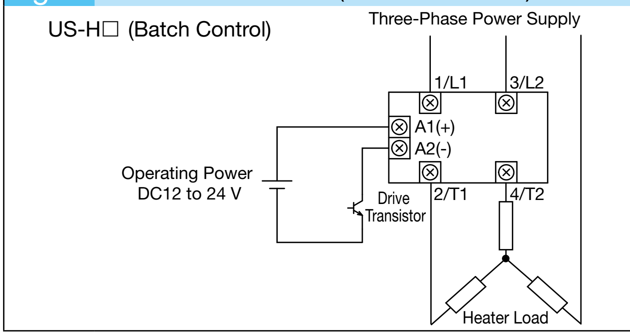


Fig. 2 US-H20/H30/H40/H50DD (Individual Control)



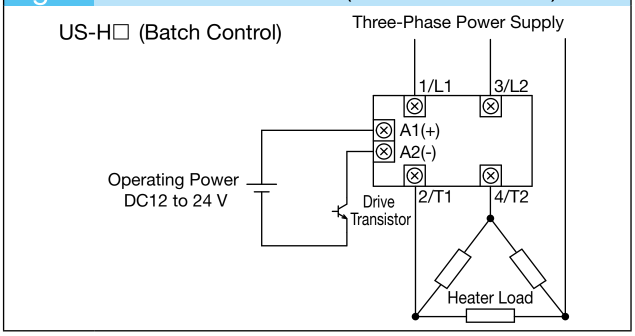
Connecting

Fig. 3 Three-Phase Heater (Star Connected)



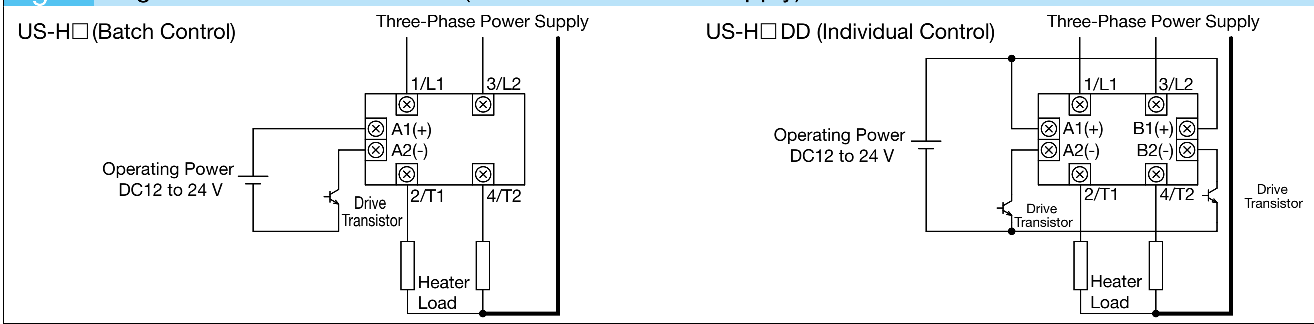
Note 1. Connect the load directly to the power supply for single-phase operation.
Note 2. The rated current of US-H□ types should be selected to match the heater current.

Fig. 4 Three-Phase Heater (Delta Connected)



Note 1. Connect the load directly to the power supply for single-phase operation.
Note 2. Heater current is √3 times for US-H□ types, so the rated current of US-H□ types should be selected accordingly.

Fig. 5 Single-Phase Heater x 2 Units (Three-Phase Power Supply)



Note 1. The solid line ▬ indicates √3 times the heater current, so the current capacity of the power wiring should be selected accordingly to withstand the current.
Note 2. 2 heaters can be independently controlled when using US-H□DD (individual control) types.

Fig. 6 Single-Phase Heater x 1 Unit (Single-Phase Power Supply)

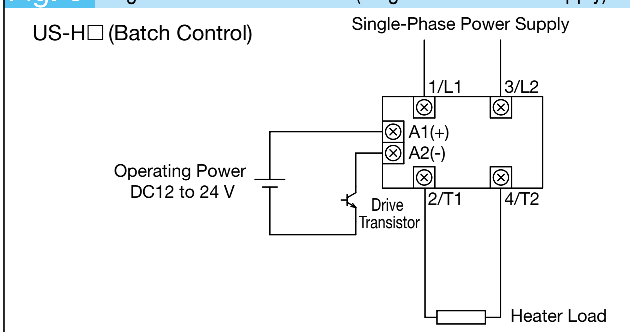
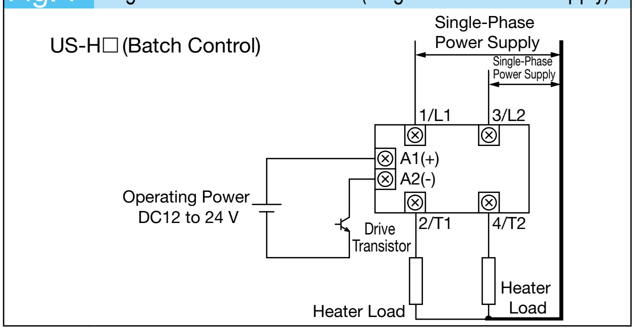


Fig. 7 Single-Phase Heater x 2 Units (Single-Phase Power Supply)



Note 1. The solid line ▬ indicates double the heater current, so the current capacity of the power wiring should be selected accordingly to withstand the current.
Note 2. 2 heaters can be independently controlled when using US-H□DD (individual control) types.

US-H□ HZ (Without Cooling Fins) Application

US-H □ (DD)HZ solid state contactors are US-H □ (DD) types without the cooling fins, allowing for combination with cooling fins that give your desired performance and cooling fins to suit the load conditions.

(1) Rating

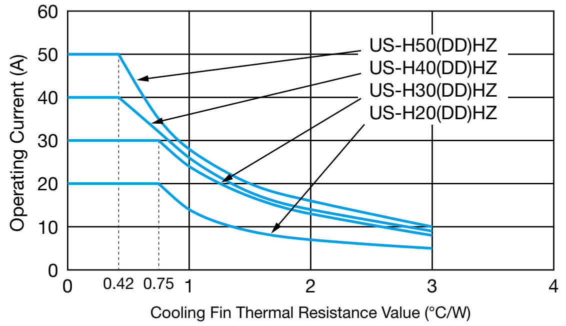
The operating current when combining with fins with the same thermal resistance value as US-H □ (DD) types or when directly mounted to control panels (iron plate) is indicated in the table below.

Operating Current Based on Mounting Conditions

Model Name	For Fins With Thermal Resistance Equivalent to US-H□(DD) (Cooling Fin Thermal Resistance Value: 0.42°C/W)	For Direct Mounting to Control Board Mounting Panels (Iron Plate) (Thermal Resistance Value: 3°C/W)
US-H20(DD)HZ	20 A	5 A
US-H30(DD)HZ	30 A	8 A
US-H40(DD)HZ	40 A	9 A
US-H50(DD)HZ	50 A	10 A

Note. Calculate the operating current for thermal resistances differing from the table above using the operating currents for cooling fin thermal resistance values in Figure 8.

Fig. 8 US-H□(DD)HZ Operating Current



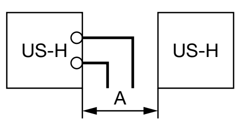
Operating Current (A)

Model Name \ Cooling Fin Thermal Resistance Value	0.42	0.75	1	1.5	2	3
US-H50(DD)HZ	50	35	28	20	16	10
US-H40(DD)HZ	40	32	26	18	14	9
US-H30(DD)HZ	30	30	24	17	13	8
US-H20(DD)HZ	20	20	14	9	7	5

(2) Mounting

1. The surface to which US-H□(DD)HZ types are mounted (cooling fins or control panel) should have flatness within 50 µm.
2. When mounting to cooling fins or control panel, apply a 0.1 mm thick coating of thermal compound with good heat-transfer properties to the rear surface of US-H□(DD)HZ types.
   Thermal Compound (E.g.) G-747 (Shin-Etsu Silicone)
3. Use 2 M4 screws with a tightening torque of 1.2 to 2.05 N·m when mounting to cooling fins or control panels.
4. The US-H□(DD)HZ type connects to the control circuit terminal from the side, so some space to the sides is required for wiring. Secure the amount of wiring space indicated by dimension A in Figure 9.

Fig. 9 US-H□(DD)HZ Wiring Space



Model Name	A Dimension
US-H□HZ	20 mm or More
US-H□DDHZ	30 mm or More

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11.3 Application to Each Load

11.3.1 US-N□ Solid State Contactors

● Heater Load

The table below shows the AC rated operating current applicable with heater loads (JEM1441 (class AC-1), IEC60947-4-3 (Class AC-51)).

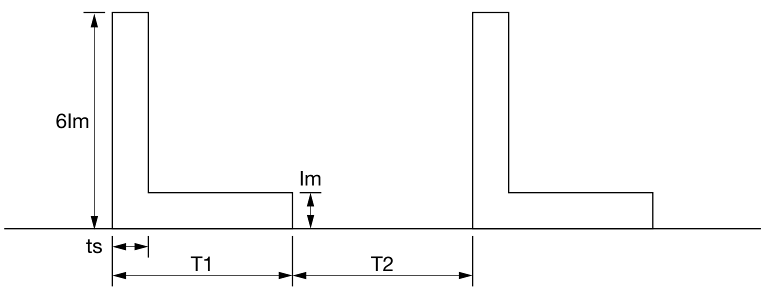
Model Name	Rated Operating Current (A)		Applicable Heater Capacity (kW)				
			Single-Phase			Three-Phase	
	JEM (Category AC-1)	IEC (Category AC-51)	100V	200V	400V	200V	400V
US-N5SS(TE)	5	5	0.5	1	–	1.7	–
US-N8SS(TE)	8	8	0.8	1.6	–	2.7	–
US-N20(TE)(CX)(RM)	20	20	2	4	8	6.9	13.8
US-N30(TE)(CX)	30	30	3	6	12	10.3	20.7
US-N40(TE)(CX)	40	40	4	8	16	13.8	27.7
US-N50(CX)	50	50	5	10	20	17.3	34.6
US-N50TE(CX)	50	45	4.5	9	18	15.5	31.1
US-N70NS(TE)	70	70	7	14	–	24.2	–
US-N80NS(TE)	80	80	8	16	–	27.7	–
US-NH70NS(TE)	70	65	–	14	28	24.2	48.5
US-NH80NS(TE)	80	75	–	16	32	27.7	55.4

Note 1. Rating applicable for -10 to 40°C ambient temperature. If the temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in Figure 1 on page 318.
Note 2. Calculate the applicable heater capacity using the equations below.
For single-phase: power supply voltage x load current
For three-phase: $\sqrt{3}$ x power supply voltage x load current (3 x power supply voltage x load current for delta connections)
Note 3. An energizing inrush current flows for heater loads when US-N is connected on the primary side of the transformer. Take this inrush current into account when making a selection. (Refer to technical documents)

● Motor Load

For applications with direct start motor loads, an applicable solid state contactor frame size should be determined based on motor starting current, starting time, switching frequency and utilization. Accordingly, it is necessary to clarify the application conditions for practical use and select a frame size that will support them.
Figure 1 and page 315 show examples for selecting a US-N solid state contactor based on the operating conditions.
Refer to page 320 for selection of solid state contactors with no-fuse breakers, thermal overload relays and quick-trip fuse protection functions.

Fig. 1 Current Pattern for Motor Direct Start



Im : Rated Current
ts : Starting Time
T1 : Current Flow Time
T2 : Downtime
Utilization : $\left(\frac{T1}{T1+T2}\right) \times 100$

(1) 200 V Main Circuit Motor

● Selection Criteria A (Switching Frequency: 1200 Times/Hour, Utilization: 25%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

<table>
<tr><th rowspan="2">Motor Capacity (3φ 200 V)</th><th colspan="14">Starting Time</th></tr>
<tr><th colspan="2">0.1 s</th><th colspan="2">0.2 s</th><th colspan="2">0.3 s</th><th colspan="2">0.4 s</th><th colspan="2">0.5 s</th><th colspan="2">0.6 s</th><th colspan="2">0.7 s</th></tr>
<tr><td>0.4 kW (3.2 A)</td><td colspan="12">US-N5□</td><td colspan="2">US-N8□</td></tr>
<tr><td>0.75 kW (4.8 A)</td><td colspan="3">US-N5□</td><td colspan="2">US-N8□</td><td colspan="9">US-N20□</td></tr>
<tr><td>1.5 kW (8.0 A)</td><td colspan="14">US-N20□</td></tr>
<tr><td>2.2 kW (11.1 A)</td><td colspan="5">US-N20□</td><td colspan="9">US-N30□</td></tr>
<tr><td>3.7 kW (17.4 A)</td><td colspan="6">US-N30□</td><td colspan="2">US-N40/N50□</td><td colspan="6">US-N70□/N80□</td></tr>
<tr><td>5.5 kW (26.0 A)</td><td colspan="4">US-N40/N50□</td><td colspan="10">US-N70□/N80□</td></tr>
<tr><td>7.5 kW (34.0 A)</td><td colspan="14">US-N70□/N80□</td></tr>
<tr><td>11 kW (48.0 A)</td><td colspan="4">US-N70□/N80□</td><td colspan="10"></td></tr>
</table>

● Selection Criteria B (Switching Frequency: 600 Times/Hour, Utilization: 40%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

<table>
<tr><th rowspan="2">Motor Capacity (3φ 200 V)</th><th colspan="14">Starting Time</th></tr>
<tr><th colspan="2">0.1 s</th><th colspan="2">0.2 s</th><th colspan="2">0.3 s</th><th colspan="2">0.4 s</th><th colspan="2">0.5 s</th><th colspan="2">0.6 s</th><th colspan="2">0.7 s</th></tr>
<tr><td>0.4 kW (3.2 A)</td><td colspan="10">US-N5□</td><td colspan="4">US-N8□</td></tr>
<tr><td>0.75 kW (4.8 A)</td><td colspan="4">US-N5□</td><td colspan="2">US-N8□</td><td colspan="8">US-N20□</td></tr>
<tr><td>1.5 kW (8.0 A)</td><td colspan="14">US-N20□</td></tr>
<tr><td>2.2 kW (11.1 A)</td><td colspan="6">US-N20□</td><td colspan="8">US-N30□</td></tr>
<tr><td>3.7 kW (17.4 A)</td><td colspan="9">US-N30□</td><td colspan="2">US-N40/N50□</td><td colspan="3">US-N70□/N80□</td></tr>
<tr><td>5.5 kW (26.0 A)</td><td colspan="4">US-N40/N50□</td><td colspan="10">US-N70□/N80□</td></tr>
<tr><td>7.5 kW (34.0 A)</td><td colspan="14">US-N70□/N80□</td></tr>
<tr><td>11 kW (48.0 A)</td><td colspan="5">US-N70□/N80□</td><td colspan="9"></td></tr>
</table>

● Selection Criteria C (Switching Frequency: 150 Times/Hour, Utilization: 60%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

<table>
<tr><th rowspan="2">Motor Capacity (3φ 200 V)</th><th colspan="14">Starting Time</th></tr>
<tr><th colspan="2">0.1 s</th><th colspan="2">0.2 s</th><th colspan="2">0.3 s</th><th colspan="2">0.4 s</th><th colspan="2">0.5 s</th><th colspan="2">0.6 s</th><th colspan="2">0.7 s</th></tr>
<tr><td>0.4 kW (3.2 A)</td><td colspan="14">US-N5□</td></tr>
<tr><td>0.75 kW (4.8 A)</td><td colspan="4">US-N5□</td><td colspan="2">US-N8□</td><td colspan="8">US-N20□</td></tr>
<tr><td>1.5 kW (8.0 A)</td><td colspan="14">US-N20□</td></tr>
<tr><td>2.2 kW (11.1 A)</td><td colspan="8">US-N20□</td><td colspan="6">US-N30□</td></tr>
<tr><td>3.7 kW (17.4 A)</td><td colspan="12">US-N30□</td><td colspan="2">US-N40/N50□</td></tr>
<tr><td>5.5 kW (26.0 A)</td><td colspan="5">US-N40/N50□</td><td colspan="9">US-N70□/N80□</td></tr>
<tr><td>7.5 kW (34.0 A)</td><td colspan="14">US-N70□/N80□</td></tr>
<tr><td>11 kW (48.0 A)</td><td colspan="9">US-N70□/N80□</td><td colspan="5"></td></tr>
</table>

(2) 400 V Main Circuit Motor

● Selection Criteria A (Switching Frequency: 1200 Times/Hour, Utilization: 25%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C

<table>
<tr><th rowspan="2">Motor Capacity (3φ 400 V)</th><th colspan="14">Starting Time</th></tr>
<tr><th colspan="2">0.1 s</th><th colspan="2">0.2 s</th><th colspan="2">0.3 s</th><th colspan="2">0.4 s</th><th colspan="2">0.5 s</th><th colspan="2">0.6 s</th><th colspan="2">0.7 s</th></tr>
<tr><td>3.7 kW (8.7 A)</td><td colspan="11">US-N20□</td><td colspan="3">US-N30□</td></tr>
<tr><td>5.5 kW (13.0 A)</td><td colspan="14">US-N30□</td></tr>
<tr><td>7.5 kW (17.4 A)</td><td colspan="6">US-N30□</td><td colspan="2">US-N40/N50□</td><td colspan="6">US-NH70□/NH80□</td></tr>
<tr><td>11 kW (26.0 A)</td><td colspan="4">US-N40/N50□</td><td colspan="10">US-NH70□/NH80□</td></tr>
<tr><td>15 kW (34.0 A)</td><td colspan="14">US-NH70□/NH80□</td></tr>
<tr><td>22 kW (48.0 A)</td><td colspan="4">US-NH70□/NH80□</td><td colspan="10"></td></tr>
</table>

11

- Selection Criteria B (Switching Frequency: 600 Times/Hour, Utilization: 40%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

<table>
<tr><th></th><th colspan="14">Starting Time</th></tr>
<tr><th>Motor Capacity (3φ 400 V)</th><th colspan="2">0.1 s</th><th colspan="2">0.2 s</th><th colspan="2">0. 3s</th><th colspan="2">0.4 s</th><th colspan="2">0.5 s</th><th colspan="2">0.6 s</th><th colspan="2">0.7 s</th></tr>
<tr><td>3.7 kW (8.7 A)</td><td colspan="14">US-N20□</td></tr>
<tr><td>7.5 kW (17.4 A)</td><td colspan="9">US-N30□</td><td colspan="2">US-N40/N50□</td><td colspan="3">US-NH70□/NH80□</td></tr>
<tr><td>11 kW (26.0 A)</td><td colspan="4">US-N40/N50□</td><td colspan="10">US-NH70□/NH80□</td></tr>
<tr><td>15 kW (34.0 A)</td><td colspan="14">US-NH70□/NH80□</td></tr>
<tr><td>22 kW (48.0 A)</td><td colspan="4">US-NH70□/NH80□</td><td colspan="10"></td></tr>
</table>

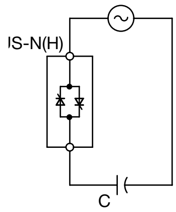
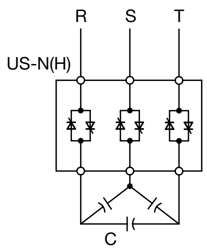
- Selection Criteria C (Switching Frequency: 150 Times/Hour, Utilization: 60%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

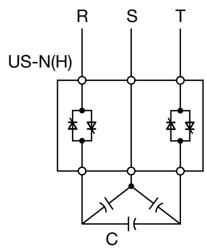
<table>
<tr><th></th><th colspan="14">Starting Time</th></tr>
<tr><th>Motor Capacity (3φ 400 V)</th><th colspan="2">0.1 s</th><th colspan="2">0.2 s</th><th colspan="2">0.3 s</th><th colspan="2">0.4 s</th><th colspan="2">0.5 s</th><th colspan="2">0.6 s</th><th colspan="2">0.7 s</th></tr>
<tr><td>3.7 kW (8.7 A)</td><td colspan="14">US-N20□</td></tr>
<tr><td>7.5 kW (17.4 A)</td><td colspan="12">US-N30□</td><td colspan="2">US-N40/N50□</td></tr>
<tr><td>11 kW (26.0 A)</td><td colspan="5">US-N40/N50□</td><td colspan="9">US-NH70□/NH80□</td></tr>
<tr><td>15 kW (34.0 A)</td><td colspan="14">US-NH70□/NH80□</td></tr>
<tr><td>22 kW (48.0 A)</td><td colspan="6">US-NH70□/NH80□</td><td colspan="8"></td></tr>
</table>

Capacitive Load

US-N solid state contactors close using a zero voltage trigger system. As such, these can suppress an inrush current when closing capacitive loads of approximately 2 to 10 times the rated current, making them suitable for frequently switched phase advanced capacitors. When using a phase advanced capacitor the voltage and current waveforms may become distorted. As these distortions increase the noise of transformers and motors, a series reactor with 6% the capacitive reactance is generally inserted to help suppress distortions to the voltage and current due to the 5th harmonic. This series reactor not only helps to restore the waveform but also helps to suppress the inrush current. We recommend their use in all capacitive circuits. The maximum inrush current with a 6% series reactor in place is approximately 5 times the rated current. When the capacitor is open-circuited, the effect of residual charge in the capacitor means a voltage 2 times greater than the power supply is applied to the main circuit element. The rated voltage of the US-N unit to be used hence must be 2 times the intended circuit voltage.
Use a AC400 V main circuit voltage US-N□ unit for AC200 V capacitive load applications.

Fig. 2 Capacitor Load Application Circuit

<table>
<tr><th>Circuit Arrangement</th><th>Single-Phase Capacitor</th><th colspan="2">Three-Phase Capacitor</th></tr>
<tr><td>Application Circuit</td><td>
</td><td>

3-Pole 3-Element Type</td><td>

3-Pole 2-Element Type</td></tr>
</table>

- Capacitor Load Application Capacity (AC200 V)

Model Name	Single-Phase Capacitor	Three-Phase Capacitor
US-N20□	3 kVA	5 kVA
US-N30□	4.6 kVA	8 kVA
US-N40□	6 kVA	10 kVA
US-N50□	7.6 kVA	13 kVA
US-NH70NS(TE)/US-NH80NS(TE) (1 to 3 Units)	10 kVA	18 kVA

11.3.2 US-H□ Solid State Contactors

● Heater Load

The table below shows the AC rated operating current applicable with heater loads (JEM1441 (class AC-1), IEC60947-4-3 (Class AC-51)).

Model Name	Rated Operating Current (A)		Applicable Heater Capacity (kW)				
			Single-Phase			Three-Phase	
	JEM (Category AC-1)	IEC (Category AC-51)	100V	200V	400V	200V	400V
US-H20 (RM)(UF)	20	20	2	4	8	6.9	13.8
US-H30 (RM)(UF)	30	30	3	6	12	10.3	20.7
US-H40	40	40	4	8	16	13.8	27.7
US-H50	50	50	5	10	20	17.3	34.6
US-H20DD (RM)(UF)	20	20	2	4	8	—	—
US-H30DD (RM)(UF)	30	30	3	6	12	—	—
US-H40DD	40	40	4	8	16	—	—
US-H50DD	50	50	5	10	20	—	—

Note 1. Rating applicable for -10 to 40°C ambient temperature. If the temperature is 40°C or more, use the rated operated current multiplied by the reduced rate shown in Figure 1 on page 318.

Note 2. Calculate the applicable heater capacity using the equations below.
For single-phase: Power supply voltage x load current
For three-phase: $\sqrt{3}$ x power supply voltage x load current (3 x power supply voltage x load current for delta connections)

11

11.4 Application Precautions

● Working Environment

(1) Operating Ambient Temperature: -10°C to 60°C
However, if the temperature is 40°C to 60°C then use the rated operating current multiplied by the reduced rate shown in Figure 1. (No freezing, no condensation)
(2) Storage Temperature : -30°C to 65°C
(3) Relative Humidity : 45% to 85% RH
(4) Vibration : 10 to 55 Hz 19.6 m/s^2 or Less
(5) Shock : 98 m/s^2 or Less
(6) Environment : Use only in well-ventilated areas free of dust, gas and organic solvents.

● Mounting

(1) US-N and US-H type main circuit and cooling fins are electrically isolated so there is no need to insulate when mounting. Mount in the mounting orientation shown in Figure 2. Remember to take ventilation within the panel into consideration.
Do not place in contact with cables etc. as the temperature of the cooling fins is approximately 100°C when the rated operating current is being continuously applied.
(2) If using US-N or US-H units on column panels or arranging with other equipment, take care to secure at least the amount of space indicated in Figure 3. If mounting US-N or US-H units vertically, then space all US-N or US-H units at least 300 mm apart.

● Main Circuit Voltage Application Range

The main circuit voltage can be operated within the range indicated in the above-right table.
DC power supplies are not supported.

● Operating Voltage and Wiring Used

The DC operating voltage for US-N or US-H drive units is required to be DC12 to 24 V with 10% or less voltage ripple. (Fig. 4)
Avoid combining the control input and power lines of US-N or US-H units.
Use a twisted-pair cable for the control circuit and limit the length to 10 m or less.

● Open Circuit Leakage Current

(1) 15 to 50 mA of leakage current will flow when US-N or US-H units are open-circuited (OFF), depending on the model. These leakage currents may cause electric shocks on the load side, so a no-fuse breaker or magnetic contactor should be connected on the power-side, as per Figure 5, to ensure the load is open-circuited.
(2) The leakage current may prevent light load motors from stopping when US-N is switched off. In such cases, connect a resistor in parallel with the load such that the load current is 10 or more times greater than the leakage current. (Fig. 6)
(3) If there is no load present with US-N or US-H units, the main circuit will not switch on and operation cannot be verified. However, the operation indicator lamp will illuminate when voltage is applied and a voltage close to the power supply voltage is applied to the load side of US-N or US-H units. (Due to US-N or US-H leakage currents) Connect a sample load such as a resistor (so that 1 A or so flows) to check the operation of US-N or US-H units.

● Main Circuit Voltage Application Range

Main Circuit Voltage \ Series	US-N	US-H
AC24 to 480 V	—	H20 to H50
AC100 to 480 V	N20 to N50	—
AC100 to 240 V	N5, N8, N70, N80	—
AC200 to 480 V	NH70, NH80	—

Note. This table indicates the applicable model names. — is not applicable

Fig. 1 Rated Operating Current Reduction Rate

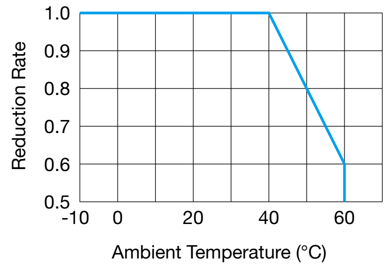


Fig. 2 Mounting Orientation

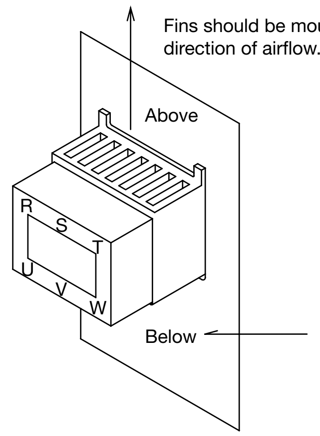


Fig. 3 Space Occupied in Mounted State

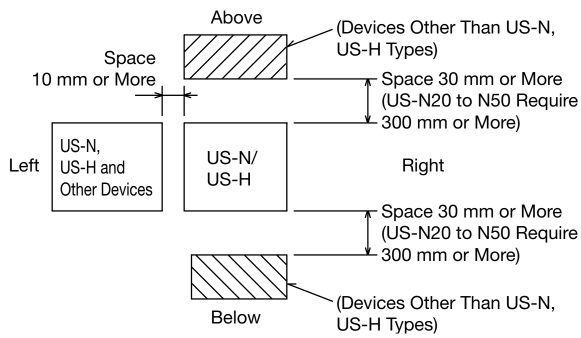
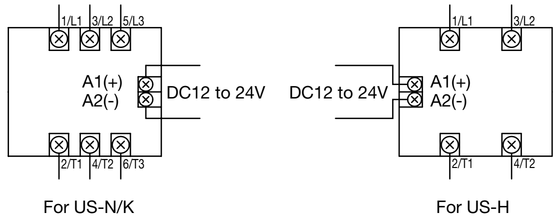


Fig. 4 Operating Voltage



Cooling Fan Circuit Connections

US-N(H)70NS(TE) and US-N(H)80NS(TE) units have an integrated cooling fan and fan fault detector. Take care to ensure these are wired to the control circuit.

(1) Cooling Fan Operating Power Terminal (FA1, FA2)
Connect the cooling fan operating power supply to the primary-side main circuit of the US-N unit as per Figure 7. If the main circuit is AC400 V, then reduce the voltage to AC200 V using a control transformer. Avoid connecting to the secondary side of the US-N unit, as the lifespan of the cooling fan will be reduced if frequently started or stopped.

(2) Cooling Fan
The lifespan of the cooling fan bearing is approximately 10,000 to 35,000 hours and should be replaced as required according to the running conditions. Replacement is also required if abnormal noise or vibrations are generated. (Replacement cooling fan units are available.)

(3) Fan Fault Detector Terminals (OT1, OT2)
Fan fault detectors operate when the is a fault with the cooling fins (faulty cooling fan etc.) by open-circuiting the normally closed fan fault detector contact. Connect to the control circuit in series to switch OFF the US-N unit when a fault is detected. The fan fault detector automatically resets (closes the contact) when the temperature has dropped. If retention of the detection signal is required, then attach an external retention circuit.

Applicable Wire Size and Terminal Screw Tightening Torque

⚠There is a risk of overheating or fire. Be sure to maintain the tightening torque and periodically re-tighten the screw.
Electric wires should be properly connected according to the electric wiring diagram. Tightening the terminal screw should be properly conducted within the tightening torque shown in the tables (1) and (2). Insufficient tightening of the terminal screw may cause overheating or cause the electric wire to fall off.
Excessive tightening torque may damage the terminal screw.

AC Operated Optional Unit Control Via Solid State Relays

When controlling the switching of AC operated optional units (UA-DR☐, UA-SH☐, UA-RE, UN-FD☐) with a solid state relay or triac output, use a solid state relay or triac output with an integrated varistor. US-N type optional UA-SH☐ unit auxiliary outputs have an integrated varistor and can be controlled by the optional units listed above.

Non-Applicable Connections

US-N or US-H types are 1-pole to 3-pole compatible and can switch single-phase and three-phase loads. The special configurations shown below cannot be used.

(1) Parallel Connections (Refer to Figure 8)
Poles of the US-N or US-H unit main circuit cannot be connected in parallel in order to increase current capacity.
(Explanation) The ON power supply to the thyristor of each pole has some variance which causes continuity current to concentrate at the pole with lower voltage, damaging the thyristor.

(2) Series Connections (Refer to Figure 9)
Poles of the US-N or US-H unit main circuit cannot be connected in series in order to increase the rated voltage.
(Explanation) The closing voltage and operating time of each pole has some variance which causes timing mismatches, applying excessive voltage to certain poles, resulting in damage.

(3) Inverter Secondary Connections

Fig. 5 Leakage Current Countermeasures

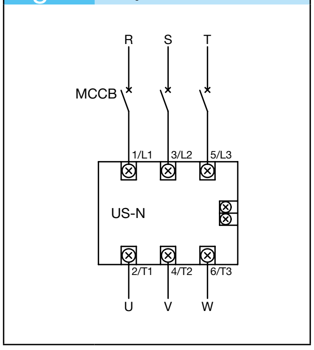


Fig. 6 Small Current Load Countermeasures

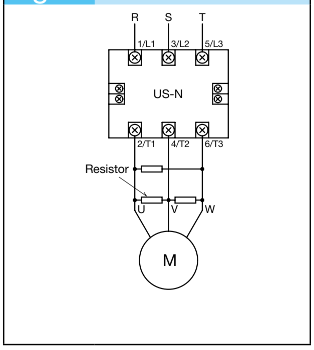
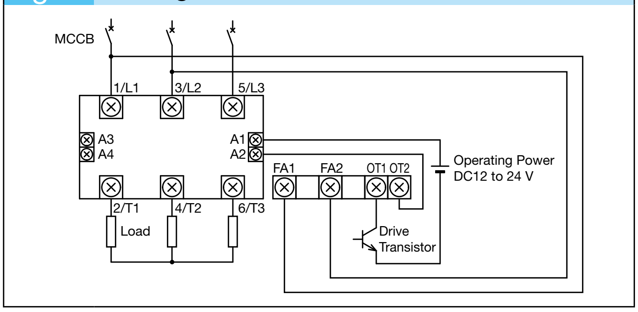


Fig. 7 Cooling Fan Control Circuit



(1) Applicable Wire Size and Terminal Screw Tightening Torque (Main Circuit)

Model Name	Terminal Screw Size	Applicable Wire Size	Applicable Crimp Lug Size	Terminal Screw Tightening Torque
US-N5SS (TE) US-N8SS (TE)	M3.5	φ1.6mm 1.25 to 2mm^2	1.25-3.5 to 2-3.5	0.94 to 1.51 N·m (Standard 1.17 N·m)
US-N20 (TE) to N50 (TE)	M5	—(Note 1) (2 to 14mm^2)	1.25-5 to 14-5	2.06 to 3.33 N·m (Standard 2.54 N·m)
US-N (H) 70NS (TE) US-N (H) 80NS (TE)	M6	—	1.25-6 to 22-6 38-S6	3.53 to 5.78 N·m (Standard 4.41 N·m)
US-H20 (DD) to H50 (DD) US-H20/H30 (DD)UF	M5	—	1.25-5 to 14-5	2.06 to 3.33N·m (Standard 2.54N·m)

Note 1. The value in parentheses is applicable for US-N☐(TE)CX only.

(2) Applicable Wire Size and Terminal Screw Tightening Torque (Control Circuit)

Model Name	Terminal Screw Size	Applicable Wire Size	Applicable Crimp Lug Size	Terminal Screw Tightening Torque
US-N/H Series All Models	M3.5	φ1.6 mm 1.25 to 2 mm^2	1.25-3.5 to 2-3.5	0.94 to 1.51 N·m (Standard 1.17 N·m)
UA, UN-☐ All Option Models	M3.5	φ1.6 mm 1.25 to 2 mm^2	1.25-3.5 to 2-3.5	0.94 to 1.51 N·m (Standard 1.17 N·m)

Fig. 8 Parallel Connected

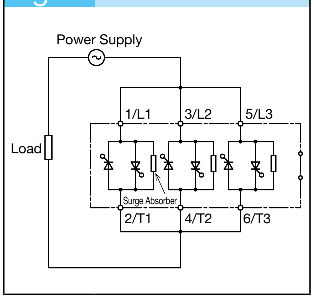
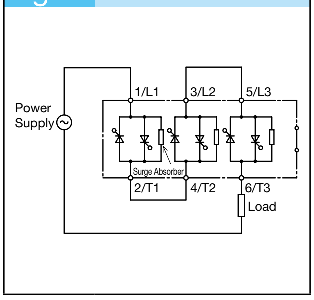


Fig. 9 Series Connected



Use on the secondary-side of the inverter is not possible as a large leakage current flows when switched off due to harmonics, potentially causing the surge absorber to burn out.

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Failure Mode

US-N or US-H units may fail if subjected to incorrect handling or operating conditions. Current usually flows continuously while in the main circuit element failure mode of US-N or US-H units. Fault detection units (UN-FD) are available as optional units to detect when US-N or US-H units fail while the main circuit element is in continuity mode. This unit should be combined for use with a no-fuse breaker with voltage tripping device or magnetic contactor.

Short-circuit Protection

US-N or US-H units have little over-current withstanding capacity (surge ON current) and regions that cannot be protected by no-fuse breakers so must be protected with quick-trip fuses or thyristor protectors.

(1) Quick-Trip Fuses

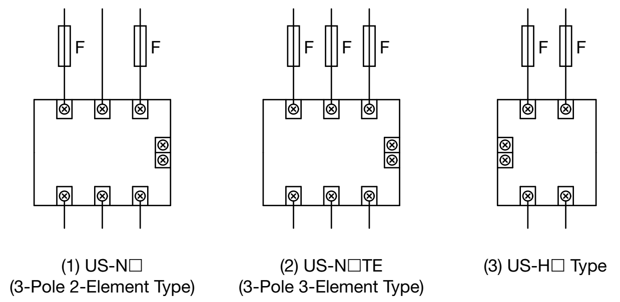
Quick-trip fuses are economical when divided among heater loads and motor loads with starting currents.
The table below shows quick-trip fuse selection criteria.

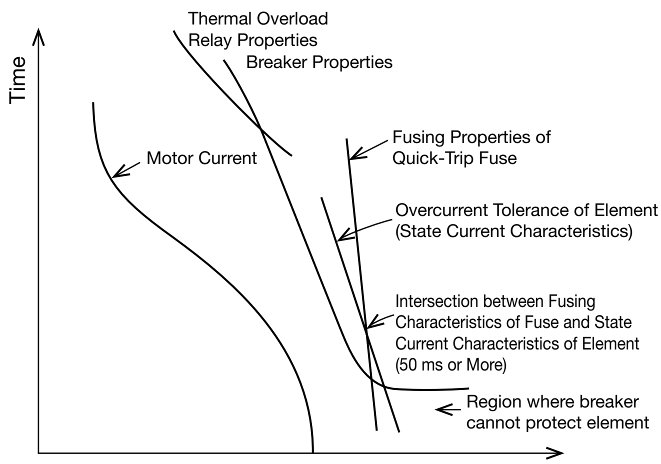
● Quick-Trip Fuse Selection Criteria

Selection Criteria	Content	Equation
(1) Fuse Rated Current	Limiting of Load Current to Prevent Fuse Temperature Rise and Erroneous Fusing	(Fuse Rated Current) x 0.8 ≥ (Load Current)
(2) Fusing Properties of Fuse	Limiting of Overcurrent to Prevent Fuse Deterioration and Fusion by Repeated Overcurrent (Ex: Motor Start-Up Current)	(Fusing Current of Fuse) x 0.6 > (Load Start-Up Current)
(3) Relationship of the Total Breaking I^2t of the Fuse and Allowable I^2t of the Element	Protection of the Element with Respect to Short Circuit of a Half Cycle or Less	(Total Breaking I^2t of Fuse) < (Allowable I^2t of Element)
(4) Relationship of the Fusing Characteristics of the Fuse and State Current of the Element	Protection of the Element during Large Current Flow	The intersection of the fusing characteristics of the fuse and state current characteristics of the element is to be 50 ms or more

For Heater Loads: Select (1), (3), (4)
For Motor Loads: Select (2), (3), (4)

Fig. 10 Short-Circuit Protection Via Quick-Trip Fuse



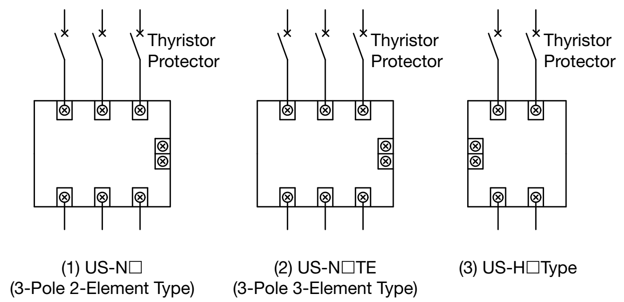


Relationship of Protective Properties

(2) Thyristor Protector

Applicable during the limited area of short-circuit current during an accident when protecting US-N and US-H types with a thyristor protector.
US-N or US-H have rated surge ON current properties and allowable I^2t values to withstand over-current situations.
Protection against the rated surge ON consists of a balance of thyristor protector operating characteristics and allowable I^2t and is limited to the protectable region applicable when short-circuited (shorted time region) with restricted thyristor protector current (continuous I^2t).

Fig. 11 Protection Via Thyristor Protector



● Heater Load

For nichrome, iron, chrome and aluminum type general heaters or far-infrared heaters without inrush current, 3x the thyristor protector types listed in the table below are ideal.
If the operating circuit short-circuit current exceeds the value listed in the table below, use a no-fuse breaker and quick-trip fuse with the US-N or US-H unit.

● US-N, US-H Series Combination Chart

	Model Name	Tolerance I^2t (A^2s)	Main Circuit Voltage	Thyristor Protector Rated Current						
				10 A	15 A	20 A	25 A	30 A	40 A	50 A
				Thyristor Protector (SP50-K 1P/2P/3P□ 3x) Short-Circuit Protection Current (kA)						
Solid State Contactors for General Loads	US-N20□	2600	Single-Phase AC110 V	8	5	3	2	—	—	—
			3-Phase AC220 V	4	3	2.2	1.6	—	—	—
			3-Phase AC440 V	1.7	1.5	1.2	1	—	—	—
	US-N30□	7000	Single-Phase AC110 V	10	10	8.5	6	4.3	3.2	—
			3-Phase AC220 V	5	5	5	3.9	2.8	2.1	—
			3-Phase AC440 V	2.5	2.5	2.5	2.1	1.3	—	—
	US-N40□ US-N50□	13500	Single-Phase AC110 V	10	10	10	10	8.6	6	4.4
			3-Phase AC220 V	5	5	5	5	5	3.5	2.9
			3-Phase AC440 V	2.5	2.5	2.5	2.5	2.5	2	1.9
	US-N70NS(TE) US-N80NS(TE)	13500	Single-Phase AC110 V	10	10	10	10	8.6	6	4.4
			3-Phase AC220 V	5	5	5	5	5	3.5	2.9
	US-NH70NS(TE) US-NH80NS(TE)	13500	3-Phase AC440 V	2.5	2.5	2.5	2.5	2.5	2.1	1.9
Solid State Contactors for Heater Loads	US-H20□	450	Single-Phase AC110 V	0.6	0.5	0.4	—	—	—	—
			3-Phase AC220 V	0.55	0.42	0.39	0.3	—	—	—
			3-Phase AC440 V	0.38	0.34	0.3	—	—	—	—
	US-H30□	2600	Single-Phase AC110 V	8	5	3	2	1.7	1.2	1
			3-Phase AC220 V	4	3	2.2	1.6	1.3	0.9	0.8
			3-Phase AC440 V	1.7	1.5	1.2	1	0.85	0.75	0.67
	US-H40□	4100	Single-Phase AC110 V	10	8.2	5	3.5	2.7	2	1.6
			3-Phase AC220 V	5	5	3.3	2.4	1.7	1.4	1.2
			3-Phase AC440 V	2.5	2.1	1.8	1.5	1.3	1	0.9
	US-H50□	7000	Single-Phase AC110 V	10	10	8.5	6	4.3	3.2	2.5
			3-Phase AC220 V	5	5	5	3.9	2.8	2.1	1.7
			3-Phase AC440 V	2.5	2.5	2.5	2.1	1.8	1.5	1.3

● Motor Load

Thyristor protectors are not applicable. Use a no-fuse breaker and quick-trip fuse with the US-N unit.

Device Selection

Selection of the solid state contactor, thermal overload relay and no-fuse breaker for each motor capacity and also the selection of element protection for US-N☐ units is explained below.
However, US-N☐ units with no-fuse breakers may not be able to offer short-circuit protection over all regions and may need to be combined with a short-circuit protecting quick-trip fuse, as described on page 320.

(1) Thermal Overload Relay and No-Fuse Breaker Selection

The applicable solid state contactor frames for motor loads can be selected from page 315, while the thermal overload relay and no-fuse breaker selection should be made from the contents below.
The solid state contactors listed below are selected based on the following ratings as per pages 315 and 316: switching frequency: 600 times/hour, utilization: 40%, starting current: 6 times full-load current, starting time: 0.2 s or less, ambient temperature 40°C.

● At AC200 V Rating

Motor Capacity	Solid State Contactors	Thermal Overload Relays	No-Fuse Breakers
0.4 kW	US-N5SS(TE)	TH-T25 2.1 A	NF32-SV 5 A
0.75 kW	US-N5SS(TE)	TH-T25 3.6 A	NF32-SV 10 A
1.5 kW	US-N20(TE)	TH-T25 6.6 A	NF32-SV 15 A
2.2 kW	US-N20(TE)	TH-T25 9 A	NF32-SV 20 A
3.7 kW	US-N30(TE)	TH-T25 15 A	NF32-SV 30 A
5.5 kW	US-N40(TE) US-N50(TE)	TH-T25 22 A	NF63-SV 50 A
7.5 kW	US-N70NS(TE) US-N80NS(TE)	TH-T65 29 A	NF63-SV 60 A
11 kW	US-N70NS(TE) US-N80NS(TE)	TH-T65 42 A	NF125-SV 75 A

● At AC400 V Rating

Motor Capacity	Solid State Contactors	Thermal Overload Relays	No-Fuse Breakers
3.7 kW	US-N20(TE)	TH-T25 6.6 A	NF32-SV 20 A
5.5 kW	US-N30(TE)	TH-T25 11 A	NF32-SV 30 A
7.5 kW	US-N30(TE)	TH-T25 15 A	NF32-SV 30 A
11 kW	US-N40(TE) US-N50(TE)	TH-T25 22 A	NF63-SV 50 A
15 kW	US-NH70NS(TE) US-NH80NS(TE)	TH-T65 29 A	NF63-SV 60 A
22 kW	US-NH70NS(TE) US-NH80NS(TE)	TH-T65 42 A	NF125-SV 75 A

(2) Selection When US-N☐ Element Protection is Required

There are some cases in which US-N ☐ elements will not be protected if overloaded (current exceeding 6 times the motor full-load current) when using the combinations in the table above.
Use one of the solid state contactor frames below if US-N ☐ element protection is required.

● At AC200 V Rating

Motor Capacity	Solid State Contactors	Thermal Overload Relays	No-Fuse Breakers
0.4 kW	US-N8SS(TE)	TH-T25 2.1 A	NF32-SV 5 A
0.75 kW	US-N20(TE)	TH-T25 3.6 A	NF32-SV 10 A
1.5 kW	US-N30(TE)	TH-T25 6.6 A	NF32-SV 15 A
2.2 kW	US-N40(TE) US-N50(TE)	TH-T25 9 A	NF32-SV 20 A
3.7 kW	US-N40(TE) US-N50(TE)	TH-T25 15 A	NF32-SV 30 A
5.5 kW	US-N70NS(TE) US-N80NS(TE)	TH-T25 22 A	NF63-SV 50 A

● At AC400 V Rating

Motor Capacity	Solid State Contactors	Thermal Overload Relays	No-Fuse Breakers
1.5 kW	US-N20(TE)	TH-T25 3.6 A	NF32-SV 10 A
2.2 kW	US-N30(TE)	TH-T25 5 A	NF32-SV 10 A
3.7 kW	US-N30(TE)	TH-T25 6.6 A	NF32-SV 20 A
5.5 kW	US-N40(TE) US-N50(TE)	TH-T25 11 A	NF32-SV 30 A
7.5 kW	US-N40(TE) US-N50(TE)	TH-T25 15 A	NF32-SV 30 A
11 kW	US-NH70NS(TE) US-NH80NS(TE)	TH-T25 22 A	NF63-SV 50 A

Differences Between 3-Pole 2-Element and 3-Pole 3-Element Types

US-N(H) ☐ units are available as 3-pole 2-element and 3-pole 3-element types. The functionality between the two is essentially the same, but as the central pole of 3-pole 2-element (between 3/L2 and 4/T2 terminals) types is internally connected, delta connections cannot be used to increase applicable capacity.
Of the 3-pole 2-element products, US-N30 and N50 types are more compact than their US-N30TE and N50TE 3-pole 3-element counterparts, allowing for greater minimization of occupied space to be achieved.

11.5 Optional Units

○ : Applicable, x: Not Applicable

Optional Unit Names	Model Name	Applicable Models			
		US-N5SS/N8SS(TE)	US-N20(TE) to N50(TE)	US-N(H)70/N(H)80NS(TE)	US-H20 to H50(DD) US-H20/H30(DD)UF
Drive Units	UA-DR1	x	○ (Note 2)	○ (Note 2)	x
Drive Units with Outputs	UA-SH8	○ (Note 1)	x	x	x
	UA-SH1	x	○ (Note 2)	○ (Note 2)	x
Reversing Unit	UA-RE	○	○	○	x
Fault Detection Units	UN-FD	○	○	○ (N70/N80(TE))	○
	UN-FD4	x	○	○ (NH70/NH80(TE))	○
Power Control Units	UA-PC	○	○	○	○
Live Part Protection Cover Units	UN-CV501US	x	x	x	○

Optional Unit Names	Model Name	Applicable Models		
		UA-DR1	UA-SH1	UA-SH8
Live Part Protection Cover Units	UA-CVDR1	○	○	x
	UA-CVSH8	x	x	○

Note 1. When mounting UA-SH8 units to US-N5SS/N8SS(TE) types, first remove the US-N □ type body cover.
If live part protection is required for UA-SH8 units then a UA-CVSH8 live part protection cover should be mounted.
Refer to page 335 for details regarding the outline drawings when UA-CVSH8 is mounted to a UA-SH8 unit.
Note 2. When mounted to US-N20(TE) to N50(TE), US-N(H)70/N(H)80NS(TE), the outline drawings are increased.
Refer to pages 337 for information about outline drawings.
If live part protection is required for UA-DR1 or SH1 units, a UA-CVDR1 live part protection cover should be mounted.

11.5.1 Drive Units (UA-DR1)

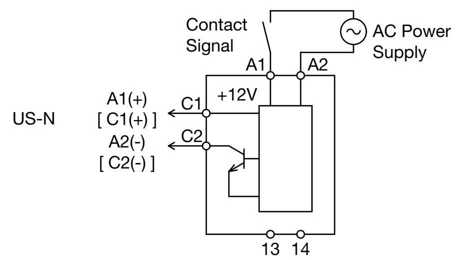
US-N units can be driven at AC100 V or AC200 V by using UA-DR1 drive units.

● Rating

Appearance		
Model Name		UA-DR1 AC100V / UA-DR1 AC200V
Rated Operational Voltage		AC100 to 120 V 50/60 Hz / AC200 to 240 V 50/60 Hz
Input Current		20mA
Rated Output Voltage/Current		DC12 to 24 V/20 mA
Response Time	OFF→ON	Max. 30 ms + 1/2 Cycle + 1 ms (When Combined With US-N)
	ON→OFF	Max. 30 ms + 1/2 Cycle + 1 ms (When Combined With US-N)
Allowable Voltage Fluctuation Range		85 to 110% of Rated Operational Voltage
Operating Temperature/Humidity		-10 to 60°C/45 to 85% RH

● Circuit

Fig. 1 UA-DR1 Type Circuit



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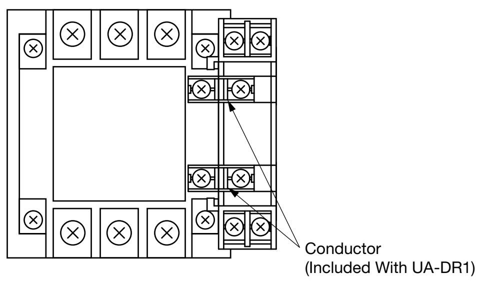
Mounting

UA-DR1 units should be mounted on the right side of US-N units using the conductor attached to the UA-DR1 unit. Refer to page 337 for information regarding outline drawings as the width and depth may increase for some models.

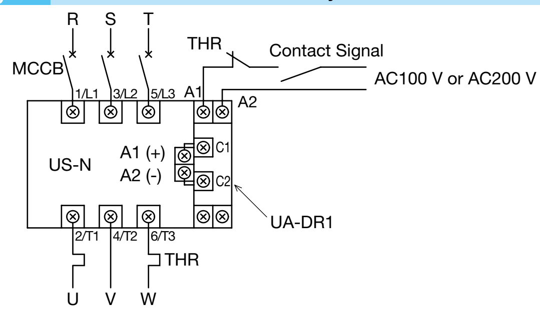
Fig. 2 UA-DR1 Type Mounting Method



Thermal Overload Relay Connection

Connect as shown in Figure 3 if using a thermal overload relay with circuits combined with UA-DR1 types.

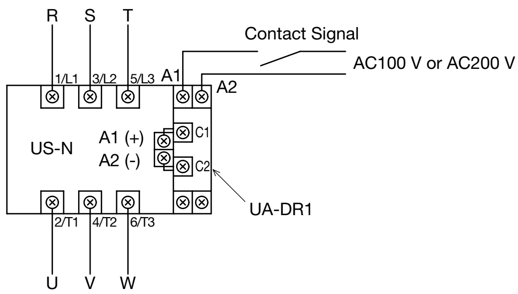
Fig. 3 Thermal Overload Relay Connection



US-N Connections

Connect as per Figure 4 if using a combination of UA-DR1 unit.

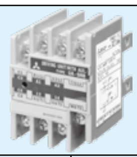
Fig. 4 For US-N20 to N50(TE), N(H)70/N(H)80NS(TE)



11.5.2 Drive Units with Outputs (UA-SH1, UA-SH8)

US-N units can be driven at AC100 V or AC200 V by using UA-SH1 or UA-SH8 drive units with outputs while simultaneously allowing use of the auxiliary outputs (triac outputs (1 circuit)).

Rating

Appearance						
Model Name			UA-SH1 AC100V	UA-SH1 AC200V	UA-SH8 AC100V	UA-SH8 AC200V
Driver	Rated Operational Voltage		AC100 to 120 V 50/60 Hz	AC200 to 240 V 50/60 Hz	AC100 to 120 V 50/60 Hz	AC200 to 240 V 50/60 Hz
Driver	Input Current		20 mA		45 mA	
Driver	Rated Output Voltage/Current		DC12 to 24 V/20 mA		DC24 V/30 mA	
Driver	Response Time	OFF→ON	Max. 50 ms (When Combined With US-N)		Max. 50 ms (When Combined With US-N5/N8SS(TE))	
Driver	Response Time	ON→OFF	Max. 50 ms (When Combined With US-N)		Max. 50 ms (When Combined With US-N5/N8SS(TE))	
Auxiliary Outputs	Rated Load Voltage		AC100 to 240 V 50/60 Hz			
Auxiliary Outputs	Rated Load Current		0.5 A (Class AC-15)			
Auxiliary Outputs	Output Method		Triac Output (1 Circuit/Built-in Surge Absorber)			
Auxiliary Outputs	Leakage Current		3 mA or Less			
Auxiliary Outputs	Making Voltage Drop		1.5 V or Less			
Common	Allowable Voltage Fluctuation Range		85 to 110% of Rated Voltage			
Common	Operating Temperature/Humidity		-10 to 60°C/45 to 85% RH			
Common	Operation Indicator		—		Lights When Operating Voltage Applied	

Circuits/Connections

Fig. 1 UA-SH1 Type Connection

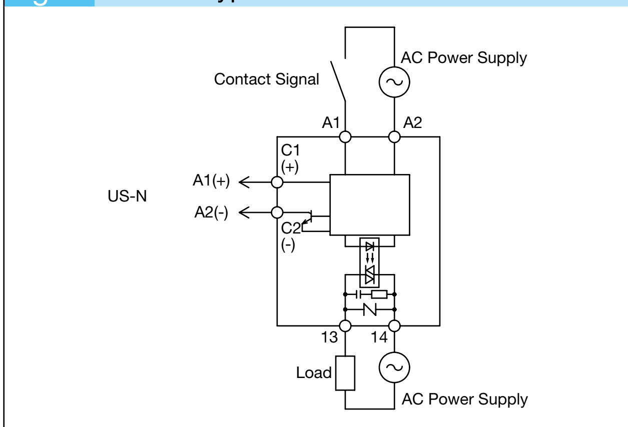
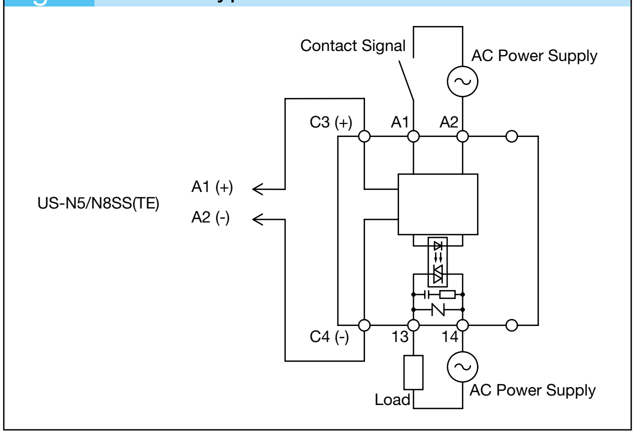


Fig. 2 UA-SH8 Type Connection



Handling

(1) Types/Mounting

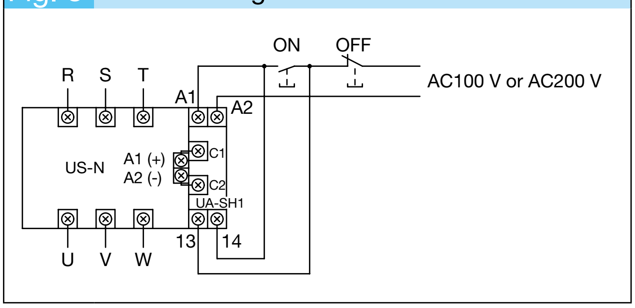
Front Clip-on mounted UA-SH8 units can be mounted to US-N5/N8SS(TE) units. Side-mounted UA-SH1 units can be mounted to US-N20/N30/N40/N50(TE) and US-N(H)70/N(H)80NS(TE) units. UA-SH1 units should be mounted to the conductor attached to the right side of US-N units.

(2) Self-Retaining Circuit

Connect as per Figure 3 if mounting a self-retaining circuit.

(3) When mounting UA-SH8 units to US-N5SS/N8SS(TE) types, first remove the US-N type body cover. If live part protection is required, mount a UA-CVSH8 live part protection cover to the UA-SH8 unit.

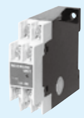
Fig. 3 Self-Retaining Circuit



11.5.3 Reversing Units (UA-RE)

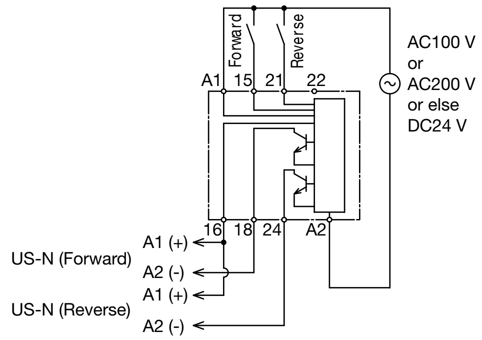
An interlock can be achieved between forward US-N units and reverse US-N units through the use of a UA-RE reversing unit, allowing for reversible motor running.

Rating

Appearance			
Model Name	UA-RE AC100V	UA-RE AC200V	UA-RE DC24V
Rated Operational Voltage	AC100 to 120 V 50/60 Hz	AC200 to 240 V 50/60 Hz	DC24 V
Input Current	Control (A1-A2): 35 mA, Signal (A2-15 or 21): 10 mA		
Rated Output Voltage/Current	DC12 V/20 mA		
Interlock Time	Max. 100 ms		
Response Time OFF → ON	Max. 20 ms + 1/2 Cycle + 1 ms (When Combined With US-N)		
Response Time ON → OFF	Max. 20 ms + 1/2 Cycle + 1 ms (When Combined With US-N)		
Allowable Voltage Fluctuation Range	85 to 110% of Rated Operational Voltage		
Operating Temperature/Humidity	-10 to 60°C/45 to 85% RH		
Operation Indicator	Lights During Forward Output (Green LED)/Lights During Reverse Output (Red LED)		

Circuit

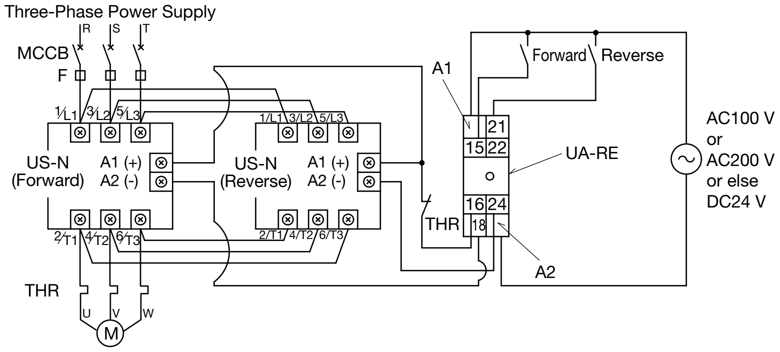
Fig. 1 UA-RE Type Circuit



Note 1. The A1 and A2 input terminals of products with DC24 V operating voltage have no polarity.

Connecting

Fig. 2 Connecting US-N□(TE) and UA-RE Types

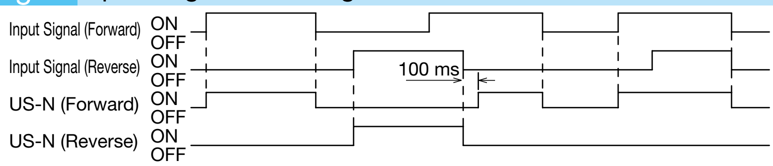


Operating Conditions

(1) Max. 100 ms switching time between forward and reverse modes.

(2) The input signal that is input first is given priority and the second signal is invalid until the first input signal switches OFF.

Fig. 3 Operating Pattern Diagram



11.5.4 Fault Detection Units (UN-FD, UN-FD4)

Detects failures that occur to the main circuit element of US-N or US-H units when in conduction mode, and can be used to prevent abnormal operation of loads by interrupting the power supply by combining a no-fuse breaker with voltage tripping device or magnetic contactor. Fault detection units are available as UN-FD type for 200 V main circuits or as UN-FD4 type for 400 V main circuits. The table below shows the differences. Refer to the Specifications column of each item for details.

Model Name	UN-FD	UN-FD4
Type	UN-FD AC100V, AC200V, DC24V 3 Types	UN-FD4 AC100V, AC200V, DC24V 3 Types
Rated Main Circuit Voltage	AC200 to 240 V 50/60 Hz	AC380 to 440 V 50/60 Hz
Output Contact Arrangement	1c	1a and 1b Types
Allowable Detection Retention Time	1 Second (Minimum Rating)	Continuous Rating
Fault Detection Criteria	· Detects When 1 or More of 2 Elements Have Continuity Failure For 2-Element Types · Detects When 2 or More of 3 Elements Have Continuity Failure For 3-Element Types or Opening Faults	· Detects When 1 or More of 2 Elements Have Continuity Failure For 2-Element Types or When Both Elements Have Opening Faults · Detects When 2 or More of 3 Elements Have Continuity Failure For 3-Element Types or Opening Faults · Fault Detection For When the Control Input Signal is ON and Main Circuit Power Supply is OFF
Fault Detection Retention	No Protection Function	Electric Retention via Operating Power Supply
Reset	When Main Circuit Power Supply Is Open	When Operating Power Supply is Turned Off
Indicator	None	· With Fault Detection Indicator Lamp · With Operation Indicator Lamp

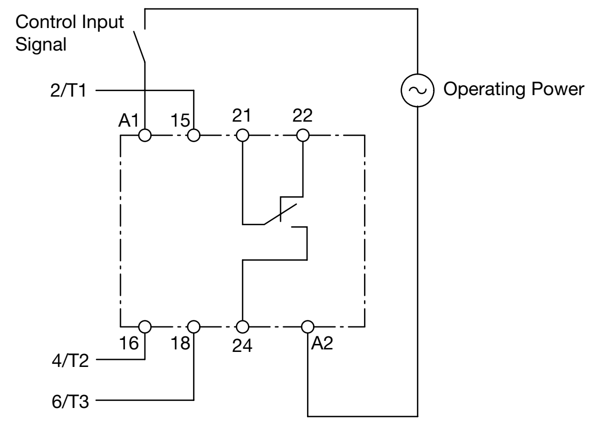
(1) UN-FD Type

● Rating

Appearance				
Model Name		UN-FD AC100V	UN-FD AC200V	UN-FD DC24V
Rated Operational Voltage		AC100 to 120 V 50/60 Hz	AC200 to 240 V 50/60 Hz	DC24 V
Rated Main Circuit Voltage		AC200 to 240 V 50/60 Hz		
Input Current		17 mA		
Output	Contact Arrangement	1c		
	Contact Rating	AC240 V 1 A, AC120 V 1.5 A (Class AC-15), DC24 V 1 A (Class DC12)		
Minimum Control Input Time		20 ms		
Detection Time		0.2 to 0.5 s		
Allowable Detection Retention Time		1 Second (Minimum Rating)		
Allowable Voltage Fluctuation Range		85 to 110% of Rated Voltage (Both Control Circuit and Main Circuit)		
Operating Temperature/Humidity		-10 to 60°C/45 to 85% RH		
Combined Protection Function		(1) No-Fuse Breakers with Voltage Tripping Device (2) Magnetic Contactors · Operate the above (1) or (2) within 1 second to shut off power to the main circuit.		

● Connecting

Fig. 1 UN-FD Type Connection



Note 1. UN-FD types cannot be used in the following circuits.
　· Capacitive Load Circuits · Star-Delta Starting Circuits · Inverter Circuits
Note 2. UN-FD types cannot be used in combination with UA-PC type power control units.
Note 3. CAN terminal types (UN-FDCX) are also manufactured.

● Operating Circuit

(1) Figures 2 to 5 indicate the main and control circuits when both use the same power supply. Use separate power supplies if the main circuit voltage and control circuit voltage are different.
(2) When using thermal overload relays with motor loads, connect the break contact of the thermal overload relay in series with the contact signal.
(3) For single-phase loads, use any 2 of the UN-FD terminals numbered 15, 16 or 18 to connect to the terminals of the load.

Fig. 2 Connecting UN-FD Types and No-Fuse Breakers (With Drive Unit)

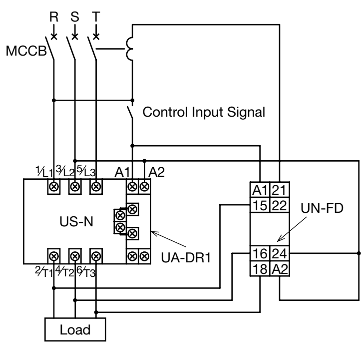


Fig. 3 Connecting UN-FD Types and Magnetic Contactors (With Drive Unit)

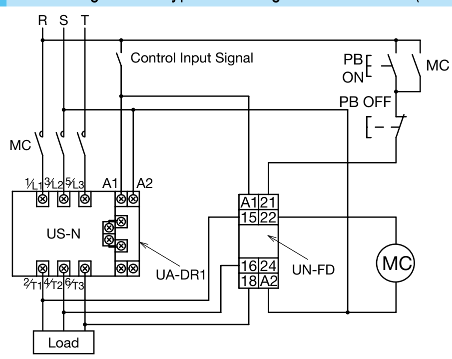


Fig. 4 Connecting UN-FD Types and No-Fuse Breakers (Without Drive Unit)

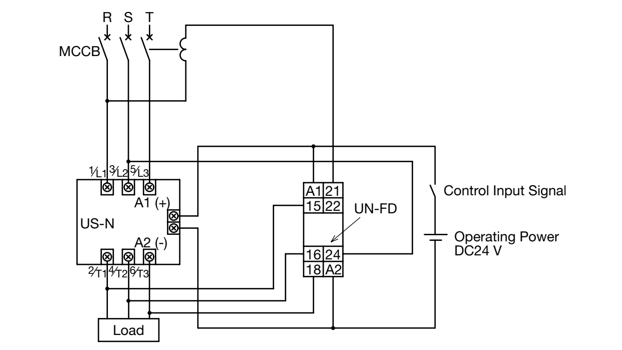
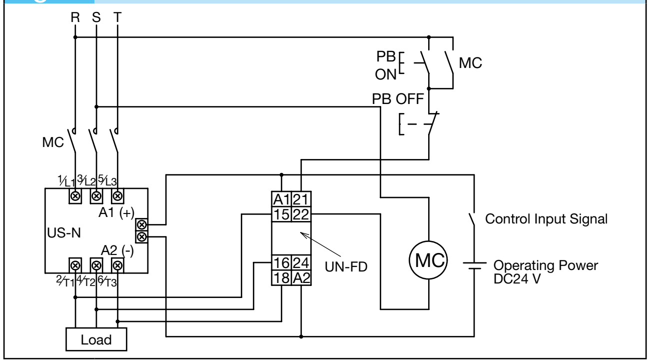


Fig. 5 Connecting UN-FD Types and Magnetic Contactors (Without Drive Unit)



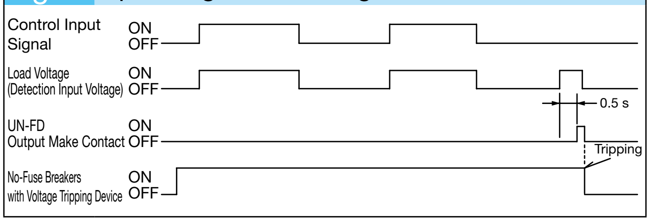
Operating Conditions

(1) Normal operation is judged to be when load current flows while the control input signal is being input.

(2) Fault detection operation is judged to be when load current flows while the control input signal is in the OFF state.

(3) US-N or US-H units trigger fault detection operation of the UN-FD unit if a main circuit power supply is applied without a load connected. Connect an actual load or a sample load such as a resistor (so that 1 A or so flows) to check the operation of US-N or US-H units. This is in order for the fault detection unit to be able to determine that a fault has occurred in the US-N or US-H unit when a voltage approximately equal to the power supply voltage is applied (due to US-N or US-H leakage current) to the load side while the US-N or US-H unit is in the OFF state. This is not considered abnormal behavior of the fault detection unit.

Fig. 6 Operating Pattern Diagram



Fault Detection Criteria

· Detects when 1 or more of the 2 elements fail continuity tests for US-N ☐ (SS)(NS) and US-H solid state contactors.
· Detects when 2 or more of the 3 elements fail continuity tests for US-N ☐ TE(SS)(NS) solid state contactors.

Handling

(1) A no-fuse breaker or magnetic contactor should be configured to open-circuit the main circuit after fault detection.
When using a fault detection unit in combination with a no-fuse breaker with voltage tripping device, use the output make contact of the fault detection unit to trip the no-fuse breaker during a fault.
When using a fault detection unit (UN-FD) in combination with a magnetic contactor, use a self-retaining circuit to retain the magnetic contactor coil and configure it such that the output break contact of the fault detection unit releases the self-retaining circuit of the magnetic contactor coil, causing the magnetic contactor to form an open-circuit.

(2) UN-FD units are rated for only short periods of time, so the detection state should not be maintained for more than 1 second. UN-FD units are reset when the main circuit becomes open-circuited.

(3) UN-FD has a fault detection time of 0.2 to 0.5 seconds. UN-FD may malfunction when applied to a motor with a long residual voltage decay time or a solid state contactor switching capacitive loads. Therefore, consider using a system that allows operation input signals to be delayed or another device to detect faults.

(4) Input as the forward/reverse signal for UN-FD unit input circuits when using a circuit supporting reversing running.

(2) UN-FD4 Type

● Rating

Appearance						
Model Name	UN-FD4 AC100V1A	UN-FD4 AC100V1B	UN-FD4 AC200V1A	UN-FD4 AC200V1B	UN-FD4 DC24V1A	UN-FD4 DC24V1B
Rated Operational Voltage	AC100 to 120 V 50/60 Hz		AC200 to 240 V 50/60 Hz		DC24 V	
Rated Main Circuit Voltage	AC380 to 440 V 50/60 Hz					
Input Current	Control (A1 to A2): 17 mA, Signal (24): 10 mA					
Output — Contact Arrangement	1a	1b	1a	1b	1a	1b
Output — Contact Rating	AC240 V 1 A, AC120 V 1.5 A (Class AC-15), DC24 V 1 A (Class DC-12)					
Minimum Control Input Time	20 ms					
Detection Time	0.2 to 0.5 s					
Allowable Detection Retention Time	Continuous Rating					
Allowable Voltage Fluctuation Range	85 to 110% of Rated Voltage (Both Control Circuit and Main Circuit)					
Operating Temperature/Humidity	-10 to 60°C/45 to 85% RH					
Operation Indicator	Lights With Signal Input (Green LED)/Lights When in Fault State (Red LED)					
Combined Protection Function	No-Fuse Breakers with Voltage Tripping Device	Magnetic Contactors	No-Fuse Breakers with Voltage Tripping Device	Magnetic Contactors	No-Fuse Breakers with Voltage Tripping Device	Magnetic Contactors
Fault Detection Retention	Electric Retention via Operating Power Supply					
Fault Detection Reset	Resetting By Turning OFF Operating Power					

Note 1. UN-FD4 types cannot be used in the following circuits.
· Capacitive Load Circuits · Star-Delta Starting Circuits · Inverter Circuits
Note 2. UN-FD4 types cannot be used in combination with UA-PC type power control units.
Note 3. CAN terminal types (UN-FD4CX) are also manufactured.

● Connecting

Fig. 7 UN-FD4 Type Connection

● Operating Circuit

(1) Figures 8 to 11 indicate the main and control circuits when both use the same power supply. Use separate power supplies if the main circuit voltage and control circuit voltage are different.
(2) When using thermal overload relays with motor loads, connect the break contact of the thermal overload relay in series with the control input signal.
(3) For single-phase loads, use any 2 of the UN-FD4 terminals numbered 15, 16 or 18 to connect to the terminals of the load.

Fig. 8 Connecting UN-FD4□1A Types and No-Fuse Breakers (With Drive Unit)

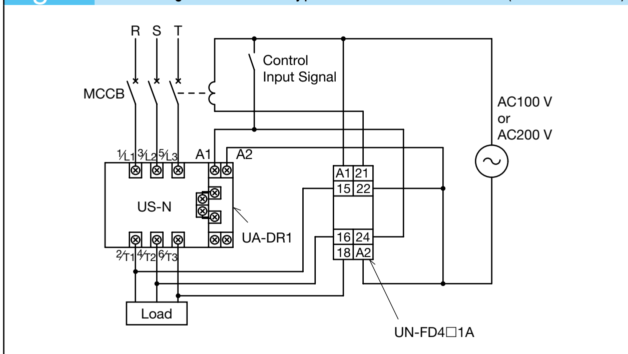
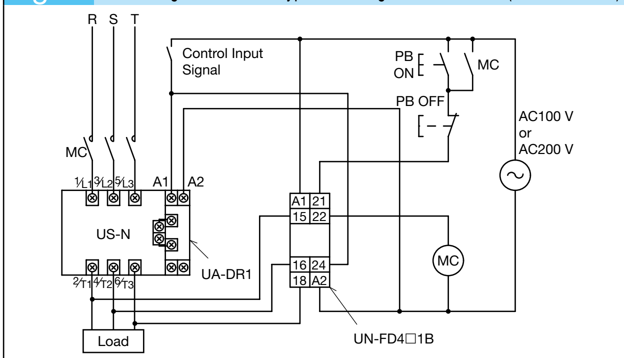


Fig. 9 Connecting UN-FD4□1B Types and Magnetic Contactors (With Drive Unit)



11

Fig. 10 Connecting UN-FD4☐1A Types and No-Fuse Breakers (Without Drive Unit)

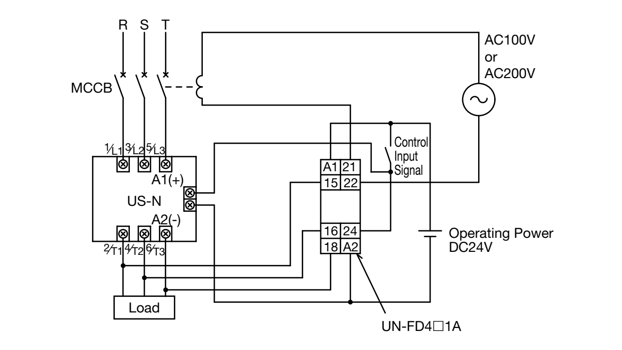
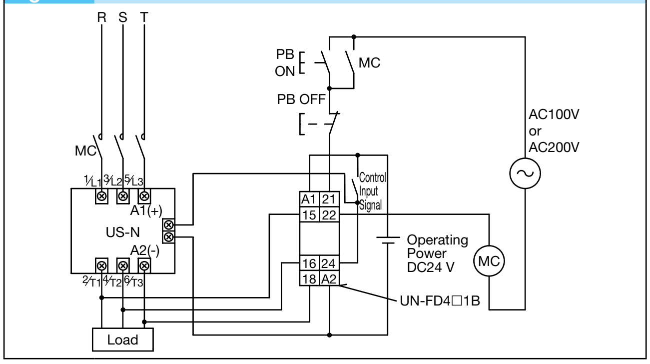


Fig. 11 Connecting UN-FD4☐1B Types and Magnetic Contactors (Without Drive Unit)



Note. It is also possible to use DC24V circuits alone if using DC operated magnetic contactors (DC24V coils).

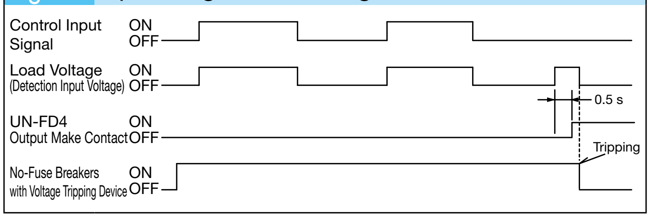
Operating Conditions

(1) Normal operation is judged to be when load current flows while the control input signal is being input.

(2) Fault detection operation is judged to be when load current flows while the control input signal is in the OFF state. Detects a fault when the control input signal is ON while the main circuit power supply is OFF.

(3) US-N or US-H units trigger fault detection operation of the UN-FD4 unit if a main circuit power supply is applied without a load connected. Connect an actual load or a sample load such as a resistor (so that 1 A or so flows) to check the operation of US-N or US-H units. This is in order for the fault detection unit to be able to determine that a fault has occurred in the US-N or US-H unit when a voltage approximately equal to the power supply voltage is applied (due to US-N or US-H leakage current) to the load side while the US-N or US-H unit is in the OFF state. This is not considered abnormal behavior of the fault detection unit.

Fig. 12 Operating Pattern Diagram



Fault Detection Criteria

- Detects when 1 or more of the 2 elements fail continuity tests or when both elements undergo open-circuit faults for US-N☐ and US-H☐ solid state contactors.
- Detects when 2 or more of the 3 elements fail continuity tests or open-circuit faults for US-N☐TE solid state contactors.

Handling

(1) A no-fuse breaker or magnetic contactor should be configured to open-circuit the main circuit after a fault has been detected.

(2) UN-FD4 units do not reset until the operating power supply is switched OFF. Switch OFF the operating power supply in order to reset.

(3) UN-FD4 has a fault detection time of 0.2 to 0.5 seconds. UN-FD4 may malfunction when applied to a motor with a long residual voltage decay time or a solid state contactor switching capacitive loads. Therefore, consider using a system that allows operation input signals to be delayed or another device to detect faults.

(4) Input as the forward/reverse signal for UN-FD4 unit input circuits when using a circuit supporting reversing running.

11.5.5 Power Control Unit (UA-PC)

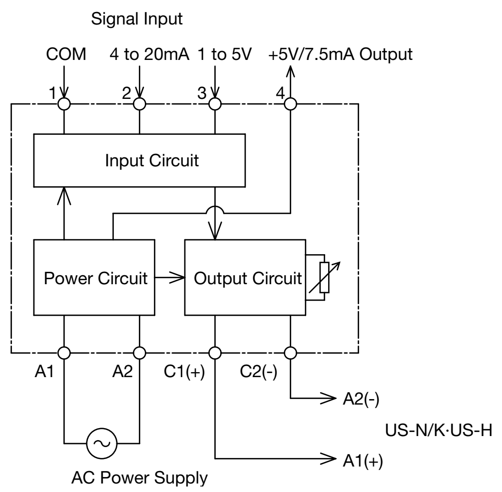
UA-PC power control units can be combined with US-N or US-H solid state contactors to control power using a low-noise minimal-cycle control system that is ideal for controlling the temperature of electric heaters, etc.

Rating

Item			
Appearance			
Model Name		UA-PC AC100V	UA-PC AC200V
Rated Operational Voltage		AC100 to 110V 50/60Hz	AC200 to 220V 50/60Hz
Input Current		20mA	
Control Method		Cycle Control (Zero Voltage Trigger)	
Input Signal		Current Signal : 4 to 20mA(250Ω) Voltage Signal : 1 to 5V(100kΩ) Contact Signal : ON, OFF Symbols Variable Resistance : Manual Setting/Gradient Setting	
Rated Output Voltage/Current		DC12V/20mA	
Gradient Setting		0 to 100%(Adjustable Via Setter)	
Control Period		0.2 to 1s (Adjustable Via Setter)	
Combining US-N/US-H	Adjustment Range of Output Voltage	0 to 100%	
	Applicable Loads	Resistor/Heating Element	
Operation Indicator	Power Indicator	Lights With Control Circuit Voltage Input (Red LED)	
	Output Indicator	Lights With US-N Drive Signal Output (Red LED)	
Allowable Voltage Fluctuation Range		85 to 110% of Rated Operational Voltage	
Operating Temperature/Humidity		-10 to 60°C/45 to 85% RH	

Connecting

Fig. 1 Connecting



Properties

Fig. 2 Output Properties

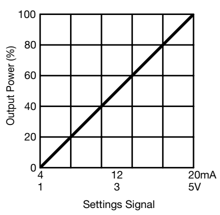
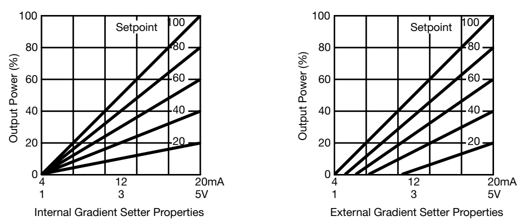
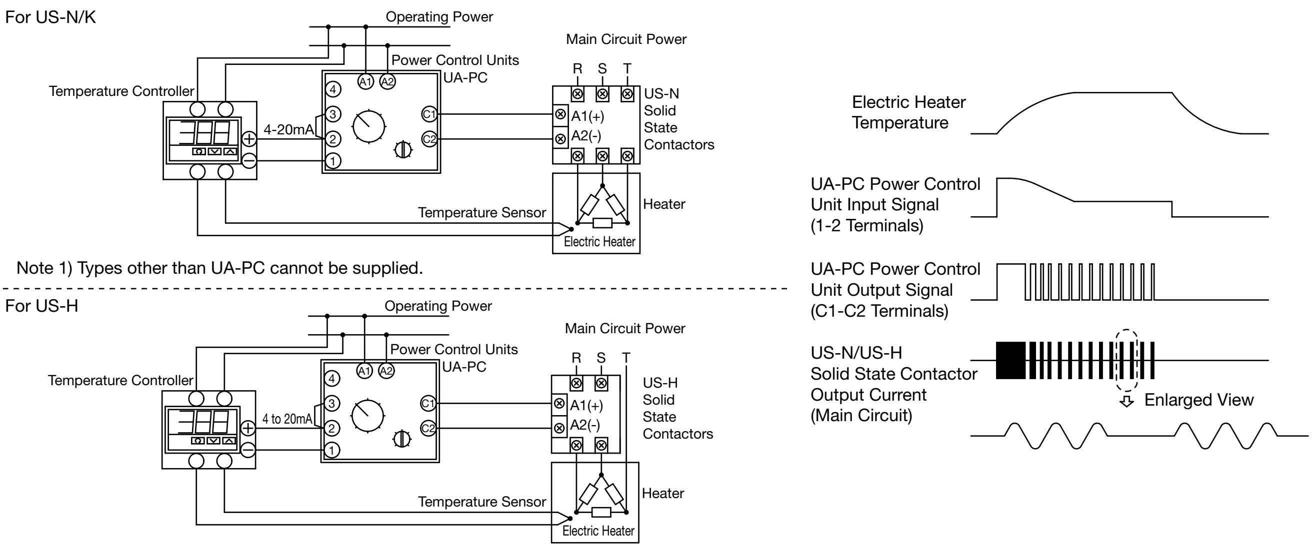


Fig. 3 Gradient Properties



Operating Circuit

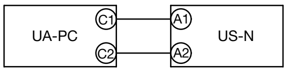
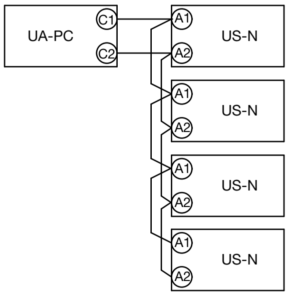
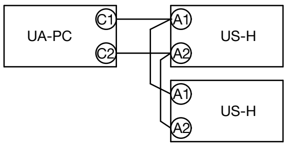
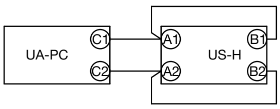
Fig. 4 Operating Circuit Example



Application

(1) No. of US-N Drive Units

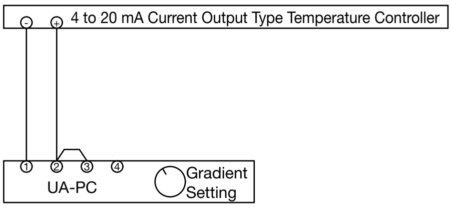
The below indicates the number of US-N or US-H drive units for UA-PC units.

Main Circuit Control Method	3-Pole Batch Control	
Model Name	US-N5SS(TE)/N8SS(TE) US-N70NS(TE)/N80NS(TE) US-NH70NS(TE)/NH80NS(TE)	US-N20(TE)to N50(TE)
Connection Circuit	Capable Of Driving Up To 1 Units 	Capable Of Driving Up To 4 Units 
Main Circuit Control Method	3-Pole Individual Control	
Model Name	US-H20 to H50	US-H20DD to H50DD
Connection Circuit	Capable Of Driving Up To 2 Units 	Capable Of Driving Up To 1 Unit (2 Circuits) 

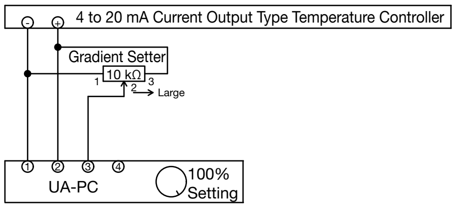
(2) Signal Input Circuit Example

(1) to (18) show the possible signal input circuits.

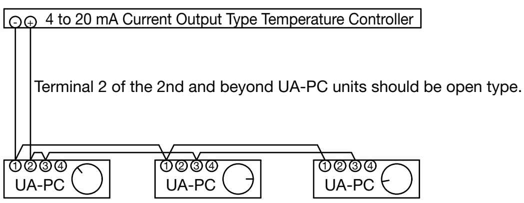
(1) Automatic Control (Current Signal) - Internal Gradient Settings



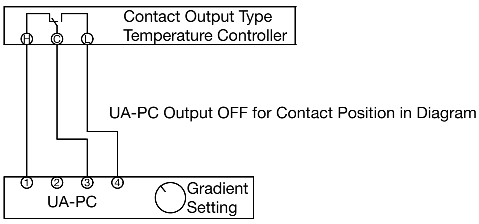
(2) Automatic Control (Current Signal) - External Gradient Settings



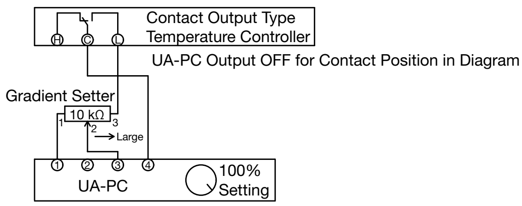
(3) Automatic Control (Current Signal) - Internal Gradient Settings - Multiple Unit Control



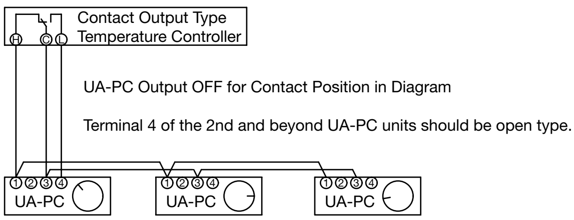
(4) Automatic Control (ON/OFF Signal) - Internal Gradient Settings



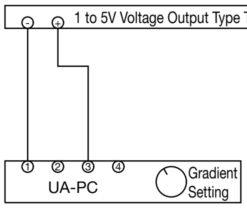
(5) Automatic Control (ON/OFF Signal) - External Gradient Settings



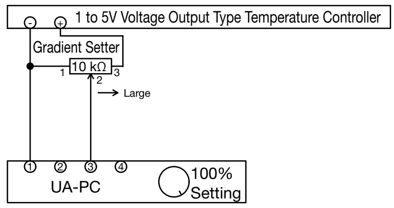
(6) Automatic Control (ON/OFF Signal) - Internal Gradient Settings - Multiple Unit Control



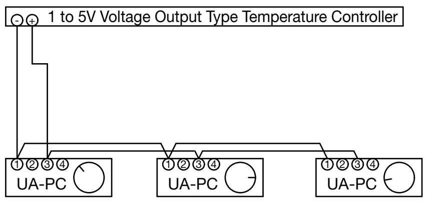
(7) Automatic Control (Voltage Signal) - Internal Gradient Settings



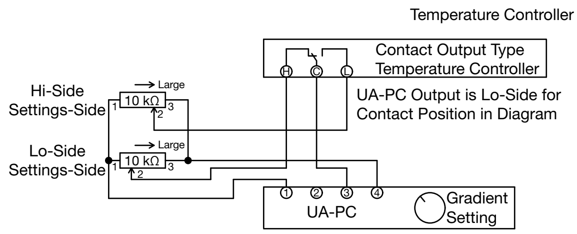
(8) Automatic Control (Voltage Signal) - External Gradient Settings



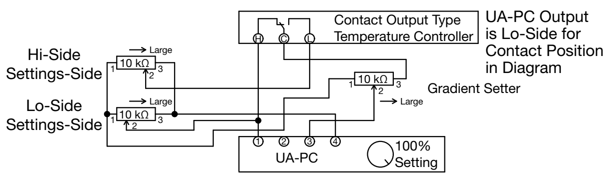
(9) Automatic Control (Voltage Signal) - Internal Gradient Settings - Multiple Unit Control



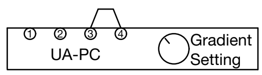
(10) Hi/Lo Control (ON/OFF Signal) - Internal Gradient Settings



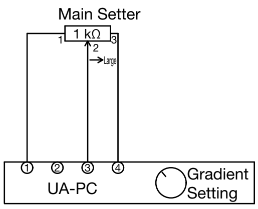
(11) Hi/Lo Control (ON/OFF Signal) - External Gradient Settings



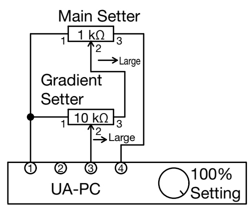
(12) Manual Control - Internal Settings



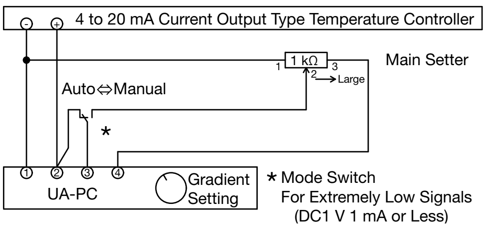
(13) Manual Control - External Main Settings - Internal Gradient Settings



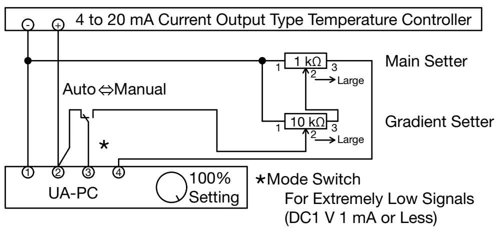
(14) Manual Control - External Main Settings - External Gradient Settings



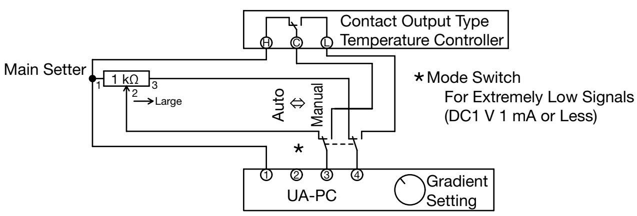
(15) Auto/Manual Control (Current Signal/External Main Settings) - Internal Gradient Settings



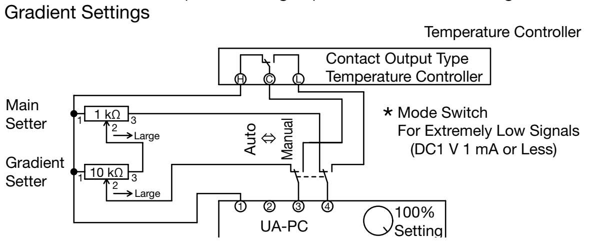
(16) Auto/Manual Control (Current Signal/External Main Settings) - External Gradient Settings



(17) Auto/Manual Control (ON/OFF Signal) - External Main Settings - Internal Gradient Settings



(18) Auto/Manual Control (ON/OFF Signal) - External Main Settings - External Gradient Settings



(3) Application Example - Rapid Start-Up Load Temperature Circuit via a UA-PC Power Control Unit

This method of temperature control rapidly starts up electric heaters to reach the set temperature in the shortest amount of time. To achieve this, the heat is initially turned on at 100% power for rapid heating, then as the temperature approaches the set temperature the power level is reduced.
The way in which UA-PC units support this kind of temperature control is indicated below.

(1) Usage Method

Short-circuiting terminals 1 and C2 of the UA-PC power control unit being used results in a 100% output signal regardless of control input signal.
Accordingly, the required functionality can be achieved by using a contact to control the current path between terminals 1 and C2.

a) Time Control Using Timers

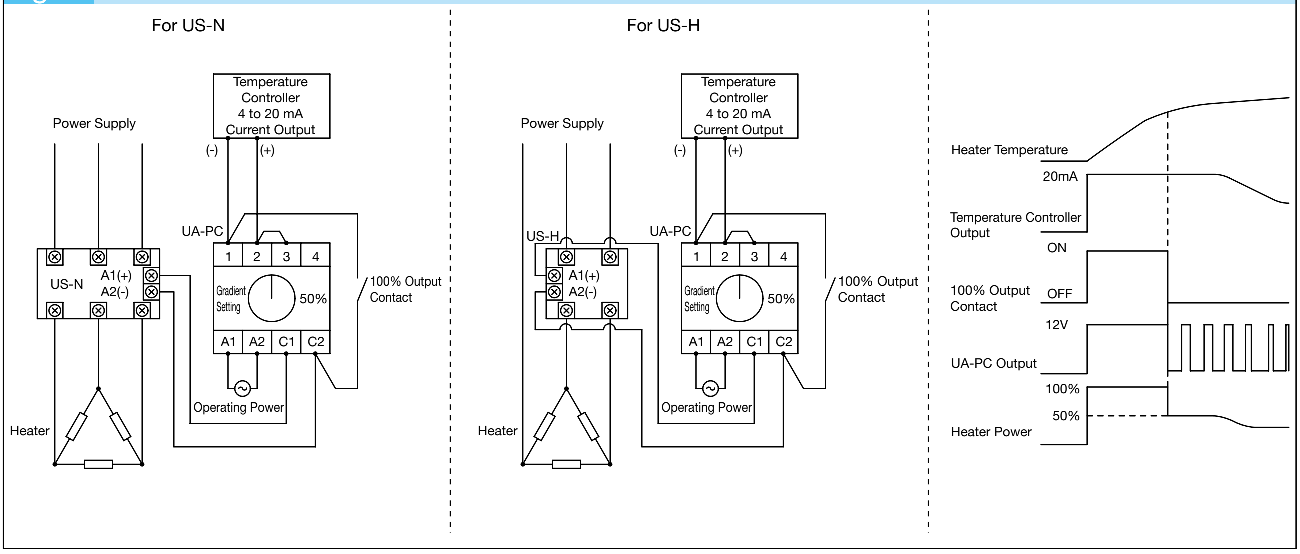
A timer is used to short-circuit terminals 1 and C2 for a fixed period of time only after power has been applied to the electric heater, open-circuiting the contact after the timed period has elapsed.

b) Control Using Thermal Switches or Temperature Controllers with Lower-Limit Alarm Outputs

Thermal switches which activate when the electric heater temperature is a little below the set temperature, or a temperature controller with lower-limit alarm output (open-circuited at low temperatures) are used to control the current path between terminals 1 and C2.

(2) Operating Circuit Example

Fig. 5 Rapid Start-Up Load Temperature Circuit



Handling

(1) Applicable Loads

UA-PC power control units are intended only for use with resistive loads and cannot be used with inductive loads or for control of transformer primary coils. Select a solid state contactor rated to suit the heater capacity.

(2) Wiring

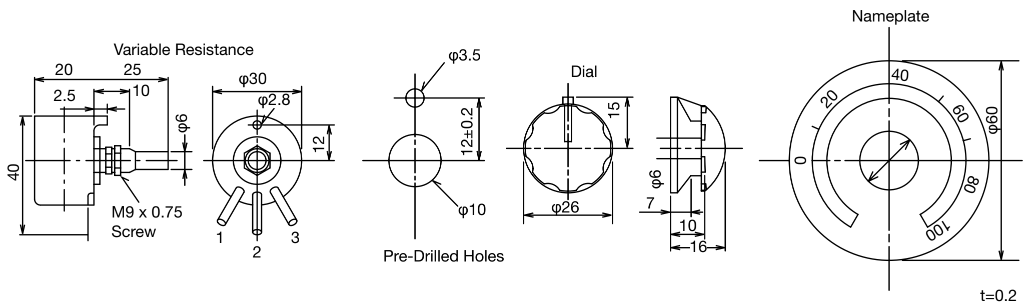
- Wiring between the UA-PC unit and temperature controller/setter should be as short as possible (3 m or less) and should be connected such that each of the respective signals match.
- For lengths exceeding 3 m, use a single-core wire or a 2-core shielded wire (10 m or less) and connect the shield to ground.
- Use 10 m or less of twisted-pair cable for wiring the UA-PC output terminals and solid state contactor input terminals together.
- Avoid parallel wiring between the control circuit and main circuit.

(3) Setters

The below types of variable resistors are available for external setting.

UA-PC – VR10

Symbol	Resistor/Application
VR10	10 kΩ/Gradient Setter
VR1	1 kΩ/Main Setter



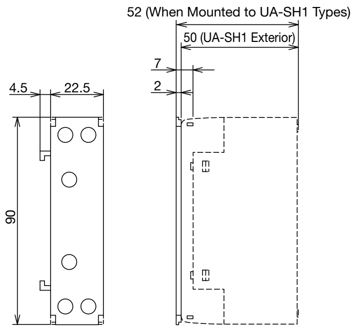
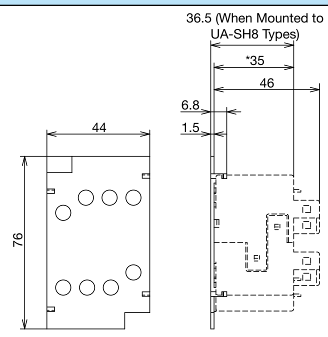
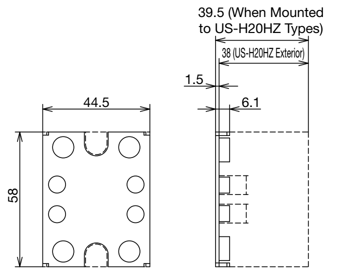
11.5.6 Live Part Protection Cover Units

Covers for preventing inadvertent contact with live parts after wiring in panel mounting.
The below live part protection cover units are available as optional units or as US-H ☐ type live part protection covers.

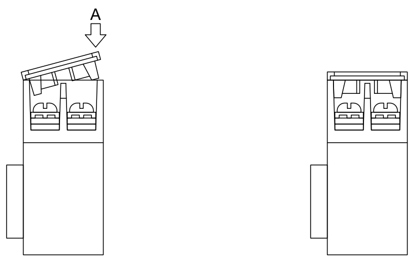
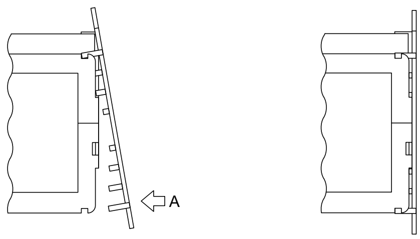
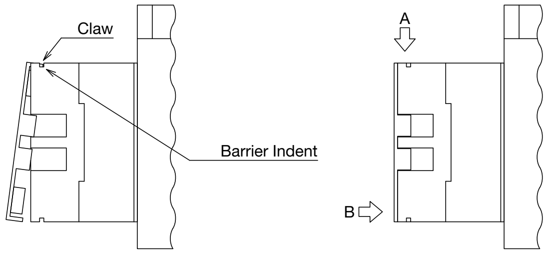
Production Range/Applicable Models

Model Name	Applicable Models
UA-CVDR1	UA-DR1, UA-SH1
UA-CVSH8	UA-SH8
UN-CV501US	US-H20/H30/H40/H50(DD), US-H20/H30(DD)UF

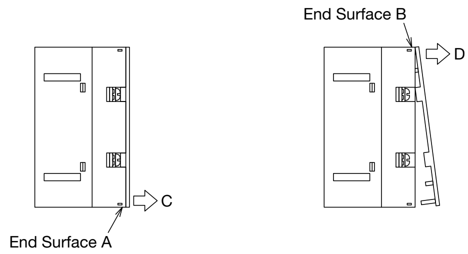
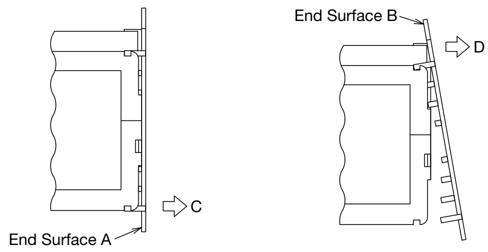
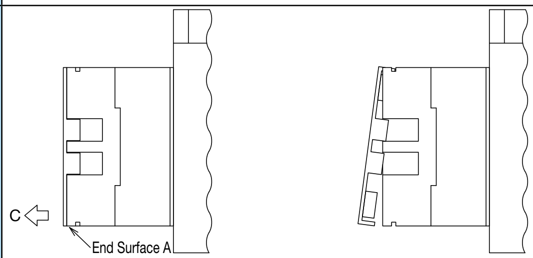
Outline Drawings

Model Name	UA-CVDR1	UA-CVSH8	UN-CV501US
Outline Drawings	 The figure above shows a UA-SH1 type unit with live part protection cover mounted.	 The figure above shows a UA-SH8 type unit with live part protection cover mounted. (* Symbol: UA-SH8 type outline drawings when US-N5/N8SS(TE) is mounted)	 The figure above shows a US-H20HZ type unit with live part protection cover mounted.

Mounting Method

Model Name	Mounting Method
UA-CVDR1	 (1) Hook the claws of the cover to the holes of the barrier at the top of the unit. (2) Press along the direction of arrow A to mount the live part protection cover.
UA-CVSH8	 (1) Hook the claws of the cover to the grooves of the barrier at the top of the unit. (2) Press along the direction of arrow A to mount the live part protection cover.
UN-CV501US	 (1) Hook the claws of the cover to the indents of the barrier at the top of the unit. (2) While pressing in the direction of arrow B, simultaneously press in the direction of arrow A.

Removal Method

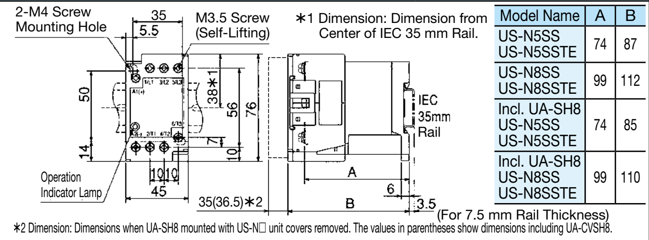
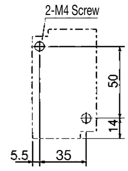
Model Name	Removal Method	
UA-CVDR1		(1) Pull end surface A of the live part protection cover away in the direction of arrow C. (2) Similarly, pull end surface B in the direction of arrow D and detach the live part protection cover.
UA-CVSH8		(1) Pull end surface A of the live part protection cover away in the direction of arrow C. (2) Similarly, pull end surface B in the direction of arrow D and detach the live part protection cover.
UN-CV501US		(1) Press end surface A of the live part protection cover in the direction of arrow C. (Press both poles up) (2) Detach the live part protection cover.

Minimum Order Unit

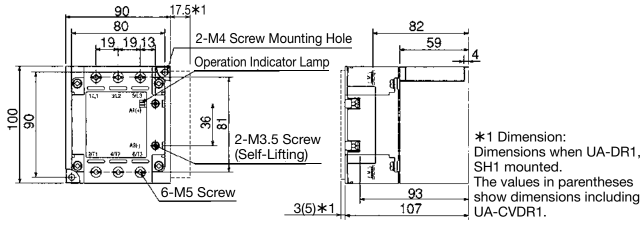
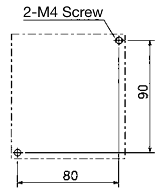
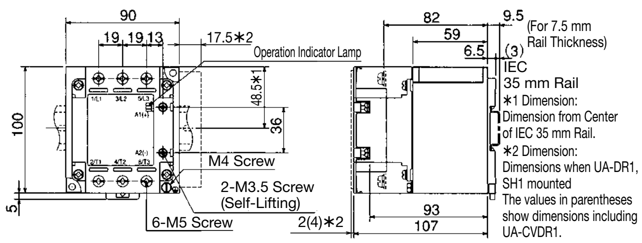
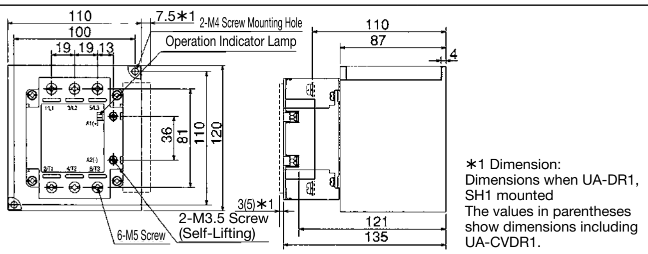
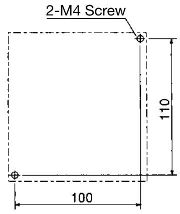
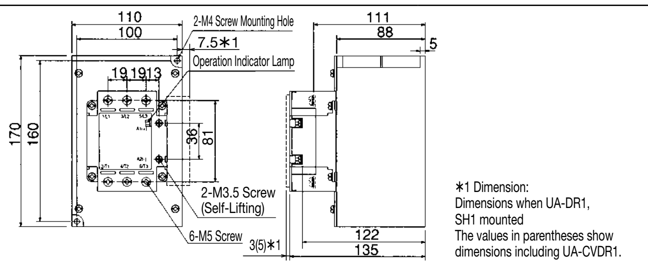
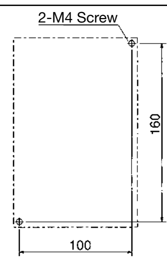
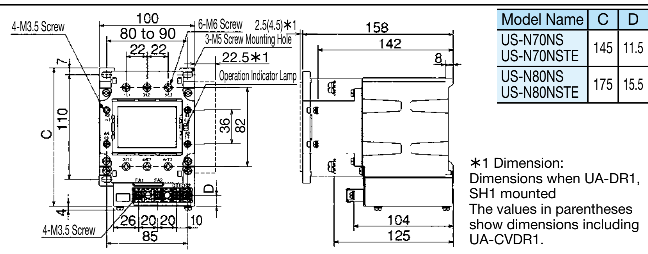
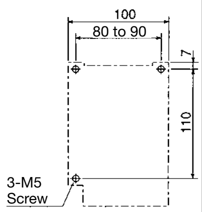
The minimum order quantity for all types is 10 pieces. 10 pieces per bag are shipped. Place orders in multiples of 10 when ordering.

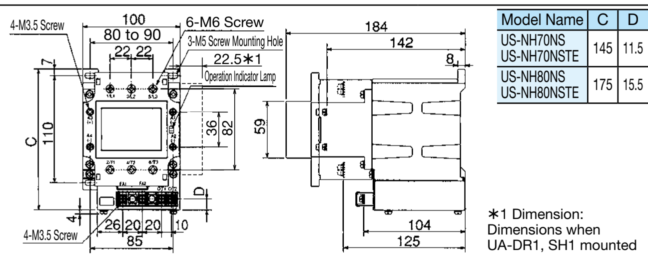
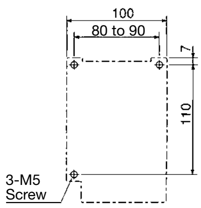
11.6 Outline Drawings

US-N Solid State Contactors

<table>
<tr><th>Model Name</th><th>Appearance</th><th>Outline Drawings</th><th>Hole Drilling Dimensions</th><th>Weight (kg)</th></tr>
<tr><td>US-N5SS
US-N5SSTE
US-N8SS
US-N8SSTE</td><td></td><td>
</td><td>

Mounting Dimension:
Also Allow For 30 x 52,
34 x 52 and 30 x 48.</td><td>US-N5SS
US-N5SSTE
0.27

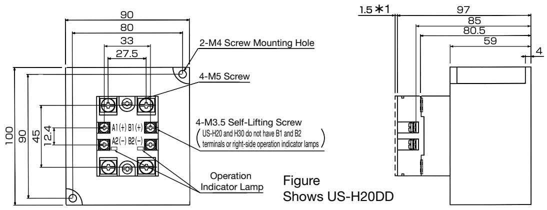
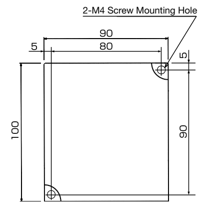
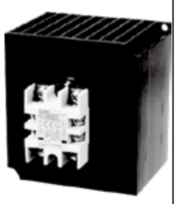
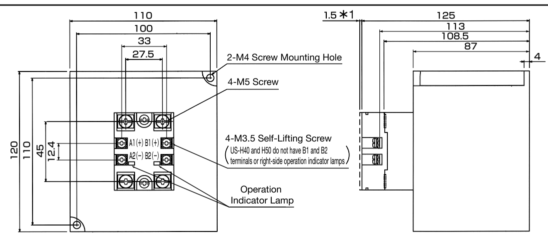
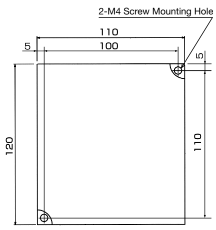
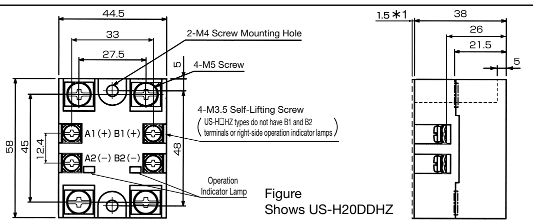
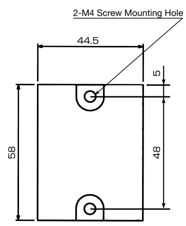
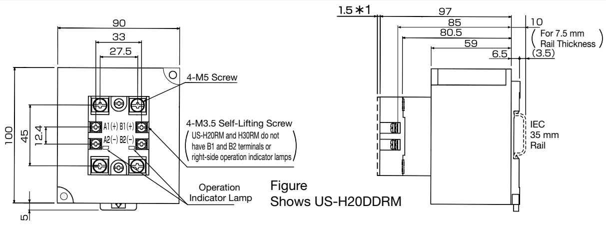
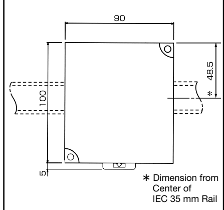
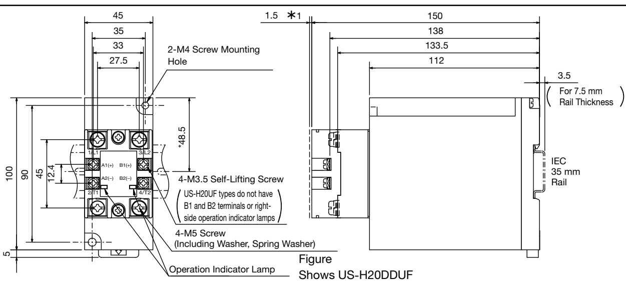
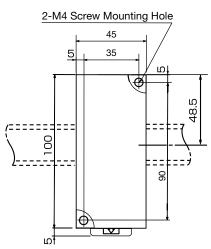
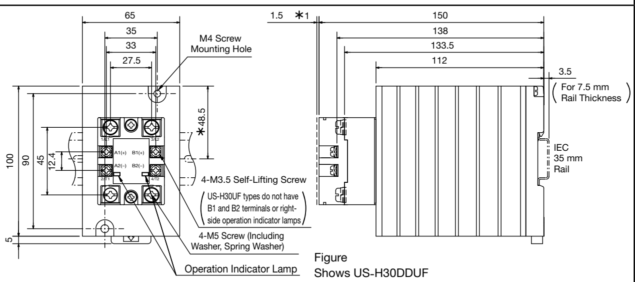
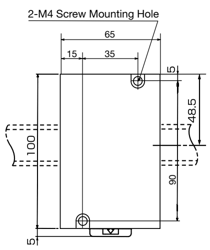
US-N8SS
US-N8SSTE
0.4</td></tr>
<tr><td>US-N20(CX)
US-N20TE(CX)
US-N30(CX)</td><td></td><td>
</td><td>
</td><td>0.78</td></tr>
<tr><td>US-N20(CX)RM
US-N20TE(CX)RM</td><td></td><td>
</td><td>—</td><td>0.8</td></tr>
<tr><td>US-N30TE(CX)
US-N40(CX)
US-N40TE(CX)
US-N50(CX)</td><td></td><td>
</td><td>
</td><td>1.2</td></tr>
<tr><td>US-N50TE(CX)</td><td></td><td>
</td><td>
</td><td>1.58</td></tr>
<tr><td>US-N70NS
US-N70NSTE
US-N80NS
US-N80NSTE</td><td></td><td>
</td><td>
</td><td>US-N70NS
US-N70NSTE
1.8

US-N80NS
US-N80NSTE
1.9</td></tr>
<tr><td>US-NH70NS
US-NH70NSTE
US-NH80NS
US-NH80NSTE</td><td></td><td>
</td><td>
</td><td>US-NH70NS
US-NH70NSTE
1.9

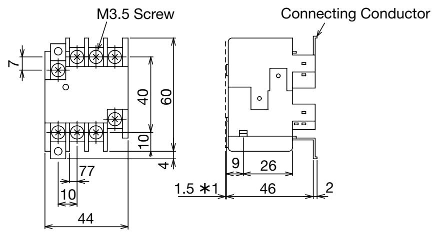
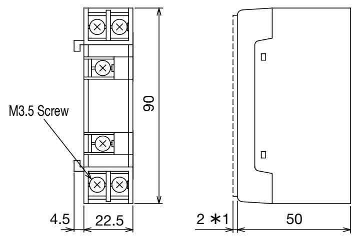
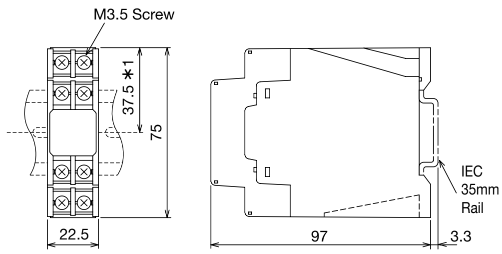
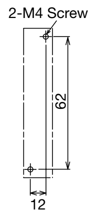
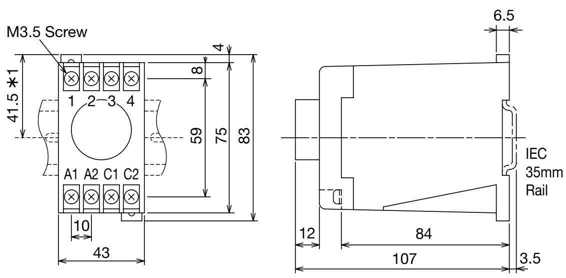
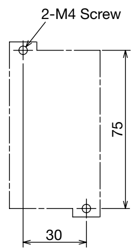
US-NH80NS
US-NH80NSTE
2.0</td></tr>
</table>

11

US-H Solid State Contactors

Model Name	Appearance	Outline Drawings	Hole Drilling Dimensions	Weight (kg)
US-H20 US-H20DD US-H30 US-H30DD		 Figure Shows US-H20DD *1 Dimension: Dimensions including live part protection cover UN-CV501US.		0.42
US-H40 US-H40DD US-H50 US-H50DD		 *1 Dimension: Dimensions including live part protection cover UN-CV501US.		0.85
US-H20HZ US-H20DDHZ US-H30HZ US-H30DDHZ US-H40HZ US-H40DDHZ US-H50HZ US-H50DDHZ		 Figure Shows US-H20DDHZ *1 Dimension: Dimensions including live part protection cover UN-CV501US.		0.13
US-H20RM US-H20DDRM US-H30RM US-H30DDRM		 Figure Shows US-H20DDRM *1 Dimension: Dimensions including live part protection cover UN-CV501US.		0.44
US-H20UF US-H20DDUF		 Figure Shows US-H20DDUF *1 Dimension: Dimensions including live part protection cover UN-CV501US.		0.52
US-H30UF US-H30DDUF		 Figure Shows US-H30DDUF *1 Dimension: Dimensions including live part protection cover UN-CV501US.		0.68

Optional

Model Name	Appearance	Outline Drawings	Hole Drilling Dimensions	Weight (kg)
UA-SH8		 ∗1 Dimension: Dimensions including live part protection cover UA-CVSH8.	Can be mounted on US-N5SS(TE) types. (Front Clip-on Type) Connecting conductor is included with the unit.	0.5
UA-DR1 UA-SH1		 ∗1 Dimension: Dimensions including live part protection cover UA-CVDR1.	UA-DR1 and UA-SH1 include connecting conductors for US-N.	0.1
UA-RE UN-FD UN-FD4		 ∗1 Dimension: Dimension from Center of IEC 35 mm Rail.		0.1
UA-PC		 ∗1 Dimension: Dimension from Center of IEC 35 mm Rail.		0.5

11.7 ET-N☐ Electric Motor Protection Relays

Electric motor protection relays that can protect against overloads (including restriction) and open-phases (including unbalanced currents) during AC motor start-up or running, as well as detect reverse-phase states.

Features

- **Optimal Protection to Suit Load Properties**
  Protection function and overload operating time can be selected to suit the load via the mode setting switch.
  Protection Function: Overload, Open-Phase and Reverse-Phase Combination
  Operating Time: Select Among 3/5/7/15/30 Seconds
  (At Current 600% of Setpoint)
- **Wide Current Settling Range**
  Applicable with a current settling range 3 to 4 times the minimum scale.
- **Easy Fault-Finding Via Operation Indicator Lamp**
  Indicators: Power/Overload/Open-Phase/Reverse-Phase
- **Indicates Load Equipment Running State**
  Indicates the normal running or stopped states of load equipment.
- **Output Contacts 1a1b**
  Make contacts and break contacts are completely independent and can be used with circuits at different voltages.
- **Simple Operation**
  Has settings/operation displays located on the front surface to make initial settings and maintenance easy.
  Settings/operation displays have protective covers to prevent misoperation.
- **Operation Checking**
  Checking of overload operation properties is possible.
  Can also be operated momentarily with external testing circuits.
- **Self-Diagnosing Functionality**
  Equipped with self-diagnosing functionality that triggers a trip when abnormalities are detected.

ET-N60

- **Compact**
  ET-N60 have a reduced width of 78 mm which is effective for reducing the size of control panels.
- **Simple Wiring**
  The main circuit wiring is connected via terminals so there is no need to wind up main circuit power lines.
- **Rail Mounting Standardized**
  ET-N60 can be mounted on IEC, DIN and JIS standards compliant 35 mm width rail.

Type Designations

· Electric Motor Protection Relays

ET — N60 △ 20A △ AC100V

Symbol	Frame Size
N60	60 A Frame
N150	150 A Frame
N360	360 A Frame

Symbol	Current Settling Range
1A	0.25 to 1 A
4A	1 to 4 A
8A	2 to 8 A
20A	5 to 20 A
60A	15 to 60 A
150A	40 to 150 A
360A	110 to 360 A

Symbol	Rated Operational Voltage
AC100V	AC100 to 120 V 50/60 Hz
AC200V	AC200 to 240 V 50/60 Hz

· Terminal Cover Units

UN — CV602

Symbol Indicates Unit

Symbol Indicating Unit Product Name
ET-N60 Terminal Cover

Rating

Model Name		Range of Setting Current [A]	Applicable Motor Capacity [kW]		Model Name		Range of Setting Current [A]	Applicable Motor Capacity [kW]	
			200 to 220 V	400 to 440 V				200 to 220 V	400 to 440 V
ET-N60	1A	0.25 to 1	0.03 to 0.2	0.05 to 0.4	ET-N60	60A	15 to 60	3.7 to 11	7.5 to 22
ET-N60	4A	1 to 4	0.2 to 0.75	0.4 to 1.5	ET-N150	150A	40 to 150	11 to 37	22 to 75
ET-N60	8A	2 to 8	0.4 to 1.5	0.75 to 2.2	ET-N360	360A	110 to 360	30 to 90	55 to 150
ET-N60	20A	5 to 20	1.5 to 4	2.2 to 7.5					

Properties

Main Circuit Rated Insulation Voltage		660V 50/60Hz						
Rated Current		1A	4A	8A	20A	60A	150A	360A
Current Settling Range		0.25 to 1A	1 to 4A	2 to 8A	5 to 20A	15 to 60A	40 to 150A	110 to 360A
Control Circuit Rated Operational Voltage		100 to 120V or 200 to 240V 50/60Hz						
Allowable Operating Voltage Fluctuation Range		85 to 110% of Rated Operational Voltage						
Control Circuit Input		For AC100 V: 7 VA (With AC100 V Applied)/For AC200 V: 14 VA (With AC200 V Applied)						
Output Contact	Contact Arrangement	1a1b						
	Rating	AC240 V 1 A, AC120 V 2 A (Class AC-15)						
	Reset	Manual Reset						
Protection Mode		Overload/Overload + Open-Phase/Overload + Open-Phase + Reverse-Phase						
Overload	Operating Current	115±5%						
	Operating Time	3/5/7/15/30 Seconds (at 600% Current)						
	Operating Method	Heat-Accumulating Operation (Inching/Hot Start Protection)						
Open Phase	Operating Current	70% or More						
	Imbalance Sensitivity	30 to 50%						
	Operating Time	3±1 s						
Reverse-Phase	Detection Method	Current Detection						
	Operating Current	70% or More						
	Operating Time	0.5 s or Less						
Property Fluctuations As Voltage Fluctuates		Operating Current ±5%, Operating Time ±10%						
Property Fluctuations As Temperature Fluctuates		Operating Current ±5%, Operating Time ±10%						
Operation Indicator Lamp		Power/Overload/Open-Phase/Reverse-Phase Individual Tripping Indicators						
Withstand Voltage		Main Circuit: AC2500 V for 1 Minute, Operation Control Circuit: AC2000 V for 1 Minute						

Working Environment Criteria

(1) Ambient Temperature: -10 to 55°C (no condensation, no freezing)
(2) Relative Humidity: 45 to 85% RH
(3) Vibration: 10 to 55 Hz 19.6 m/s^2 or Less
(4) Shock: 49 m/s^2 or Less
(5) Altitude: 2000 m or Below

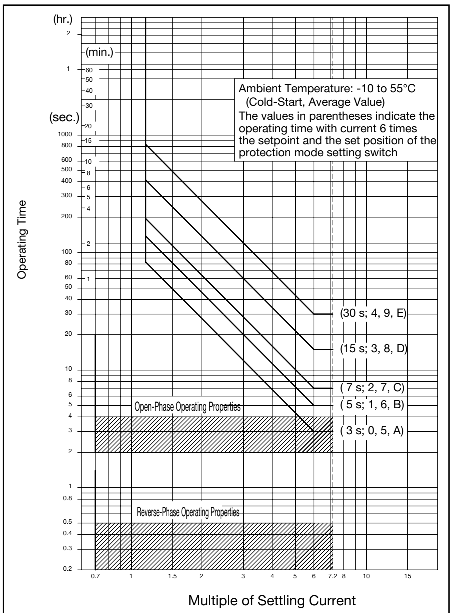


Fig. 2. Overload Protection Properties

Handling

- Control Panel

  The protection mode setting switch and current adjusting dial have a control groove to support control operations via compact minus (flathead) screwdrivers.

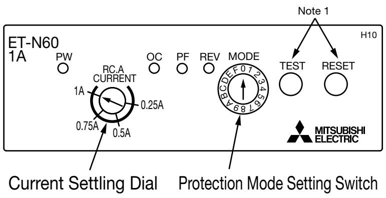


Fig. 1. Control Panel

Note 1. When operating the buttons with the protective cover on, do so with the button front surface part open.
If the buttons are pressed from above the cover without opening it, unnecessary operations may occur.

- Protection Mode Settings

  Configure the protection function and operating time via the protection mode settings switch to suit the load characteristics and application before use. The switch is set to position 0 at shipping.
  However, if the settings switch is stopped between two values unstable operation may result, so take care ensure a clear selection is made.
  Do not set the switch to the "F" position.

- Protection Mode Setting Switch Settings and Protection Functionality

Set Position	Protection Function	Operating Time (At 600% I)	Set Position	Protection Function	Operating Time (At 600% I)	Set Position	Protection Function	Operating Time (At 600% I)
0	Overload, Open-Phase and Reverse-Phase Protection (3E)	3 s	5	Overload and Open-Phase Protection (2E)	3 s	A	Overload Protection (1E)	3 s
1	Overload, Open-Phase and Reverse-Phase Protection (3E)	5 s	6	Overload and Open-Phase Protection (2E)	5 s	B	Overload Protection (1E)	5 s
2	Overload, Open-Phase and Reverse-Phase Protection (3E)	7 s	7	Overload and Open-Phase Protection (2E)	7 s	C	Overload Protection (1E)	7 s
3	Overload, Open-Phase and Reverse-Phase Protection (3E)	15 s	8	Overload and Open-Phase Protection (2E)	15 s	D	Overload Protection (1E)	15 s
4	Overload, Open-Phase and Reverse-Phase Protection (3E)	30 s	9	Overload and Open-Phase Protection (2E)	30 s	E	Overload Protection (1E)	30 s

Configuring Settling Current

Configure the current adjusting dial to suit the rated current of the load before use.
For greater precision configuration, illuminate the "OC" lamp of the ET-N when setting the current.

- Detailed Setting Procedure (Set the current using the following procedure.)

  (1) Turn the current setting dial to the maximum position.
  (2) Apply the operating power supply.
  (3) Allow 115% of the rated motor current to flow through the ET-N main circuit terminal using an actual load or a resistor.
  (4) Set the protection mode setting switch to "A" to "E" if testing single-phase current, connect the main circuit in series with 1/L1 phase, 3/L2 phase and 5/L3 phase, then allow the main circuit current to flow.
  (5) The "OC" indicator lamp should now blink with a 1 second period.
  (6) In this state, slowly reduce the current value using the current setting dial. (Rotate to the left)
  (7) Stop turning the current setting dial when the "OC" indicator lamp blinking changes from a 1 second period to a 0.2 second period to complete configuration.

The overload protection properties are those shown in Figure 2. Configure special load devices by first verifying the overload withstanding capacity of the device.

Do not turn the current adjusting dial past the maximum or minimum values of the rated current range.

● Mounting

The control circuit terminal should be facing downwards to be in the correct orientation when screw mounting or IEC 35 mm rail mounting on vertical surfaces.
If mounting horizontally with screws, then rotate the unit 90 degrees in a counterclockwise direction.
Close mounting is not possible, as a minimum gap of 10 mm should be established when mounting.

● Indicator Lamp Display Contents

4 indicator lamps are used to indicate the running and tripping status of the load device.

Indicator Lamp Names	Always Lit	1 s Blinking	0.2 s Blinking
PW	Power Indicator	Self-Diagnosing Abnormal Tripping	———
OC	Overload Tripping	Load Running (Normal Running)	Testing Overcurrent and Overload Protection (Test 1)
PF	Open Phase Tripping	———	———
REV	Reverse-Phase Tripping	Test Tripping (Test 2)	———

● Tests

(1) Overload Protection Testing (Test 1)

Pressing the test button applies a signal with 600% normal current in order to test the overload protection function. The OC indicator lamp will blink with a 0.2 second period. Continue to press the test button and time how long it takes until the OC indicator lamp is continuously lit or the output contact operates in order to test the overload protection function.
The operating time should be ±10% of the operating time range (at 600% current) configured with the protection mode settings switch.

(2) Test Tripping (Test 2)

Simultaneously press the test button and reset button to momentarily trip the output relay.

● Reset

Press the reset button to reset the tripped state relay. If tripped via an overload then the relay cannot be immediately reset. (If tripped via an overload then the relay cannot be reset for 5 minutes) Open-phase or reverse-phase trips can be reset. The relay is reset electrically so cannot be reset if the operating power supply is OFF.

● Reverse-Phase Protection

The operating time for reverse-phase protection is 0.5 seconds, so the motor will rotate in the reverse direction for a short period of time even if the phases are reversed. If reversing for even a short period of time cannot be tolerated, then use in combination with a separate reverse-phase protection relay. The current flowing in ET-N main circuit terminals is used to detect phase reversal, so detection is not possible if the order of the phases between ET-N and the load device are changed.

● Non-Applicable Loads

ET-N units have an integrated current transformer that detects main circuit current and provides overcurrent protection, protecting the load device. (Refer to Figure 3). The integrated current transformer is designed to detect 50/60 Hz power, so a reduction in power supply frequency (low inverter operating frequency) may fail to saturate the iron core of the transformer, causing only low signals from the main circuit current to be detected, changing the operating properties of the ET-N unit. ET-N units cannot be used to protect motors for the above reasons when driving with an inverter and so should not be used.
They are similarly unusable for DC circuits or for circuits other than 50/60 Hz for the same reasons.

Connecting

● Terminal Connections

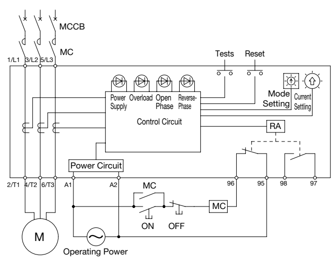


Fig. 3. Terminal and Internal Connections

Magnetic contactors should be mounted separately and terminal connections made with the wires from the table at right.

● Applicable Wires

Model Name	Main Circuit: Terminal Screw Size	Main Circuit: Applicable Wires	Main Circuit: Applicable Crimp Lugs	Main Circuit: Tightening Torque N·m Parentheses show standard value	Control Circuit: Terminal Screw Size	Control Circuit: Applicable Wires	Control Circuit: Applicable Crimp Lugs	Control Circuit: Tightening Torque N·m Parentheses show standard value
ET-N60 1 A to 60 A	M5		1.25-5 to 14-5	2.06 to 3.33 (2.54)				
ET-N150 150 A	M8	—	5.5-8 to 60-8	6.28 to 10.29 (7.84)	M3.5	1.25 to 2 mm² φ1.6 mm	1.25-3.5 to 2-3.5φ	0.94 to 1.51 (1.17)
ET-N360 360 A	M12		5.5-12 to 200-12	19.6 to 31.3 (24.5)				

● Connection Method

(1) Control Circuit Wiring

The protection function does not operate at all if the operating power supply is not applied to the ET-N unit. Configure the circuit such that the operating power supply is normally applied.

(2) Large Capacity Motor or High Voltage Motor Application

Application to high voltage motors or motors exceeding 360 A should be in combination with an external current transformer as per Figure 4.
The external current transformer should be used with objects that have large overcurrent time constants in order not to saturate up to 600% rated motor current.

(3) Single-Phase Motor Application

Single-phase loads should be connected with the protection mode setting switch set to any of overcurrent protection positions A to E as per Figure 5.

(4) Phase Advanced Capacitor Connections

Phase advanced capacitors should be connected to the main circuit power supply side of ET-N units as per Figure 6.

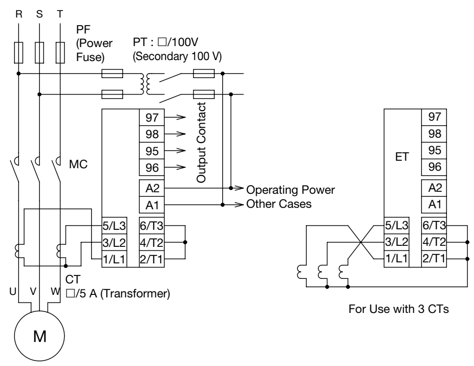


Fig. 4. For Large Capacity Motors/High Voltage Motors

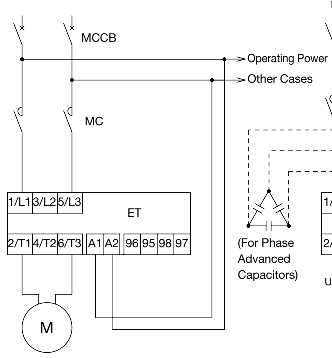


Fig. 5. For Single-Phase Motors

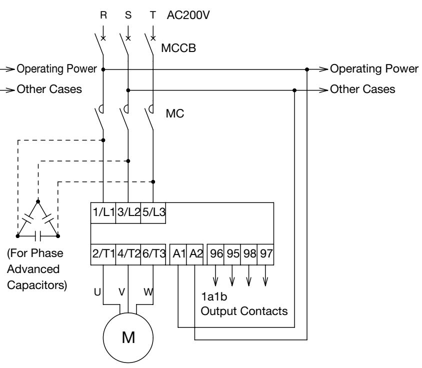


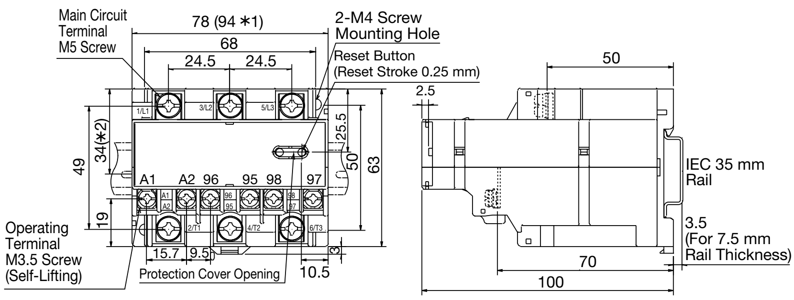
Fig. 6. For Phase Advanced Capacitors

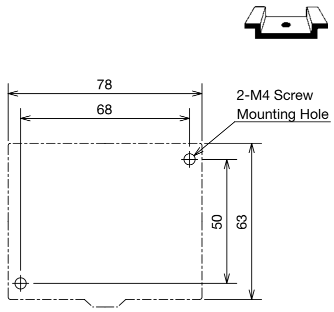
Outline Drawings

Can be mounted on IEC 35 mm rails.

Model Name	Outline Drawings	Hole Drilling Dimensions

ET-N60
1A
4A
8A
20A
60A



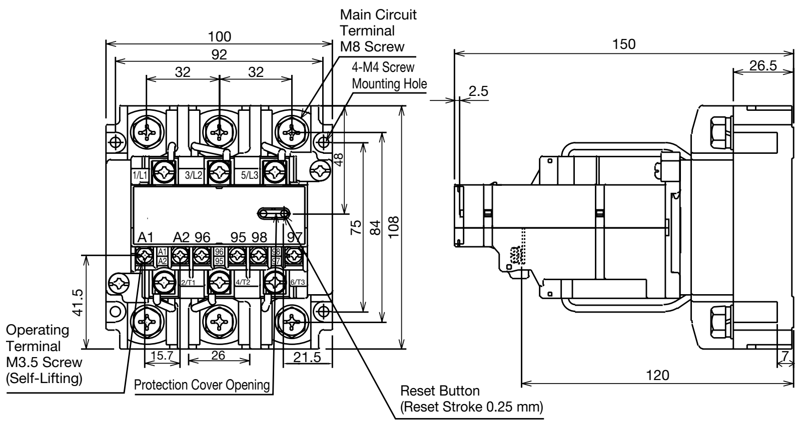


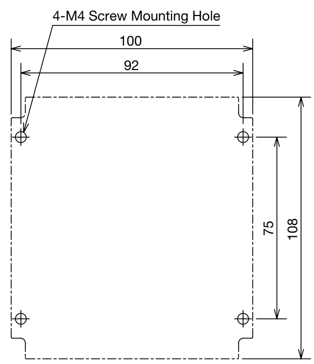
85 x 50 Mounting Possible With Use Of Adapter

*1 Dimension: Including Adapter, *2 Dimension: Dimension from Center of IEC 35 mm Rail

0.3 kg

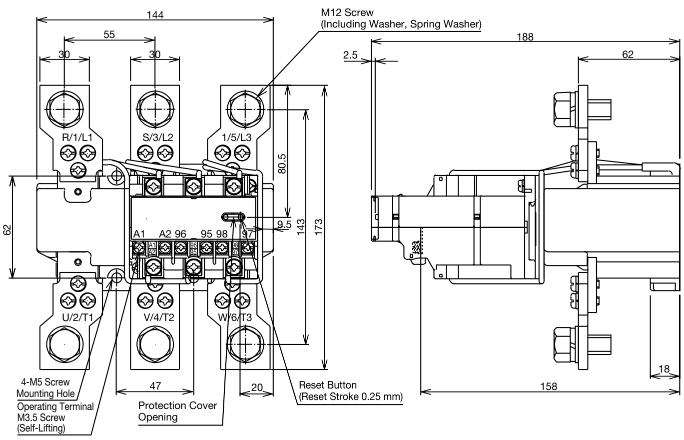
ET-N150
150A

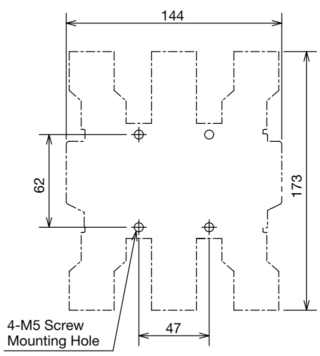




1.6 kg

ET-N360
360A

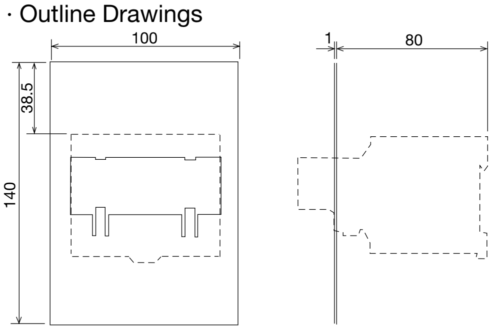




2.5 kg

UN-CV602 Live Part Protection Cover Units

· Outline Drawings



· Mounting Method

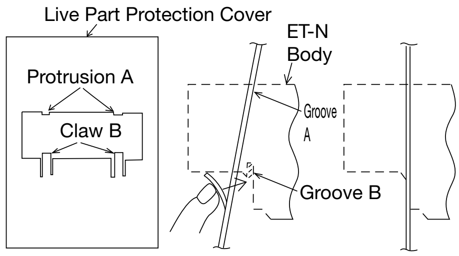


Fig. (1) Fig. (2) Fig. (3)

1. Insert protrusion A of the live part protection cover into groove A of the ET-N upper surface. (Figs. (1) and (2))
2. Press the live part protection cover B claw in the direction of the arrow and insert it into the B groove of the ET-N lower surface. (Figs. (1) and (2))

Model Name	Minimum Order Unit
UN-CV602	5 (5-Pack)

11.8 SRE Voltage Detection Relays

SRE-AA units can detect both DC and AC overvoltage or undervoltage conditions with high precision, and have a wide configurable range from 0.1 V to 250 V. SRE-K units not only allow detection by simply connecting to a power terminal but can be used to detect drops in power supply voltage, such as a warning when switching to home generated power during a power outage or when battery voltage drops.

Features

- **High External Surge Withstand Capability**
  The integrated surge absorber circuit delivers excellent external surge withstanding capacity.
- **Simple Wiring**
  Adopts self-lifting terminal screws for simple wiring.

- **High Precision**
  The detector uses an IC for high accuracy and high reliability.
- **High Input Impedance**
  Has a high input impedance so as to not affect other equipment.
- **Wide Detection Range**
  Has a wide 0.1 to 250 V range for DC and 3 to 250 V range for AC.
  (For Standard Detection)

Type Designations

1. For Standard Detection

SRE – AA CN △ 015 D

Symbol	Rated Operational Voltage
AA	AC100 to 110, 200 to 220 V 50/60 Hz Shared Use
AAU	AC115 to 120, 230 to 240 V 50/60 Hz Shared Use

Symbol	Specifications
None	Standard
CN	CCC Certified Products

Symbol	Detection Voltage (V)	
0P5	DC	0.1 to 0.5
1P5	DC	0.3 to 1.5
005	DC	1 to 5
015	DC ∗AC	3 to 15
050	DC ∗AC	10 to 50
150	DC ∗AC	30 to 150
250	DC ∗AC	50 to 250

Symbol	Detection
D	DC
A	AC

2. For Power Detection

SRE – K CN △ AC100V

Symbol	For Power Detection
K	Set Value (Scale) is OFF Voltage
KT	Set Value (Scale) is ON Voltage

Symbol	Specifications
None	Standard
CN	CCC Certified Products

Voltage
AC100 V
AC120 V
AC200 V
AC240 V
DC 12 V
DC 24 V
DC100 V

Note. AC detection is applicable for those items marked with ∗ above.

Ratings/Specifications

By Model	Model Name		Detection Voltage Setting Range	Detector Input Max. Voltage (Continuous)	Input Impedance	Output Contact	Rated Operational Voltage
For Standard Detection	SRE-AA SRE-AAU	0P5D	DC 0.1 to 0.5 V	±100 V	20 KΩ	Contact Arrangement 1c Rated Operating Current Class AC-15 Electrical Durability of 0.5 mil. times AC110 V 1.5 A AC220 V 1 A Class DC-13 Electrical Durability of 0.25 mil. times DC110 V 0.2 A Rated Continuity Current Ith 3 A	AC100 to 110, 200 to 220 V 50/60 Hz Shared Use or AC115 to 120, 230 to 240 V 50/60 Hz
		1P5D	DC 0.3 to 1.5 V	±100 V	50 KΩ		
		005D	DC 1 to 5 V	±150 V	100 KΩ		
		015D	DC 3 to 15 V	±150 V	100 KΩ		
		050D	DC 10 to 50 V	±200 V	500 KΩ		
		150D	DC 30 to 150 V	±300 V	800 KΩ		
		250D	DC 50 to 250 V	±300 V	800 KΩ		
		015A	AC 3 to 15 V	AC150 V	100 KΩ		
		050A	AC 10 to 50 V	AC200 V	500 KΩ		
		150A	AC 30 to 150 V	AC300 V	800 KΩ		
		250A	AC 50 to 250 V	AC300 V	800 KΩ		
For Power Detection	SRE-K	AC100V	AC 75 to 105 V	AC120 V	Input 1.8 VA		AC100 V 50/60 Hz Shared Use
		AC120V	AC 90 to 125 V	AC132 V			AC120 V 50/60 Hz Shared Use
		AC200V	AC 150 to 210 V	AC240 V			AC200 V 50/60 Hz Shared Use
		AC240V	AC 180 to 250 V	AC264 V			AC240 V 50/60 Hz Shared Use
		DC12V	DC 9 to 12.5 V	DC 14 V	Input 1.7 W		DC 12 V
		DC24V	DC 18 to 25 V	DC 28 V			DC 24 V
		DC100V	DC 75 to 105 V	DC120 V			DC100 V
	SRE-KT	AC100V	AC 80 to 115 V	AC120 V	Input 1.8 VA		AC100 V 50/60 Hz Shared Use
		AC120V	AC 95 to 130 V	AC132 V			AC120 V 50/60 Hz Shared Use
		AC200V	AC 160 to 230 V	AC240 V			AC200 V 50/60 Hz Shared Use
		AC240V	AC 190 to 260 V	AC264 V			AC240 V 50/60 Hz Shared Use
		DC12V	DC 10 to 14 V	DC 14 V	Input 1.7 W		DC 12 V
		DC24V	DC 20 to 28 V	DC 28 V			DC 24 V
		DC100V	DC 80 to 115 V	DC120 V			DC100 V

Note. SRE-AA(U) DC detectors can be used with single-phase full-wave power supplies.

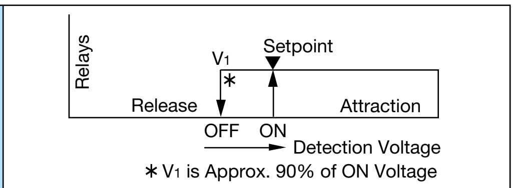
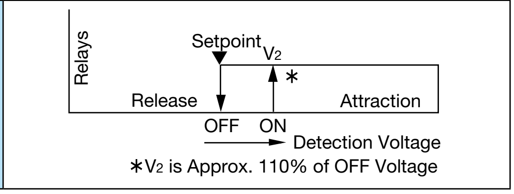
Properties

Item	Use Conditions	Properties	Remarks
Voltage Fluctuation Properties	85 to 110% of Rated Operational Voltage	±1.5%	Excluding SRE-K, KT Types
Ambient Temperature Properties	-10°C to 55°C	±2.5%	
Repeat Properties	Repeating under Identical Conditions	±1%	
Response Time	150% of Set Voltage Applied	100 ms	
Withstand Voltage	Between Batch Terminal - Ground Terminal, Input - Output	AC1500 V for 1 Minute	
Insulation Resistance	Between Batch Terminal - Ground Terminal, Input - Output	100 MΩ or More	DC500 V Insulation Tester
Power Consumption	Rated Operational Voltage Applied	2 VA	Same as SRE-K, KT Types
Surge Withstand Voltage	Detection Input, Power Input	3500 V 1 x 40 μs	Excluding DC Operated SRE-K, KT Types

Working Environment Criteria

(1) Ambient Temperature : -10 to 55°C (no condensation, no freezing)
(2) Relative Humidity : 45 to 85% RH
(3) Vibration : 10 to 55Hz 19.6 m/s^2 or Less
(4) Shock : 49 m/s^2 or Less
(5) Altitude : 2000 m or Below

Operation

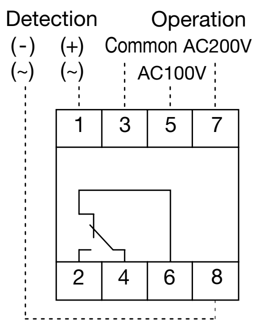
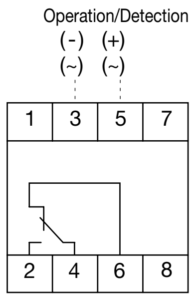
SRE-AA SRE-KT	
SRE-K	

Application

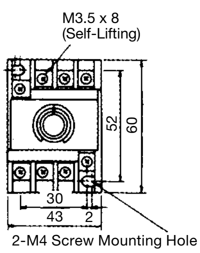
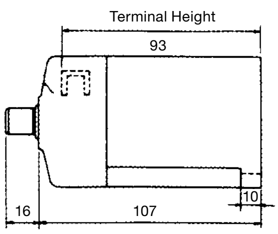
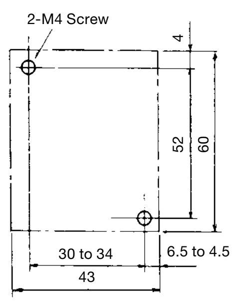
● SRE-AA Type
· DC Motor Speed Detection
· DC Motor Field Detection
· Motor PG Output Detection
· For Power Supply Voltage Output Protection
· For Detection Feedback of Each Signal Output

● SRE-K, SRE-KT Types
· For Emergency Power Supply Switching Detection
· For Household Generated Power Switching Detection
· General Power Supply Voltage Drop Detection
· Battery Voltage Drop Detection

Connection Method

Model Name	SRE-AA Type	SRE-K, SRE-KT Types
Connection Method		

Outline Drawings

Model Name	Appearance	Outline Drawings	Hole Drilling Dimensions	Weight [kg]
SRE-AA SRE-K SRE-KT		 		0.3

11.9 UA-DL2 Instantaneous Stop/Restart Relays

Power supply continuity is very important for industrial plants. Short-term voltage drop or power failures can affect plant machinery and even cause the production line to grind to a halt.
UA-DL2 instantaneous stop/restart relays automatically restart load equipment that has stopped momentarily due to voltage drop or temporary outages, when power returns.

Features

- **Simple Mounting/Wiring**
  Can be connected without the need to modify existing control circuitry. The plug-in structure also simplifies wiring, attachment and removal.
- **Compact**
  The reduced mounting area required allows for more compact panels.

- 100 V and 200 V Shared Operating Voltage
- With Operation Indicator
- Lights up when the power is on, turns off when the power is off
- Switchable Allowable Momentary Failure Time
  The allowable momentary failure time can be switched between 1 and 2 seconds for optimal configuration to suit the properties of the load equipment.

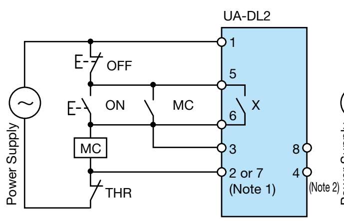
Ratings/Specifications

Item		Specifications
Control Circuit Allowable Voltage Fluctuation Range		85 to 110% of Rated Voltage
Operating Temperature/Humidity		-10 to 55°C/45 to 85% RH
Withstand Voltage		AC2000 V for 1 Minute
Insulation Resistance		100 MΩ or More
Vibration-Resistant/Shock-Resistant		Vibration: 10 to 55 Hz 19.6 m/s^2/ Shock: 98 m/s^2
Operating Time		1 Second/2 Seconds Switchable
Time Accuracy	Setting Error	-20% to +90% (With AC100 V/AC200 V Applied)
	Voltage Error	±35%
	Temperature Error	±25%
Minimum Retention Time		5 s or More
Minimum Off Time		50 ms
Input		3 VA
Electrical Durability		0.5 mil. times
Output Contact	Contact Arrangement	1a
	Contact Capacity	AC220 V 1 A, AC110 V 1.5 A (Class AC-15)
Applicable Magnetic Contactor Model Names		S-T10 to T100, S-N125 to N400∗

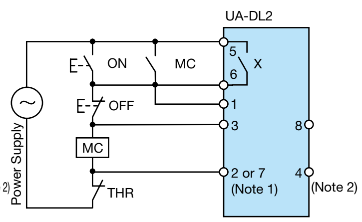
Note 1. There is a limit to the size of the coil impedance of the magnetic contactor to be combined with. ∗ Consult with us regarding use in combination with other magnetic contactors.

Connection Diagram (The functionality of the UA-DL2 units is the same for examples 1 and 2; however, the ON and OFF operating switch connections differ.)

Example 1



Example 2

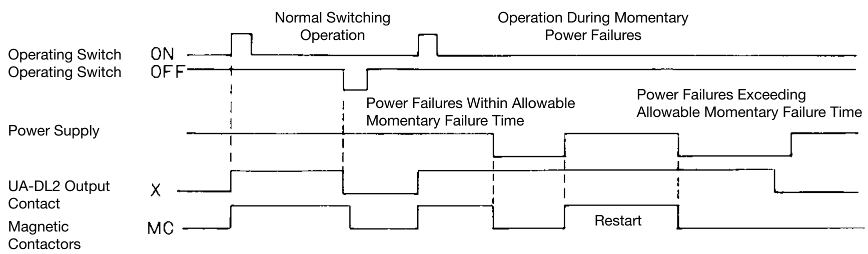


Note 1. The below 3 types of voltage specifications are available; however, the correct connection terminal number (2 or 7) that supports the voltage range should be used depending on the operating voltage.
(The connection diagram shows connections to terminal 2 for both examples 1 and 2.)

Voltage Specifications / Connection Terminal Number	AC100/200 V	AC120 V	AC240 V
2	100 to 110 V	100 to 110 V	200 to 220 V
7	200 to 220 V	110 to 120 V	220 to 240 V

Note 2. Connecting terminal 4 or terminal 8 may lead to failure, so connections should not be made.

Circuit Operation



Precautions for Use

(1) The allowable momentary failure time is set to 2 seconds at shipping. To set to 1 second, firmly rotate the switch in the direction of the arrow until it won't rotate any further.
(2) Terminal (2) and (7) connections differ depending on the operating circuit voltage. Connect for use in accordance with the circuit voltage used. (Refer to connection diagram note 1.)
(3) The length of OFF commands sent by external switches (the OFF push button switch in the connection diagram) must be at least 50 ms.
(4) When using a relay contact in place of a push button switch (OFF), use a contact that won't open if power failures occur. If the push button switch (OFF) opens, the UA-DL2 unit will turn OFF and the magnetic contactor will not restart.
(5) Uses an electrolytic capacitor so the operation time should be checked periodically.

Type Designations

(1) Instantaneous Stop/Restart Relays

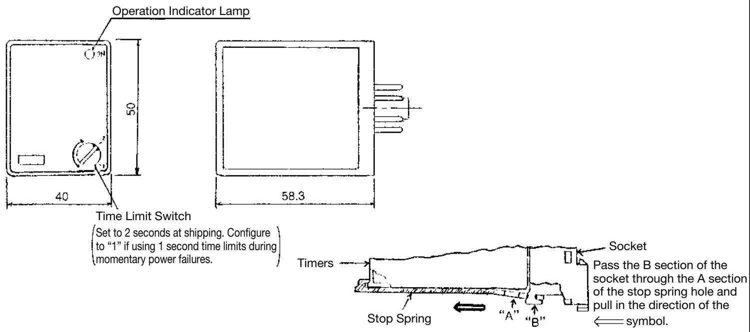
UA-DL2 △ AC100/200V

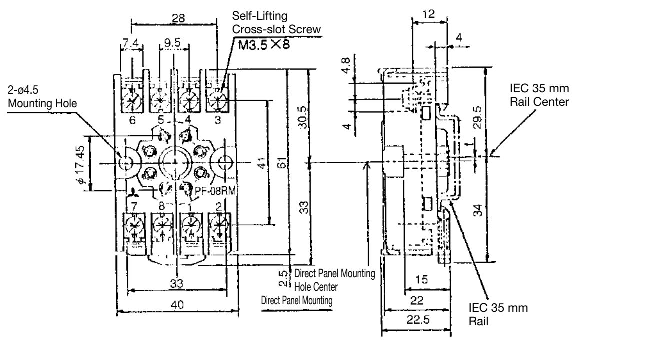
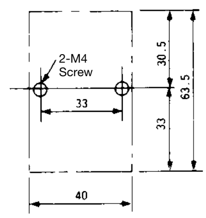
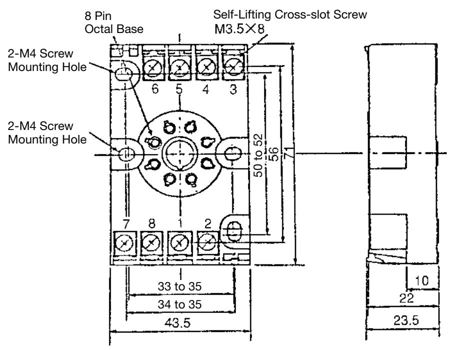
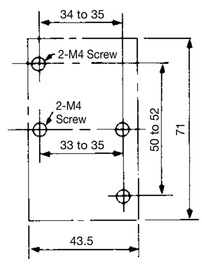
Designation	Rated Voltage
AC100/200V	100 to 110 V 50/60 Hz 200 to 220 V 50/60 Hz
AC120V	100 to 110 V 50/60 Hz 110 to 120 V 50/60 Hz
AC240V	200 to 220 V 50/60 Hz 220 to 240 V 50/60 Hz

(2) Socket

PF-08RM Surface Connection Socket (For Panel Mounted Rail Mounting)
PF-08TM Surface Connection Socket (For Panel Mounting)

Outline Drawings

<table>
<tr><th>Model Name</th><th>Outline Drawings</th><th>Hole Drilling Dimensions</th><th>Weight [kg]</th></tr>
<tr><td>Instantaneous Stop/Restart Relays
UA-DL2</td><td>

*Stop spring is attached to the body.</td><td>—</td><td>0.1</td></tr>
<tr><td>Socket
PF-08RM</td><td>
</td><td>Up to 2 2-3.5 Sized Crimp Lugs Compliant with Terminal
Up to 2 1.25 to 2 mm² Sized Wires Conforming to Terminal

</td><td>0.05</td></tr>
<tr><td>Socket
PF-08TM</td><td>
</td><td>Up to 2 2-3.5 Sized Crimp Lugs Conforming to Terminal
Up to 2 1.25 to 2 mm² Sized Wires Conforming to Terminal

</td><td>0.05</td></tr>
</table>

11

11.10 How to Order

Follow the steps below when ordering. (Enter a space in ▲ .)

1. US-N Solid State Contactors

Model Name
US-N20TE
Specify from page 304.

2. US-H Solid State Contactors

Model Name
US-H20
Specify from page 305, 307 and 311.

3. Optional Units

■ Drive Units (UA-DR1)

Model Name	Rated Operational Voltage
UA-DR1	▲ AC100V
Specify from page 323.	Select the rated operational voltage from page 323.

■ Drive Units with Output (UA-SH1, UA-SH8)

Model Name	Rated Operational Voltage
UA-SH1 UA-SH8	▲ AC100V ▲ AC200V
Specify from page 325.	Select the rated operational voltage from page 325.

■ Reversing Units (UA-RE)

Model Name	Rated Operational Voltage
UA-RE	▲ AC100V
Specify from page 326.	Select the rated operational voltage from page 326.

■ Fault Detection Units (UN-FD, UN-FD4)

Model Name	Rated Operational Voltage	Contact Arrangement
UN-FD UN-FD4	▲ AC100V ▲ AC200V	▲ 1A
Specify from page 327.	Select the rated operational voltage from page 327.	Specification available for UN-FD4 units only. Select a contact arrangement to be specified from page 329.

■ Power Control Units (UA-PC)

Model Name	Rated Operational Voltage
UA-PC	▲ AC100V
Specify from page 331.	Select the rated operational voltage from page 331.

■ Variable Resistors for Power Control Units (UA-PC-VR□)

Model Name
UA-PC-VR10
Specify from page 334.

■ Live Part Protection Cover Units (UA-CV□, UN-CV501US)

Model Name
UA-CVDR1
Specify from page 335.

4. Electric Motor Protection Relays

ET Type

Model Name		Settling Current Designation		Rated Operational Voltage
ET-N60	▲	20A	▲	AC100V
Specify from page 340.		Select from page 340.		Select an operating voltage designation (symbol) from page 340.

ET Live Part Protection Cover

Model Name
UN-CV602
Specify from page 343.

5. Voltage Relays

SRE-AA☐ Type

Model Name		Detection Voltage Designation
SRE-AA SRE-AAU	▲ ▲	015D 150A
Specify from page 344.		Select the detection voltage configuration range from page 344.

SRE-K☐ Type

Model Name		Operation and Detection Voltage Designation
SRE-K SRE-KT	▲ ▲	AC100V DC100V
Specify from page 344.		Select the detection voltage configuration range from page 344.

6. Instantaneous Stop/Restart Relays

Model Name		Rated Operational Voltage Designation
UA-DL2	▲	AC100V/200V
Specify from page 346.		Select an operating voltage designation from page 347.

7. Socket

Model Name
PF-08RM
Specify from page 347.

11

MEMO

12

Motor Circuit Breakers MMP-T32

* MMP-T32(BC) motor circuit breakers manufactured after April 2021 do not bear the UL mark.
Note that information on the UL standard is for products that bear the UL mark only.
For details, refer to the "MITSUBISHI ELECTRIC Control Equipment Sales and Service 168".

Sales and Service 168
https://www.mitsubishielectric.com/fa/document/sales/lvsw/168_e/168_e.pdf

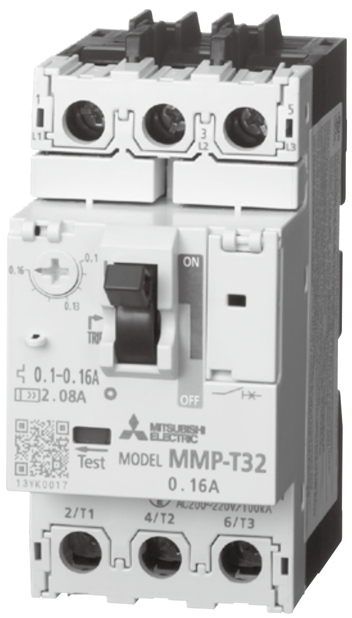
12.1 Features

* Information on the UL standard is for products that bear the UL mark only. (Refer to page 362.)

A device integrating a circuit breaker and thermal overload relay functions

One motor circuit breaker can protect motor branch circuits from overloads, open phase, and short circuits. The connecting conductor unit can be used to connect between a motor circuit breaker and a magnetic contactor without wires, and modularize them. This method saves space in the panel and reduces wiring time. Moreover, the motor circuit breaker meets the international standards of major countries and is UL-listed for its high SCCR.

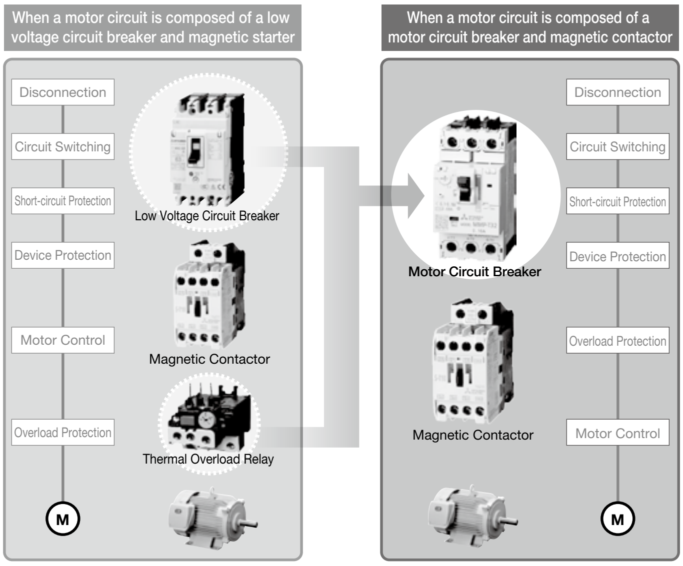
● Features



MMP-T32

● **Protection of Industrial Motor with One Unit**

The device has both functions of a circuit breaker and a thermal overload relay. One motor circuit breaker can detect whether a motor operates under overload conditions and open-phase conditions, and interrupt accidental short-circuit currents.



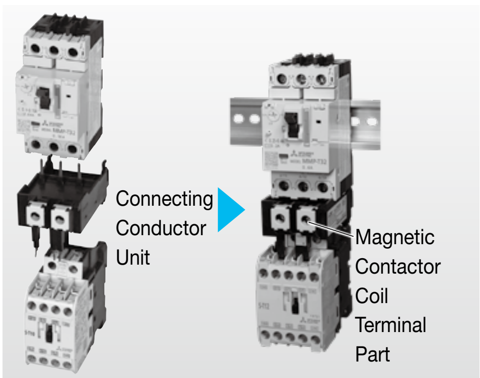
● **Compact Design and Superior Interrupting Performance**

Compact design (45mm wide) with a rated breaking capacity of 100kA (200/240V).
An auxiliary contact unit, alarm contact unit, and short-circuit display unit can be integrated without changing the width.

● **Contribution to the Downsizing of the Control Board and Panel, and Reduction in Wiring Time**

The connecting conductor unit (UT-MT □) can be used to connect between a motor circuit breaker and a magnetic contactor without wires, and modularize them. This reduces the space required in the panel and wiring time. Bus bars to connect products in parallel and fast wiring terminals are also available.

<Wiring Example of Connecting Conductor Units>
No wires are required, and products can be modularized.



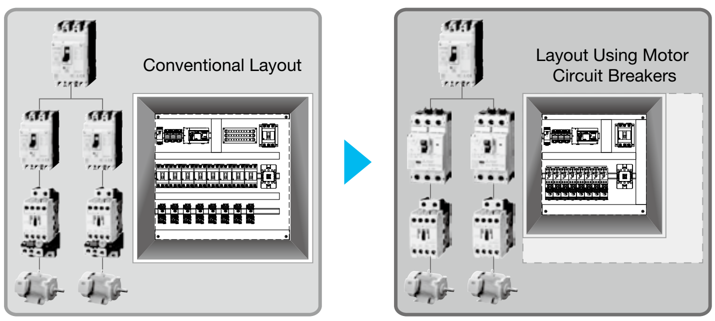
● **High Level of Safety (Reliable Wire Protection)**

Using motor circuit breakers allows individual protection circuits. Thereby, the number of devices in the circuits can be reduced compared to that in general group protection circuits. Concerns over selecting wires for group protection can be solved, and wires can be protected easily and reliably. For further details, refer to page 363.

● **High SCCR to Meet the UL Standards**

Type E/F combination motor controllers and group installation are UL-listed. Motor circuit breakers help increase the SCCR and reduce the number of devices. Refer to page 364 for details on the SCCR and combination motor controllers, and page 365 for details on group installation.

<Example of Installation to Control Circuitry>
The space required in the panel can be reduced. * 40% reduction compared to our former product



12.2 Specifications

Frame Size			32 A									
Model Name			MMP-T32					MMP-T32BC *1				
Standard			JIS C8201-2-1 Ann. 1, JIS C8201-4-1, EN60947-2, EN60947-4-1, IEC60947-2, IEC60947-4-1, GB/T14048.2									
No. of Poles			3									
Handle Shape			Tumbler Handle									
Rated Current In [A]			0.1 to 32									
Rated Operational Voltage Ue [V]			100 to 690									
Rated Operating Frequency [Hz]			50/60									
Rated Insulation Voltage Ui [V]			690									
Rated Impulse Withstand Voltage Uimp [kV]			6									
Rated Short Circuit Breaking Capacity [kA]	Rated Operating Current Ie [A]*2		200/240 V		400/415 V		440/460 V		500 V		600/690 V	
	Heater Designation	Current Setting Range	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics	Icu	Ics
	0.16	0.1 to 0.16	100		100		100		100		100	
	0.25	0.16 to 0.25	100		100		100		100		100	
	0.4	0.25 to 0.4	100		100		100		100		100	
	0.63	0.4 to 0.63	100		100		100		100		100	
	1	0.63 to 1	100		100		100		100		100	
	1.6	1 to 1.6	100		100		100		100		100	
	2.5	1.6 to 2.5	100		100		100		100		8	6
	4	2.5 to 4	100		100		100		100		8	6
	6.3	4 to 6.3	100		100		100		100		6	5
	8	5.5 to 8	100		100		50	38	42	32	6	5
	10	7 to 10	100		100		50	38	42	32	6	5
	13	9 to 13	100		100		50	38	42	32	6	5
	18	12 to 18	100		50	38	35	27	10	8	4	3
	25	18 to 25	100		50	38	35	27	10	8	4	3
	32	24 to 32	100		50	38	35	27	10	8	4	3
Category of Use	Selectivity Category		Cat.A									
	Utilization Category		AC-3									
Tripping Class (JIS C8201-4-1, IEC 60947-4-1)			10									
Instant Tripping Characteristics			13x Max. Ie									
Switching Life	Mechanical [Times]		0.1 mil.									
	Electrical [Times] (AC-3)		0.1 mil.									
Tripping Durability [Times]			1,000									
Open-Phase Protection			Yes									
Tripping Display			Yes									
Test Trip Function			Yes									
Auxiliary Contact Unit			UT-MAX (1a or 1b)									
Alarm Contact Unit			UT-MAL (1a or 1b)									
Short-circuit Display Unit			UT-TU									
Mass [g]			330									

∗1: MMP-T32BC is equipped with wiring streamlining terminal ∗2: Rated operating current for UL application is listed on a separate page

Type Designations

MMP-T Series

MMP - T32 BC ▲ 32 A

Model Name	Model
MMP	Motor Circuit Breakers

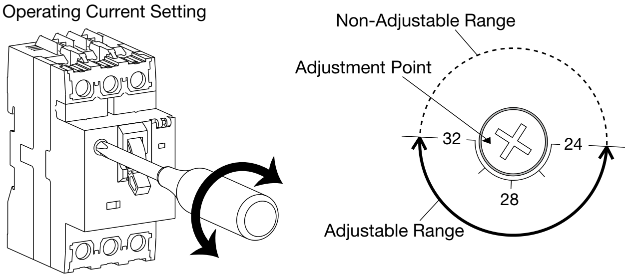
Frame	Specifications
T32	32 A

Symbol	Specifications
BC	With Wiring Streamlining Terminal

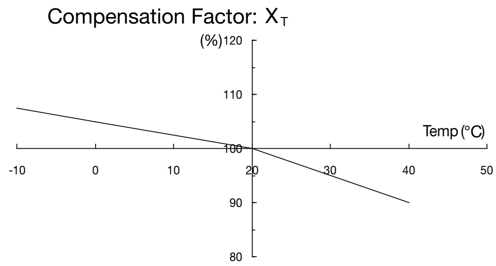
Heater Designation (A)	Current Setting Range (A)
0.16	0.1 to 0.16
0.25	0.16 to 0.25
0.4	0.25 to 0.4
0.63	0.4 to 0.63
1	0.63 to 1
1.6	1 to 1.6
2.5	1.6 to 2.5
4	2.5 to 4
6.3	4 to 6.3
8	5.5 to 8
10	7 to 10
13	9 to 13
18	12 to 18
25	18 to 25
32	24 to 32

12.3 Working Environment

(1) Ambient Temperature : -10°C to 40°C
(Applied outside control panel) Daily Average Temperature Maximum 35°C, Yearly Average Temperature Maximum 25°C
(2) Maximum Temperature Inside Control Panel : 55°C (yearly average temperature inside panel of 40°C or below)
Please note that operation characteristics are affected by the ambient temperature.
(3) Relative Humidity : 45% to 85% RH (no condensation, no freezing)
(4) Altitude : 2000 m or Below
(5) Vibration : 10 to 55 Hz 19.6 m/s^2 or Less
(6) Shock : 49 m/s^2 or Less
(7) Atmosphere : Low levels of dust, smoke, corrosive gas, moisture or sodium.
When used in a sealed state for a long time, contact failure, etc., can occur.
Do not use the products in an atmosphere containing flammable gas.
(8) Storage Temperature/Relative Humidity: -30°C to 65°C/45% to 85% RH (no condensation, no freezing) Storage temperature refers to ambient temperature during transportation or storage of product. When starting use of the product, the temperature must be within the working temperature.
(9) Precautions for Use : Set the position of the adjusting dial in consideration of the panel interior temperature and the mounting conditions.



<Fig. 1. Temperature compensation properties>

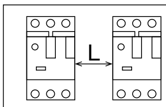
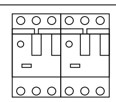


$I_{SET} = I/X_{SET} \times 100$

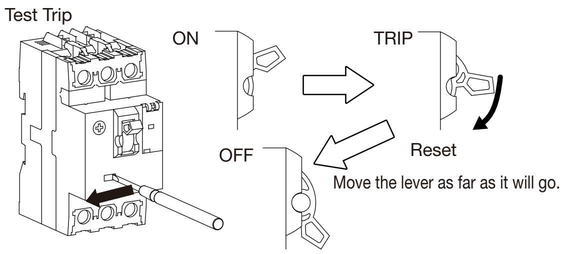
[I : Motor Rated Current
X_{SET} : Determined based on the following Figures 1 and 2]

(E.g.) If I = 2.8 A, Panel Interior Temperature = 40°C, and close mounted
$I_{SET} = 2.8/(90-5) \times 100 \approx 3.3$ A
→ Set the adjusting dial to position 3.3 A.

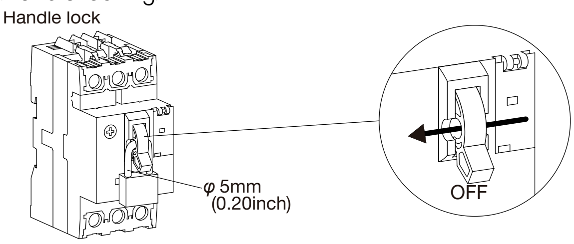
<Fig. 2. Mounting condition compensation>

	[Non-Close Mounting] $X_{SET} = X_T$ (L ≥ 10mm)
	[Close Mounting] $X_{SET} = X_T - 5$

<Test Tripping>



<Handle locking>

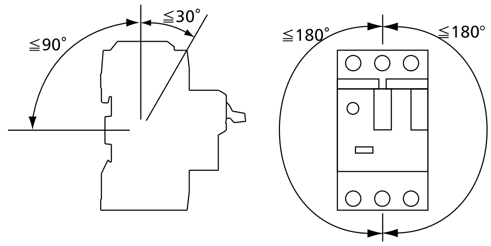


(10) Connecting

Model Name		MMP-T32	UT-MAX(LL), UT-MAL(LL)
Terminal Screw Size		M4	M3.5
Recommended Length L of Insulation Layer to be Peeled off When Wired with Bare Wire 		10 mm	8.5 mm
Applicable Wire Size	Single Wire [mm]	φ 1.6, φ 2.6	φ1.6
	Stranded Wire [mm^2]	1 to 6	0.5 to 2
	UL Electrical Wire (60/70°C, Copper Only) (Note 4)	#14 to #8	#16 to #14
Crimp Lug Size		R1.25-4 to R5.5-4 8-4NS (Note 3)	0.5-3.7A to 2-S3A (Note 3)
Terminal Screw Tightening Torque [N·m]		1.4 to 2.0	0.9 to 1.1

Note 1. In each terminal, two wires or two crimp lugs may be connected.
Note 2. For details about handling, temperature compensation, close mounting, etc., refer to the Operating Manual.
Note 3. J.S.T. Mfg. Co., Ltd. model numbers are shown as typical products.
Note 4. Only 70°C is applicable for AWG#8.

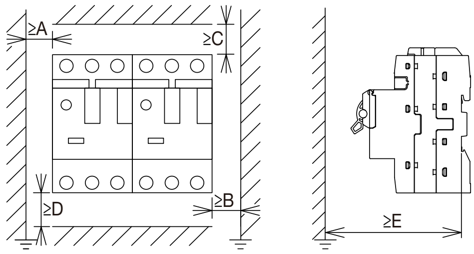
(11) Installation: Install the motor circuit breaker using an IEC rail.
(Applicable IEC rail: 35mm wide and 15mm high)
Screw mounting not possible.
(Screws can be used for UT-BT20, BT32, and BT32D only.)
The installation angle must be within the ranges shown in the figure.



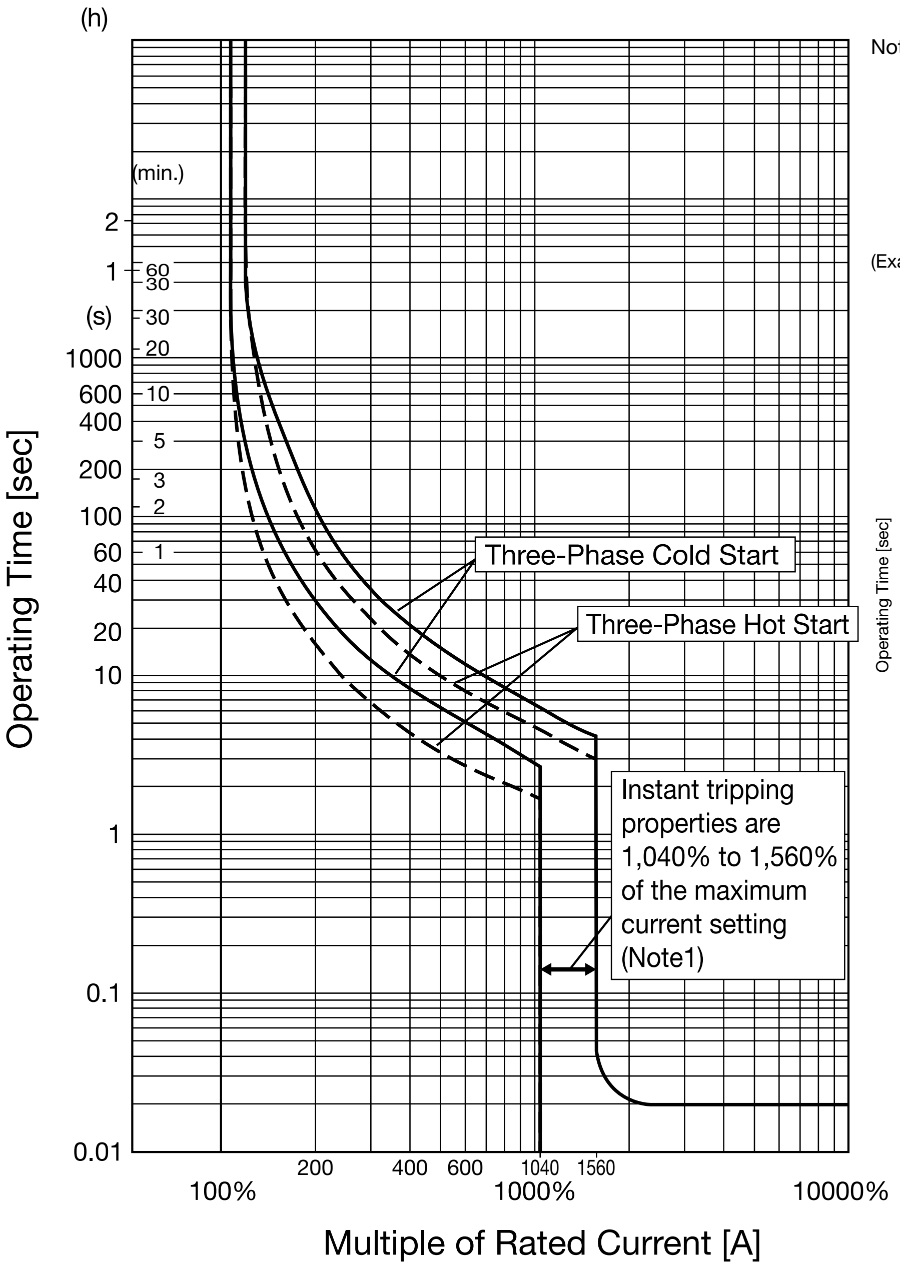
Permissible Installation Angles

Arc Spacing: [mm]

Ue [V]	A,B	C,D	E
≤690V	27.5	75	87.5

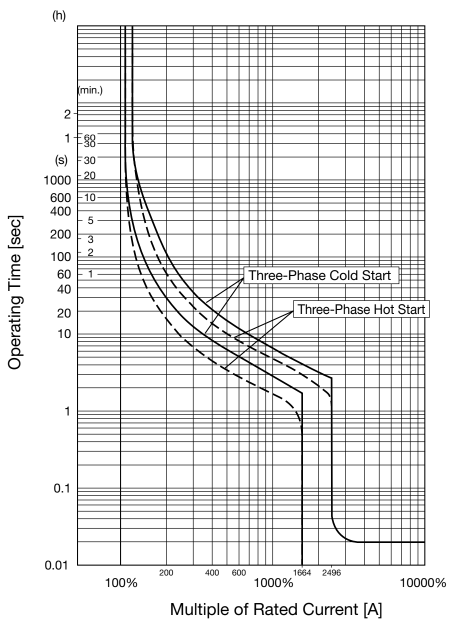


12.4 Operating Characteristic Curve



Note 1. Instant tripping properties are 1,040% to 1,560% of the maximum current setting. Select a motor circuit breaker taking into consideration that the operating characteristic curve will be as shown below if the current settling value is low.

(Example) When a heater designation of 1.6A is selected and 1A is set.



12

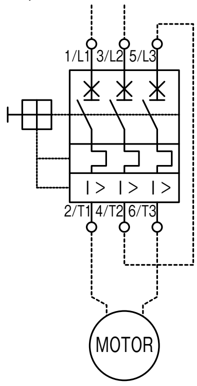
12.5 Selection and application

* Information on the UL standard is for products that bear the UL mark only. (Refer to page 362.)

● How to Select a Motor Circuit Breaker

The following outlines the steps of selecting a motor circuit breaker.

(1) Check the load current of the motor.
(2) Select the rated current of the motor circuit breaker. Refer to "Specifications" on page 353.
   ∗To use it with an inverter, refer to the following section.
(3) Check the specifications of the control panel (wires and their applicable size for the branch circuit).
(4) Check the breaking capacity of the circuit. Refer to "Specifications" on page 353.
   To meet standards such as Type 1 and Type E/F, check the rating table.
(5) Check the operation characteristics. Refer to "Operating Characteristic Curve" on page 355.



Single-phase Motor Wiring

● Use with a Single-phase Motor

To use it with a single-phase motor, use all the poles and wire them in series.
(Figure to the right)
The motor circuit breaker has an open-phase protection function.
Connecting only two poles may unnecessarily activate the function.

● Use with an Inverter

Inverters can detect overcurrent and undervoltage. Therefore, use motor circuit breakers for short-circuit protection as the overcurrent detection function of the thermal overload relay is not required. Select a motor circuit breaker according to the following conditions.

(1) To prevent the motor circuit breaker from being activated by the load current including high frequency components, select a slightly larger heater value than the rated current of the inverter. (Reference value: Load current × 1.4)
(2) For wire protection, the operating characteristic of the motor circuit breaker must be equal to or lower than the thermal properties of the wire.

∗The above formula is for reference purposes only. The motor circuit breaker may be activated by the capacitor charging current at power-on of the inverter or other factors. Therefore, check the actual operation as well.
∗The combination motor controller Type E is UL-listed for the SCCR when used with an inverter (manufactured by Mitsubishi Electric). (For the ratings, refer to page 369.)

● Use with an IE3 Motor

The motor circuit breaker (MMP-T32) can be used with an IE3 motor (superline premium series compatible with IE3 premium efficiency).
The starting current of the IE3 motor is higher than that of the former motor.
∗Refer to the following table for combinations of MMP-T32 and SF-PR high-efficiency motors (our motors that conform to the Top Runner Standard).

SF-PR High-efficiency Motor			Motor Circuit Breakers		
Main Circuit Voltage	No. of Poles [P]	Output [kW]	Model Name	Heater Designation	Current Setting Range
Three-Phase 200V50Hz 200-230V60Hz	2-pole	0.75	MMP-T32	4A	2.5 to 4A
		1.5		6.3A	4 to 6.3A
		2.2		10A	7 to 10A
		3.7		18A	12 to 18A
		5.5		25A	18 to 25A
		7.5		32A	24 to 32A
	4-pole	0.75		4A	2.5 to 4A
		1.5		8A	5.5 to 8A
		2.2		10A	7 to 10A
		3.7		18A	12 to 18A
		5.5		25A	18 to 25A
		7.5		32A	24 to 32A
	6-pole	0.75		4A	2.5 to 4A
		1.5		8A	5.5 to 8A
		2.2		10A	7 to 10A
		3.7		18A	12 to 18A
		5.5		25A	18 to 25A
		7.5		32A	24 to 32A

Note 1. The table shows reference heater designations for when MMP-T32 is used with SF-PR high-efficiency motors manufactured by Mitsubishi Electric. Depending on the condition of voltage, frequency, ambient temperature, and installation, the actual value may go beyond the current settling range of the heater designation. Check the rated motor current or other values before selecting a heater designation.

SF-PR High-efficiency Motor			Motor Circuit Breakers		
Main Circuit Voltage	No. of Poles [P]	Output [kW]	Model Name	Heater Designation	Current Setting Range
Three-Phase 380-415V50Hz	2-pole	0.75	MMP-T32	2.5A	1.6 to 2.5A
		1.5		4A	2.5 to 4A
		2.2		6.3A	4 to 6.3A
		3.7		8A	5.5 to 8A
		5.5		13A	9 to 13A
		7.5		18A	12 to 18A
		11		25A	18 to 25A
		15		32A	24 to 32A
	4-pole	0.75		2.5A	1.6 to 2.5A
		1.5		4A	2.5 to 4A
		2.2		6.3A	4 to 6.3A
		3.7		10A	7 to 10A
		5.5		13A	9 to 13A
		7.5		18A	12 to 18A
		11		25A	18 to 25A
		15		32A	24 to 32A
	6-pole	0.75		2.5A	1.6 to 2.5A
		1.5		4A	2.5 to 4A
		2.2		6.3A	4 to 6.3A
		3.7		10A	7 to 10A
		5.5		13A	9 to 13A
		7.5		18A	12 to 18A
		11		25A	18 to 25A
		15		32A	24 to 32A

12.6 Optional Units

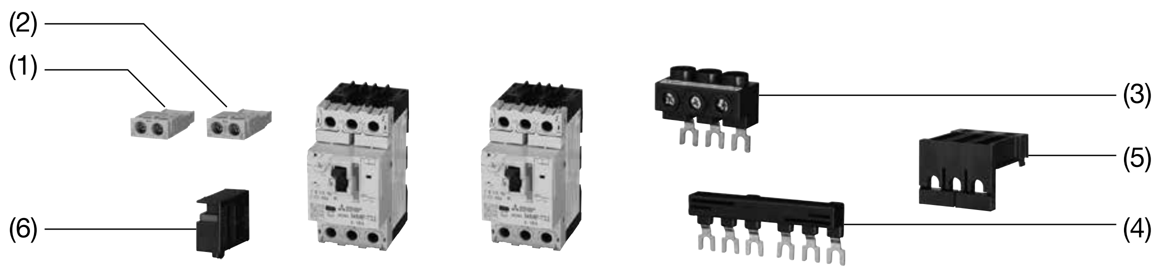
* Information on the UL standard is for products that bear the UL mark only. (Refer to page 362.)

Optional Units (for the Motor Circuit Breaker)

Number	Product Name	Model Name	Specifications	Description	Applicable Models
(1)	Auxiliary Contact (Interior)	UT-MAX	1a	The contacts of this unit operate in unison with the turning ON/OFF of the main unit.	MMP-T32
			1b		
		UT-MAXLL (For Very Small Loads)	1a		
			1b		
(2)	Alarm Contact (Interior)	UT-MAL	1a	The contacts of this unit operate (either short-circuits, overloads, open-phase) in unison with the trip operation of the main unit.	
			1b		
		UT-MALLL (For Very Small Loads)	1a		
			1b		
(3)	Power Supply Block	UT-EP3		This is a terminal block unit that can enable the wiring of bare wires (single core wire/ stranded wire) on the power supply side if the unit is connected in parallel with a bus bar.	
(4)	Bus Bar	UT-2B4	45mm Clearance Row of 2	A unit that can supply power (parallel connection) to 2 or 3 units individually without use of electric wire.	
		UT-3B4	45mm Clearance Row of 3		
		UT-2B5	57mm Clearance Row of 2		
		UT-3B5	57mm Clearance Row of 3		
(5)	Power Side Terminal Cover	UT-CV3		Power side terminal cover for UL60947-4-1A, Type E/F. When attaching the cover to MMP-T32BC, remove the screw holder of the power supply terminals. Fast wiring terminals cannot be used.	
(6)	Short-circuit Display Unit	UT-TU		A unit that operates and displays in red only when the unit trips due to a short circuit. Necessary for application to UL60947-4-1A, Type E/F.	

Note 1. For the models that can be used with the optional units, refer to "Outline Drawings" on pages 371 to 373.
Note 2. The power supply block and the bus bar (4) cannot be used with the power side terminal cover (5).
Note 3. For options for combination starters, refer to page 359.

Configuration Diagram of Options



Optional Unit Specifications

◆ Operating Optional Units

Unit Types	Model Name	Contact Arrangement	Operation of MMP-T32			
			ON	Short Circuit Tripping	Overload/Open-Phase Tripping (Test Tripping)	OFF
Auxiliary Contact Unit	UT-MAX(LL)	1a	ON	OFF	OFF	OFF
		1b	OFF	ON	ON	ON
Alarm Contact Unit	UT-MAL(LL)	1a	OFF	ON	ON	OFF
		1b	ON	OFF	OFF	ON
Short-circuit Display Unit	UT-TU	—	No Display	Red Display	No Display	No Display

◆ Specifications of Auxiliary Contact Unit and Alarm Contact Unit

Model Name	Contact Arrangement	Durability		Minimum Applicable Load	Rated Operating Current [A]					
					AC-12 (Resistive Load)		DC-12 (Resistive Load)			
		Mechanical	Electrical		125V	250V	30V	48V	125V	250V
UT-MAX	1a, 1b	0.1 mil. times	10,000 times	5 V/160 mA 24 V/40 mA	5	3	–	–	0.4	0.2
UT-MAL	1a, 1b									
UT-MAXLL	1a, 1b			5 V/1 mA 24 V/0.25 mA	0.1	–	0.1	0.03	–	–
UT-MALLL	1a, 1b									

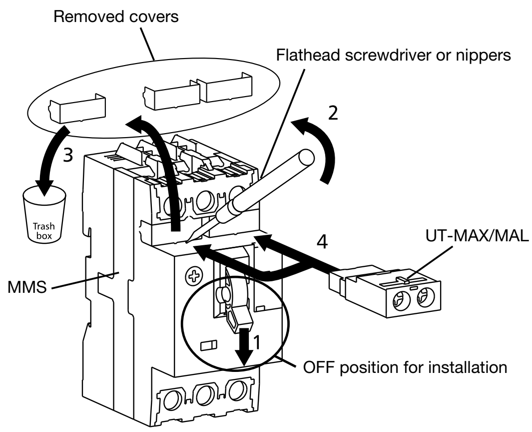
◆ Specifications of Power Supply Block and Bus Bar

Model Name	Conventional Free Air Thermal Current Ith [A]	Rated Conditional Short-Circuit Current Iq [kA]	Applicable Electrical Wire
UT-EP3	63	50	Flexible Stranded Wire: 1 x 6: 25 mm^2 Stranded Wire: 1 x 6: 16 mm^2 (Cannot be wired with crimp lug)
UT-2B4/3B4/2B5/3B5			1 x R1.25/4: 8-4NS (Cannot be wired with bare wire)

Option Unit Specifications

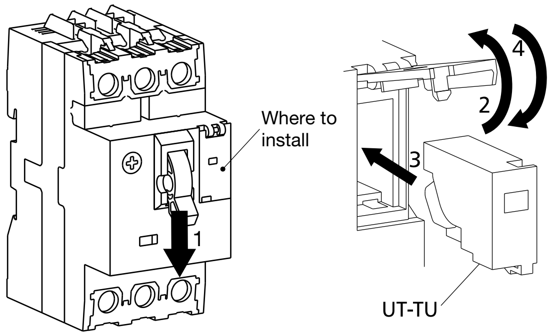
● How to Install UT-MAX or MAL

(1) Set the handle to the OFF position.
Installing the product in the trip state will cause damage.
(2) Remove the covers from the housing.
Remove three covers on one side.
(3) The removed covers are not required.
Dispose of them.
(4) Insert the product into place.
Insert it as far as it will go.



● How to Install UT-TU

(1) Set the handle to the OFF position.
(2) Open the cover in the direction of the arrow.
(3) Insert the product into place.
(4) Close the cover.
Close it until it clicks.



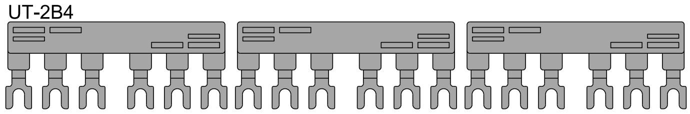
● Parallel Connection Using Bus Bar Unit

· When connecting four or more MMP-T32 Motor Circuit Breakers in parallel, connect them alternately reversing multiple UT-☐B☐ Bus Bar Units.
· Meet the following requirement in limiting the number of units when connecting in parallel.
[Rated Current of Bus Bar Unit (63 A)] > [Sum Value of Settling Current (Parallel Connection)]

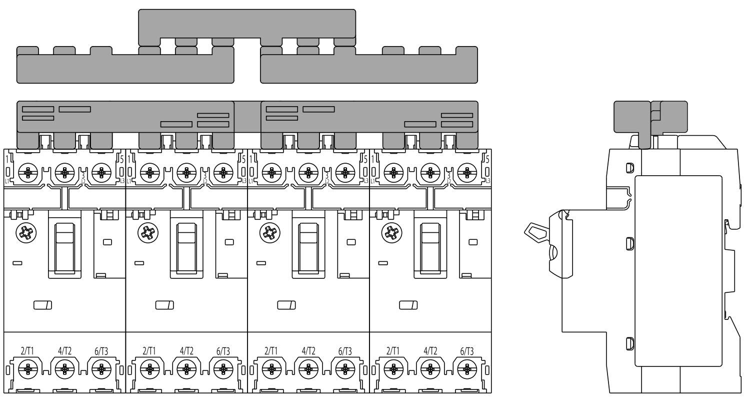
· Application Example: For Connecting 4 Units in Parallel (Close Mounting)

Bus Bar Units to be Used

UT-2B4



· Connection Example ∗ Determine the arrangement of the bus bar unit according to the feed position.



12.7 Combination Starter

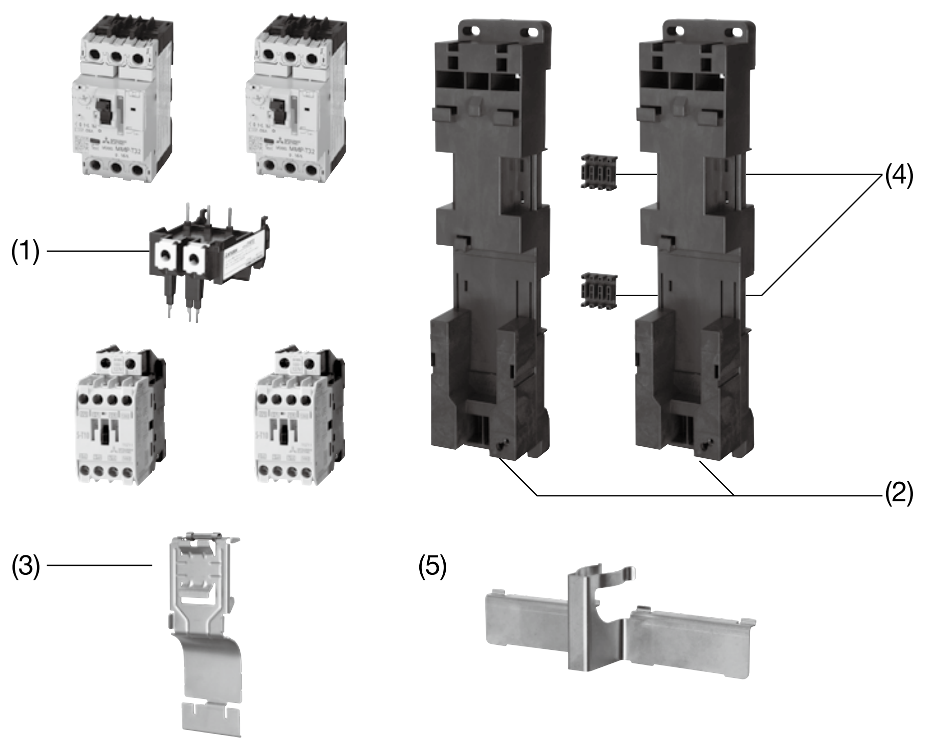
* Information on the UL standard is for products that bear the UL mark only. (Refer to page 362.)

To make a combination starter, use a motor circuit breaker and a contactor in combination.
The combination starter satisfies the requirements for Type 1 coordination (protection of magnetic starters and short- circuit protection devices defined in IEC 60947 and JIS C8201).
Using an optional unit can modularize the combination starter. If an electrical accident occurs, the combination starter decreases the possibility of spreading the effect to neighboring areas. Moreover, the combination starter contributes to space saving and less wiring.

Number	Product Name	Model Name	Specifications	Description	Applicable Models
(1)	Connecting Conductor Unit	UT-MT20		Unit for electrically and mechanically connecting MMP-T32 and a magnetic contactor.	MMP-T32
		UT-MT32			
		UT-MQ12			
		UT-MT20D			
		UT-MT32D			
(2)	Mounting Base Unit	UT-BT20		Plate for mounting a combination starter by combining MMP-T32 and a magnetic contactor. Can be rail mounted or screw mounted.	
		UT-BT32			
		UT-BT32D			
(3)	Mounting Base Unit	UT-BT32DMP		This is a plate to combine MMP-T32 and a DC operated magnetic contactor and install them. Single rail mounting is possible.	
(4)	Jointing Block Unit	UT-RT10		A block that connects the 2 mounting base units mechanically.	
		UT-RT20			
		UT-RT32			
(5)	Jointing Block Unit	UT-RT32DMP		This is a unit to combine UT-BT32DMP and a reversible magnetic contactor. It is required to use UT-BT32DMP in combination with MMP-T32 and a reversible DC operated magnetic contactor.	

Note 1. Motor circuit breaker options can also be installed. (Page 357)

Configuration Diagram of Options



Combinations of Devices to Make Combination Starters

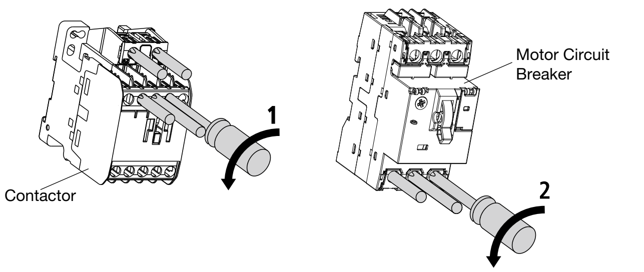
Motor Circuit Breaker (Type E Optional Unit)	Magnetic Contactors		Connecting Conductor Unit	Mounting Base Unit	Mounting Method	Jointing Block Unit
MMP-T32 (UT-CV3, UT-TU)	S-T10	Non-Reversing	UT-MT20	Configurable without the base unit if screw mounting is not required	IEC Rail (1 pc)	—
	S-T12/T20		UT-MT20		IEC Rail (1 pc)	—
	S-T32		UT-MT32		IEC Rail (1 pc)	—
	S-T10		UT-MT20	UT-BT20	Screw Mounting or IEC Rail (2 pcs)	—
	S-T12/T20		UT-MT20	UT-BT20	Screw Mounting or IEC Rail (2 pcs)	—
	S-T32		UT-MT32	UT-BT32	Screw Mounting or IEC Rail (2 pcs)	—
	S-2xT10	Reversing	UT-MT20	UT-BT20 (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT10
	S-2xT12/T20		UT-MT20	UT-BT20 (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT20
	S-2xT32		UT-MT32	UT-BT20 (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT32
	SD-Q11/Q12	Non-Reversing	UT-MQ12	Not Required (Screw Mounting Not Possible)	IEC Rail (1 pc)	—
	SD-QR11/QR12	Reversing	UT-MQ12		IEC Rail (1 pc)	Not Required
	SD-T12/T20	Non-Reversing	UT-MT20D	UT-BT32D	Screw Mounting or IEC Rail (2 pcs)	—
				UT-BT32DMP	IEC Rail (1 pc)	—
	SD-T32		UT-MT32D	UT-BT32D	Screw Mounting or IEC Rail (2 pcs)	—
				UT-BT32DMP	IEC Rail (1 pc)	—
	SD-2xT12/T20	Reversing	UT-MT20D	UT-BT32D (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT20
				UT-BT32DMP (2 Units)	IEC Rail (1 pc)	UT-RT32DMP
	SD-2xT32		UT-MT32D	UT-BT32D (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT32
				UT-BT32DMP (2 Units)	IEC Rail (1 pc)	UT-RT32DMP

Note 1. For Type E/F certification, use UT-CV3 and UT-TU in combination. (Page 367 for the ratings)
Note 2. If only one IEC rail is used for the installation (no mounting base unit is used), the operating conditions of the contactor are as follows: Opening and closing: 600 times/hour, mechanical durability: 5,000,000 times (10,000,000 times when a mounting base unit is used)

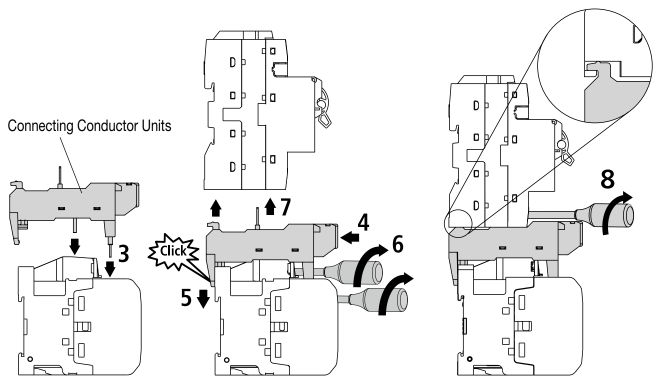
Where and How to Install Optional Units

● Connecting Conductor Units (UT-MT20 and MT32)

· Loosen the terminals for installing the connecting conductor unit.

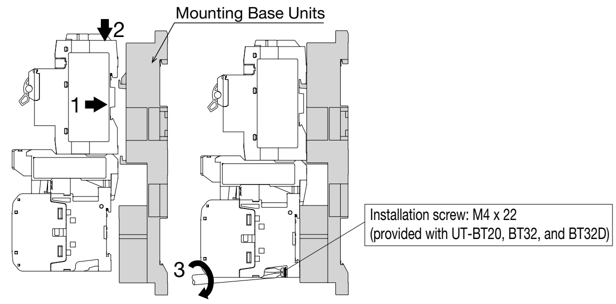


· Install the connecting conductor unit using the following steps.

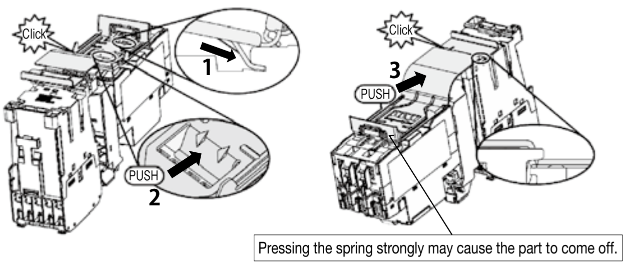


Note 1. For how to install UT-MT20D or 32D, refer to the instructions for the product.

● Mounting Base Units (UT-BT20, BT32, and BT32D)



● Mounting Base Units (UT-BT32DMP)



Note 1. The connecting conductor unit is required to install the mounting base unit.
Note 2. For combination with a reversible magnetic contactor, use two mounting base units (UT-BT**) and connect them using a jointing block unit (UT-RT**).

Type 1 Coordination (Non-Reversing/Reversing, Direct Start)

Satisfies the requirements for protection coordination Type 1 (Type 1 Coordination) of combination starters specified in IEC 60947-4-1 and JIS C 8201-4-1.

◆ Combining Motor Circuit Breakers and Magnetic Contactors (Type 1 Coordination)

Motor Circuit Breakers			Magnetic Contactors	Rated Conditional Short-Circuit Current Iq [kA]			
Model Name	Heater Designation	Rated Current Setting Range [A]		200/240 V	400/415 V	440/460 V	500 V
MMP-T32	0.16	0.1 to 0.16	Refer to the Combination List (Table Below)	50	50	50	50
	0.25	0.16 to 0.25		50	50	50	50
	0.4	0.25 to 0.4		50	50	50	50
	0.63	0.4 to 0.63		50	50	50	50
	1	0.63 to 1		50	50	50	50
	1.6	0.1 to 1.6		50	50	50	50
	2.5	1.6 to 2.5		50	50	50	50
	4	2.5 to 4		50	50	50	50
	6.3	4 to 6.3		50	50	50	50
	8	5.5 to 8		50	50	50	42
	10	7 to 10		50	50	50	42
	13	9 to 13		50	50	50	42
	18	12 to 18		50	50	35	10
	25	18 to 25		50	50	35	10
	32	24 to 32		50	50	35	10

The following table shows the magnetic contactors that can be combined with each rating of the motor circuit breaker.

Motor Circuit Breakers

Model Name	Heater Designation	Rated Current Setting Range [A]
MMP-T32	0.16	0.1 to 0.16
	0.25	0.16 to 0.25
	0.4	0.25 to 0.4
	0.63	0.4 to 0.63
	1	0.63 to 1
	1.6	0.1 to 1.6
	2.5	1.6 to 2.5
	4	2.5 to 4
	6.3	4 to 6.3
	8	5.5 to 8
	10	7 to 10
	13	9 to 13
	18	12 to 18
	25	18 to 25
	32	24 to 32

Magnetic Contactors (Non-Reversing/Reversing) — Model Name

Model Name	200/240 V	400/415 V	440/460 V	500 V
S-(2x)T10(BC)	≤ 11	≤ 7	≤ 7	≤ 6
S(D)-(2x)T12(BC)	≤ 13	≤ 9	≤ 9	≤ 9
S(D)-(2x)T20(BC)	≤ 18	≤ 18	≤ 18	≤ 17
S(D)-(2x)T21(BC)	≤ 20	≤ 20	≤ 20	≤ 17
S-(2x)T25(BC)	≤ 26	≤ 25	≤ 25	≤ 20
S(D)-(2x)T32(BC)	≤ 32	≤ 32	≤ 32	≤ 20
SD-Q(R)11/12	≤ 12	≤ 9	≤ 9	≤ 7

Note 1. When combining S(D)-T21 and S-T25, only wiring with electric wires is possible. (Connecting conductor units cannot be used)
Note 2. The above table is based on the class AC-3 maximum rated operating current of each magnetic contactor. Select with attention to the actual operating conditions.
Note 3. When selecting a unit to use it with a motor circuit breaker and a magnetic contactor, use the following combinations or refer to page 360.

S-T10(BC) to T20(BC): UT-MT20
S-T32(BC): UT-MT32

SD-T12(BC)/T20(BC): UT-MT20D+UT-BT32D or UT-MT20D+UT-BT32DMP
SD-T32(BC): UT-MT32D+UT-BT32D or UT-MT32D+UT-BT32DMP

S-2xT10(BC): UT-MT20+UT-RT10+UT-BT20 (2 Units)
S-2xT12(BC)/T20(BC): UT-MT20+UT-RT20+UT-BT20 (2 Units)
S-2xT32(BC): UT-MT32+UT-RT32+UT-BT32 (2 Units)

SD-2×T12(BC)/T20(BC): UT-MT20D+UT-RT20+UT-BT32D (2 Units) or UT-MT20D+UT-RT32DMP+UT-BT32DMP (2 Units)
SD-2×T32(BC): UT-MT32D+UT-RT32+UT-BT32D (2 Units) or UT-MT32D+UT-RT32DMP+UT-BT32DMP (2 Units)

S-T21(BC)/T25(BC)/SD-T21(BC)/S-2xT21(BC)/SD-2xT21(BC)/T25(BC): Electric Wire Connection

SD-Q11/Q12/QR11/QR12: UT-MQ12

12

12.8 Applicable Standard

● Regulatory/Legal Conformity and Compliance

<table>
<tr><th colspan="4">Model Name
Standards/Regulations</th><th>MMP-T32</th><th>UT-MAX
UT-MAL</th><th>UT-TU</th><th>UT-CV3</th><th>UT-MT20
UT-MT32
UT-MT20D
UT-MT32D
UT-MQ12</th><th>UT-BT20
UT-BT32</th><th>UT-BT32D
UT-BT32DMP</th><th>UT-2B4/3B4
UT-2B5/3B5</th><th>UT-EP3</th></tr>
<tr><td rowspan="12">Overseas Tripping</td><td rowspan="3" colspan="2">International</td><td>IEC60947-2</td><td>○</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>○</td><td>○</td></tr>
<tr><td>IEC60947-4-1</td><td>○</td><td>∗</td><td>∗</td><td>∗</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>IEC60947-5-1</td><td>∗</td><td>○</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td></tr>
<tr><td rowspan="5">Europe</td><td rowspan="3">CE</td><td>EN60947-2</td><td>○</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td></tr>
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<tr><td>EN60947-5-1</td><td>∗</td><td>○</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td></tr>
<tr><td>TÜV
TÜV Rheinland
(Certification Number)</td><td>EN60947-2</td><td>○
(R50269663
R50269678
R50269688
R50269690)</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td></tr>
<tr><td colspan="2">RoHS Directive</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="2">China</td><td rowspan="2">CCC
(Certification Number)</td><td>GB/T14048.2</td><td>○
(2012010307533513)</td><td>∗</td><td rowspan="2" colspan="7">∗</td></tr>
<tr><td>GB/T14048.2</td><td>∗</td><td>○
(2012010304563726)</td></tr>
<tr><td rowspan="2">North America
Canada</td><td rowspan="2">UL/CSA
c UL us
(File Number)</td><td>UL60947-4-1</td><td rowspan="2">Refer to Note 1.
(Single Unit : E361855
Combination: E319418)</td><td rowspan="2">○
(E361855)</td><td rowspan="2">○
(E319418)</td><td rowspan="2">○
(E319418)</td><td rowspan="2">○
(E319418)</td><td rowspan="2">○
(E319418)</td><td rowspan="2">○
(E319418)</td><td rowspan="2">–</td><td rowspan="2">–</td></tr>
<tr><td>CSA C22.2
No.60947-4-1</td></tr>
<tr><td rowspan="4">Domestic</td><td rowspan="3" colspan="2">Japan</td><td>JIS C8201-2-1
Ann.1</td><td>○</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>○</td><td>○</td></tr>
<tr><td>JIS C8201-4-1</td><td>○</td><td>∗</td><td>∗</td><td>∗</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>JIS C8201-5-1</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td><td>∗</td></tr>
<tr><td colspan="2">Electrical Appliances and Materials Safety Act</td><td>Non-Specified Electric Appliances</td><td>○</td><td colspan="8">∗</td></tr>
</table>

○: Compliant (or Certified in the Case of Third-Party Authentication), –: Models not yet certified (non-pending); ∗: Standard certification non-applicable model

Note 1. MMP-T32(BC) motor circuit breakers manufactured after April 2021 do not bear the UL mark. Note that information on the UL standard is for products that bear the UL certification mark only.
Using a motor circuit breaker that does not bear the UL certification mark will void the UL certification of the Type E/F combination motor controller and group installation.
For details, refer to the "MITSUBISHI ELECTRIC Control Equipment Sales and Service 168".

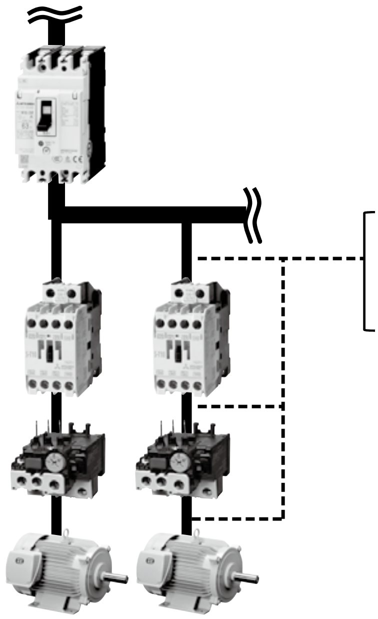
Sales and Service 168
https://www.mitsubishielectric.com/fa/document/sales/lvsw/168_e/168_e.pdf

Reliable Wire Protection (EN/JIS Standards)

Motor circuit breakers allow you to solve concerns over selecting wires for group protection.

◆ General Group Protection (Only with a Master Breaker)

Standards of major countries such as IEC/EN 60204 and JIS B9960-1 require that the control panel properly protect wires and load equipment from short circuits.
In some cases, it is difficult to select the size of wires for general group protection to protect them properly.
Individual protection using motor circuit breakers will solve such concerns.



Select a master breaker rated to protect wires and load equipment on the secondary side.
All the wires must be thick (∗) enough to be protected by the master breaker.
∗ Branch breaker rating × 1.25 < permissible current of wires

The wire used in the branch circuit must meet the following conditions.

1. The size matches the load current (the cost and current-carrying capacity both taken into account).
2. The wire matches the terminal size of the load equipment.
3. The wire can be protected from burn damage due to short circuits and overloads.

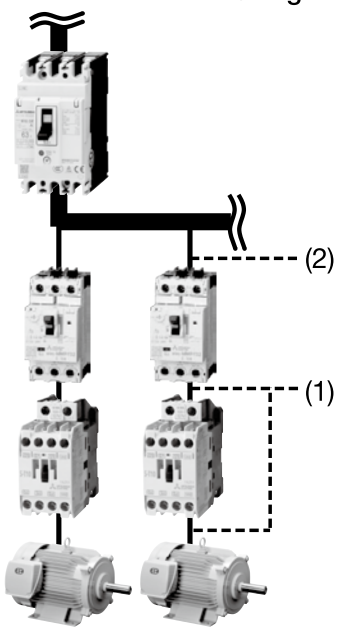
Concerns If thin wires are used, condition 3 may not be met. If thick wires are used, conditions 1 and 2 may not be met, increasing the cost and decreasing workability.

As a result, it may be difficult to select wires with safety and cost both taken into account.

∗In many cases in Japan, the wire of branch circuits in the control panel is too thin to be protected by the master breaker. The manufacturer must produce "safe" control panels to meet standards.

Individual protection using motor circuit breakers will solve such concerns.

◆ Individual Protection Using Motor Circuit Breakers



The motor circuit breaker has a short-circuit protection function, which protects branch circuits independently.
∗ Since the motor circuit breaker has both functions of a breaker and a thermal overload relay, branch circuits can be protected independently without additional devices.

● Reasons that Individual Protection Makes Wire Selection Easier

(1) Wiring on the secondary side of motor circuit breakers
Since branch circuits can be protected independently, the wire size can be selected according to the load current of motors.

(2) Wiring of branch circuits
A special exemption is available for individual protection (EN 60204 Clause 7.2.8). If the following conditions are met, the wire size used on the secondary side of the motor circuit breaker in range (1) can be used for the branch circuit in range (2).

1. The conductor current capacity exceeds the load capacity.
2. The length of each connection conductor for the overcurrent protection device is within 3m.
3. The conductor is protected by an enclosure or duct.

For individual protection, if an electrical accident occurs on the load side, the possibility of spreading the effect to neighboring areas can be decreased.

12.9 UL Standards and SCCR

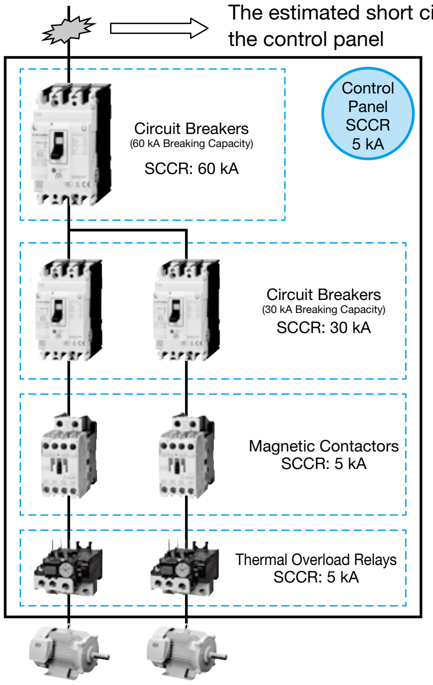
* Information on the UL standard is for products that bear the UL mark only.
(Refer to page 362.)

The motor circuit breaker is UL-listed. Moreover, with the motor circuit breaker, Type E/F combination motor controllers, high SCCR (short circuit current rating), and group installation are available.

● What is SCCR (Short-Circuit Current Rating)?

Article 409 of NFPA 70 (National Electric Code: NEC), which is the electrical equipment standard of the United States, requires the SCCR value to be displayed on industrial control panels. SCCR is defined as the value of the short-circuit current that various devices connected to the main circuit can withstand; it is stipulated that the SCCR value of the control panel must be greater than the estimated short circuit current at the location where the control panel is installed. The SCCR value for industrial control panels is determined based on supplement SB of UL 508A.

The estimated short circuit current at the location of installation must be smaller than or equal to the SCCR of the control panel



● Determination of SCCR for Control Panel
Basically, the smallest SCCR value among the power circuit components is regarded as SCCR for the control panel.
In the case of the circuit in the figure at left, the SCCR value for the control panel is 5 kA.

● Determination of SCCR Value for Power Circuit Components
The determination method of SCCR for the power circuit components is in accordance with one of the following.
(1) The SCCR value displayed on device rating plates, in instruction manuals, etc.
(2) The estimated SCCR value described in table UL508A, SB4.1.
(3) The value described in the manufacturer's UL procedure and evaluated using a specific combination.

● To increase the SCCR value of the control panel
When adopting the values from (1) or (2) above, the SCCR value of the magnetic contactors/thermal overload relays is 5 kA and the SCCR of the control panel is limited. However, by applying the SCCR value of (3), it is possible to further increase the SCCR value of the control panel.

● Examples for Combinations of Specific Devices
The following types of specific combinations can achieve a high SCCR.

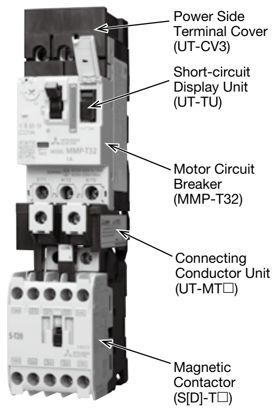
(1) Combination Motor Controller Type C
Combination of UL489 Breaker and UL60947-4-1 Contactor or Thermal Overload Relay

(2) Combination Motor Controller Type E
Combination of UL 60947-4-1 Motor Circuit Breaker and Specific Optional Items
∗ Specific Optional Items: Power Side Terminal Cover (UT-CV3) and Short-Circuit Display Unit (UT-TU)

(3) Combination Motor Controller Type F
Combination with Combination Motor Controller Type E and UL60947-4-1 Contactor

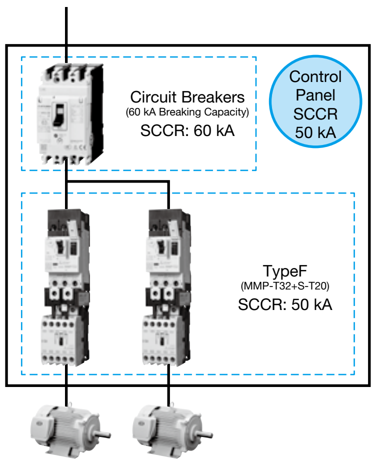
⇒ **MMP-T32 has a high SCCR UL certification with Type E/F**

Refer to page 367 for Type E/F combination table and SCCR values.



Combination Motor Controller Type F

● Advantages Seen in Type E/F Circuit Example



By using Type E/F it is possible to display a high SCCR value.
The circuit diagram at left shows an example using Type F, with SCCR value of 50 kA.
Also, by adopting Type E/F combination motor controllers, it is possible to reduce the number of components (breakers). In addition, connecting with connecting conductor units can save space and wiring.

● Increasing the SCCR value by other methods (reference)
The SCCR values can also be increased by using the following methods.
∗ Check UL508A SB for details.
1. Correction for Transformer Capacity and Secondary Side SCCR
2. Correction with Current Limiting Circuit Breaker and Current Limiting Fuse

Group Installation

A group installation is a short-circuit protection method that protects multiple motor branch circuits with one short-circuit protection device, such as a circuit breaker or fuse, for group protection (UL standards). To design group protection that meets the UL standards, consider adopting this short-circuit protection method. MMP-T32 is UL-listed for high SCCR in group installation when used with circuit breakers.

● Group Protection (UL Standards)

For general protection circuits, a BCP is installed to each branch circuit. Since many BCPs are used for such circuits, group protection is adopted in some cases. To meet the UL standards, consider the following conditions.

Selecting A (BCP):

Consider the following conditions.

· Capacity enough to protect wire B

· Conditions in which devices D and E meet the UL standards (Availability of group protection and required SCCR)

Select wires that connect the BCP according to the following conditions.

Selecting B (branch circuit conductor):

· Select one considering the load current (∗) of the branch circuit.

∗Maximum rated motor current value × 1.25 + total current value of the other motors

Selecting C (tap conductor):

Select one that meets any of the following conditions.

· Same capacity as B

· Capacity of more than 1/3 of B (up to 7.5m, protection against damage to the wire required)

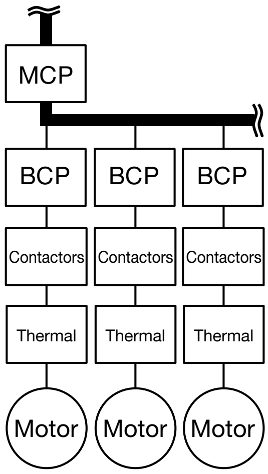
If the conditions mentioned above are met, the wire may be thick depending on condition C, and thereby the equipment size may become large.

[Definition of Abbreviations]

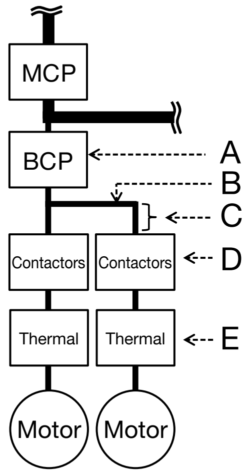
MCP: Main Circuit Protection device

BCP: Branch Circuit Protection device

MMS: Manual Motor Starter



General Protection Circuit Example



Group Protection Circuit Example

● Group Protection Using Motor Circuit Breakers (UL Standards)

Group protection using motor circuit breakers has the following advantages.

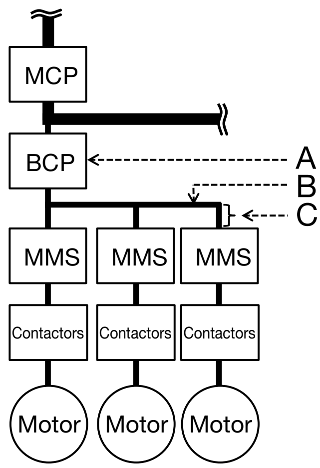
<Advantage 1: The number of BCPs can be reduced.>

MMP-T32 is UL-listed when used with high rated breakers (BCPs). Therefore, many branch circuits can be placed in the downstream of one BCP.

<Advantage 2: High SCCR>

The motor circuit breaker is UL-listed for its high SCCR in group installation. The SCCR of the control panel can be increased.

∗ For details on the UL-listed ratings for group installation, refer to page 370.



Group Protection Circuit Example Using Motor Circuit Breakers

● Differences from Individual Protection Using Type E/F

When a Type E/F combination motor controller (MMP-T32 with optional unit) is used, branch circuits are protected independently.

Individual protection using Type E/F has the following advantages.

<Advantage 1: The number of devices can be reduced.>

Since the rated current of the upstream protection device is not restricted to meet the UL standards, the number of protection devices can be further reduced.

<Advantage 2: Thin wires can be used for tap conductors.>

For circuits including Type E/F, tap conductors with any of the following conditions can be used. Therefore, thinner wires can be selected.

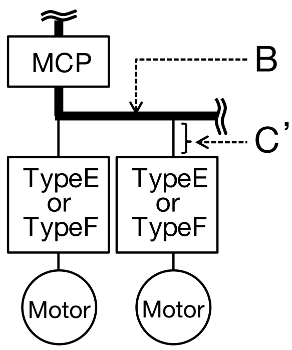
Selecting C' (tap conductor):

Select one that meets any of the following conditions.

· Same capacity as B

· Capacity of more than 1/3 of B (up to 7.5m, protection against damage to the wire required)

· Capacity of more than 1/10 of B (up to 3m, protection against damage to the wire required)



Individual Protection Circuit Example Using Type E/F

12 Motor Circuit Breakers MMP-T32

● UL Standard Certified Rating (Motor Circuit Breakers)

When UL standards are applied and used, select from the rating table below.

■ Motor Circuit Breakers UL Standard Certified Ratings

[Certified Rating]

◆ Main Circuit Single-Phase

Motor Circuit Breaker (Current Setting Range)		Certified Rating											
		110 to 120V		200 V		208 V		220 to 240V		440 to 480V		550 to 600V	
		Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]
MMP-T32	0.1 to 0.16	—	0.16	—	0.16	—	0.16	—	0.16	—	0.16	—	0.16
	0.16 to 0.25	—	0.25	—	0.25	—	0.25	—	0.25	—	0.25	—	0.25
	0.25 to 0.4	—	0.4	—	0.4	—	0.4	—	0.4	—	0.4	—	0.4
	0.4 to 0.63	—	0.63	—	0.63	—	0.63	—	0.63	—	0.63	—	0.63
	0.63 to 1	—	1	—	1	—	1	—	1	—	1	—	1
	1 to 1.6	—	1.6	—	1.6	—	1.6	1/10	1.5	—	1.6	—	1.6
	1.6 to 2.5	—	2.5	1/6	2.5	1/6	2.4	1/6	2.2	1/2	2.5	1/2	2
	2.5 to 4	1/8	3	1/3	4	1/3	4	1/3	3.6	1	4	1-1/2	4
	4 to 6.3	1/4	5.8	1/2	5.6	1/2	5.4	1/2	4.9	2	6	2	4.8
	5.5 to 8	1/3	7.2	3/4	7.9	3/4	7.6	1	8	2	6	3	6.8
	7 to 10	1/2	9.8	1	9.2	1	8.8	1-1/2	10	3	8.5	—	10
	9 to 13	3/4	13	1-1/2	11.5	1-1/2	11	2	12	5	13	5	11.2
	12 to 18	1	16	2	13.8	2	13.2	3	17	5	14	7-1/2	16
	18 to 25	2	24	3	19.6	3	18.7	—	25	7-1/2	21	10	20
	24 to 32	2	24	5	32	5	30.8	5	28	10	26	15	27

Note 1. Since "—" has no horsepower setting by standard, select the maximum rated operating current [A].

◆ Main Circuit Three-Phase

Motor Circuit Breaker (Current Setting Range)		Certified Rating											
		110 to 120V		200 V		208 V		220 to 240V		440 to 480V		550 to 600V	
		Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]
MMP-T32	0.1 to 0.16	—	0.16	—	0.16	—	0.16	—	0.16	—	0.16	—	0.16
	0.16 to 0.25	—	0.25	—	0.25	—	0.25	—	0.25	—	0.25	—	0.25
	0.25 to 0.4	—	0.4	—	0.4	—	0.4	—	0.4	—	0.4	—	0.4
	0.4 to 0.63	—	0.63	—	0.63	—	0.63	—	0.63	—	0.63	—	0.63
	0.63 to 1	—	1	—	1	—	1	—	1	1/2	1	1/2	0.9
	1 to 1.6	—	1.6	—	1.6	—	1.6	—	1.6	3/4	1.6	3/4	1.3
	1.6 to 2.5	—	2.5	1/2	2.5	1/2	2.4	1/2	2.2	1	2.1	1-1/2	2.4
	2.5 to 4	—	4	3/4	3.7	3/4	3.5	1	4	2	3.4	3	3.9
	4 to 6.3	3/4	6.3	1-1/2	6.3	1-1/2	6.3	1-1/2	6	3	4.8	5	6.1
	5.5 to 8	1	8	2	7.8	2	7.5	2	6.8	5	7.6	5	6.1
	7 to 10	1	8.4	—	10	—	10	3	9.6	5	7.6	7-1/2	9
	9 to 13	1-1/2	12	3	11	3	10.6	3	9.6	7-1/2	11	10	11
	12 to 18	2	13.6	5	17.5	5	16.7	5	15.2	10	14	15	17
	18 to 25	3	19.2	7-1/2	25.3	7-1/2	24.2	7-1/2	22	15	21	20	22
	24 to 32	5	30.4	10	32	10	30.8	10	28	20	27	30	32

Note 1. Since "—" has no horsepower setting by standard, select the maximum rated operating current [A].

UL Standard Certification (SCCR) [Type E/F Combination Motor Controllers]

Type E/F combination motor controllers can be configured by applying power side terminal covers and short circuit display units to motor circuit breakers. Increasing the SCCR value contributes to panel miniaturization and reduced wiring.

Type E/F Selection Table

(1) Type E Combination

[Certified Rating]

Combination Arrangements	=	Motor Circuit Breaker MMP-T32	+	Power Side Terminal Cover Kit UT-CV3	+	Short-circuit Display Unit UT-TU

◆ **Main Circuit Three Phase 220 to 240 V**

Type E Combination				Certified Rating			
Motor Circuit Breaker (Current Setting Range)		Power Side Terminal Cover	Short-circuit Display Unit	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	SCCR	
MMP-T32	0.1 to 0.16	UT-CV3	UT-TU	—	0.16	240V	50kA
	0.16 to 0.25			—	0.25		
	0.25 to 0.4			—	0.4		
	0.4 to 0.63			—	0.63		
	0.63 to 1			—	1		
	1 to 1.6			—	1.6		
	1.6 to 2.5			1/2	2.2		
	2.5 to 4			1	4		
	4 to 6.3			1-1/2	6		
	5.5 to 8			2	6.8		
	7 to 10			3	9.6		
	9 to 13			3	9.6		
	12 to 18			5	15.2		
	18 to 25			7-1/2	22		25kA
	24 to 32			10	28		

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

◆ **Main Circuit Three Phase 440 to 480 V**

Type E Combination				Certified Rating			
Motor Circuit Breaker (Current Setting Range)		Power Side Terminal Cover	Short-circuit Display Unit	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	SCCR	
MMP-T32	0.1 to 0.16	UT-CV3	UT-TU	—	0.16	480Y / 277V	50kA
	0.16 to 0.25			—	0.25		
	0.25 to 0.4			—	0.4		
	0.4 to 0.63			—	0.63		
	0.63 to 1			1/2	1		
	1 to 1.6			3/4	1.6		
	1.6 to 2.5			1	2.1		
	2.5 to 4			2	3.4		
	4 to 6.3			3	4.8		
	5.5 to 8			5	7.6		
	7 to 10			5	7.6		
	9 to 13			7-1/2	11		
	12 to 18			10	14		
	18 to 25			15	21		25kA
	24 to 32			20	27		

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

(2) Type F Combination

[Certified Rating]

Combination Arrangements	=	Type E Combination (See (1))	+	Connecting Conductor Unit UT-MT □ /UT-MQ12	+	Magnetic Contactor S(D)-(2x)T □ /SD-Q(R) □

◆ **Main Circuit Three Phase 220 to 240 V**

Note. Some combinations require the mounting base unit (UT-BT □) and jointing block unit (UT-RT □) for installation.

Type F Combination							Certified Rating			
Type E Combination (Current Setting Range)		Magnetic Contactors				Connecting Conductor Unit	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	SCCR	
MMP-T32 + UT-CV3 + UT-TU	0.1 to 0.16	S-(2x)T10 SD-Q(R)11 /Q(R)12	S-(2x)T12 SD-(2x)T12			UT-MT20 (For S-T10/T12/T20) UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) UT-MT32 (For S-T32) UT-MT32D + UT-BT32D/BT32DMP (For SD-T32) UT-MQ12 (For SD-Q11/Q12)	—	0.16	240V	50kA
	0.16 to 0.25						—	0.25		
	0.25 to 0.4						—	0.4		
	0.4 to 0.63						—	0.63		
	0.63 to 1						—	1		
	1 to 1.6			S-(2x)T20 SD-(2x)T20	S-(2x)T32 SD-(2x)T32		—	1.6		
	1.6 to 2.5						1/2	2.2		
	2.5 to 4						1	4		
	4 to 6.3						1-1/2	6		
	5.5 to 8						2	6.8		
	7 to 10						3	9.6		
	9 to 13						3	9.6		
	12 to 18						5	15.2		
	18 to 25						7-1/2	22		
	24 to 32						10	28		

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

◆ **Main Circuit Three Phase 440 to 480 V**

Type F Combination							Certified Rating			
Type E Combination (Current Setting Range)		Magnetic Contactors				Connecting Conductor Unit	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]	SCCR	
MMP-T32 + UT-CV3 + UT-TU	0.1 to 0.16	S-(2x)T10 SD-Q(R)11 /Q(R)12	S-(2x)T12 SD-(2x)T12			UT-MT20 (For S-T10/T12/T20) UT-MT20D + UT-BT32D/BT32DMP (For SD-T12/T20) UT-MT32 (For S-T32) UT-MT32D + UT-BT32D/BT32DMP (For SD-T32) UT-MQ12 (For SD-Q11/Q12)	—	0.16	480Y / 277V	50kA
	0.16 to 0.25						—	0.25		
	0.25 to 0.4						—	0.4		
	0.4 to 0.63						—	0.63		
	0.63 to 1						1/2	1		
	1 to 1.6			S-(2x)T20 SD-(2x)T20	S-(2x)T32 SD-(2x)T32		3/4	1.6		
	1.6 to 2.5						1	2.1		
	2.5 to 4						2	3.4		
	4 to 6.3						3	4.8		
	5.5 to 8						5	7.6		
	7 to 10						5	7.6		
	9 to 13						7-1/2	11		
	12 to 18						10	14		
	18 to 25						15	21		
	24 to 32						20	27		

Note 1. Since “—” has no horsepower setting by standard, select the maximum rated operating current [A].

12 Motor Circuit Breakers MMP-T32

UL Standard Certification (SCCR) [Combination with Servo Amplifier]

The SCCR is acquired by combining a Combination Motor Controller Type E and a Mitsubishi Electric AC servo amplifier.
The applicable combinations and SCCR values are shown in the table below.

Type E Combination Motor Controller (SCPD)		Servo Amplifiers			Main Circuit Voltage (Vac)	SCCR (kA)
Model Name	Maximum Heater Designation	Model Name	Input Rating (Vac)	Input Phase		
MMP-T32	1.6A	MR-J4-10#	200 to 240	Three-Phase	240	50
	2.5A	MR-J4-20#				
	4A	MR-J4-40#				
	6.3A	MR-J4-60#				
	6.3A	MR-J4-70#				
	8A	MR-J4-100#				
	18A	MR-J4-200#				
	25A	MR-J4-350#				25 (Note 1)
	32A	MR-J4-500#				
	2.5A	MR-J4-60#4	380 to 480	Three-Phase	480Y277	50
	4A	MR-J4-100#4				
	8A	MR-J4-200#4				
	13A	MR-J4-350#4				
	18A	MR-J4-500#4				
	25A	MR-J4-700#4				25 (Note 1)
	6.3A	MR-J4W2-22B	200 to 240	Three-Phase	240	50
	8A	MR-J4W2-44B				
	13A	MR-J4W2-77B				
	18A	MR-J4W2-1010B				
	8A	MR-J4W3-222B				
	13A	MR-J4W3-444B				

#: Either A, B, or GF.

UL Standard Certification (SCCR) [Combination with Inverter]

The SCCR is acquired by combining a Combination Motor Controller Type E and a Mitsubishi Electric inverter.
The applicable combinations and SCCR values are shown in the table below.

Type E Combination Motor Controller (SCPD)		Inverters		Main Circuit Voltage (Vac)	SCCR (kA)
Model Name	Maximum Heater Designation	Model Name	Capacity [kW]		
MMP-T32	1.6A	FR-E720	0.1	480Y277	50
	4A		0.2		
	6.3A		0.4		
	10A		0.75		
	13A		1.5		
	18A		2.2		
	25A		3.7		25 (Note 1)
	4A	FR-E740	0.4		50
	6.3A		0.75		
	8A		1.5		
	10A		2.2		
	18A		3.7		
	25A		5.5		25 (Note 1)
	32A		7.5		
	1.6A	FR-D720	0.1		50
	4A		0.2		
	6.3A	FR-D720 (FR-F720PJ)	0.4		
	8A		0.75		
	13A		1.5		
	18A		2.2		
	25A		3.7		25 (Note 1)
	2.5A	FR-D740 (FR-F740PJ)	0.4		50
	4A		0.75		
	6.3A		1.5		
	10A		2.2		
	18A		3.7		
	25A		5.5		25 (Note 1)
	32A		7.5		
MMP-T32	8A	FR-A820	0.4	480Y277	50
	13A		0.75		
	18A		1.5		
	25A		2.2		25 (Note 1)
	32A		3.7		
	4A	FR-A840	0.4		50
	6.3A		0.75		
	8A		1.5		
	13A		2.2		
	18A		3.7		
	25A		5.5		25 (Note 1)
	32A		7.5		
	8A	FR-F820	0.75		50
	13A		1.5		
	18A		2.2		
	25A		3.7		25 (Note 1)
	32A		5.5		
	4A	FR-F840	0.75		50
	6.3A		1.5		
	8A		2.2		
	13A		3.7		
	18A		5.5		
	25A		7.5		25 (Note 1)
	32A		11		

Note 1. If a heater designation of 18A or less is selected based on the load current, the SCCR is 50kA.
Note 2. To prevent the Type E combination motor controller from being activated by the load current including high frequency components of the inverter, select a slightly larger heater designation value than the rated current of the inverter. Then, check the actual operation (Reference value: Load current × 1.4). If the Type E combination motor controller is activated by the maximum heater designation value in the above table, use a UL489-listed low voltage breaker.

UL Certification Rating (SCCR) [Group Installation]

The table below shows the UL certification ratings applicable to group installation circuits.

Table 1. Motor Circuit Breaker MMP-T32 Single Unit

Motor Circuit Breaker Model Name	Heater Designation	Short-Circuit Current Rating (SCCR)							
		Main Circuit Voltage: 240 V Maximum				Main Circuit Voltage: 480 V Maximum			
			Low Voltage Circuit Breaker (BCP) Rating				Low Voltage Circuit Breaker (BCP) Rating		
			Maximum Rated Current	Minimum Breaking Current	Recommended Model Name		Maximum Rated Current	Minimum Breaking Current	Recommended Model Name
MMP-T32	0.16A	50 kA	250 A	50 kA	NF250-HVU NV250-HVU	50 kA	250 A	50 kA	NF250-HVU NV250-HVU
	0.25A								
	0.4A								
	0.63A								
	1A								
	1.6A								
	2.5A								
	4A								
	6.3A								
	8A								
	10A								
	13A								
	18A								
	25A	25 kA				25 kA			
	32A								

Table 2. Motor Circuit Breaker MMP-T32+S(D)-(2x)T □

Motor Circuit Breaker Model Name	Heater Designation	Combination Connecting Unit/Magnetic Contactor				Short-Circuit Current Rating (SCCR)							
						Main Circuit Voltage: 240 V Maximum				Main Circuit Voltage: 480 V Maximum			
							Low Voltage Circuit Breaker (BCP) Rating				Low Voltage Circuit Breaker (BCP) Rating		
							Maximum Rated Current	Minimum Breaking Current	Recommended Model Name		Maximum Rated Current	Minimum Breaking Current	Recommended Model Name
MMP-T32	0.16A	UT-MT20 / S-(2x)T10	UT-MT20(D) / S(D)-(2x)T12	UT-MT20(D) / S(D)-(2x)T20	UT-MT32(D) / S(D)-(2x)T32	50 kA	250 A	50 kA	NF250-HVU NV250-HVU	50 kA	250 A	50 kA	NF250-HVU NV250-HVU
	0.25A												
	0.4A												
	0.63A												
	1A												
	1.6A												
	2.5A												
	4A												
	6.3A												
	8A												
	10A												
	13A												
	18A	–	–										
	25A			–									
	32A												

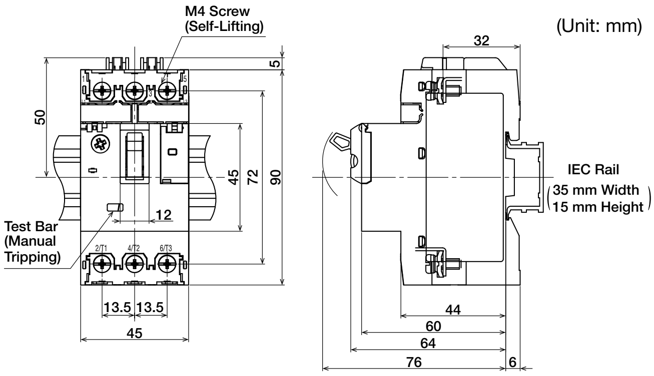
Note. Some combinations require the mounting base unit (UT-BT □) and jointing block unit (UT-RT □) for installation.

12.10 Outline Drawings

* Information on the UL standard is for products that bear the UL mark only.
(Refer to page 362.)

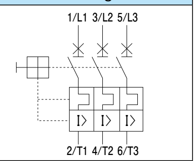
MMP-T32

(Unit: mm)



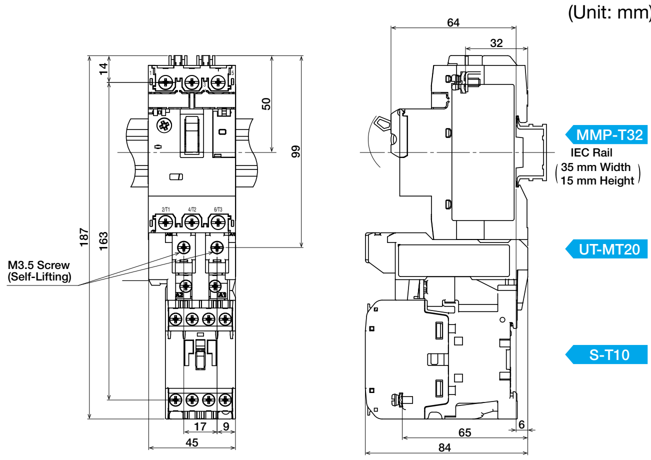
Model Name	Heater Designation
MMP-T32	0.16 to 8
	10 to 18
	25
	32

Contact Arrangement



MMP-T32 + UT-MT20 + S-T10

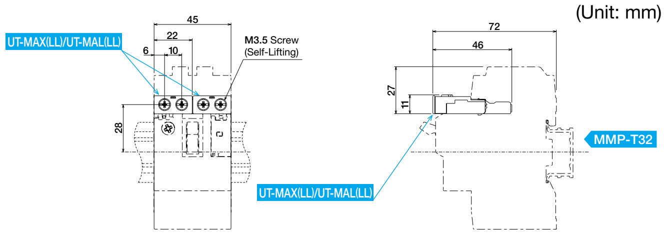
(Unit: mm)



Model Name
UT-MT20

MMP-T32 + UT-MAX(LL)/UT-MAL(LL)

(Unit: mm)



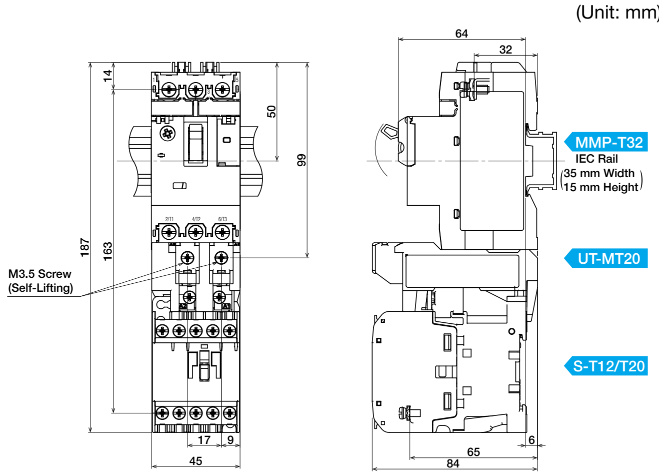
∗ The above figure shows the state where 2 units [UT-MAX(LL) and/or UT-MAL(LL)] are installed.
Outline drawings of UT-MAX(LL) and UT-MAL(LL) are equivalent.

Model Name
UT-MAX
UT-MAXLL
UT-MAL
UT-MALLL

Model Name	Contact Arrangement Terminal No. (marked) 1a	1b
UT-MAX UT-MAXLL	13(23)-14(24)	11(21)-12(22)
UT-MAL UT-MALLL	17(27)-18(28)	15(25)-16(26)

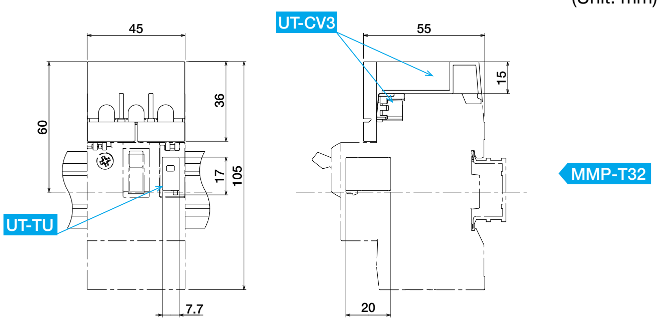
MMP-T32 + UT-MT20 + S-T12/S-T20

(Unit: mm)



MMP-T32 + UT-CV3 + UT-TU (Type E Combination)

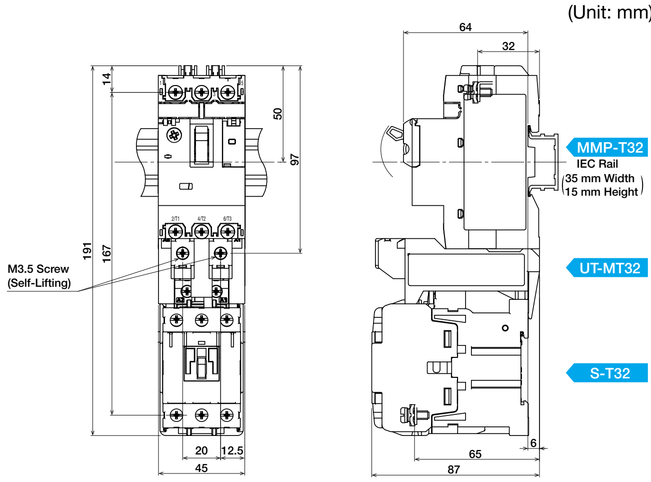
(Unit: mm)



Model Name
UT-CV3
UT-TU

MMP-T32 + UT-MT32 + S-T32

(Unit: mm)

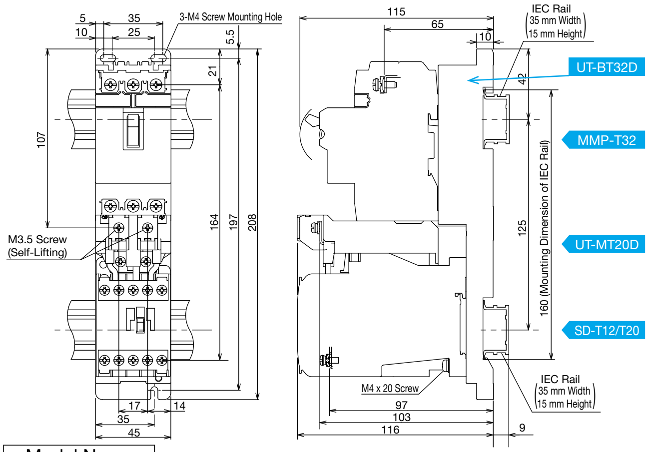


Model Name
UT-MT32

12

MMP-T32+ UT-MT20D + SD-T12/SD-T20 + UT-BT32D

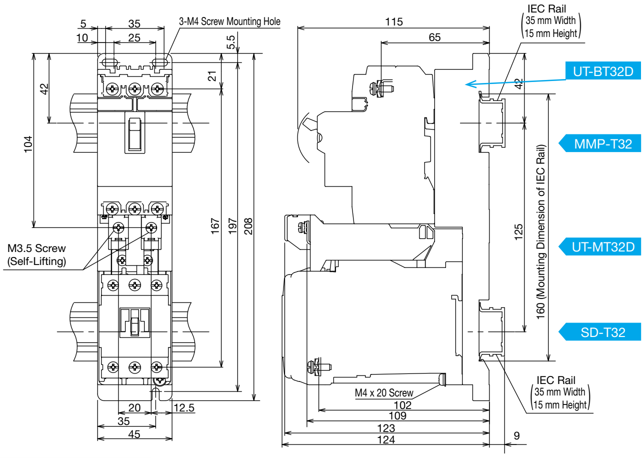
(Unit: mm)



Model Name
UT-MT20D
UT-BT32D

MMP-T32+ UT-MT32D + SD-T32 + UT-BT32D

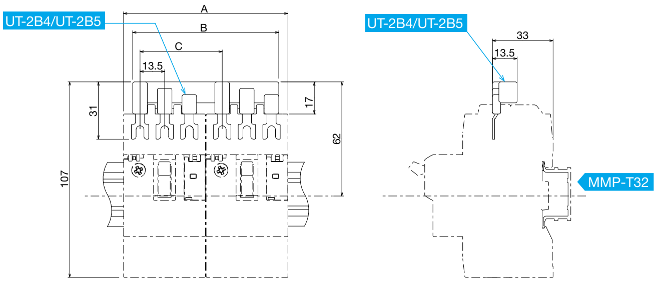
(Unit: mm)



Model Name
UT-MT32D

MMP-T32x2 + UT-2B4/UT-2B5

(Unit: mm)

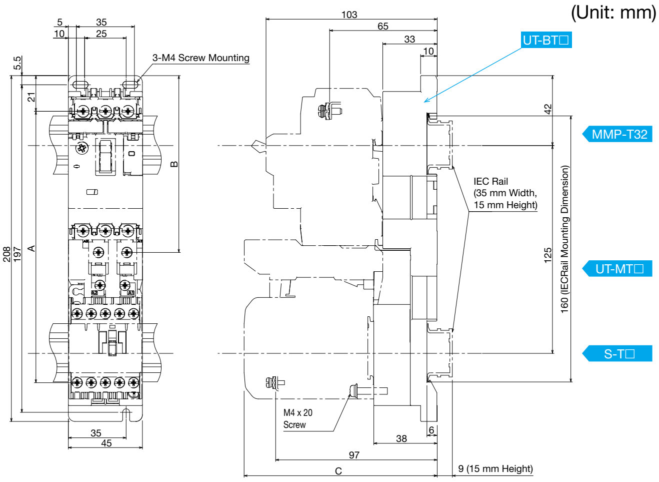


Variable Dimensions	Variable Dimension [mm]		
	A	B	C
UT-2B4	90	80	45
UT-2B5	102	92	57

Model Name
UT-2B4
UT-2B5

MMP-T32 + UT-MT☐ + UT-BT☐ + S-T☐

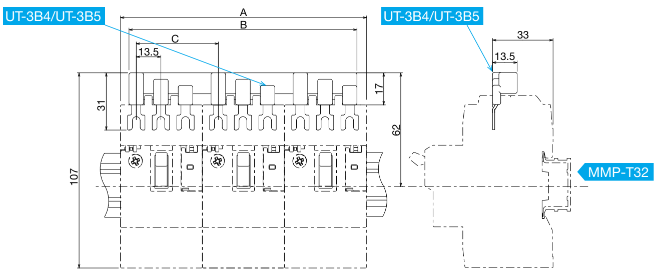
(Unit: mm)



Variable Dimensions	Combination Contactor	Variable Dimension [mm]		
		A	B	C
UT-BT20	S-T10/T12/T20	163	106	116
UT-BT32	S-T32	167	104	120

MMP-T32x3 + UT-3B4/UT-3B5

(Unit: mm)

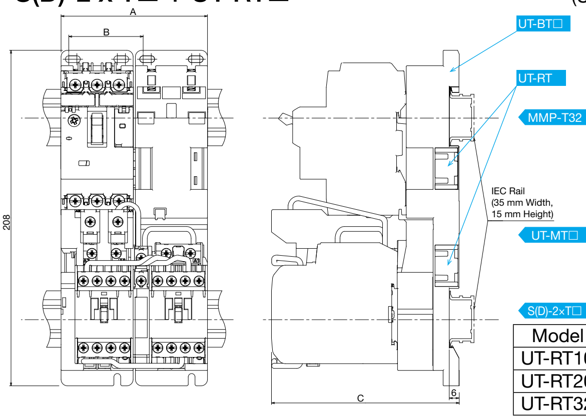


Variable Dimensions	Variable Dimension [mm]		
	A	B	C
UT-3B4	135	125	45
UT-3B5	159	149	57

Model Name
UT-3B4
UT-3B5

MMP-T32 + UT-MT☐ + UT-BT☐ x 2 + S(D)-2 x T☐ + UT-RT☐

(Unit: mm)



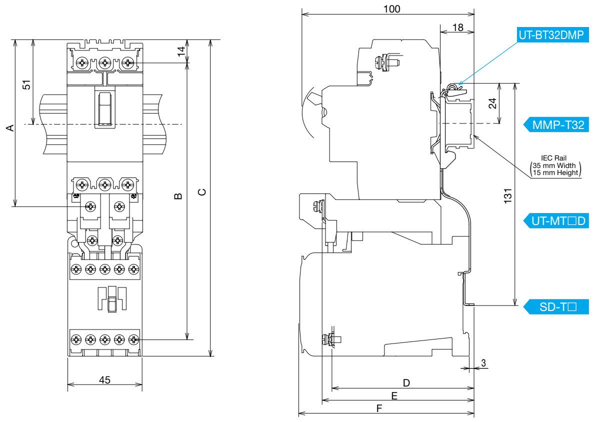
Model Name
UT-RT10
UT-RT20
UT-RT32

Combination Contactor	Combination Connecting Conductor Unit	Combination Mounting Base Unit	Variable Dimensions	Variable Dimension [mm]		
				A	B	C
S-2×T10	UT-MT20	UT-BT20 (2 Units)	UT-RT10	91	46	116
S-2×T12/T20	UT-MT20	UT-BT20 (2 Units)	UT-RT20	99	54	116
SD-2×T12/T20	UT-MT20D	UT-BT32D (2 Units)				
S-2×T32	UT-MT32	UT-BT32 (2 Units)	UT-RT32	98	53	150
SD-2×T32	UT-MT32D	UT-BT32D (2 Units)		98	53	154

Note. The main circuit conductor kit UT/UN-SD☐ is also available as a reversible electric wire. When using UN-SD18CX, switch the reversible wire power side and load side for this kit.

MMP-T32 + UT-MT☐D + SD-T☐ + UT-BT32DMP

(Unit: mm)

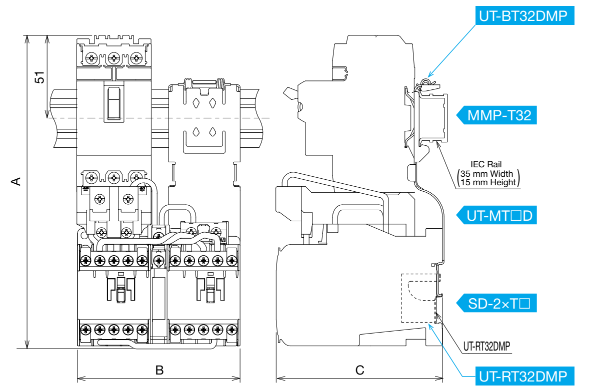


Combination Contactor	Combination Connecting Conductor Unit	Variable Dimensions	Variable Dimension [mm]					
			A	B	C	D	E	F
SD-T12/T20	UT-MT20D	UT-BT32DMP	99	164	188	84	90	103
SD-T32	UT-MT32D		97	167	191	89	96	111

Model Name
UT-BT32DMP

MMP-T32 + UT-MT☐D + SD-2×T☐ + UT-BT32DMP x 2 + UT-RT32DMP

(Unit: mm)



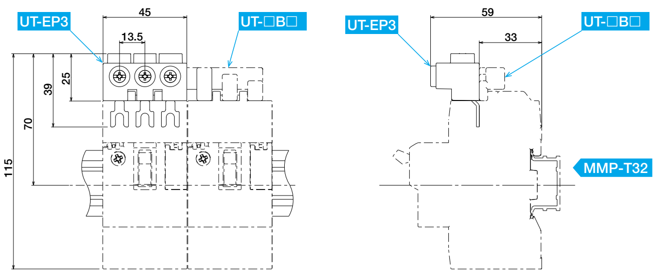
Combination Contactor	Combination Connecting Conductor Unit	Combination Mounting Base Unit	Variable Dimensions	Variable Dimension [mm]		
				A	B	C
SD-2×T12/T20	UT-MT20D	UT-RT32DMP (2 Units)	UT-RT32DMP	190	98	103
SD-T32	UT-MT32D			191	96	141

Note. The main circuit conductor kit UT/UN-SD☐ is also available as a reversible electric wire. When using UN-SD18CX, switch the reversible wire power side and load side for this kit.

Model Name
UT-RT32DMP

MMP-T32×2 + UT-EP3 + UT-☐B☐

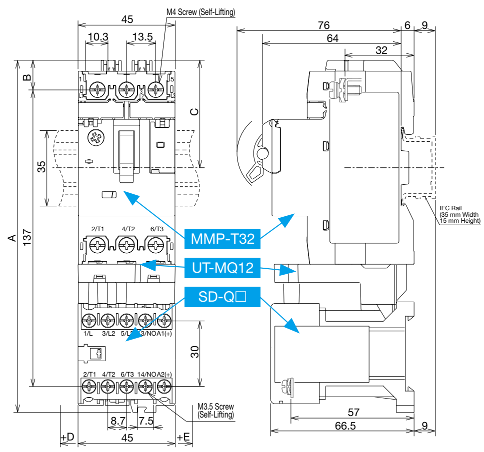
(Unit: mm)



Model Name
UT-EP3

MMP-T32 + UT-MQ12 + SD-Q☐

(Unit: mm)



Connecting Conductor Unit	Combination Contactor	Variable Dimension [mm]				
		A	B	C	+D	+E
UT-MQ12	SD-Q11	163	14	50	0	0
	SD-Q12	163	14	50	9.5	0
	SD-QR11	166	14	50	0	45
	SD-QR12	166	14	50	9.5	54.5

Model Name
UT-MQ12

12.11 How to Order

How to Order

Follow the steps below when ordering.
(Enter a space in ▲.)

Model Name		Heater Designation
MMP-T32	▲	32A
MMP-T32BC		

How to Order Options

Follow the steps below when ordering.
(Enter a space in ▲.)

	Model Name		Contact Arrangement
Auxiliary Contact Unit	UT-MAX	▲	1a
	UT-MAX	▲	1b
Alarm Contact Unit	UT-MAL	▲	1a
	UT-MAL	▲	1b

Note. When ordering an optional unit without contact arrangement options, state the model name only.

13

Supplementary Information

13 Supplementary Information

13.1 Model Name Changes and Compatibility Between New and Old Products

Our magnetic starters, magnetic contactors and contactor relays undergo model name transition as follows.

	1963 EM Series	1968 MS Series	1976 MS-A Series	1982, 1983, 1985 MS-K Series	1994, 1996, 1998 MS-N Series	2012, 2013, 2015 MS-T Series
Enclosed Magnetic Starters	EM	MS	MS-A	MS-K	MS-N	MS-T
Non-Enclosed Magnetic Starters	EMO	MSO	MSO-A	MSO-K	MSO-N	MSO-T
Magnetic Contactors	M	S	S-A	S-K	S-N	S-T
Contactor Relays	MR	SR	SR	SR-K	SR-N	SR-T

SR: 1969

The mounting compatibility between the old and current models with equal capacity is shown below. Note that the symbols in the compatibility column are as follows, showing the compatibility for the standard mounting dimensions of each series. Not coil/contactor compatibility.

○: Compatible
●: Can be made compatible by adding an MSO-T/N Series-dedicated adapter (available as a separate part) ∗
■: Standard products are not compatible, S/MSO(D)-2xT☐XN is compatible
◆: Can be made compatible by directly incorporating MSO-N☐XA into MSO-A Series
△: Can be made compatible by adding an S-T/N Series-dedicated adapter (available as a separate part) ∗
▲: Standard products are not compatible, S, SD and SL(D)-N☐XA are compatible
x : Not compatible

∗ The adapters for S-T12 and SR-T5 can be used only for products where the manufacturing numbers on the front is "14Y ∗∗" or "14Z ∗∗", or products where the first 2-digit number is equal to or greater than "15" (those that have been manufactured in part of October 2014, and from November on).

1. Magnetic Starters

(1) Mounting Compatibility of MS-A and MS-T/N

Non-Reversible Type		
Old Model	Compatibility	Current Model
MS-A10(RM)	○	MS-T10
MS-A11(RM)	○	MS-T12
MS-A12(RM)	x	MS-T12
MS-A20	○	MS-T21
MS-A21	○	MS-T21
MS-A25	○	MS-T35
MS-A35	○	MS-T35
MS-A50	x	MS-T50
MS-A60	○	MS-T65
MS-A65	x	MS-T65
MS-A80	x	MS-T80
MS-A100	○	MS-N125
MS-A120	○	MS-N125
MS-A125	x (○)	MS-N125 (MS-N150)
MS-A150	○	MS-N150
MS-A220	○	MS-N220
MS-A300	○	MS-N300
MS-A401	○	MS-N400
MS-A400	x	MS-N400
MS-A600	—	—

Reversible Type		
Old Model	Compatibility	Current Model
MS-AR11	x	MS-2xT21
MS-2xA20	○	MS-2xT21
MS-2xA21	○	MS-2xT21
MS-2xA25	x	MS-2xT35
MS-2xA35	○	MS-2xT35
MS-2xA50	x	MS-2xT50
MS-2xA60	○	MS-2xT65
MS-2xA65	x	MS-2xT65
MS-2xA80	x	MS-2xT80
MS-2xA100	○	MS-2xN125
MS-2xA120	○	MS-2xN125
MS-2xA125	x (○)	MS-2xN125 (MS-2xN150)
MS-2xA150	○	MS-2xN150
MS-2xA220	○	MS-2xN220
MS-2xA300	○	MS-2xN300
MS-2xA401	○	MS-2xN400
MS-2xA400	x	MS-2xN400

(2) Mounting Compatibility of MS-K and MS-T/N

Non-Reversible Type		
Old Model	Compatibility	Current Model
MS-K10	○	MS-T10
MS-K11	○	MS-T12
MS-K12	○	MS-T12
MS-K20	○	MS-T21
MS-K21	○	MS-T21
MS-K25	○	MS-T35
MS-K35	○	MS-T35
MS-K50	x	MS-T50
MS-K65	○	MS-T65
MS-K80	x	MS-T80
MS-K95	○	MS-T100
MS-K100	○	MS-N125
MS-K125	○	MS-N125
MS-K150	○	MS-N150
MS-K180	○	MS-N180
MS-K220	○	MS-N220
MS-K300	○	MS-N300
MS-K400	○	MS-N400

Reversible Type		
Old Model	Compatibility	Current Model
MS-KR11	x	MS-2xT21
MS-2xK20	○	MS-2xT21
MS-2xK21	○	MS-2xT21
MS-2xK25	○	MS-2xT35
MS-2xK35	○	MS-2xT35
MS-2xK50	x	MS-2xT50
MS-2xK65	○	MS-2xT65
MS-2xK80	x	MS-2xT80
MS-2xK95	○	MS-2xT100
MS-2xK100	○	MS-2xN125
MS-2xK125	○	MS-2xN125
MS-2xK150	○	MS-2xN150
MS-2xK180	○	MS-2xN180
MS-2xK220	○	MS-2xN220
MS-2xK300	○	MS-2xN300
MS-2xK400	○	MS-2xN400

(3) Mounting Compatibility of MS-N and MS-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
MS-N10	○	MS-T10
MS-N11	○	MS-T12
MS-N12	○	MS-T12
MS-N20	○	MS-T21
MS-N21	○	MS-T21
MS-N25	○	MS-T35
MS-N35	○	MS-T35
MS-N50	x	MS-T50
MS-N65	○	MS-T65
MS-N80	x	MS-T80
MS-N95	○	MS-T100

Reversible Type		
Old Model	Compatibility	Current Model
MS-2xN20	○	MS-2xT21
MS-2xN21	○	MS-2xT21
MS-2xN25	○	MS-2xT35
MS-2xN35	○	MS-2xT35
MS-2xN50	x	MS-2xT50
MS-2xN65	○	MS-2xT65
MS-2xN80	x	MS-2xT80
MS-2xN95	○	MS-2xT100

(4) Mounting Compatibility of MSO-A and MSO-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
MSO-A10(RM)	●	MSO-T10
MSO-A11(RM)	○	MSO-T12
MSO-A12(RM)	●	MSO-T12
MSO-A20	●	MSO-T20
MSO-A21	○	MSO-T21
MSO-A25	x	MSO-T25
MSO-A35	x	MSO-T35
MSO-A50	x	MSO-T50
MSO-A60	x	MSO-T65
MSO-A65	x	MSO-T65
MSO-A80	x	MSO-T80
MSO-A100	◆	MSO-N125
MSO-A120	◆	MSO-N125
MSO-A125	x (◆)	MSO-N125 (MSO-N150)
MSO-A150	◆	MSO-N150
MSO-A220	◆	MSO-N220
MSO-A300	◆	MSO-N300
MSO-A401	◆	MSO-N400
MSO-A400	x	MSO-N400
MSO-A600	x	S-N600 + TH-N600

Reversible Type		
Old Model	Compatibility	Current Model
MSO-AR11	x	MSO-2xT10
	x	MSO-2xT12
MSO-2xA20	x	MSO-2xT20
MSO-2xA21	x	MSO-2xT21
MSO-2xA25	x	MSO-2xT25
MSO-2xA35	x	MSO-2xT35
MSO-2xA50	x	MSO-2xT50
MSO-2xA60	x	MSO-2xT65
MSO-2xA65	x	MSO-2xT65
MSO-2xA80	x	MSO-2xT80
MSO-2xA100	x	MSO-2xN125
MSO-2xA120	x	MSO-2xN125
MSO-2xA125	x	MSO-2xN125
MSO-2xA150	x	MSO-2xN150
MSO-2xA220	x	MSO-2xN220
MSO-2xA300	x	MSO-2xN300
MSO-2xA401	x	MSO-2xN400
MSO-2xA400	x	MSO-2xN400
MSO-2xA600	x	S-2xN600 + TH-N600

(5) Mounting Compatibility of MSO-K and MSO-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
MSO-K10	●	MSO-T10
MSO-K11	○	MSO-T12
MSO-K12	●	MSO-T12
MSO-K18	○	MSO-T20
MSO-K19	●	MSO-T20
MSO-K20	●	MSO-T20
MSO-K21	○	MSO-T21
MSO-K25	x	MSO-T25
MSO-K35	x	MSO-T35
MSO-K50	●	MSO-T50
MSO-K65	○	MSO-T65
MSO-K80	●	MSO-T80
MSO-K95	○	MSO-T100
MSO-K100	○	MSO-N125
MSO-K125	○	MSO-N125
MSO-K150	○	MSO-N150
MSO-K180	○	MSO-N180
MSO-K220	○	MSO-N220
MSO-K300	○	MSO-N300
MSO-K400	○	MSO-N400

Reversible Type		
Old Model	Compatibility	Current Model
MSO-KR11	x	MSO-2xT10
	x	MSO-2xT12
MSO-2xK18	x	MSO-2xT20
MSO-2xK19	x	MSO-2xT20
MSO-2xK20	x	MSO-2xT20
MSO-2xK21	x	MSO-2xT21
MSO-2xK25	x	MSO-2xT25
MSO-2xK35	○	MSO-2xT35
MSO-2xK50	■	MSO-2xT50
MSO-2xK65	○	MSO-2xT65
MSO-2xK80	■	MSO-2xT80
MSO-2xK95	○	MSO-2xT100
MSO-2xK100	○	MSO-2xN125
MSO-2xK125	○	MSO-2xN125
MSO-2xK150	○	MSO-2xN150
MSO-2xK180	○	MSO-2xN180
MSO-2xK220	○	MSO-2xN220
MSO-2xK300	○	MSO-2xN300
MSO-2xK400	○	MSO-2xN400

(6) Mounting Compatibility of MSO-N and MSO-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
MSO-N10	●	MSO-T10
MSO-N11	○	MSO-T12
MSO-N12	●	MSO-T12
MSO-N18	○	MSO-T20
MSO-N20	●	MSO-T20
	○	MSO-T21
MSO-N21	○	MSO-T21
MSO-N25	●	MSO-T25
MSO-N35	○	MSO-T35
MSO-N50	●	MSO-T50
MSO-N65	○	MSO-T65
MSO-N80	●	MSO-T80
MSO-N95	○	MSO-T100

Reversible Type		
Old Model	Compatibility	Current Model
MSO-2×N10	x	MSO-2×T10
MSO-2×N11	x	MSO-2×T12
MSO-2×N18	x	MSO-2×T20
MSO-2×N20	x	MSO-2×T20
	○	MSO-2×T21
MSO-2×N21	○	MSO-2×T21
MSO-2×N25	x	MSO-2×T25
MSO-2×N35	○	MSO-2×T35
MSO-2×N50	■	MSO-2×T50
MSO-2×N65	○	MSO-2×T65
MSO-2×N80	■	MSO-2×T80
MSO-2×N95	○	MSO-2×T100

2. Magnetic Contactors

(1) Mounting Compatibility of S-A and S-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
S-A10(RM)*	△	S-T10
S-A11(RM)*	○	S-T12
S-A12(RM)*	△	S-T12
S-A20	△	S-T20
S-A21	○	S-T21
S-A25	x	S-T25
S-A35	x	S-T35
S-A50	x	S-T50
S-A60	△	S-T65
S-A65	x	S-T65
S-A80	x	S-T80
S-A100	▲	S-N125
S-A120	▲	S-N125
S-A125	x(▲)	S-N125(S-N150)
S-A150	▲	S-N150
S-A220	▲	S-N220
S-A300	▲	S-N300
S-A401	▲	S-N400
S-A400	x	S-N400
S-A600	○	S-N600
S-A800	○	S-N800

∗(RM) indicates that it can be rail-mounted. S-T10 to T80 are standard products that can be rail-mounted.

Reversible Type		
Old Model	Compatibility	Current Model
S-AR11	x	S-2×T10
	x	S-2×T12
S-2×A20	x	S-2×T20
S-2×A21	x	S-2×T21
S-2×A25	x	S-2×T25
S-2×A35	x	S-2×T35
S-2×A50	x	S-2×T50
S-2×A60	x	S-2×T65
S-2×A65	x	S-2×T65
S-2×A80	x	S-2×T80
S-2×A100	x	S-2×N125
S-2×A120	x	S-2×N125
S-2×A125	x	S-2×N125
S-2×A150	x	S-2×N150
S-2×A220	x	S-2×N220
S-2×A300	x	S-2×N300
S-2×A401	x	S-2×N400
S-2×A400	x	S-2×N400
S-2×A600	x	S-2×N600
S-2×A800	x	S-2×N800

(2) Mounting Compatibility of S-K and S-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
S-K10	△	S-T10
S-K11	○	S-T12
S-K12	△	S-T12
S-K18	○	S-T20
S-K19	△	S-T20
S-K20	△	S-T20
S-K21	○	S-T21
S-K25	x	S-T25
S-K28	x	S-T32
S-K35	x	S-T35
S-K38	x	S-T35
S-K48	x	S-T50
S-K50	△	S-T50
S-K65	○	S-T65
S-K80	△	S-T80
S-K95	○	S-T100
S-K100	○	S-N125
S-K125	○	S-N125
S-K150	○	S-N150
S-K180	○	S-N180
S-K220	○	S-N220
S-K300	○	S-N300
S-K400	○	S-N400
S-K600	○	S-N600
S-K800	○	S-N800

Reversible Type		
Old Model	Compatibility	Current Model
S-KR11	x	S-2×T10
	x	S-2×T12
S-2×K18	x	S-2×T32
S-2×K19	x	S-2×T20
S-2×K20	x	S-2×T20
S-2×K21	x	S-2×T21
S-2×K25	x	S-2×T25
S-2×K28	x	S-2×T32
S-2×K35	○	S-2×T35
S-2×K38	x	S-2×T35
S-2×K48	x	S-2×T50
S-2×K50	■	S-2×T50
S-2×K65	○	S-2×T65
S-2×K80	■	S-2×T80
S-2×K95	○	S-2×T100
S-2×K100	○	S-2×N125
S-2×K125	○	S-2×N125
S-2×K150	○	S-2×N150
S-2×K180	○	S-2×N180
S-2×K220	○	S-2×N220
S-2×K300	○	S-2×N300
S-2×K400	○	S-2×N400
S-2×K600	○	S-2×N600
S-2×K800	○	S-2×N800

(3) Mounting Compatibility of S-N and S-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
S-N10	△	S-T10
S-N11	○	S-T12
S-N12	△	S-T12
S-N18	○	S-T20
S-N20	△	S-T20
	○	S-T21
S-N21	○	S-T21
S-N25	△	S-T25
S-N28	○	S-T32
S-N35	○	S-T35
S-N50	△	S-T50
S-N65	○	S-T65
S-N80	△	S-T80
S-N95	○	S-T100

Reversible Type		
Old Model	Compatibility	Current Model
S-2xN10	x	S-2xT10
S-2xN11	x	S-2xT12
S-2xN18	x	S-2xT20
S-2xN20	x	S-2xT20
	○	S-2xT21
S-2xN21	○	S-2xT21
S-2xN25	x	S-2xT25
S-2xN28	○	S-2xT32
S-2xN35	○	S-2xT35
S-2xN50	■	S-2xT50
S-2xN65	○	S-2xT65
S-2xN80	■	S-2xT80
S-2xN95	○	S-2xT100

(4) Mounting Compatibility of SD-A and SD-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SD-A11	○	SD-T12
SD-A12	△	SD-T12
SD-A21	○	SD-T21
SD-A35	x	SD-T35
SD-A50	x	SD-T50
SD-A60	△	SD-T65
SD-A65	x	SD-T65
SD-A80	x	SD-T80
SD-A100	▲	SD-N125
SD-A150	▲	SD-N150
SD-A220	▲	SD-N220
SD-A300	▲	SD-N300
SD-A401	▲	SD-N400
SD-A400	x	SD-N400
SD-A600	○	SD-N600

Reversible Type		
Old Model	Compatibility	Current Model
SD-2xA21	x	SD-2xT21
SD-2xA35	x	SD-2xT35
SD-2xA50	x	SD-2xT50
SD-2xA60	x	SD-2xT65
SD-2xA65	x	SD-2xT65
SD-2xA80	x	SD-2xT80
SD-2xA100	x	SD-2xN125
SD-2xA150	x	SD-2xN150
SD-2xA220	x	SD-2xN220
SD-2xA300	x	SD-2xN300
SD-2xA401	x	SD-2xN400
SD-2xA400	x	SD-2xN400
SD-2xA600	x	SD-2xN600

(5) Mounting Compatibility of SD-K and SD-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SD-K11	○	SD-T12
SD-K12	△	SD-T12
SD-K21	○	SD-T21
SD-K35	x	SD-T35
SD-K50	△	SD-T50
SD-K65	○	SD-T65
SD-K80	△	SD-T80
SD-K95	○	SD-T100
SD-K100	○	SD-N125
SD-K125	○	SD-N125
SD-K150	○	SD-N150
SD-K220	○	SD-N220
SD-K300	○	SD-N300
SD-K400	○	SD-N400
SD-K600	○	SD-N600
SD-K800	○	SD-N800

Reversible Type		
Old Model	Compatibility	Current Model
SD-2xK21	x	SD-2xT21
SD-2xK35	○	SD-2xT35
SD-2xK50	■	SD-2xT50
SD-2xK65	○	SD-2xT65
SD-2xK80	■	SD-2xT80
SD-2xK95	○	SD-2xT100
SD-2xK100	○	SD-2xN125
SD-2xK125	○	SD-2xN125
SD-2xK150	○	SD-2xN150
SD-2xK220	○	SD-2xN220
SD-2xK300	○	SD-2xN300
SD-2xK400	○	SD-2xN400
SD-2xK600	○	SD-2xN600
SD-2xK800	○	SD-2xN800

(6) Mounting Compatibility of SD-N and SD-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SD-N11	○	SD-T12
SD-N12	△	SD-T12
SD-N21	○	SD-T21
SD-N35	○	SD-T35
SD-N50	△	SD-T50
SD-N65	○	SD-T65
SD-N80	△	SD-T80
SD-N95	○	SD-T100

Reversible Type		
Old Model	Compatibility	Current Model
SD-2xN11	x	SD-2xT12
SD-2xN21	○	SD-2xT21
SD-2xN35	○	SD-2xT35
SD-2xN50	■	SD-2xT50
SD-2xN65	○	SD-2xT65
SD-2xN80	■	SD-2xT80
SD-2xN95	○	SD-2xT100

(7) Mounting Compatibility of SL(D)-A and SL(D)-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-A21	○	SL(D)-T21
SL(D)-A50	△	SL(D)-T50
SL(D)-A60	△	SL(D)-T65
SL(D)-A80	△	SL(D)-T80
SL(D)-A100	▲	SL(D)-N125
SL(D)-A120	▲	SL(D)-N125
SL(D)-A150	▲	SL(D)-N150
SL(D)-A220	▲	SL(D)-N220
SL(D)-A300	▲	SL(D)-N300
SL(D)-A401	▲	SL(D)-N400
SL(D)-A400	x	SL(D)-N400
SL(D)-A600	○	SL(D)-N600

Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-2xA21	x	SL(D)-2xT21
SL(D)-2xA50	x	SL(D)-2xT50
SL(D)-2xA60	x	SL(D)-2xT65
SL(D)-2xA80	○	SL(D)-2xT80
SL(D)-2xA100	x	SL(D)-2xN125
SL(D)-2xA120	x	SL(D)-2xN125
SL(D)-2xA150	x	SL(D)-2xN150
SL(D)-2xA220	x	SL(D)-2xN220
SL(D)-2xA300	x	SL(D)-2xN300
SL(D)-2xA401	x	SL(D)-2xN400
SL(D)-2xA400	x	SL(D)-2xN400
SL(D)-2xA600	x	SL(D)-2xN600

(8) Mounting Compatibility of SL(D)-K and SL(D)-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-K21	○	SL(D)-T21
SL(D)-K35	x	SL(D)-T35
SL(D)-K50	△	SL(D)-T50
SL(D)-K65	○	SL(D)-T65
SL(D)-K80	△	SL(D)-T80
SL(D)-K95	○	SL(D)-T100
SL(D)-K100	○	SL(D)-N125
SL(D)-K125	○	SL(D)-N125
SL(D)-K150	○	SL(D)-N150
SL(D)-K220	○	SL(D)-N220
SL(D)-K300	○	SL(D)-N300
SL(D)-K400	○	SL(D)-N400
SL(D)-K600	○	SL(D)-N600
SL(D)-K800	○	SL(D)-N800

Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-2xK21	x	SL(D)-2xT21
SL(D)-2xK35	○	SL(D)-2xT35
SL(D)-2xK50	x	SL(D)-2xT50
SL(D)-2xK65	○	SL(D)-2xT65
SL(D)-2xK80	x	SL(D)-2xT80
SL(D)-2xK95	○	SL(D)-2xT100
SL(D)-2xK100	○	SL(D)-2xN125
SL(D)-2xK125	○	SL(D)-2xN125
SL(D)-2xK150	○	SL(D)-2xN150
SL(D)-2xK220	○	SL(D)-2xN220
SL(D)-2xK300	○	SL(D)-2xN300
SL(D)-2xK400	○	SL(D)-2xN400
SL(D)-2xK600	○	SL(D)-2xN600
SL(D)-2xK800	○	SL(D)-2xN800

(9) Mounting Compatibility of SL(D)-N and SL(D)-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-N21	○	SL(D)-T21
SL(D)-N35	○	SL(D)-T35
SL(D)-N50	△	SL(D)-T50
SL(D)-N65	○	SL(D)-T65
SL(D)-N80	△	SL(D)-T80
SL(D)-N95	○	SL(D)-T100

Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-2xN21	○	SL(D)-2xT21
SL(D)-2xN35	○	SL(D)-2xT35
SL(D)-2xN50	x	SL(D)-2xT50
SL(D)-2xN65	○	SL(D)-2xT65
SL(D)-2xN80	x	SL(D)-2xT80
SL(D)-2xN95	○	SL(D)-2xT100

3. Contactor Relays

(1) Mounting Compatibility of SR(RM) Type and current models (SR-K/SR-T)

Old Model	Compatibility	Current Model
SR-40(RM)	○	SR-T5
SR-50(RM)	△	SR-T5
SR-80(RM)	○	SR-T9
SR-63,60(RM)	x	SR-T9
SR-100	○	SR-K100

(2) Mounting Compatibility of SR-K Type and current models (SR-K/SR-T)

Old Model	Compatibility	Current Model
SR-K4	○	SR-T5
SR-K5	△	SR-T5
SR-K8	○	SR-T9
SR-K63,K6	x	SR-T9
SR-K10	○	SR-K100

(3) Mounting Compatibility of SR-N Type and current models (SR-T)

Old Model	Compatibility	Current Model
SR-N4	○	SR-T5
SR-N5	△	SR-T5
SR-N8	○	SR-T9

(4) Mounting Compatibility of SRD Type and current models (SRD-K/SRD-T)

Old Model	Compatibility	Current Model
SRD-40	○	SRD-T5
SRD-50	△	SRD-T5
SRD-80	○	SRD-T9
SRD-100	○	SRD-K100

(5) Mounting Compatibility of SRD-K Type and current models (SRD-T)

Old Model	Compatibility	Current Model
SRD-K4	○	SRD-T5
SRD-K5	△	SRD-T5
SRD-K8	○	SRD-T9

(6) Mounting Compatibility of SRD-N Type and current models (SRD-T)

Old Model	Compatibility	Current Model
SRD-N4	○	SRD-T5
SRD-N5	△	SRD-T5
SRD-N8	○	SRD-T9

(7) Mounting Compatibility of SRL(D) Type and current models (SRL(D)-K/SRL(D)-N/SRL-T)

Old Model	Compatibility	Current Model
SRL(D)-40(SE)	○	SRL(D)-T5
SRL(D)-50(SE)	△(○)	SRL(D)-T5(SRL(D)-K100)
SRL(D)-100(SE)/ SRL(D)-101	○	SRL(D)-K100

(8) Mounting Compatibility of SRL(D)-K Type and current models (SRL(D)-K/SRL(D)-N/SRL-T)

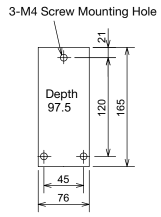
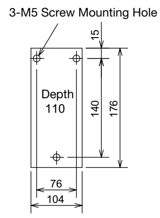
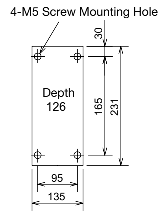
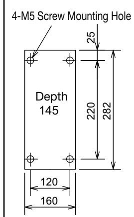
Old Model	Compatibility	Current Model
SRL(D)-K4	○	SRL(D)-T5
SRL(D)-K10	○	SRL(D)-K100

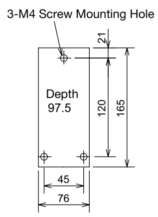
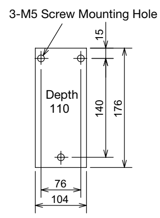
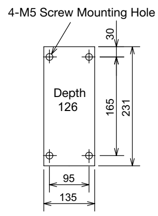
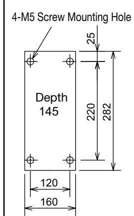
(9) Mounting Compatibility of SRL(D)-N and SRL(D)-T Types

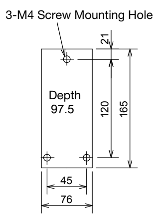
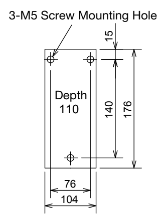
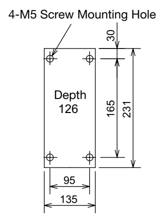
Old Model	Compatibility	Current Model
SRL(D)-N4	○	SRL(D)-T5

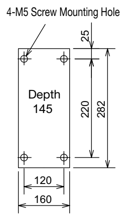
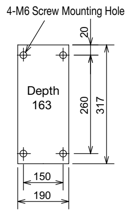
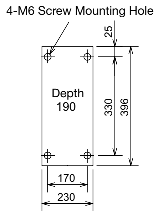
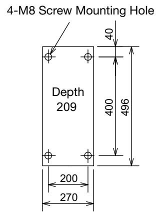
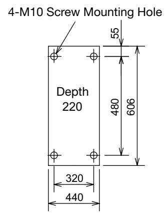
13.2 Magnetic Starters and Magnetic Contactors New and Old Model Comparison List

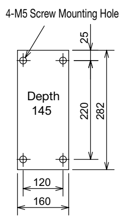
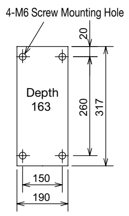
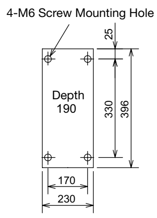
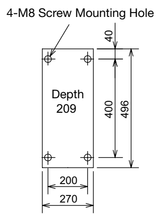
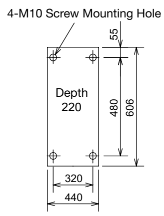
● MS-K, MS-N and MS-T Enclosed Magnetic Starters Comparison List (Category AC-3)

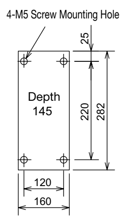
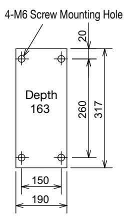
MS-K Series	Model Name		MS-K10	MS-K11	MS-K12	MS-K20	MS-K21	MS-K25	MS-K35	MS-K50
	Rated Capacity (kW) AC-3	220 to 240 V	2.5 (2.2)	3.5 (2.7)	3.5 (2.7)	5.5 (4)	5.5 (4)	7.5 (5.5)	11 (7.5)	15 (11)
		380 to 440 V	4 (2.7)	5.5 (4)	5.5 (4)	11 (7.5)	11 (7.5)	15 (11)	18.5 (15)	22 (22)
		500 V	4 (2.7)	5.5 (5.5)	5.5 (5.5)	11 (7.5)	11 (7.5)	15 (11)	18.5 (15)	22 (22)
	Auxiliary Contact Arrangement		1a	1a	1a1b	1a1b	2a2b	2a2b	2a2b	2a2b
	Outline Drawings (mm)									
	Weight (kg)		0.8	0.8	0.9	1.2	1.2	2.0	2.0	3.2
	Mounting Compatibility With MS-T Series		○	○	○	○	○	○	○	x

MS-N Series	Model Name		MS-N10	MS-N11	MS-N12	MS-N20	MS-N21	MS-N25	MS-N35	MS-N50
	Rated Capacity (kW) AC-3	220 to 240 V	2.5 (2.2)	3.5 (2.7)	3.5 (2.7)	4.5 (4)	5.5 (4)	7.5 (5.5)	11 (7.5)	15 (11)
		380 to 440 V	4 (2.7)	5.5 (4)	5.5 (4)	7.5 (7.5)	11 (7.5)	15 (11)	18.5 (15)	22 (22)
		500 V	4 (2.7)	5.5 (5.5)	5.5 (5.5)	7.5 (7.5)	11 (7.5)	15 (11)	18.5 (15)	25 (22)
	Auxiliary Contact Arrangement		1a	1a	1a1b	1a1b	2a2b	2a2b	2a2b	2a2b
	Outline Drawings (mm)									
	Weight (kg)		0.8	0.8	0.8	1.1	1.1	1.8	1.8	2.9
	Mounting Compatibility With MS-T Series		○	○	○	○	○	○	○	x

MS-T Series	Model Name		MS-T10	MS-T12		MS-T21		MS-T35		MS-T50
	Rated Capacity (kW) AC-3	220 to 240 V	2.5 (2.2)	3.5 (2.7)		5.5 (4)		11 (7.5)		15 (11)
		380 to 440 V	4 (2.7)	5.5 (4)		11 (7.5)		18.5 (15)		22 (22)
		500 V	4 (2.7)	5.5 (5.5)		11 (7.5)		18.5 (15)		25 (22)
	Auxiliary Contact Arrangement		1a	1a1b		2a2b		2a2b		2a2b
	Outline Drawings (mm)									
	Weight (kg)		0.74	0.76		1.12		1.9		1.9

	MS-K65	MS-K80	MS-K95	MS-K100	MS-K125	MS-K150	MS-K180	MS-K220	MS-K300	MS-K400
	18.5 (15)	22 (19)	30 (22)	30 (25)	37 (30)	45 (37)	55 (45)	75 (55)	90 (75)	125 (110)
	30 (30)	45 (37)	55 (45)	55 (50)	60 (60)	75 (75)	90 (90)	132 (110)	100 (150)	220 (200)
	30 (30)	45 (45)	55 (45)	55 (55)	60 (60)	90 (90)	110 (110)	132 (132)	100 (160)	220 (200)
	2a2b	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)		2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)
										
	3.2	4.0	4.0	8		12.8	16.2	16.2	28	28
	○	x	○	○	○	○	○	○	○	○

	MS-N65	MS-N80	MS-N95	MS-N125		MS-N150	MS-N180	MS-N220	MS-N300	MS-N400
	16.5 (15)	22 (19)	30 (22)	37 (30)		45 (37)	55 (45)	75 (55)	90 (75)	125 (110)
	30 (30)	45 (37)	55 (45)	60 (60)		75 (75)	90 (90)	132 (110)	160 (150)	220 (200)
	37 (30)	45 (45)	55 (45)	60 (60)		90 (90)	110 (110)	132 (132)	160 (160)	225 (200)
	2a2b	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)		2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)
										
	2.9	4.0	4.0	8	8	12.8	16.2	16.2	27.5	28
	○	x	○							

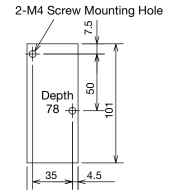
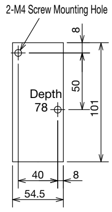
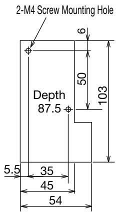
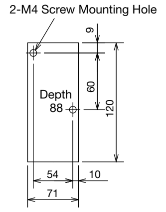
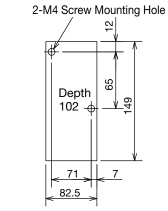
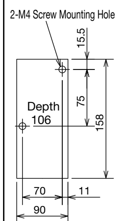
	MS-T65	MS-T80	MS-T100
	18.5 (15)	22 (19)	30 (22)
	30 (30)	45 (37)	55 (45)
	37 (30)	45 (45)	55 (45)
	2a2b	2a2b	2a2b
			
	2.9	2.9	4.0

Note 1. The mounting compatibility symbols have the following indications.
○: Can be directly replaced as an enclosed type
x: Not compatible

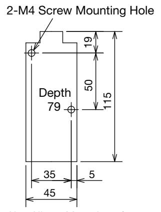
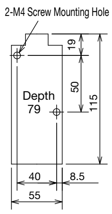
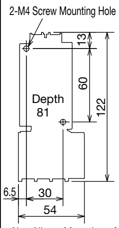
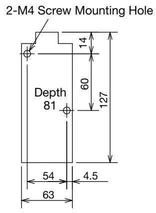
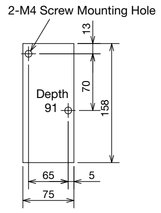
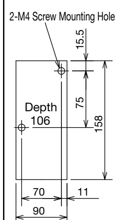
Note 2. If replacing the starter or contactor only, consult with your dealer or with us.

● MSO-K, MSO-N and MSO-T Non-Enclosed Type Magnetic Starter Comparison List (Category AC-3)

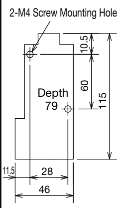
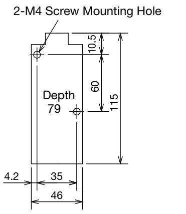
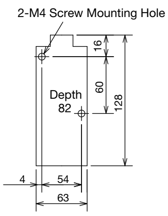
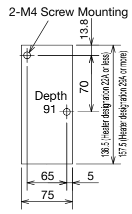
MSO-K Series

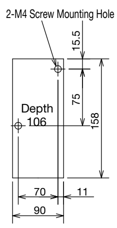
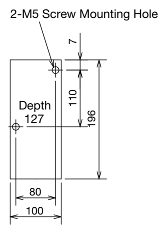
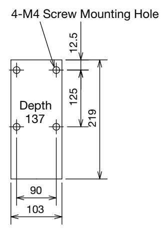
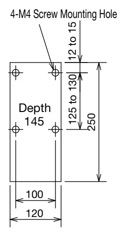
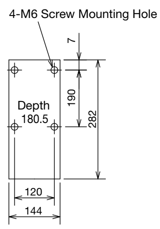
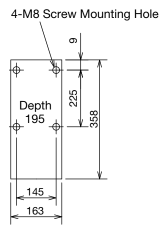
Model Name		MSO-K10	MSO-K11	MSO-K12	MSO-K18	MSO-K20	MSO-K21	MSO-K25	MSO-K35	MSO-K50
Rated Capacity (kW) AC-3	220 to 240 V	2.5 (2.2)	3.5 (2.7)	3.5 (2.7)	4.5 (3.7)	5.5 (4)	5.5 (4)	7.5 (5.5)	11 (7.5)	15 (11)
	380 to 440 V	4 (2.7)	5.5 (4)	5.5 (4)	7.5 (5.5)	11 (7.5)	11 (7.5)	15 (11)	18.5 (15)	22 (22)
	500 V	4 (2.7)	5.5 (5.5)	5.5 (5.5)	7.5 (5.5)	11 (7.5)	11 (7.5)	15 (11)	18.5 (15)	22 (22)
Auxiliary Contact Arrangement		1a (3a2b)	1a (3a2b)	1a1b	(2a2b)	1a1b	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)
Outline Drawings (mm)		 Also Allows Mounting of 30 x 52, 30 x 48 and 34 x 52		 Allows mounting of up to 40 x (50 to 52) and 34 x 52	 Also Allows Mounting of 32 x 52 and 34 x 52	 Allows Mounting of up to 54 x (56 to 60)		 Allows Mounting of up to (65 to 71) x 65, (59 to 65) x 70		
Weight (kg)		0.38		0.42	0.45	0.7	0.7	0.9	0.9	1.4
Mounting Compatibility With MSO-T Series		●	○	●	○	●	○	x	x	●

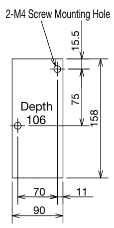
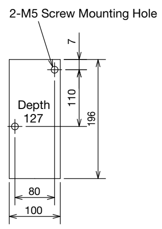
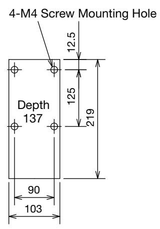
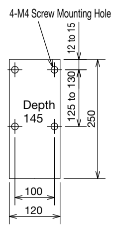
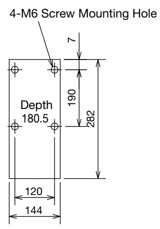
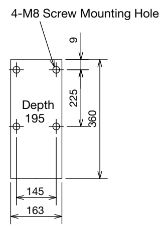
MSO-N Series

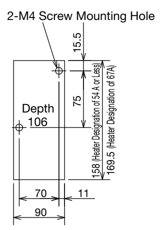
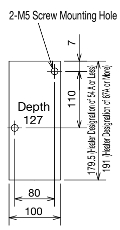
Model Name		MSO-N10	MSO-N11	MSO-N12	MSO-N18	MSO-N20	MSO-N21	MSO-N25	MSO-N35	MSO-N50
Rated Capacity (kW) AC-3	220 to 240 V	2.5 (2.2)	3.5 (2.7)	3.5 (2.7)	4.5 (3.7)	5.5 (4)	5.5 (4)	7.5 (5.5)	11 (7.5)	15 (11)
	380 to 440 V	4 (2.7)	5.5 (4)	5.5 (4)	7.5 (5.5)	11 (7.5)	11 (7.5)	15 (11)	18.5 (15)	22 (22)
	500 V	4 (2.7)	5.5 (5.5)	5.5 (5.5)	7.5 (5.5)	11 (7.5)	11 (7.5)	15 (11)	18.5 (15)	25 (22)
Auxiliary Contact Arrangement		1a (3a2b)	1a (3a2b)	1a1b (3a3b)	(2a2b)	1a1b (3a3b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)
Outline Drawings (mm)		 Also Allows Mounting of 30 x 52, 30 x 48 and 34 x 52		 Also Allows Mounting of 40 x 52 and 34 x (48 to 52)	 Also Allows Mounting of 35 x 50, 32 x 52 and 34 x 52	 Allows Mounting of up to 54 x (56 to 60)		 Also Allows 60 x 70		
Weight (kg)		0.41	0.41	0.43	0.46	0.54	0.56	0.72	0.72	1.1
Mounting Compatibility With MSO-T Series		●	○	●	○	●	○	●	○	●

MSO-T Series

Model Name		MSO-T10	MSO-T12		MSO-T20		MSO-T21	MSO-T25	MSO-T35	MSO-T50
Rated Capacity (kW) AC-3	220 to 240 V	2.5 (2.2)	3.5 (2.7)		4.5 (3.7)		5.5 (4)	7.5 (5.5)	11 (7.5)	15 (11)
	380 to 440 V	4 (2.7)	5.5 (4)		7.5 (7.5)		11 (7.5)	15 (11)	18.5 (15)	22 (22)
	500 V	4 (2.7)	5.5 (5.5)		7.5 (7.5)		11 (7.5)	15 (11)	18.5 (15)	25 (22)
Auxiliary Contact Arrangement		1a (3a2b)	1a1b (3a3b)		1a1b (3a3b)		2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)
Outline Drawings (mm)			 Also Allows Mounting of 30 x 60 and 35 x 50 to 52				 Also Allows Mounting of 54 x 56		 Also Allows 60 x 70	
Weight (kg)		0.36	0.38		—	0.38	0.58	0.58	0.79	0.79

MSO-K65	MSO-K80	MSO-K95	MSO-K100	MSO-K125	MSO-K150	MSO-K180	MSO-K220	MSO-K300	MSO-K400
18.5 (15)	22 (19)	30 (22)	30 (25)	37 (30)	45 (37)	55 (45)	75 (55)	90 (75)	125 (110)
30 (30)	45 (37)	55 (45)	55 (50)	60 (60)	75 (75)	90 (90)	132 (110)	160 (150)	220 (200)
30 (30)	45 (45)	55 (45)	55 (55)	60 (60)	90 (90)	110 (110)	132 (132)	160 (160)	220 (200)
2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)		2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)
									
1.4	2.2	2.2	3.5		4.6	8	8	12	12
○	●	○	○	○	○	○	○	○	○

MSO-N65	MSO-N80	MSO-N95	MSO-N125	MSO-N150	MSO-N180	MSO-N220	MSO-N300	MSO-N400
18.5 (15)	22 (19)	30 (22)	37 (30)	45 (37)	55 (45)	75 (55)	90 (75)	125 (110)
30 (30)	45 (37)	55 (45)	60 (60)	75 (75)	90 (90)	132 (110)	160 (150)	220 (200)
37 (30)	45 (45)	55 (45)	60 (60)	90 (90)	110 (110)	132 (132)	160 (160)	225 (200)
2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)
								
1.1	2.2	2.2	3.5	4.6	8	8	11.5	12
○	●	○						

MSO-T65	MSO-T80	MSO-T100
18.5 (15)	22 (19)	30 (22)
30 (30)	45 (37)	55 (45)
37 (30)	45 (45)	55 (45)
2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)
		
1.1	1.1	2.2

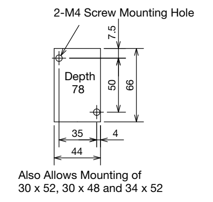
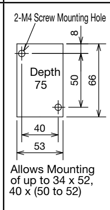
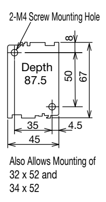
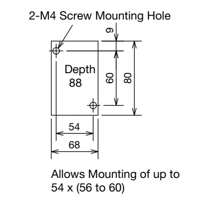
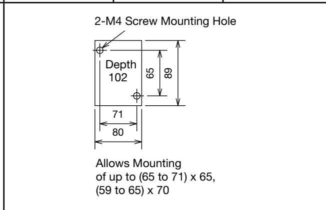
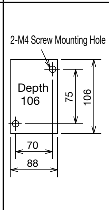
Note 1. The mounting compatibility symbols have the following indications.
- ○: Compatible
- ●: Can be made compatible by adding an MSO-T/N Series-dedicated adapter (available as a separate part)
- ◇: Can be made compatible by incorporating an MSO-N Series-dedicated adapter (available as a separate part) into the mounting plate of MSO-A Series ∗
- ◆: Can be made compatible by directly incorporating MSO-N□XA into MSO-A Series
- x: Not compatible

∗ The adapters for S-T12 and SR-T5 can be used only for products where the manufacturing numbers on the front is "14Y ∗∗" or "14Z ∗∗", or products where the first 2-digit number is equal to or greater than "15" (some of those manufactured in October 2014, and those manufactured from November on).

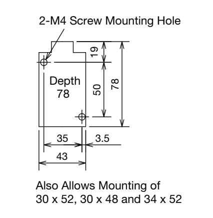
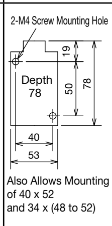
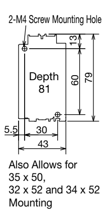
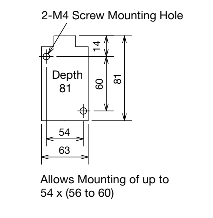
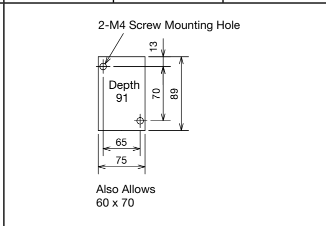
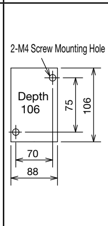
Note 2. Although MSO-N600 is not manufactured, a non-enclosed type magnetic starter can be configured by combining a S-N600 magnetic contactor, TH-N600 thermal overload relay, and current transformer.

S-K, S-N and S-T Magnetic Contactors Comparison List (Category AC-3)

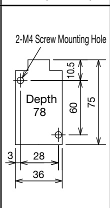
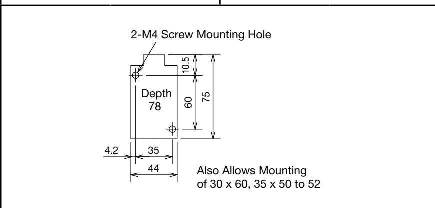
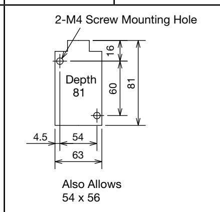
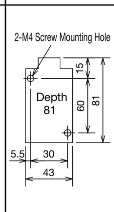
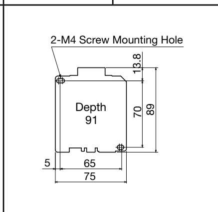
S-K Series

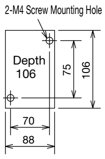
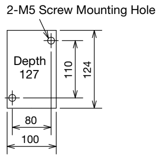
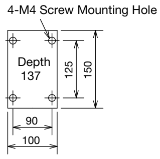
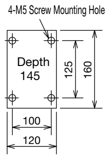
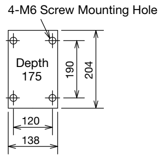
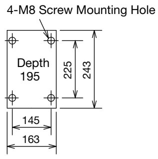
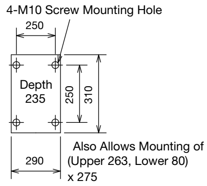
Model Name		S-K10	S-K11	S-K12	S-K18	S-K20	S-K21	S-K25	—	S-K35	S-K50
Rated Operating Current (A) AC-3	200 to 240 V	11 (11)	13 (13)	13 (13)	18 (18)	22 (20)	22 (20)	30 (26)	—	40 (35)	55 (50)
	380 to 440 V	9 (7)	12 (9)	12 (9)	16 (13)	22 (20)	22 (20)	30 (24)	—	40 (32)	46 (46)
	500 V	7 (6)	9 (9)	9 (9)	13 (13)	17 (17)	17 (17)	24 (19)	—	32 (24)	33 (33)
Conventional Free Air Thermal Current (A)		20	20	20	25	32	32	50	—	60	80
Auxiliary Contact Arrangement (Maximum)		1a (3a2b)	1a (3a2b)	1a1b, 2a	(2a2b)	1a1b, 2a	2a2b (4a4b)	2a2b (4a4b)	—	2a2b (4a4b)	2a2b (4a4b)
Outline Drawings (mm)		 Also Allows Mounting of 30 x 52, 30 x 48 and 34 x 52		 Allows Mounting of up to 34 x 52, 40 x (50 to 52)	 Also Allows Mounting of 32 x 52 and 34 x 52	 Allows Mounting of up to 54 x (56 to 60)		 Allows Mounting of up to (65 to 71) x 65, (59 to 65) x 70			
Terminal Screw (Main)		M3.5		M3.5	M4	M4	M4	M5	—	M5	M6
Applicable Crimp Lug (Main)		1.25-3.5 to 2-3.5		1.25-3.5 to 2-3.5	1.25-4 to 5.5-4	1.25-4 to 5.5-4	1.25-4 to 5.5-4	1.25-5 to 14-5	—	1.25-5 to 14-5	1.25-6 to 22-6
Weight (kg)		0.28	0.28	0.32	0.32	0.5	0.65	0.76	—	0.76	1.1
Mounting Compatibility With S-T Series		◇	○	◇	○	◇	○	x	—	x	◇

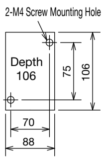
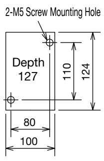
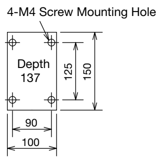
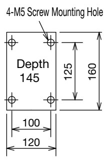
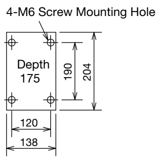
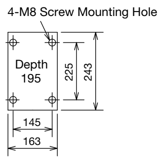
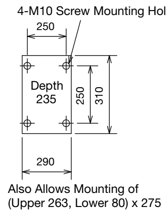
S-N Series

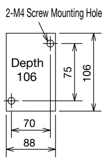
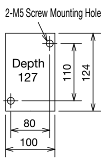
Model Name		S-N10	S-N11	S-N12	S-N18	S-N20	S-N21	S-N25	—	S-N35	S-N50
Rated Operating Current (A) AC-3	200 to 240 V	11 (11)	13 (13)	13 (13)	18 (18)	22 (20)	22 (20)	30 (26)	—	40 (35)	55 (50)
	380 to 440 V	9 (7)	12 (9)	12 (9)	16 (13)	22 (20)	22 (20)	30 (25)	—	40 (32)	50 (48)
	500 V	7 (6)	9 (9)	9 (9)	13 (13)	17 (17)	17 (17)	24 (20)	—	32 (26)	38 (38)
Conventional Free Air Thermal Current (A)		20	20	20	25	32	32	50	—	60	80
Auxiliary Contact Arrangement (Maximum)		1a (3a2b)	1a (3a2b)	1a1b (3a3b)	(2a2b)	1a1b (3a3b)	2a2b (4a4b)	2a2b (4a4b)	—	2a2b (4a4b)	2a2b (4a4b)
Outline Drawings (mm)		 Also Allows Mounting of 30 x 52, 30 x 48 and 34 x 52		 Also Allows Mounting of 40 x 52 and 34 x (48 to 52)	 Also Allows for 35 x 50, 32 x 52 and 34 x 52 Mounting	 Allows Mounting of up to 54 x (56 to 60)		 Also Allows 60 x 70			
Terminal Screw (Main)		M3.5		M3.5	M4	M4	M4	M5	—	M5	M6
Applicable Crimp Lug (Main)		1.25-3.5 to 2-3.5		1.25-3.5 to 2-3.5	1.25-4 to 5.5-4	1.25-4 to 5.5-4	1.25-4 to 5.5-4	1.25-5 to 14-5	—	1.25-5 to 14-5	1.25-6 to 22-6
Weight (kg)		0.3	0.3	0.32	0.33	0.38	0.4	0.52	—	0.52	0.75
Mounting Compatibility With S-T Series		◇	○	◇	○	◇	○	◇	—	○	◇

S-T Series

Model Name		S-T10	S-T12		S-T20		S-T21	S-T25	S-T32	S-T35	S-T50
Rated Operating Current (A) AC-3	200 to 240 V	11 (11)	13 (13)		18 (18)		25 (20)	30 (26)	32 (32)	40 (35)	55 (50)
	380 to 440 V	9 (7)	12 (9)		18 (18)		23 (20)	30 (25)	32 (32)	40 (32)	50 (48)
	500 V	7 (6)	9 (9)		17 (17)		17 (17)	24 (20)	24 (20)	32 (26)	38 (38)
Conventional Free Air Thermal Current (A)		20	20		20		32	32	32	60	80
Auxiliary Contact Arrangement (Maximum)		1a (3a2b)	1a1b (3a3b)		1a1b (3a3b)		2a2b (4a4b)	2a2b (4a4b)	— (2a2b)	2a2b (4a4b)	2a2b (4a4b)
Outline Drawings (mm)			 Also Allows Mounting of 30 x 60, 35 x 50 to 52				 Also Allows 54 x 56				
Terminal Screw (Main)		M3.5	M3.5		M3.5		M4	M4	M4	M5	
Applicable Crimp Lug (Main)		1.25-3.5 to 2-3.5	1.25-3.5 to 2-3.5		1.25-3.5 to 2-3.5		1.25-4 to 5.5-4	1.25-4 to 5.5-4	1.25-4 to 5.5-4	1.25-5 to 14-5, 22-S5	
Weight (kg)		0.25	0.27		0.27		0.41	0.41	0.36	0.55	0.55

	S-K65	S-K80	S-K95	S-K100	S-K125	S-K150	S-K180	S-K220	S-K300	S-K400	S-K600	S-K800
	65 (65)	85 (80)	105 (93)	105 (100)	125 (125)	150 (150)	180 (180)	250 (220)	300 (300)	400 (400)	630 (630)	800 (800)
	62 (62)	85 (75)	105 (93)	105 (100)	120 (120)	150 (150)	180 (180)	250 (220)	300 (300)	400 (400)	630 (630)	800 (800)
	45 (45)	75 (75)	85 (75)	85 (80)	90 (90)	140 (140)	180 (180)	200 (200)	250 (250)	350 (350)	500 (500)	720 (720)
	100	135	150	150	150	200	260	260	350	450	660	800
	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)		2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)
												
	M6	M6	M6	M8		M8	M10	M10	M12	M12	M16	M16
	1.25-6 to 22-6	1.25-6 to 60-6	1.25-6 to 60-6	5.5-8 to 60-8		8-8 to 100-8	14-10 to 150-10	14-10 to 150-10	22-12 to 200-12	22-12 to 200-12	80-16 to 325-16	80-16 to 325-16
	1.1	1.8	1.8	2.7		3.2	5.5	5.5	9.5	9.5	24	24
	○	◇	○	○	○	○	○	○	○	○	○	○

	S-N65	S-N80	S-N95	S-N125	S-N150	S-N180	S-N220	S-N300	S-N400	S-N600	S-N800
	65 (65)	85 (80)	105 (100)	125 (125)	150 (150)	180 (180)	250 (220)	300 (300)	400 (400)	630 (630)	800 (800)
	65 (65)	85 (80)	105 (93)	120 (120)	150 (150)	180 (180)	250 (220)	300 (300)	400 (400)	630 (630)	800 (800)
	60 (45)	75 (75)	85 (75)	90 (90)	140 (140)	180 (180)	200 (200)	250 (250)	350 (350)	500 (500)	720 (720)
	100	135	150	150	200	260	260	350	450	660	800
	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)
											
	M6	M6	M6	M8	M8	M10	M10	M12	M12	M16	M16
	1.25-6 to 22-6	1.25-6 to 60-6	1.25-6 to 60-6	5.5-8 to 60-8	8-8 to 100-8	14-10 to 150-10	14-10 to 150-10	22-12 to 200-12	22-12 to 200-12	80-16 to 325-16	80-16 to 325-16
	0.75	1.7	1.7	2.7	3.3	5.5	5.5	9.0	9.5	24	24
	○	◇	○								

	S-T65	S-T80	S-T100
	65 (65)	85 (80)	105 (100)
	65 (65)	85 (80)	105 (93)
	60 (45)	75 (75)	85 (75)
	100	120	150
	2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)
			
	M6		M6
	1.25-6 to 22-6, 38-S6, 60-S6		1.25-6 to 60-6
	0.75	0.75	1.7

Note 1. The mounting compatibility symbols have the following indications.
○: Compatible
●: S-N□XA can be replaced as is
◇: Can be made compatible by adding an S-T/N Series-dedicated adapter (available as a separate part) *
x : Not compatible

∗ The adapters for S-T12 and SR-T5 can be used only for products where the manufacturing numbers on the front is “14Y ∗∗” or “14Z ∗∗”, or products where the first 2-digit number is equal to or greater than “15” (some of those manufactured in October 2014, and those manufactured from November on).

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13.3 Compatibility of New and Old Thermal Overload Relays and Magnetic Contactors When Used In Combination

13.3.1 Compatibility of New (MS-T Series) and Old (MS-N Series) When Used In Combination

Whether or not each thermal overload relay and magnetic contactor from the MS-T/MS-N Series can be combined is shown in the table below.

(1) Mounting Compatibility of MS-N Series Magnetic Contactors and MS-T Series Thermal Overload Relays

Magnetic Contactors	Thermal Overload Relays	Compatibility	Combination Method
S-N10	TH-T18(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-N11/SD-N11	TH-T18(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-N12/SD-N12	TH-T18(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-N20	TH-T25(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-N21/SD-N21	TH-T25(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-N25	TH-T25(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-N35/SD-N35	TH-T25(KP)/T50(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-N50/SD-N50	TH-T65(KP)	Yes [Note1]	Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets.
S-N65/SD-N65	TH-T65(KP)	Yes	Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets.
S-N80	TH-T65(KP)/T100(KP)	Yes	Can be combined using the MSO-N80/N95 connecting conductors and mounting brackets.
SD-N80	TH-T65(KP)/T100(KP)	Yes	Can be combined using the MSOD-N80/N95 connecting conductors and mounting brackets.
S-N95	TH-T65(KP)/T100(KP)	Yes	Can be combined using the MSO-N80/N95 connecting conductors and mounting brackets.
SD-N95	TH-T65(KP)/T100(KP)	Yes	Can be combined using the MSOD-N80/N95 connecting conductors and mounting brackets.

Note 1.Cannot be combined with TH-T25(KP)/T50(KP).

(2) Mounting Compatibility of MS-T Series Magnetic Contactors and MS-N Series Thermal Overload Relays

Magnetic Contactors	Thermal Overload Relays	Compatibility	Combination Method
S-T10	TH-N12(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-T12/SD-T12	TH-N12(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-T20/SD-T20	TH-N20(KP)	None	(Different outline drawings)
S-T21/SD-T21	TH-N20(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-T25	TH-N20(TA)(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-T35/SD-T35	TH-N20(TA)(KP)	None	(The mounting portion of the thermal overload relay does not match)
S-T50/SD-T50	TH-N60(KP)	None	(Different outline drawings)
S-T65/SD-T65	TH-N60(KP)	Yes	Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets.
S-T80/SD-T80	TH-N60(TA)(KP)	Yes [Note2]	Can be combined using the MSO(D)-N50/N65 connecting conductors and mounting brackets.
S-T100	TH-N60(TA)(KP)	Yes	Can be combined using the MSO-N80/N95 connecting conductors and mounting brackets.
SD-T100	TH-N60(TA)(KP)	Yes	Can be combined using the MSOD-N80/N95 connecting conductors and mounting brackets.

Note 2. Cannot be combined using the MSO-N80/N95 or MSOD-N80/N95 connecting conductors and mounting brackets.
Note 3. If connecting conductors and mounting brackets are required, optional connecting conductor kits are also available.
- For S(D)-T65/T80 Frame (AC/DC Operation) : BH559N350
- For S-T100 Frame (AC Operation) : BH569N350
- For SD-T100 Frame (DC Operation) : BH569N352

13.3.2 Compatibility of New (MS-N series) and Old (MS-K series) When Used In Combination

Whether or not each thermal overload relay and magnetic contactor from the MS-N/MS-K Series can be combined is shown in the table below.

(1) Mounting Compatibility of MS-K Series Magnetic Contactors and MS-N Series Thermal Overload Relays

Magnetic Contactors	Thermal Overload Relays	Compatibility	Combination Method
S-K125,K150 SD-K125,K150	TH-N120(TA)(KP)	Yes	Can be combined using the K Series connecting conductors and mounting brackets. (Note 1)
S-K180/K220 SD-K220	TH-N220RH(KP)	Yes	Use the screws that come with the thermal overload relay.
S-K300/K400 SD-K300/K400	TH-N400RH(KP)	Yes	Use the screws that come with the thermal overload relay.

(2) Mounting Compatibility of MS-N Series Magnetic Contactors and MS-K Series Thermal Overload Relays

Magnetic Contactors	Thermal Overload Relays	Compatibility	Combination Method
S-N125,N150 SD-N125,N150	TH-K120(TA)(KP)	Yes	Can be combined using the K Series connecting conductors and mounting brackets. (Note 1)
S-N180/N220 SD-N220	TH-K220RH(KP)	Yes	Use the screws fixing the currently attached thermal overload relay.
S-N300/N400 SD-N300/N400	TH-K400RH(KP)	Yes	Use the screws fixing the currently attached thermal overload relay.

Note 1. If connecting conductors and mounting brackets are required, optional connecting conductor kits are also available.
- For 125 A Frame (AC/DC Operation) : BH579N355
- For 150 A Frame (AC/DC Operation) : BH589N355

13.4 Compatibility of New and Old Optional Units When Used In Combination

13.4.1 Compatibility of New (MS-T Series) and Old (MS-N Series) When Used In Combination

The combinability of MS-T/MS-N Series optional units, magnetic contactors, contactor relays, and thermal overload relays is shown in the following table. For more information on the optional units, refer to page 191.

Product Name	MS-T Series				MS-N Series			
	Unit Model Name	Application to MS-N Series			Unit Model Name	Application to MS-T Series		
		AC Operated	DC Operated	Mechanically Latched Type		AC Operated	DC Operated	Mechanically Latched Type
Auxiliary Contacts	UT-AX2,AX4	x	x	x	UN-AX2,AX4	S-T65, T80	SD-T65, T80	x
	UT-AX11	x	x	x	UN-AX11	S-T65, T80	SD-T65, T80	SL(D)-T65, T80
					UN-AX80	S-T100	SD-T100	SL(D)-T100
Mechanical Interlocks					UN-ML11	x	x	x
	UT-ML20	x	x	x	UN-ML21	S-T21 to T80	SD-T21 to T80	SL(D)-T21 to T80
					UN-ML80	S-T100	SD-T100	SL(D)-T100
Surge Absorbers for Operation Coils	UT-SA13	x	SRD-N4,N5,N8 SD-N11 to N35	SRL(D)-N4 Closing Coil SL(D)-N21 Closing Coil	UN-SA13	x	x	x
	UT-SA21	SR-N4,N5,N8 S-N10 to N35 S-N38,N48			UN-SA21	x	x	x
	UT-SA22				UN-SA22	x	x	x
	UT-SA23		x		UN-SA23	x	x	x
	UT-SA25		SRD-N4,N5,N8 SD-N11 to N35		UN-SA25	x	x	x
					UN-SA721	x	SD-T65, T80	SL(D)-T21 to T80*1
					UN-SA712	x	x	SL(D)-T21 to T50*1
					UN-SA722	x	SD-T65, T80	SL(D)-T65, T80*1
					UN-SA713	x	SD-T65, T80	SLD-T21 to T80*1
					UN-SA723	x	x	SL-T21 to T80*1
					UN-SA725	x	SD-T65, T80	SL(D)-T21 to T80*1
Surge Absorbers for Main Circuits	UT-SA3320	x	x	x	UN-SA3310	x	x	x
	UT-SA3332	x	x	x	UN-SA3320	x	x	x
					UN-SA33	S-T10 to T100	SD-T12 to T100	SL(D)-T21 to T100
DC/AC Interfaces for Operation Coil					UN-SY11	S-T10 to T100	x	x
					UN-SY12	S-T10 to T100	x	x
	UT-SY21	x	x	x	UN-SY21(CX)	x	x	x
	UT-SY22	x	x	x	UN-SY22(CX)	x	x	x
					UN-SY31	S-T65, T80	x	x
					UN-SY32	S-T65, T80	x	x
Live Part Protection Covers	UT-CW800	S-N50,N65	SD-N50,N65	x				
	UT-CW655	TH-N60			UN-CZ□	S-T65 to T100	SD-T65 to T100	SL(D)-T65 to T100
Manual Operation Prevention Covers	UT-CV107	x	x	x	UN-CV117	x	x	x
Main Circuit Conductor Kits (For Reversing)	UT-SD10	x	x	x	UN-SD10CX	x	x	x
	UT-SD20	x	x	x	UN-SD21CX	x	x	x
					UN-SD18CX	S-2xT32	SD-2xT32	x
	UT-SD25	x	x	x	UN-SD25CX	S-2xT35, T50	SD-2xT35, T50	SL(D)-2xT35, T50
					UN-SD50	S-2xT65, T80	SD-2xT65, T80	SL(D)-2xT65, T80
					UN-SD80	S-2xT100	SD-2xT100	SL(D)-2xT100
Main Circuit Conductor Kits (For Crossover)	UT-SG10	x	x	x	UN-SG10CX	x	x	x
	UT-SG20	x	x	x	UN-SG21CX	x	x	x
					UN-SG18CX	S-2xT32	SD-2xT32	x
	UT-SG25	x	x	x	UN-SG25CX	S-2xT35, T50	SD-2xT35, T50	SL(D)-2xT35, T50
					UN-SG50	S-2xT65, T80	SD-2xT65,T80	SL(D)-2xT65, T80
					UN-SG80	S-2xT100	SD-2xT100	SL(D)-2xT100
Main Circuit Conductor Kits (For 3-Pole Short-Circuit)					UN-YG21 to YG80	S-T21 to T100	SD-T21 to T100	SL(D)-T21 to T100
Main Circuit Conductor Kits (For 2-Pole Short-Circuit)	UT-YD20	SR-N4,N5,N8 S-N10 to N12	SRD-N4,N5,N8 SD-N11,N12	SRL(D)-N4	UN-YD21 to YD80	S-T21 to T100	SD-T21 to T100	SL(D)-T21 to T100
3-Pole Array Connection Units	UT-YY20	x	x	x	UN-YY21	S-T21	SD-T21	SL(D)-T21
					UN-YY35	S-T35, T50	SD-T35, T50	SL(D)-T35, T50
					UN-YY50	S-T65, T80	SD-T65, T80	SL(D)-T65, T80
					UN-YY80	S-T100	SD-T100	SL(D)-T100
Thermal Overload Relay Misoperation Prevention Covers					UN-CV203	TH-T25, T50		
					UN-CV603	TH-T65, T100		
Thermal Overload Relays Reset Releases	UT-RR204 to RR704	x			UN-RR205 to RR705	x		
					UN-RR200 to RR700	TH-T25, T50		
					UN-RR206 to RR706	TH-T65, T100		
Thermal Overload Relays Fluorescent Display Lamps					UN-TL12	TH-T18		
					UN-TL20	TH-T25, T50		
					UN-TL60	TH-T65, T100		
Thermal Overload Relays With Independent Mounting	UT-HZ18	x			UN-HZ12	x		
					UN-RM20	TH-T25		

Note 1. x indicates inapplicability.
Note 2. ∗1 can be applied to the tripping coil.

13.4.2 Compatibility of New (MS-N series) and Old (MS-K series) When Used In Combination

The combinability of MS-N/MS-K Series optional units, magnetic contactors, contactor relays, and thermal overload relays is shown in the following table. For more information on the optional units, refer to page 191.

Product Name	MS-N Series				MS-K Series			
	Unit Model Name	Application to MS-K Series			Unit Model Name	Application to MS-N Series		
		AC Operated	DC Operated	Mechanically Latched Type		AC Operated	DC Operated	Mechanically Latched Type
Auxiliary Contacts	UN-AX80	S-K125	SD-K125	SL(D)-K125	UA-AX80	S-N125	SD-N125	SL(D)-N125
	UN-AX150	S-K150 to K400	SD-K150 to K400	SL(D)-K150 to K400	UA-AX150	S-N150 to N400	SD-N150 to N400	SL(D)-N150 to N400
	UN-AX600	S-K600,K800	SD-K600,K800	SL(D)-K600,K800	UA-AX600	S-N600,N800	SD-N600,N800	SL(D)-N600,N800
Mechanical Interlocks	UN-ML80	S-K125	SD-K125	SL(D)-K125	UA-ML80	S-N125	SD-N125	SL(D)-N125
	UN-ML150	S-K150	SD-K150	SL(D)-K150	UA-ML150	S-N150	SD-N150	SL(D)-N150
	UN-ML220	S-K180 to K400	SD-K220 to K400	SL(D)-K220 to K400	UA-ML220	S-N180 to N400	SD-N220 to N400	SL(D)-N220 to N400
Surge Absorbers for Main Circuits	UN-SA33	S-K125 to K800	SD-K125 to K800	SL(D)-K125 to K800	UA-SA33	S-N125 to N800	SD-N125 to N800	SL(D)-N125 to N800
DC/AC Interfaces for Operation Coil	UN-SY11	S-K125 to K400	–	–	UA-SY11	S-N125 to N400	–	–
	UN-SY12	S-K125 to K400	–	–	UA-SY12	S-N125 to N400	–	–
Main Circuit Conductor Kits (For Reversing)	UN-SD80 to SD600	S-2xK125 to K800	SD-2xK125 to K800	SL(D)-2xK125 to K800	UA-SD80 to SD600	S-2xN125 to N800	SD-2xN125 to N800	SL(D)-2xN125 to N800
Main Circuit Conductor Kits (For Crossover)	UN-SG80 to SG600	S-2xK125 to K800	SD-2xK125 to K800	SL(D)-2xK125 to K800	UA-SG80 to SG600	S-2xN125 to N800	SD-2xN125 to N800	SL(D)-2xN125 to N800
Main Circuit Conductor Kits (For 3-Pole Short-Circuit)	UN-YG21 to YG300	S-K125 to K400	SD-K125 to K400	SL(D)-K125 to K400	UA-YG21 to YG300	S-N125 to N400	SD-N125 to N400	SL(D)-N125 to N400
Main Circuit Conductor Kits (For 2-Pole Short-Circuit)	UN-YD11 to YD300	S-K125 to K400	SD-K125 to K400	SL(D)-K125 to K400	UA-YD11 to YD300	S-N125 to N400	SD-N125 to N400	SL(D)-N125 to N400
Thermal Overload Relays Misoperation Prevention Covers	UN-CV203	x			UA-CV203	TH-N120 to N600		
	UN-CV603	TH-K120 to K600						
Thermal Overload Relays Reset Releases	UN-RR200 to RR700	x			UA-RR200 to RR700	TH-N120 to N600		
	UN-RR206 to RR706	TH-K120 to K600						
Thermal Overload Relays Fluorescent Display Lamps	UN-TL20	x			UA-TL20	TH-N120 to N600		
	UN-TL60	TH-K120 to K600						

Note 1. x indicates inapplicability.
Note 2. ∗1 can be applied to the tripping coil.

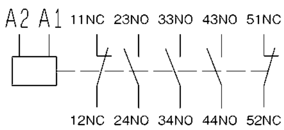
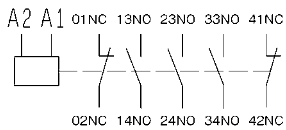
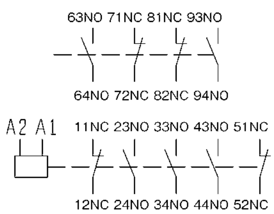
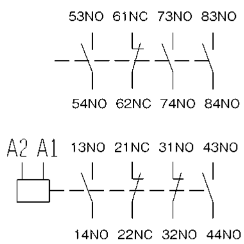
13.5 MS-T Series Changes

The main contents of what has been changed from MS-T Series to MS-N Series are summarized.
For more information regarding mounting compatibility, refer to the following. It is to be noted that components such as contacts and operation coils are for respective series only, and have no compatibility.

· Magnetic Starters and Magnetic Contactors Page 376 (for contactor relays, T5/T9 is similarly compatible with magnetic contactor T12.)

Product Marking

(1) Terminal Number

	Item	MS-T Target Model Names (Typical Model)	MS-T Series	MS-N Series	Remarks
Display Content	Auxiliary Terminal Number (Magnetic Contactor)	S-T10,T12,T20, SD-T12,T20	Make Contacts: 13NO-14NO Break Contacts: 21NC-22NC	Make Contacts: 13NO-14NO Break Contacts: 21NC-22NC	NO (Normally Open): Make Contact NC (Normally Closed): Break Contact
		S-T21 to T35, SD-T21 to T35	Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC-32NC	Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC-32NC	
		S-T50 to T100 SD-T50 to T100	Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC-32NC	Make Contacts: 13 (13) NO-14 (14) NO 43 (23) NO-44 (24) NO Break Contacts: 21 (31) NC-22 (32) NC 31 (41) NC-32 (42) NC	
	Auxiliary Terminal Number (Contactor Relay)	SR-T5 SRD-T5	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 1 to 5 E.g.: SR-T5 3a2b 	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 ·Tens Place of the Number Changes to 0 to 4 E.g.: SR-N5 3a2b 	Complies With the International Standards IEC
		SR-T9 SRD-T9	· Ones Place of the Number for Make Contacts: 3-4, Break Contacts: 1-2 · Tens Place of the Number Changes to 1 to 9 Example: SR-T9 5a4b 	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 1 to 8 E.g.: SR-N8 5a3b 	
	Coil Terminal Number	S-T10 to T35 S-T12 to T35	A1, A2 (Embossed Characters)	A1, A2 (Simultaneous Printing With Rated Coil Display)	
		S-T50 to T100 SD-T50 to T100	A1, A2 (Embossed Characters)	A1, A2 (Embossed Characters)	

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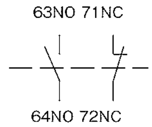
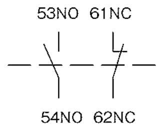
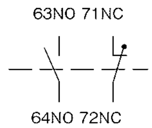
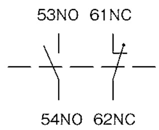
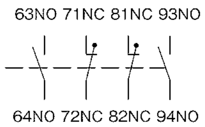
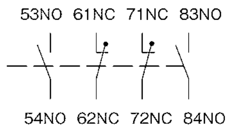
Item		MS-T Target Model Names (Typical Model)	MS-T Series	MS-N Series	Remarks
Display Content	Auxiliary Terminal Number (Auxiliary Contact Unit)	UT-AX11	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 6 to 7 E.g.: UT-AX11 1a1b (When mounted on the left side of the body)  	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 5 to 6 E.g.: UN-AX11 1a1b (When mounted on the left side of the body)  	
		UT-AX2	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 6 to 7 E.g.: UT-AX2 1a1b  	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 5 to 6 E.g.: UN-AX2 1a1b  	
		UT-AX4	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 6 to 9 E.g.: UT-AX4 2a2b  	· Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2 · Tens Place of the Number Changes to 5 to 8 E.g.: UN-AX4 2a2b  	
Display Position	Terminal Number	S-T10 to T20 SD-T12 to T20 SR-T5/T9 SRD-T5/T9 UT-AX2, AX4	· Laser printed on the product front for both the body and auxiliary contact unit	· For the body (lower part of SR-N8), printed on the product front in blue · For the upper part of SR-N8 (auxiliary contact unit), the terminal number is printed on the paper name plate in blue	
		UT-AX11	· The terminal number is printed on a paper name plate on the product front	· The terminal number is printed on the paper name plate in blue	
		S-T21 to T35 SD-T21 to T35	· Laser printed on the front of the product	· Printed on the front of the product in blue	
		S-T50 SD-T50	· Laser printed on the front of the product	· Printed on the name plate on the product front in blue	
		S-T65 to T100 SD-T65 to T100	· Printed on the name plate on the product front in gray	· Printed on the name plate on the product front in blue	

(2) Rating

Item		MS-T Target Model Names (Typical Model)	MS-T Series	MS-N Series	Remarks
Display Method	Main Circuit Rating	S-T10 to T35 SD-T12 to T35 SR-T5, T9 SRD-T5, T9	All laser printed on the side	· The Ith rating (A) is printed on the front bottom left · Other ratings are displayed on a name plate on the side	
		S-T50 SD-T50	Laser printed on the side	Printed on the name plate on the front in gray	
		S-T-65 to T100 SD-T65 to T100	Printed on the name plate on the front in gray	Printed on the name plate on the front in gray	
	Coil Rating	S-T10 to T35 SD-T12 to T35 SR-T5, T9 SRD-T5, T9	All laser printed (No color-coding)	· The designation AC100V/200V has all rated ranges color-coded (between the power supply side coil terminals) 100 V 50 Hz 100 to 110V 60 Hz 200 V 50 Hz · Other ratings have all rated ranges printed on a name plate in white · SD and SRD are printed in black on blue	
		S-T50 SD-T50	All laser printed (No color-coding)	· The designation AC100V/200V is printed in black on color-coded nameplates · Other ratings are printed in black on white nameplates · SD is printed in black on blue	
		S-T65 to T100 SD-T-65 to T100	All printed in black on white nameplates		
	Coil Polarity (+ -)	SD-T12 to T32 SRD-T5, T9	Laser printed between the coil terminals	(no marking as it has no polarity)	

(3) Model Names

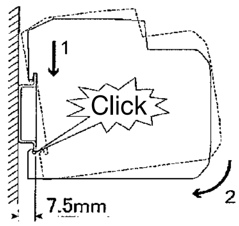
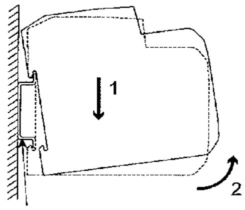
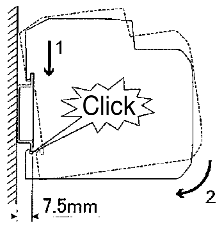
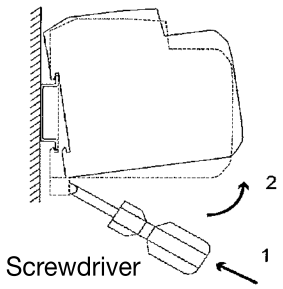
Item		MS-T Target Model Names (Typical Model)	MS-T Series	MS-N Series	Remarks
Display Method	Model Name	S-T10 to T35 SD-T12 to T35 SR-T5, T9 SRD-T5, T9 UT-AX2, AX4	Laser printed on the product front left	Printed on the front left center of the product in blue	
		S-T50 SD-T50	Laser printed on the product front left	Printed on the name plate on the product front in blue	
		S-T65 to T100 SD-T-65 to T100	Printed on the name plate on the product front in gray	Printed on the name plate on the product front in blue	
		UT-AX11	Printed on the paper name plate on the side of the product	Printed on the front center of the product in blue	

Wiring Related

(1) Terminals/Location

<table>
<tr><th>Item</th><th>MS-T Target Model Names (Typical Model)</th><th>MS-T Series</th><th>MS-N Series</th><th>Remarks</th></tr>
<tr><td rowspan="2">Contact Mark Display of Auxiliary Terminal
[Displayed with engraved marks on contact and terminal, etc.]</td><td>S-T10 to T35
SD-T12 to T35
SR-T5, SRD-T5</td><td>Make Contact ▽ Break Contact △</td><td>Make Contact ⊥⊤ Break Contact ⊥̸⊤</td><td rowspan="2"></td></tr>
<tr><td>SR-T9, SRD-T9</td><td>Upper Part (Body Side): Make Contact ▽, Break Contact △
Lower Part (Additional Auxiliary Contact Unit Side): Make Contact, Break Contact</td><td>Upper Part (Body Side): Make Contact ⊥⊤, Break Contact ⊥̸⊤
Lower Part (Additional Auxiliary Contact Unit Side): Make Contact ▽, Break Contact △</td></tr>
</table>

(2) Rail Mounting

<table>
<tr><th>Item</th><th>MS-T Target Model Names (Typical Model)</th><th>MS-T Series</th><th>MS-N Series</th><th>Remarks</th></tr>
<tr><td rowspan="3">DIN Rail Mounting</td><td>S-T10 to T50
SD-T12 to T50</td><td>·Mounting

·Removing

Screwdriver Not Required</td><td rowspan="2">Mounting

·Removing

Operated by Screwdriver</td><td rowspan="3"></td></tr>
<tr><td>S-T65</td><td rowspan="2">Same Operation as N Series</td></tr>
<tr><td>S-T80</td><td>Not Available</td></tr>
</table>

(3) Other

<table>
<tr><th>Item</th><th>MS-T Target Model Names (Typical Model)</th><th>MS-T Series</th><th>MS-N Series</th><th>Remarks</th></tr>
<tr><td rowspan="2">Coil Surge Absorber Function</td><td>S-T10SA to T50SA
SD-T12SA to T50SA</td><td>· Surge Absorber Mounted Type Operation Coil Surge Absorber Unit UT-SA21 (Varistor Element) Mounted on Main Body</td><td>· Surge Absorber Integrated Type Operation Coil Surge Absorber (Varistor Element) Integrated in Main Body</td><td rowspan="2"></td></tr>
<tr><td>S-T65 to T100</td><td>Integrated Surge Absorber Function Through AC Operated DC Excitation Type Electromagnet
· S-T65 to T100</td><td>Integrated Surge Absorber Function Through AC Operated DC Excitation Type Electromagnet
· S-N50 to N400</td></tr>
</table>

13.6 MS-N Series Changes

The main contents of what has been changed from MS-K Series to MS-N Series are summarized.
For more information regarding mounting compatibility, refer to the following. It is to be noted that components such as contacts and operation coils are for respective series only, and have no compatibility. Refer to page 389 regarding optional units.

· Magnetic Starters/Magnetic Contactors Page 376
· Thermal Overload Relays Page 388

Product Marking

(1) Terminal Number

Item		MS-N Model Names (Typical Model)	MS-N Series	MS-K Series	Remarks
Display Content	Main Terminal Number	S-N, TH-N All Models	Power Supply Side: 1/L1, 3/L2, 5/L3 Load Side: 2/T1, 4/T2, 6/T3	Power Supply Side: R/1/L1, S/3/L2, T/5/L3 Load Side: U/2/T1, V/4/T2, W/6/T3	Change in accordance with JEM1038 and JIS C4531
	Auxiliary Terminal Number		· Ones Place of the Number for Make Contacts: 3-4, Break Contacts: 1-2	· Ones Place of the Number for Make Contacts: 3-4, Break Contacts: 1-2	
	(Magnetic Contactors)	S-N125 to N800	Make Contacts: 13 (13) NO-14 (14) NO, 43 (23) NO-44 (24) NO Break Contacts: 21 (31) NC-22 (32) NC, 31 (41) NC-32 (42) NC	Make Contacts: 13 (13)-14 (14), 43 (23)-44 (24) Break Contacts: 21 (31)-22 (32), 31 (41)-32 (42)	NO (Normally Open): Make Contact NC (Normally Closed): Break Contact
	Coil Terminal Number	S-N125 to N800	A1/a, A2/b (Mold Embossed Characters)	A1/a, A2/b (Mold Embossed Characters)	
Display Position	Auxiliary Terminal Number	S-N125	Printed on the name plate on top of the arc box (arc cover) in black	Embossed on the base barrier	
		S-N150 to N400		Embossed on the base side	
		S-N600/N800		Embossed on the auxiliary contact unit	

(2) Rating

Item		MS-N Model Names (Representative Model)	MS-N Series	MS-K Series	Remarks
Display Position	Main Circuit Rating	S-N125 to N400	· The Ith rating (A) is printed on the name plate on the front bottom left · The JIS and JEM ratings are printed on a name plate in the upper right hand corner, IEC rating is on the front right center, UL rating is on the front lower right and EN rating is on the front lower center (EN rating shows the rated operating current (A) and others show the rated capacity (UL is (HP), others are (kW)))	· The JEM rating is printed on the name plate on the front left in green, and the IEC rating on the front right in red [both the rated capacity (kW) and rated operating current (A)]	
		S-N600/N800		· The JEM rating is printed on the name plate on the front center in green, and the IEC rating in red [both the rated capacity (kW) and rated operating current (A)]	

(3) Model Names and Standards

Item		MS-N Model Names (Typical Model)	MS-N Series	MS-K Series	Remarks
Display Method	Model Name	S-N125 to N800	Printed on the left center of the arc cover (arc box) in black	Printed on the name plate on the front upper right of the arc cover (arc box)	
	Compliance and Certification Standards	S-N125 to N400	JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN 60947 cULus, CE and TÜV Marks Printed on the name plate on the front	JEM 1038 NK Certification Number IEC 947-4-1 DIN VDE 0660 BS EN 60947 UR and CE Marks Printed on the name plate on the front	The cUL mark is equivalent to the CSA mark
		S-N600	JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN cURus and CE Marks Printed on the name plate on the front	JEM 1038 NK Certification Number IEC 947-4-1 DIN VDE 0660 BS EN 60947-4-1 UR and CE Marks Printed on the name plate on the front	
		S-N800	JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN CE Mark Printed on the name plate on the front	JEM 1038 NK Certification Number IEC 947-4-1 VDE 0660 BS EN 60947-4-1 CE Mark Printed on the name plate on the front	

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Changes in Outline Drawings and Structure

(1) Mounting

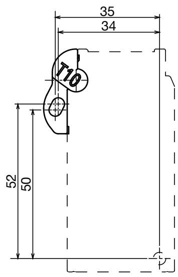
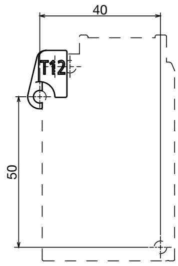
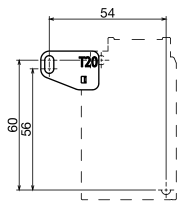
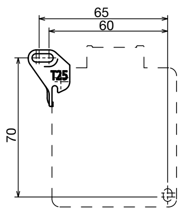
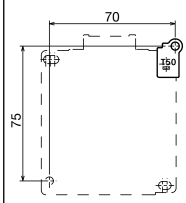
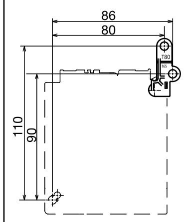
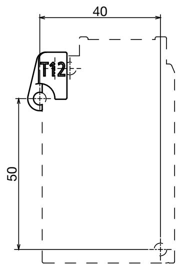
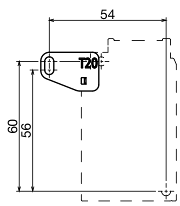
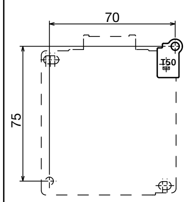
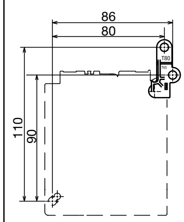
Item	MS-N Model Names (Representative Model)	MS-N Series	MS-K Series	Remarks
Arc Space	N125 to N220	10 mm	30 mm	
	N300/N400	10 mm	50 mm	
	N600/N800	10 mm	10 mm	
Mounting Compatibility With MS-A Series	MSO/S-N125 to N400	Can be made compatible with MSO/S-N☐XA	Can be made compatible by changing the direction of the mounting plate	
	S-N600/N800	Compatible	Compatible	

(2) Other

Item	MS-N Model Names (Representative Model)	MS-N Series	MS-K Series	Remarks
Built-in Operation Coil Surge Absorbing Function	MSOL(D)/SL(D)-N125 to N220	Built-in Surge Absorbing Function (Closing/Tripping) (Excluding AC/DC24 V and 48 V)	No Surge Absorbing Function (Closing/Tripping)	
	MSOL(D)/SL(D)-N300, N400		Surge Absorbing Function Built-in Only for Closing	
	SL(D)-N600, N800	Built-in Surge Absorbing Function (Closing/Tripping) (Excluding AC/DC24 V and 48 V)	Built-in Surge Absorbing Function (Closing/Tripping)	

13.7 Mounting Dimensions When Using Mounting-Compatible Adapter for MS-T Series Magnetic Contactors and Contactor Relays

Although the MS-T Series is not compatible with the MS-N Series and some other models, it can be made compatible with the use of our MS-T Series additional mounting-compatible adapter.

AC Operated	Model Name		S-T10	S-T12, SR-T5 (∗3)	S-T20	S-T25	S-T50	S-T80
AC Operated	Outline Drawing (∗1)							
AC Operated	Mounting Pitch Width x Height	Body	28 x 60	35 x 60 30 x 60 34 x 52 35 x 50 to 52	35 x 60 30 x 60 34 x 52 35 x 50 to 52	54 x 56 54 x 60	65 x 70 60 x 70	70 x 75
AC Operated	Mounting Pitch Width x Height	Adapter (∗2)	35 x 50 34 x 52	40 x 50	54 x 60 54 x 56	65 x 70 60 x 70	70 x 75	80 x 110 86 x 90
DC Operated	Model Name		–	SD-T12, SRD-T5	SD-T20	–	SD-T50	SD-T80
DC Operated	Outline Drawing (∗1)		–			–		
DC Operated	Mounting Pitch Width x Height	Body	–	35 x 60 34 x 52 35 x 50 to 52	35 x 60 34 x 52 35 x 50 to 52	–	65 x 70 60 x 70	70 x 75
DC Operated	Mounting Pitch Width x Height	Adapter (∗2)	–	40 x 50	54 x 60 54 x 56	–	70 x 75	80 x 110 86 x 90

∗1. The dimensions shown in the figure are the mounting pitch when using the mounting-compatible adapter.
∗2. There are no changes in the depth dimensions when using the mounting-compatible adapter.
∗3. Mounting-compatible adapters can be used only with S-T12 and SR-T5 types where the manufacturing numbers on the front of the product is "14Y∗∗" or "14Z∗∗", or where the first 2 digits are equal to or greater than "15" (some of those manufactured in October 2014, and those manufactured from November on).
∗4. Please use mounting screws with metal washers.

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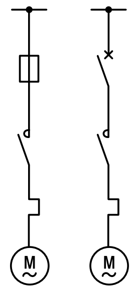
13.8 Model Names of Discontinued Former Models and Replacements

Old Model Name	Model Name	Alternative Model Name	Compatibility		Remarks
			Mounting	Rating	
AT-☐	DC Delayed Relay	Schneider LADT ☐, LADR ☐ (Pneumatic Timer Unit)	x	At Right	Confirm the actual operating voltage and current.
AX-☐	DC Relay	SRD-T☐	x	At Right	Confirm the actual operating voltage and current.
AM-☐	Time Limit Relay	Schneider LADT ☐, LADR ☐ (Pneumatic Timer Unit)	x	○	Model Name End 1: OFF Delay, 2: ON Delay
B-☐	NC Main Contact Contactor	B-T/N☐	At Right	○	Only B-A20 and B-N20 have compatibility.
BD-☐	NC Main Contact Contactor	BD-T/N☐	At Right	○	Only BD-A20 and BD-N20 have compatibility.
C-831	Commercial Magnetic Contactor	S-T☐	x	○	
DM-☐	Time Limit Relay	Schneider LADT ☐, LADR ☐ (Pneumatic Timer Unit)	x	○	Model Name End 1: OFF Delay, 2: ON Delay
DU-☐	Magnetic Contactor For DC	DU-N☐	At Right	○	Only DU-K180, K260 and DU-N180, N260 have compatibility.
DUD-☐	Magnetic Contactor For DC	DUD-N☐	At Right	○	Only DUD-K180, K260 and DUD-N180, N260 have compatibility.
EKO-☐	Magnetic Starter	MSO-T/N☐	x	At Right	Make a selection upon confirming the actual operating voltage and current.
ESO-15	Magnetic Starter	MSO-T21	x	At Right	Make a selection upon confirming the actual operating voltage and current.
EMO-☐	Magnetic Starter	MSO-T/N☐	x	At Right	Since the thermal overload relay displays TC (trip current), select a heater designation close to 1/1.15 the set current.
MR-☐	Contactor Relay	SR-T/K☐	○	○	
MRD-☐	Contactor Relay	SRD-T/K☐	At Right	At Right	Partly compatible.
MRL-☐	Mechanically Latched Contactor Relay	SRL-T/K☐	○	○	
MRDL-☐	Mechanically Latched Contactor Relay	SRLD-T/K☐	○	○	
ML-☐	Mechanically Latched Contactor	SL-T/N☐	At Right	○	Partly compatible.
MSO-☐	Magnetic Starter	MSO-T/N☐	At Right	At Right	Partly compatible.Make a selection upon confirming the actual operating voltage and current.
N-☐	Magnetic Contactor	S-T/N☐	x	At Right	Make a selection upon confirming the actual operating voltage and current.
ND-☐	Magnetic Contactor	SD-T/N☐	x	At Right	Make a selection upon confirming the actual operating voltage and current.
NS-15	Magnetic Contactor	S-T21	x	○	
RP-☐P	Control Relay	Omron MK☐P-2	○	○	SR(D)-T is functionally usable.
RP-☐SP	Control Relay With Twin Contact	Omron MK☐ZP-2	○	○	SR(D)-T is functionally usable.
S-☐	Magnetic Contactor	S-T/N☐	At Right	At Right	Partly compatible.Make a selection upon confirming the actual operating voltage and current.
SD-☐	Magnetic Contactor	SD-T/N☐	At Right	At Right	Partly compatible.Make a selection upon confirming the actual operating voltage and current.
SM- ☐, SRT- ☐	Pneumatic Timer	Schneider LADT ☐, LADR ☐ (Pneumatic Timer Unit)	x	○	Model Name End 1: OFF Delay, 2: ON Delay
SMD- ☐, SRTD- ☐	Pneumatic Timer	Schneider LADT ☐, LADR ☐ (Pneumatic Timer Unit)	x	○	Model Name End 1: OFF Delay, 2: ON Delay
TR-☐	Thermal Overload Relay	TH-T/N☐	x	At Right	Since TR displays TC (trip current), select the TH-T/N heater designation close to 1/1.15 the designation of TR.
DRS-☐	Solid State Timer	Omron H3CR-☐	x	At Right	Make a selection upon confirming the actual operating voltage and current.
SRS-☐	Solid State Timer	Omron H3CR-☐	x	At Right	Make a selection upon confirming the actual operating voltage and current.

13.9 Tool for Selecting Power Distribution Control Devices Compatible with Mitsubishi Electric Motors

13.9.1 3-phase Motor with Direct-on-Line Starting



For D.O.L starting at 3phase 1500rpm or 1800rpm squirrel cage motors under AC-3 operating conditions according to IEC609 47-4-1.
Fuse is valid for this motor full load current and for max.
6×f.l.c. starting current and max.5secs starting time.
The setting current of the heater should be adjusted to the motor full-load current.

	Motor rating	0.06	0.09	0.12	0.18	0.25	0.37	0.55	0.75	1.1	1.5	2.2	3	3.7	4	5.5	7.5	11	15	kW
		1/12	1/8	1/6	1/4	1/3	1/2	3/4	1	1 1/2	2	3	4	5	5 1/2	7 1/2	10	15	20	HP
220V 3-phase 50/60Hz	motor full load current	0.5	0.7	0.8	1.2	1.5	2.1	2.7	3.5	4.5	6.1	8.7	11.5	14.2	15.2	20	26.5	39	50	A
	type designation of Magnetic Starter MSO-	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T12	T20	T20	T21	T35	T35	T50	KP
	associated thermal overload relay TH-	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T25	T50	T50	T65	KP
	heater designation	0.5	0.7	0.9	1.3	1.7	2.1	2.5	3.6	5	6.6	9	11	15	15	22	29	35	54	A
	Fuse (VDE0660 gT time-delay)	2	2	4	4	6	6	10	16	16	20	25	35	50	50	50	80	80	160	A
	MCCB NF	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	63-SV	63-SV	125-SV	125-SV	
	rated current(In)	(3)	(3)	(3)	3	4	6	6	10	16	16	20	25	32	32	50	63	50	63	A
	wire size recommended	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	4	4	6	10	16	25	mm²
380V 3-phase 50/60Hz	motor full load current	0.25	0.35	0.45	0.65	0.85	1.2	1.6	2.0	2.7	3.6	5.1	6.8	8.5	8.7	11.8	16	22	30	A
	type designation of Magnetic Starter MSO-	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T12	T12	T20	T20	T21	T35	KP
	associated thermal overload relay TH-	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T25	T50	KP
	heater designation	0.24	0.35	0.5	0.7	0.9	1.3	1.7	2.1	2.5	3.6	5	6.6	9	9	11	15	22	29	A
	Fuse (VDE0660 gT time-delay)	*2	*2	2	2	4	4	6	6	10	16	16	20	25	25	35	50	50	80	A
	MCCB NF	–	–	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	63-SV	63-SV	
	rated current(In)	–	–	(3)	(3)	(3)	3	4	6	6	10	16	16	20	20	25	32	50	63	A
	wire size recommended	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	4	6	10	mm²
415V 3-phase 50Hz	motor full load current	0.2	0.3	0.4	0.6	0.8	1.1	1.5	1.9	2.6	3.5	5.0	6.3	7.5	8.0	11	15	21	28	A
	type designation of Magnetic Starter MSO-	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T10,T12	T12	T12	T20	T20	T21	T35	KP
	associated thermal overload relay TH-	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T18	T25	T50	KP
	heater designation	0.24	0.35	0.5	0.7	0.9	1.3	1.3	1.7	2.5	3.6	5	6.6	6.6	9	11	15	22	29	A
	Fuse (VDE0660 gT time-delay)	*2	*2	*2	2	4	4	6	6	10	16	16	20	20	25	35	50	50	80	A
	MCCB NF	–	–	–	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	63-SV	63-SV	
	rated current(In)	–	–	–	(3)	(3)	3	3	4	6	10	10	16	16	20	25	32	50	63	A
	wire size recommended	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	4	6	10	mm²

	Motor rating	18.5	22	30	37	45	55	75	90	110	132	160	200	250	315	355	400	450	kW
		25	30	40	50	60	75	100	125	150	180	220	270	340	420	480	540	600	HP
220V 3-phase 50/60Hz	motor full load current	62	75	100	124	148	182	245	295	350	420	510	630	–	–	–	–	–	A
	type designation of Magnetic Starter MSO-	T65	T80	T100	N125	N150	N180	N220	N300	N400	S-N600	S-N600	S-N800	–	–	–	–	–	KP
	associated thermal overload relay TH-	T65	T80	T100	N120TA	N120TA	N220RH	N220RH	N400RH	N400RH	N600+CT	N600+CT	N600+CT	–	–	–	–	–	KP
	heater designation	54	82	95	125	125	180	210	250	330	500	500	660	–	–	–	–	–	A
	Fuse (VDE0660 gT time-delay)	160	200	200	315	315	400	500	800	800	800	1000	1250	–	–	–	–	–	A
	MCCB NF	125-SV	125-SV	250-SV	250-SV	250-SV	400-SW	400-SW	630-SW	630-SW	630-SW	800-SEW	1000-SW	–	–	–	–	–	
	rated current(In)	80	100	150	200	225	300	350	500	500	630	600	1000	–	–	–	–	–	A
	wire size recommended	25	35	50	50	70	95	150	150	150	185	240	150(2wires)	–	–	–	–	–	mm²
380V 3-phase 50/60Hz	motor full load current	37	43	57	72	86	105	140	168	205	245	290	360	475	580	636	710	800	A
	type designation of Magnetic Starter MSO-	T35	T50	T65	T80	T80	T100	N150	N180	N220	N220	N300	N400	S-N600	S-N600	S-N800	S-N800	S-N800	KP
	associated thermal overload relay TH-	T50	T65	T65	T100	T100	T100	N120TA	N220RH	N220RH	N220RH	N400RH	N400RH	N600+CT	N600+CT	N600+CT	N600+CT	N600+CT	KP
	heater designation	35	42	54	67	82	95	125	150	180	210	250	330	500	500	660	660	660	A
	Fuse (VDE0660 gT time-delay)	80	125	160	160	200	200	315	315	500	500	800	800	1000	1250	1250	1500	1500	A
	MCCB NF	125-SV	125-SV	125-SV	125-SV	125-SV	250-SV	250-SV	250-SV	400-SW	400-SW	630-SW	630-SW	800-SEW	800-SEW	1000-SW	1250-SW	1250-SW	
	rated current(In)	50	63	80	100	125	150	225	250	300	350	500	600	600	700	1000	1200	1200	A
	wire size recommended	10	16	25	25	35	50	50	70	95	150	150	185	240	300	300	185(2wires)	185(2wires)	mm²
415V 3-phase 50Hz	motor full load current	35	40	54	67	79	98	130	160	190	230	270	328	435	530	580	650	730	A
	type designation of Magnetic Starter MSO-	T35	T50	T65	T80	T80	T100	N150	N180	N220	N220	N300	N400	S-N600	S-N600	S-N600	S-N800	S-N800	KP
	associated thermal overload relay TH-	T50	T65	T65	T100	T100	T100	N120TA	N220RH	N220RH	N220RH	N400RH	N400RH	N600+CT	N600+CT	N600+CT	N600+CT	N600+CT	KP
	heater designation	35	42	54	67	82	95	125	150	180	210	250	330	500	500	660	660	660	A
	Fuse (VDE0660 gT time-delay)	80	125	160	160	200	200	315	315	500	500	800	800	800	1000	1250	1250	–	A
	MCCB NF	125-SV	125-SV	125-SV	125-SV	125-SV	125-SV	250-SV	250-SV	400-SW	400-SW	400-SW	630-SW	630-SW	800-SEW	800-SEW	1000-SW	1250-SW	
	rated current(In)	50	50	80	100	100	125	200	250	300	350	400	500	630	600	700	1000	1200	A
	wire size recommended	10	16	25	25	35	50	50	70	95	150	150	185	240	300	300	185(2wires)	185(2wires)	mm²

Note1. This selection scale made up depending upon the average rating current of motor.
Note2. Actual rating current could be high or low for a specific motor.Therefore heater selection on this basis always involves risk.
For fully reliable motor protection, select heaters on the basis of full load current rating as show on the motor nameplate.
Note3. Type MSO-N600KP and N800KP are not available.
Use contactor S-N600 or S-N800 and OLR TH-N600KP with suitable CTs.

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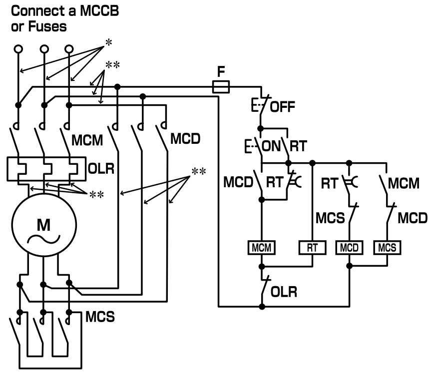
13.9.2 3-phase Motor with Star-delta Starting

For star-delta starting at 1500rpm or 1800rpm 3phase squirrel cage motors.
The selection of contactor MCS can be applied only to this diagram.
Fuse is valid for this motor full load current and for max. 2×f.l.c. starting current and max.15secs starting time.
The setting current of the heater should be adjusted to $1/\sqrt{3}$×f.l.c



	Motor rating		2.2	3	3.7	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	kW
			3	4	5	5 1/2	7 1/2	10	15	20	25	30	40	50	60	75	100	125	150	HP
220V 3-phase 50/60Hz	motor full load current		8.7	11.5	14.2	15.2	20	26.5	39	50	62	75	100	124	148	182	245	295	350	A
	type designation of Magnetic Starter MCM+OLR	MSO-	T12	T12	T12	T12	T12	T20	T25	T35	T35	T50	T65	T80	T80	N125	N150	N180	N220	KP
	type designation of OLR	TH-	T18	T18	T18	T18	T18	T18	T25	T50	T50	T65	T65	T100	T100	N120TA	N120TA	N220RH	N220RH	KP
	heater designation		5	6.6	9	9	11	15	22	29	35	42	54	67	82	105	150	180	210	A
	type designation of Contactor MCD	S-	T12	T12	T12	T12	T12	T20	T25	T35	T35	T50	T65	T80	T80	N125	N150	N180	N220	
	type designation of Contactor MCS	S-	T10	T10	T10	T10	T10	T10	T10	T10	T12	T20	T21	T25	T35	T35	T50	T65	T80	
	Fuse (VDE0660 gT time-delay)		16	20	32	32	32	40	63	80	100	100	125	160	200	220	315	400	400	A
	MCCB	NF	32-SV	32-SV	32-SV	63-SV	63-SV	63-SV	125-SV	125-SV	125-SV	160-SV	160-SV	250-SV	250-SV	400-SW	400-SW	630-SW	630-SW	
	rated current(In)		20	32	32	40	50	63	63	80	100	125	160	200	225	300	400	500	600	A
	wire size recommended(*)		1.5	1.5	1.5	4	6	10	16	25	25	35	50	50	70	95	150	150	150	mm^2
	wire size recommended(*)		1.5	1.5	1.5	1.5	1.5	2.5	4	6	6	10	16	25	25	35	50	70	95	mm^2
380V 3-phase 50/60Hz	motor full load current		5.1	6.8	8.5	8.7	11.8	16	22	30	37	43	57	72	86	105	140	168	205	A
	type designation of Magnetic Starter MCM+OLR	MSO-	T12	T12	T12	T12	T12	T20	T20	T20	T21	T25	T35	T50	T50	T65	T80	T100	N125	KP
	type designation of OLR	TH-	T18	T18	T18	T18	T18	T18	T18	T18	T25	T25	T50	T65	T65	T65	T100	T100	N120TA	KP
	heater designation		3.6	3.6	5	5	6.6	9	15	15	22	22	29	42	54	54	82	95	105	A
	type designation of Contactor MCD	S-	T12	T12	T12	T12	T12	T20	T20	T20	T21	T25	T35	T50	T50	T65	T80	T100	N125	
	type designation of Contactor MCS	S-	T10	T10	T10	T10	T10	T10	T10	T10	T12	T12	T20	T20	T20	T21	T25	T35	T50	
	Fuse (VDE0660 gT time-delay)		12	16	16	16	20	32	32	40	40	63	63	100	100	125	160	200	250	A
	MCCB	NF	32-SV	32-SV	32-SV	32-SV	32-SV	63-SV	63-SV	125-SV	125-SV	125-SV	125-SV	160-SV	160-SV	160-SV	250-SV	400-SW	400-SW	
	rated current(In)		16	16	20	20	32	40	50	50	63	63	100	125	150	160	225	300	350	A
	wire size recommended		1.5	1.5	1.5	1.5	2.5	4	6	10	10	16	25	25	35	50	50	70	95	mm^2
	wire size recommended		1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	4	6	6	10	16	25	35	35	mm^2
415V 3-phase 50Hz	motor full load current		5.0	6.3	7.5	8	11	15	21	28	35	40	54	67	79	98	130	160	190	A
	type designation of Magnetic Starter MCM+OLR	MSO-	T12	T12	T12	T12	T12	T12	T20	T20	T21	T25	T35	T50	T50	T65	T80	T100	N125	KP
	type designation of OLR	TH-	T18	T18	T18	T18	T18	T18	T18	T18	T25	T25	T50	T65	T65	T65	T100	T100	N120TA	KP
	heater designation		3.6	3.6	5	5	6.6	9	11	15	22	22	29	42	42	54	67	95	105	A
	type designation of Contactor MCD	S-	T12	T12	T12	T12	T12	T12	T20	T20	T21	T25	T35	T50	T50	T65	T80	T100	N125	
	type designation of Contactor MCS	S-	T10	T10	T10	T10	T10	T10	T10	T10	T10	T12	T20	T20	T20	T21	T25	T35	T50	
	Fuse (VDE0660 gT time-delay)		12	16	16	16	20	32	32	40	40	63	63	100	100	125	160	160	250	A
	MCCB	NF	32-SV	32-SV	32-SV	32-SV	32-SV	32-SV	63-SV	125-SV	125-SV	125-SV	125-SV	125-SV	160-SV	160-SV	250-SV	400-SW	400-SW	
	rated current(In)		16	16	16	20	25	32	50	40	50	63	80	100	125	150	225	300	350	A
	wire size recommended		1.5	1.5	1.5	1.5	2.5	4	6	10	10	16	25	25	35	50	50	70	95	mm^2
	wire size recommended		1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	2.5	4	6	6	10	16	25	35	35	mm^2

	Motor rating		132	160	200	250	315	355	400	450	kW
			180	220	270	340	420	480	540	600	HP
220V 3-phase 50/60Hz	motor full load current		420	510	630	790	990	1100	1230	1380	A
	type designation of Magnetic Starter MCM+OLR	MSO-	N300	N300	N400	S-N600	S-N600	S-N600	S-N800	S-N800	KP
	type designation of OLR	TH-	N400RH	N400RH	N400RH	N600+CT	N600+CT	N600+CT	N600+CT	N600+CT	KP
	heater designation		250	250	330	500	500	660	660	660	A
	type designation of Contactor MCD	S-	N300	N300	N400	N600	N600	N600	N800	N800	
	type designation of Contactor MCS	S-	T100	T100	N125	N150	N220	N220	N220	N300	
	Fuse (VDE0660 gT time-delay)		500	630	800	1000	1250	1500	1500	2000	A
	MCCB	NF	800-SEW	1000-SW	1000-SW	1250-SW	1600-SW	AE1600-SW	AE2000-SW	AE2000-SW	
	rated current(In)		600	800	1000	1200	1500	1600	2000	2000	A
	wire size recommended(*)		185	240	185(2wires)	240(2wires)	60x5(2bars)	80x5(2bars)	80x5(2bars)	100x5(3bars)	mm^2
	wire size recommended(*)		120	185	240	150(2wires)	185(2wires)	240(2wires)	240(2wires)	240(2wires)	mm^2
380V 3-phase 50/60Hz	motor full load current		245	290	360	475	580	636	710	800	A
	type designation of Magnetic Starter MCM+OLR	MSO-	N150	N180	N220	N300	N400	N400	S-N600	S-N600	KP
	type designation of OLR	TH-	N120TA	N220RH	N220RH	N400RH	N400RH	N400RH	N600+CT	N600+CT	KP
	heater designation		125	150	180	250	330	330	500	500	A
	type designation of Contactor MCD	S-	N150	N180	N220	N300	N400	N400	N600	N600	
	type designation of Contactor MCS	S-	T50	T65	T80	T100	N125	N150	N150	N180	
	Fuse (VDE0660 gT time-delay)		250	310	400	630	630	800	800	1000	A
	MCCB	NF	400-SW	630-SW	630-SW	1000-SW	1000-SW	1000-SW	1250-SW	1250-SW	
	rated current(In)		400	500	600	700	900	1000	1200	1200	A
	wire size recommended		150	150	185	240	185(2wires)	240(2wires)	240(2wires)	240(2wires)	mm^2
	wire size recommended		50	70	95	150	185	240	150(2wires)	150(2wires)	mm^2
415V 3-phase 50Hz	motor full load current		230	270	328	435	530	580	650	730	A
	type designation of Magnetic Starter MCM+OLR	MSO-	N150	N180	N220	N300	N400	N400	N400	S-N600	KP
	type designation of OLR	TH-	N120TA	N220RH	N220RH	N400RH	N400RH	N400RH	N400RH	N600+CT	KP
	heater designation		125	150	180	250	330	330	330	500	A
	type designation of Contactor MCD	S-	N150	N180	N220	N300	N400	N400	N400	N600	
	type designation of Contactor MCS	S-	T50	T65	T65	T80	T100	N125	N150	N150	
	Fuse (VDE0660 gT time-delay)		250	315	400	630	630	800	800	1000	A
	MCCB	NF	400-SW	630-SW	630-SW	800-SEW	1000-SW	1000-SW	1000-SW	1250-SW	
	rated current(In)		400	500	600	500	800	900	1000	1200	A
	wire size recommended		150	150	185	150(2wires)	185(2wires)	185(2wires)	240(2wires)	240(2wires)	mm^2
	wire size recommended		50	70	95	150	185	185	240	150(2wires)	mm^2

Note1. This selection scale made up depending upon the average rating current of motor.
Note2. Actual rating current could be high or low for a specific motor.Therefore heater selection on this basis always involves risk.For fully reliable motor protection, select heaters on the basis of full load current rating as show on the motor nameplate.
Note3. Type MSO-N600KP and N800KP are not available.Use contactor S-N600 or S-N800 and OLR TH-N600KP with suitable CTs.

13.10 Index by Content

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13 Supplementary Information

13.11 Index by Model Name

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13.12 Index by Product Name

Precautions Regarding Safety
● For correct and safe use, read the "Instruction Manual" beforehand. ● For safety, make sure that only technicians qualified for electric work or wiring perform connection of the product. ● When a product described in this catalog is to be used in a facility where a failure can lead to injury to the human body or serious damage to earnings, make sure to install safety mechanisms. ● Upon adoption for use, read the "Notes for Adopting the Product" on page 10, beforehand.

(Note) Mark that indicates certification of the China Compulsory Certificate.

(Note) Mark that indicates EC Directives compliance. CE Mark labeled products can also be used in Europe.

(Note) Mark that indicates German Rheinland Inspection Association certified products.

(Note) Mark that indicates UL certified products to UL and CSA Standards.

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO 14001 (standards for environmental management systems).

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