

FACTORY AUTOMATION

# Mitsubishi Electric Magnetic Starters MS-T/N Series





# 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, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation 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.

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## Line-up A Wide Variation that Suits User Needs

Application	MS-T/N Series Magnetic Starters/Contactors							
Based Name	Standard Type (AC Operate	d) Reversible Type	э	DC Operated Type	Mechanically Latched			
External Appearance of	MS-T MSO-T S-T	MS-2xT MSO-2xT	S-2xT	MSOD-T SD-T	SL/SLD-T			
Representative Model	MS-N MSO-N S-N	MS-2xN MSO-2xN	S-2xN	MSOD-N SD-N	SL/SLD-N			
Application/ Function	<ul> <li>Usable in general applications such motor starting, stopping, and burno protection.</li> </ul>	as · Ideal for forward rotation, rev rotation, or plugging, as well switching of normal and eme power supplies.	<ul> <li>Ideal for forward rotation, reverse rotation, or plugging, as well as for the switching of normal and emergency power supplies.</li> </ul>		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			
Page	Page 74	Page 75		Page 91	Page 102			
Application	MS-T/N Series Magnet	ic Starters/Contactors			Contactor Relays			
Based Name	With Wiring Streamlining Terminal	Main Circuit 3-Pole Magnetic Contactors	Main Circuit 3-Pole Magnetic Contactors		Standard Type (AC Operated)			
Sevent External Appearance of	MSO-T⊡BC S-T⊡BC	5 S-T32	الله الله الله الله الله الله الله الله		SR-T			
Representative Model	_	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	<ul> <li>Because there are only 3 main contacts and no auxiliary contact, the required surface area for mounting panels has been significantly reduced.</li> <li>By additionally installing an</li> </ul>	ise there are only 3 main cts and no auxiliary contact, quired surface area for ting panels has been cantly reduced. ditionally installing an rry contact unit, it is possible SR), and speed ty		<ul> <li>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/NICRP), delay trip types (TH-T/NIC SR), and speed types (TH-T/NICRS, TH TICRS TH NICRS are</li> </ul>		Can be used as an operating relay for magnetic contactors, etc., and can direct/transmit signals using multiple contacts.	
	using a protective cover, etc.	auxiliary contact unit, it is possible to attach a auxiliary contact.	SR), and speed	TH-N□KF), etc.				

	MS-T/N Se	eries Magnet	tic Starters/C	Contactors			
Delay Open Type	Magnetic Starters with Sat and Thermal Overlo	turable Reactors ad Relays	Magnetic Star characteristics	ters with Quick-acting Thermal Overload Relays	,	Magnetic Starters with Push-Buttons	
MSO/S-T⊡DL	MSO-T⊡KI	PSR	MSC	D-T⊡FSKP		MS-T⊡PM	
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 reture nabling continuous operation of load.     Applications     Temporary Storage Circuits such as Automatic Control Devices	<ul> <li>Prevents motor overl restriction when start long or starting curre well as preventing ur thermal overload rela . Can be used to prote intermittently operati</li> </ul>	<ul> <li>✓ Frevents motor overload or restriction when starting time is long or starting current is large, as well as preventing unnecessary thermal overload relay operation.</li> <li>Can be used to protect intermittently operating motors.</li> </ul>		CO-N□KF Co-N□KF ecting motors with lowances for uch as submersible mpressors.	· Becau integr starte perfo separ	- use the push-button is rated with the magnetic er, operation can be rrmed without the need for a rate push-button.	
Page 111	Page 11	4	P	age 116		Page 117	
 Contactor Relays						Optional Units	
DC Operated Type	Mechanically Latched Type	lechanically Delay Op atched Type		pen Type With Wiring Streamlining Terr		Failure Detection Units (Contact Welding Detection)	
		RE					

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22222 B			-18-	_
SRD-T	SRL-T SRLD-T	SR-T⊡DL	SR/SRD-T⊡BC	
H	-	-	-	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.	<ul> <li>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.</li> </ul>	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.	<ul> <li>Detects failures (contact welding) that occur to the main circuit contar 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.</li> </ul>
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Magnetic Starters/Contactors/Relays According to Application							
DC Interface Contactors	NC Main Contact Contactors	DC Contactors	Safety Contactors				
MSOD-Q MSOD-Q SD-Q SD-Q SD-QR (Reversible)	i       i         i	Du(D)-N	S(D)-TSD-QSD-QS(D)-N				
Capable of being directly driven by the transistor output (DC24 V 0.1 A) of PLCs etc.	<ul> <li>Main circuit break contact (normally closed contact) can be used for motor control and power switching for lighting circuits.</li> <li>Applications <ul> <li>For Motor Starting Resistance Shortcircuits</li> <li>For Cushioned Starting of AC Motors</li> </ul> </li> </ul>	<ul> <li>Can be used for applications controlling DC motors at 440 V or less and other general DC circuits.</li> <li>Applications <ul> <li>Variable Speed Motor Control</li> <li>For Dynamic Brakes</li> </ul> </li> </ul>	<ul> <li>Suitable for standard products in which the auxiliary break contact is a mirror contact.</li> <li>Can be applied to mechanical safety category 4 circuits. (Can detect malfunction of break contacts)</li> </ul>				
Page 242	Page 249	Page 253	Page 282				

Related E		
Voltage Detection Relays	Motor Circuit Breakers	
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.	<ul> <li>This is a relay that automatically restarts load equipment that has stopped momentarily due to a voltage drop or temporary outage, when power returns.</li> <li>Applications <ul> <li>Motors or Heater Load Circuits at Various Types of Industrial Plants</li> </ul> </li> </ul>	<ul> <li>A device that integrates a low voltage circuit breaker with thermal overload relay functionality.</li> <li>One unit protects motor branch circuits from overloads, open phase and short-circuits.</li> </ul>
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### For Use in Various Industries

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



### 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 our magnetic starters and magnetic contactors, we recommend that customers renew the products every 10 years as a rule, provided that the products are used in line with the number of open/close operations specified by this catalog or the instruction manual or in a report entitled "Investigation of recommended renewal periods for low voltage devices" issued by the Japan Electrical Manufacturers' Association (JEMA).

We also recommend renewing devices other than the magnetic starters and magnetic contactors described in this catalog every 10 years as a rule.

### 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.

### A 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.

### A 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.

# **Features**

1	Introducing the MS-T Series	14
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### **MS-T Series Introduction**

### Down-sizing

### 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)



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



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



1

(Unit: mm)

#### <AC Operated Type> Frame Size 13A 32A 20A 25A 75 53 43 43 63 <u>ete</u> Traditional Front View 聞 None ď ď **MS-N Series** ¢ S-N10 S-N11 (Auxiliary 1-pole) S-N12 (Auxiliary 2-pole) S-N20 S-N25 43 44 44 63 36 ēlē **P** ΘΩe New New slimline . Front View **P MS-T Series** 闹 몞 旧船 € -9mm 9000 -7mm 99999 -19mm \*\*\* S-T20 S-T10 S-T12 (Auxiliary 2-pole) S-T25 S-T32 Frame Size 35A 100A 50A 65/ 80A 75 88 88 88 88 100 100 000 QIOLO Traditional Front View Ň M 6 **MS-N Series ିକ୍ଟି**କ୍ଟିକ୍ଟି S-N50 S-N50AE S-N65AE S-N65 S-N80 S-N95 S-N35 100 75 75 88 88 ēNē **B New slimline** Front View **MS-T Series** -13mn 00 je le de S-T65 S-T80 S-T50 S-T100 S-T35

#### <DC Operated Type>

Frame Size		13A		18A	20A	32A
Traditional MS-N Series	Front View			None		None
		SD-N11	SD-N12		SD-N21	
New slimline MS-T Series	Front View					

Frame Size		35A	50A	65A	80A	100A
Traditional MS-N Series	Front View	75			100	100
New slimline MS-T Series	Front View		75 0 0 0 0 0 0 0 0 0 0 0 0 0	88 6666 7006 80-T65	88 88 80 80 80 80 80 80 80 80	100 100 100 100 100 100 100 100

### **MS-T Series Introduction**

### 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.





#### 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.





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** 

#### 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
7W	2.2W	69%
9W	2.2W	76%
-	2.2W	-
	Traditional Model 7W 9W -	Traditional ModelNew Model7W2.2W9W2.2W-2.2W



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# Safety & Quality 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 Design Means Smart Wiring**

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

Target Frames: 10 A to 50 A Frame

(model name with suffix "BC") are also available to further improve wiring efficiency, workability and hence productivity.







(2) Insert the ring crimp lug.



(3) Tighten the screw.

### **MS-T Series Introduction**

### 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.







## **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.

		Safety Certification Standard				
	International	Japan	China	U.S. & Canada		
			EN	Certifying Body	GB	
Standards		_	EC Directive	Certifying Body	GB	
		JIS	CE	TÜV Rheinland		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 expanded by combining with optional units. (The photo shown is just one example of a possible combination.)



### MS-T Series with Spring Clamp Terminals

### 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.



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



### 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.



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



- 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.

#### WAGO PUSH-IN CAGE CLAMP<sup>®</sup>

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



#### 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.



### **MS-N Series Magnetic Contactors**

### 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 <sup>(\*)</sup>, 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.
- $\cdot$  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.



### SD-Q Series DC Interface Contactors

### Support for Direct Drive Using PLC Transistor Output

#### DC Interface Contactors (12 A Frame)



#### SD-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.



MSOD-Q11 Type

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.

	Rated Capac	ity (kW) AC-3	Free Air Thermal	Electrical
Model Name	200 to 240V	380 to 440V	Current (A)	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<sup>-7</sup>/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

			Applicable	e Standard		Safety Certified Standard		EC Directives	Certifying Body	CCC Certification
		JIS*1 JEM	IEC	DIN VDE	BS EN	UL	CSA	CE Mark	ΤÜV	GB
Model	Model Name	Japan	International	Germany	United	US Canada		Europe	Germany	China
					Europe	c (U) LISTED		CE	TOV Number	
Magnetic Contactors	SD-Q11, Q12 SD-QR11, QR12	0	0	0	O	0	0	0	0	0
Magnetic Starters	MSOD-Q11 (BC) KP, Q12 (BC) KP MSOD-QR11 (BC) KP, QR12 (BC) KP	0	0	0	O	0	0	0	0	0

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

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.

#### US-N20TE Type

US-H40DD Type

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

#### 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.



US-H20HZ Type

- 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

	AC220	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]	
20	(Note 1) (Three- AC380	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]	
+0.4	Phase Cage Motor 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]	
č	[kW/A] (Note 2) AC690V	4/5	5.5/7	7.5/9	7.5/9	11/12	11/12	15/17	22/26	30/38	
c	Conventional		20			32		60	80	100	
<	Free Air Thermal Current Ith [A]	1a	1a	1b	2a	2b	_	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			ТН-Т25(BC) ТН-Т25(BC)КР			TH-TE	50(BC) (BC)KP	тн-т65 тн-т65КР	
0	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	
E	lectromagnetic Method				AC Operation	AC Excitation					
IE	EC 35 mm Rail Mounting										
A	pplicable to AC690 V										
S	Surge Absorber		Externall	y Mounted Uni	ts (Model nam	nes with "SA" a	re externally n	nounted.)			
A	uxiliary Twin Contacts										
ducto	DC Operated										
A Dro	Mechanically Latched Type										
Annlia	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
	2a2h	2a2b	2a2h	200 2a2b	200 2a2h	200 2a2h	2a2h	2a2h	2a2h	2a2h
	LULD	LULD	ZULD	ZULD	LULD	LULD	LULD	LULD	LULD	LULD
	<b>МS-Т80</b>	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-N2		TH-N4		TH-T TH-T	N600 500KP
	TH-T1	IOOKP	TH-N120KP	TH-N120TAKP	TH-N22	ORHKP	TH-N40	ORHKP	(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 t	o 800
				ŀ	AC Operation/	UC Excitation	1			
					Derit	lt in				
					Bui	11-1[]				

### 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



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

(9

(8

Example of Wiring in Electric Wires







With I IT-MO12

#### Ease-of-Use

A wide range of optional units is offered.

This is in order to satisfy the various usage applications of our customers.



	Number	Product Name	Model Name	Specifications	Description						
	(1)	Auxiliary	UT-MAX	1a 1b	The contacts of this unit operate in unison with the						
	(1)	Contact (Interior)	UT-MAXLL(For Very Small Loads)	1a 1b	turning ON/OFF of the main unit.						
	(2)	Alarm Contact	UT-MAL	1a 1b	The contacts of this unit operate (either short-circuits, overloads,						
	(2)	(Interior)	UT-MALLL(For Very Small Loads)	1a 1b	open-phase) in unison with the trip operation of the main unit.						
	(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.						
			UT-2B4	45 mm Clearance Row of 2							
	(4)	Buo Bor	UT-3B4	45 mm Clearance Row of 3	A unit that can supply power (parallel connection) to 2 or 3						
		Dus Dai	UT-2B5	57 mm Clearance Row of 2	units individually without use of electric wire.						
			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.						
		Connecting	UT-MT20 UT-MT32		Unit for electrically and						
	(7)	Conductor Unit	UT-MQ12		MMP-T32 and a magnetic						
			UT-MT32D		contactor.						
	(8)	Mounting Base Unit	UI-BT20 UT-BT32		Plate for mounting a combination starter by combining MMP-T32 and a magnetic contactor Can be						
	(9)	Mounting Base Unit	UT-BT32DMP		rail mounted or screw mounted.						
	(10)	Jointing Block Unit	UT-RT10 UT-RT20 UT-RT32		A block that connects the 2 mounting base units						
	(11)	Jointing Block Unit	UT-BT32DMP		mechanically.						

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

# **Selection and Application**

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### 2.1 Model List

		Frame		T10	T12	T20	T21	T25	T32	T35	T50	
	Applica	able standard			JIS C	8201-4-1. I	EC60947-4-	1. EN60947	-4-1. GB14	048.4		
	Magnetic Contactors		Non-Reversing	S-T10	S-T12	S-T20	S-T21	S-T25	S-T32	S-T35	S-T50	
	(Without Thermal Overload	d Relay, Open Type)	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		Non-Reversing	MS-T10	MS-T12	_	MS-T21	—	—	MS-T35	MS-T50	
۵.	(With standard	Enclosed Type	Reversing		_	•	MS-2 x T21	_	_	MS-2 x T35	MS-2 x T50	
Ĕ	2-element, With		Non-Reversing	MSO-T10	MSO-T12	MSO-T20	MSO-T21	MSO-T25	_	MSO-T35	MSO-T50	
ž	Thermal Overload	Open type	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	
del	Relay)	Combined Thermal Over	load Relays		TH-T18		TH-	T25	_	TH-T25 / T50	TH-T25 / T50	
β	Magnetic Starters	Enclosed Type	Non-Reversing	MS-T10KP	MS-T12KP	_	MS-T21KP	_	_	MS-T35KP	MS-T50KP	
-	With 3-element type	2.10.0000	Reversing		_		MS-2 x T21KP	_		MS-2 x T35KP	MS-2 x T50KP	
	Thermal Overload	Open Type	Non-Reversing	MSO-110KP	MSO-112KP	MSO-120KP	MSO-121KP	MSO-125KP		MSO-135KP	MSO-150KP	
	Relays	Cambinad Thormal Our	Reversing	MSO-2 X 110KP	MSU-2 X 112KP	MSO-2 X 120KP	MSO-2 X 121KP	MSU-2 X 125KP	_	MSO-2 X 135KP	MSO-2 X 150KP	
	Pated Inculation Voltage				IH-IIONP			2011		1H-120 / 100KP	1H-120/100KP	
	Rated Impulse Withstan	d Voltage	[v]					3				
	Rated Frequency	la voltage	[Hz]				50	/60				
	Pollution Degree		[]					3				
ng	Rated operational currer	nt / power	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]	
ati	Category AC-3 (Note 1)		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]	
t	(Three-phase squirrel-ca	ige motor load	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]	
nta	standard responsibility)	(Note 2) [kW/A]	AC690V	4/5	5.5/7	7.5/9	7.5/9	11/12	11/12	15/17	22/26	
ō	Rated operational current	/ power Category AC-4	AC220 to 240V	1.5/8	2.2/11	3.7	/18	4.5/20	5.5/26	5.5/26	7.5/35	
ain	(Three-phase squirrel-ca	age motor load	AC380 to 440V	2.2/6	4/9	5.5	/13	7.5/17	11/24	11/24	15/32	
Ŝ	inching responsibility)	[KW/A]	AC500V	2.7/6	5.5/9	5.5	/10	7.5/12	7.5/13	11/17	15/24	
	Rated operational curre	nt / power	AC100 to 240V		20			32		60	80	L
	Category AC-1 (Resista	nce, heater load)	AC380 to 440V	11	1	3		32		60	80	
	Conventional Free Air Thormal Current Ith		ACOULO 200V	0	20	13		32		60	80	
			Non-Reversing	1a	1a	1b	2a	2b	_	2a2b	2a2b	
p		Standard Accessory	Reversing (Note 8,	10 4 0 4 04	tathy	0.06	0.00		0.00	Ocob v O	0-0h y 0	
atir	Contact Arrangement		Note 9)	18 X Z + 20	Taibx	2 + 20	2821	J X Z	2820 X 2	2820 X 2	2820 X 2	
ct	o on laot / in angoment	Max. number of	Non-Reversing			1 fc	or UT-AX2/4	, 2 for UT-A	(11	1		
nta		(Note 11)	Note 9)		2 for	any UT-AX2	/4/11		-	2 for any U	T-AX2/4/11	
S	Rated Operating Curren	t (Category AC-15:	AC120V	6	6	6	6	6	6	6	6	
ary	Alternating current coil I	oad) [A]	AC240V	3	3	3	3	3	3	3	3	
llixr	Rated Operational Curre	ent	DC24V				3	3				
Ā	(Category DC-13 : Direc	t current coil load)	DC110V	10	10		0	.6				
	Conventional Free Air T	nermal Current Ith	[A]	10	10	10	10	10	10	10	10	
e			Category AC-3	200 (Note 5, 6)								
anc	Electrical Durability (Not	te 5)	Category AC-4	3 (Note 5)								
E			Category AC-1				5	0				
erfo			Category AC-3				1800				1200	
ď.	Switching Frequency	[Times/Hour]	Category AC-4	300								
.9			Category AC-1		7		12	7	15	1	0	
cterist	Coil consumption (Note	27) [VA]	Inrush		45		75			1.	10	
Chara	Power Consumption (N	ote 7) [W]			2.2		2.4	2.4	1.8	3.8	3.8	
	Magnetic Contactors (with	out Thermal Overload	Non-Reversing	36 x 75 x 78	44 x 7	5 x 78	63 x 8	1 x 81	43 x 81 x 81	75 x 8	9 x 91	
de ons	Relays) (Width x Height x I	Depth) [mm]	Reversing	82 x 85 x 78	98 x 8	5 x 78	136 x 8	31 x 81	96 x 81 x 111	160 x 1	14 x 97	
tsic	Open Type Magnetic St	arters	Non-Reversing	00.5	46 x 115 x 79	05 70	63 x 12	28 x 82	-	75 x 15	/.5 x 91	
n o m	(Width X Height X Depth	<u>ı) (mm</u>	Nep Poversing	90.5 X 125 X 79	98.5 X 1	25 x 79	136 X 1	38 x 82	-	160 X 1	<u>/9 X 9/</u>	
õ	Width x Height x Depth	niers (mm)	Reversing	70×10	-		220×192×115			300×24	47×130	
IEC :	35mm rail mounting	<u>, ()</u>	rioronomig			Possible (ex	cluding Enc	losed Magne	etic Starters	;)		
Â		(Contact Arrangement	t 1a1b)				UT-AX	2/AX11		/		
e 1(	Contact Units	(Contact Arrangement	t 2a2b)				UT-	AX4				
Not		With Low-Level Signa	I Contact				-	_				
) se	Coil Surge Absorber	(Varistor)	(Note 4)				01-8	SA21				
am	Units	(varistor + Display LEI	(ב	UT-SA22								
N	(Note 4)	(Un) (Varistor + CR)		UT-SA23								
lode	DC-AC	Triac Output		UT-SY21								
it N	Interface	Contact Output					UT-S	SY22				
Ľ			Non-Reversing				_	_				
ona	Live Part Protection	For Magnetic Starters	Boversing									
Dptic	Cover	For Magnetic	Non-Reversing					_				
le C		Contactors	Reversina				_	_				
ıllab	Terminal Cover	For Magnetic Starters (N	on-Reversing)				(Standard I	Equipment)				
ısta		For Magnetic Contactors (N	Non-Reversing)				(Standard I	Equipment)				
-	Mechanical Interlock Ur	nits		I 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 ( $\Box$ - $\Box$ SA type). The UT-SA21 type can be mounted.

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.

2

T65	T80	T100	N125	N150	N180	N220	N300	N400	N600	N800
			JIS C82	201-4-1, IEC60	0947-4-1, EN6	0947-4-1, GB1	4048.4			
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-165	MS-180	MS-1100	MS-N125	MS-N150	MS-N180	MS-N220	MS-N300	MS-N400		
MS-2 X 165	MS-2 X 180	MS-2 X 1100	MS-2 X N125	MS-2 X N 150	MS-2 X N 180	MS-2 X N220	MS-2 X N300	MS-2 X 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-N220BH	TH-N220BH	TH-N400RH	TH-N400RH		
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			50/60		6	(8)		
 					30/60					
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 UI	N-AX80		2	2 for UN-AX150	5		1 for UN	I-AX600
2 for any UT-AX2/4/11		2 for UI	N-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
				100 (11 1 0)	500				50 (11 + 0)	
200				100 (Note 6)	2 (Noto 5)				50 (Note 6)	
					50					
					1200					· · · · · · · · · · · · · · · · · · ·
					300					<u>-</u> -
12	00					600				
2	0	23	24	24	40	40	50	50	90	90
 11	5	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	2/U x 140 x 137	2/6 x 150 x 148	296 x 160 x 156	3/U x 215 x189	3/U x 215 x 189	395 x 250 x 209	895 x 250 x 209	660 x 435 x 254	660 x 435 x 254
216 x 158 X 106	216 x 1/4.5 X 100	100 X 190 X 127	112 X 239 X 137	120 X 200 X 145	144 X 202 X 180.5	144 X 202 X 180.5	103 X 300 X 195	103 X 300 X 195		
160 x 28	32 x 145	190 x 317 x 163	230 x 396 x 190	230 x 270 x 130	270 x 496 x 20	9				
320 x 28	32 x 140	410 x 347 x 154	440 x 436 x 170	5	520 x 536 x 20	9	600 x 6 <sup>-</sup>	l6 x 230	—	_
 Possible (excluding Encl	osed Magnetic Starters)	_	_	_	_	_		_	_	_
UN-AX	2/AX11	UN-A	AX80			UN-AX150				_
UN-	AX4							_	UN-A	X600
UN-I	_L22		_	_			_	_		
	-							_		
			_					_		
	_					_				
 UN-S	SY31	_	_	_	_	_	_	_	_	_
 UN-S	SY32		_		_		_	_	_	
 UN-CZ500 +	- UN-CZ501	UN-CZ800+	UN-CZ1250+	UN-CZ1500+	UN-CZ2200 -	+ UN-CZ2201	UN-CZ3000 -	- UN-CZ3001	_	_
	7504	UN-CZ801	UN-CZ1251	UN-CZ1501		72204		73004		
	500 x 2	UN-C7800 x 2	UN-C71250 x 2	UN-C71500 x 2	UN-C72	2204 2200 x 2	UN-C7	20004 3000 x 2		
UN-C	Z502	UN-CZ802	UN-CZ1252	UN-CZ1502	UN-C	Z2202	UN-C	Z3002	_	
UT-CW800 +	- UT-CW655	_	_	_	-	-	_	_	_	_
 UT-C	W800	—	_	—	-	—	_	-	-	
UN-N	/IL21	UN-N	/L80	UN-ML150		UN-M	1L220		_	

 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 provide contact arrangements. 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

Frame					T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100	N125	N150	N180	N220	N300	N400	N600	N800
		Category AC	Jory AC-3 22		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
```	$\setminus$	Rated Capacity	y [kW]	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 Standard			1a	1a1b	1a1b	<b>←</b> 2a	2b <b>→</b>	_	•						2a2b						<b>&gt;</b>		
Model Name (Note 6)				14	2a	2a	- 24									LULD							
Chandard Coopilitations INC			ai	(Note 8)	(Note 8)	-	_	_	-	-	-	-	-	-	-	-	-	-	-	_	_		
	eq	Standard Specifications	MS-L		0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	_	-
	clos	2 Element (2E) Thormal			0	0	_	0	_	_	0	0	0	0	0	-	-	-		-	-	_	_
	Ш	Open Time Quick Metion Time			0		-	0	_		0	0	0	0	0	0	0	0	0	0	0	_	
		Open nine Quick Motion type	MSO		-	-	-	-	-		-	-	0	0	0	0	0	0	0	0	0	_	
		Standard Specifications				0	0	0		_	0	0	0	0	0	0	0	_	0	0	0	_	<u> </u>
			MSO	-□KP	0	0	0	0	0	_	0	0	0	0	0	0	0	0	0	0	0	_	_
		Thermal			_	0	0	0	_	_	0	0	0	0	0	0	0	_	0	0	0	_	_
		With Schurchis	MSO	- SR	0	0	0	0	0	_	0	0	0	0	0	0	0	0	0	0	0	_	_
		Reactor	MSOD-⊡SR		_	0	0	0	_	_	0	0	0	0	0	0	0	_	0	0	0	_	_
		With 3-Element	MSO-	□KPSR	_	_	_	0	0	_	0	0	0	0	0	0	0	0	0	0	0	_	_
Magnetic Starters	Open Type	(2E) Thermal Saturable Reactor	Thermal rable Reactor MSOD		_	_	_	0	_	_	0	0	0	0	0	0	0	_	0	0	0	_	_
		2-Element			_	_	_	0	0	_	0	0	0	0	0	_	_	_	-	_	_	_	_
		Quick-acting Characteristics Thermal	MSOL	D-□FS	_	_	_	0	_	_	0	0	0	0	0	_	_	_	-	_	_	_	_
		3-Element (2E)	MSO-	∃FSKP	0	0	0	0	0	_	0	0	0	0	0	_	_	_	Ι	_	_	_	_
		Quick-acting Characteristics Thermal	al MSOD-DFSKF		_	0	0	0	_	_	0	0	0	0	0	_	_	_	-	_	_	_	_
		Open Time Quick Motion Type	MSO-□QM		_	_	_	_	_	_	_	-	0	0	0	0	0	0	0	0	0	_	_
		Surge	MSO-	-□SA	0	0	0	0	0	_	0	0	_	_	-	_	_	_	-	_	_	_	-
		Absorber Mounted Type	MSO	D-⊡SA	_	0	0	0	_	_	0	0	_	-	-	_	_	_	-	_	_	_	-
		Wiring MSC		-□BC	0	0	O	O	0	_	0	0	_	_	_	_	_	—	_	_	_	_	-
		Terminal	MSO	D-□BC	_	0	0	0	_	_	0	0	_	_	_	_	_	—	-	_	-	_	-
		Anticorrosion	MSO-	- UYS	0	0	0	0	0	_	0	0	0	0	0	0	0	0	0	0	0	-	—
		Treatment	MSO	D-⊟YS	_	0	0	0	-	_	0	0	0	0	0	0	0	—	0	0	0	-	-
		Delay Open Type	MSO-	-DL	_	0	-	0	—	_	0	0	0	0	0	-	0	—	0	0	0	—	-
		Mechanically	MSO	□	_	_	_	0	_	_	0	0	0	0	0	0	0	_	0	0	0	_	_
		Latched lype	MSO	_D-□	_	_	-	0	_	_	0	0	0	0	0	0	0	—	0	0	0	_	
		With Terminal	MSO-		_	_	-	_	_	_	-	-	0	(Note 7)	_	-	_	_	-	_	_	_	
					-	-	-	-	-	-	-	-	0			-	-	-	-		-	-	-
		Standard Specifications	SD-	1		0	0	0		0	0	0	0	0	0	0	0	_	0	0	0	0	0
		Surge	S-⊡SA	A(Note3)	0	0	0	0	0	0	0	0				_		_			_	-	_
		Absorber Mounted Type	SD-□	ISA	_	0	0	0	_	0	0	0	_	_	_	_	_	_	-	_	_	_	_
s		Anticorrosion Treatment	S-□YS		_	_	_	_	_	_	0	0	0	0	0	0	0	0	0	0	0	0	0
Ictor	_	Open Time Quick Motion Type	S-□QM		_	_	_	_	_	_	_	_	0	0	0	0	0	0	0	0	0	_	_
Magnetic Conta	Type	Wiring	S-⊡B	C	O	0	O	0	O	O	O	O	—	_	_	_	_	—	Ι	_	_	_	_
	Jen J	Terminal	SD-□	BC	-	0	O	0	-	0	0	O	-	-	_	-	—	-	-	—	-	—	-
	ð	With Spring Clamp	S-⊡S	Q	_	0	0	_	_	_	-	-	_	_	_	_	_	_	_	_	_	_	
		Terminals	SD-C	ISQ	-	0	0	-	_	-	-	-	-	-	_	-	_	—	-	_	-	_	_
		With Terminal Cover			-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	-
		Delay Open Type	S-D-L		-	-	_	-	-	-	-	-	0	0	-	-	-	_	-	-	-	_	_
		Moobaricelly			_		_		_	_	0	0	0	0	Ô	0		_			0	0	0
		Latched Type	SLD-		_	_	_	Q	_	_	0	Q	Q	Ø	Ø	0	Ø	_	0	0	0	0	0
_																							<u> </u>

2

#### Reversible Type

$\setminus$		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
T		Category AC-3 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
/	<b>\</b>	Bated Capacity [k\M]		440V	4	5.5	75	11	15	15	18.5	22	30	45	55	60	75	90	132	160	220	330	440
	$\vdash$	Auxiliary Contact (Note 4 to Note 6) Special			(1a × 2)	(1a1b	× 2) +		10	10	10.0						10 00				220	1a4b 0	
					+ 2b	2	b	•			2	a2b ×	2				•	`	a3b × 1	2		4a4b	0×2
Mod	lel				(16 × 2) + 2b	(2a × 2	:2)+ b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	dType	Standard Specifications	MS-□		_	_	_	0	_	_	0	0	0	0	0	0	0	0	0	0	0	_	_
	Enclose	3-Element (2E) Thermal	MS-□	KP	-	_	_	0	_	_	0	0	0	0	0	0	0	0	0	0	0		_
		Standard	MSO-□		0	0	0	0	0	—	0	0	0	0	O	0	0	0	0	0	0	—	—
		Specifications	MSOD-		-	0	0	0	—	—	0	0	0	0	0	0	0	—	0	0	0	_	—
		3-Element (2E)	MSO-□KP		0	0	0	0	0	_	0	0	0	0	0	0	0	0	0	0	0		_
		Thermal	MSOD-□KP		—	0	0	0	—	_	0	0	0	0	0	0	0	—	0	0	0		_
		With Saturable	MSO-I	MSO-□SR		0	0	0	0	_	0	0	0	0	0	0	0	0	0	0	0		_
Magnetic Starters		Reactor	MSOD	-□SR	—	0	0	0	—	_	0	0	0	0	0	0	0	—	0	0	0		—
		With 3-Element (2E) Thermal Saturable Reactor	MSO-I			—	—	0	0	_	0	0	0	0	0	0	0	0	0	0	0		
			MSOD-		-	—	—	0	-	-	0	0	0	0	0	0	0	—	0	0	0		
		2-Element Quick-acting	MSO-		-	_	_	0	0	_	0	0	0	0	0	_	_	_	_	-	_		_
	ype	characteristics mential	MSOD		-	-	-	0	-	-	0	0	0	0	0	_	—	—	_	-	—	_	—
	en T	3-Element (2E) Quick-acting Characteristics Thermal	MSO-		0	0	0	0	0		0	0	0	0	0	_	_	_	_	_	_		
	ð	Surge Absorber Mounted Type	MSO-		-	0	0	0	-	_	0	0	0	0	0	_	_	_	_	_	_	_	
			MSOD			0	0	0			0	0			_					_			
		Wiring Streamlining Terminal	MSO-		0	0	0	0	0	_	0	0	_	_	_	_	_	_	_	_	_	_	_
			MSOD		_	0	0	0		_	0	0	_	_	_	_	_	_	_	_	_		
		With Terminal MSC			_	_	_	_	_	_	_	_	0	(Note 7)	_	_	_	_	_	_	_	_	_
		Cover	MSOD	-□CW	_	_	_	_	_	_	_	_	0	(Note 7)	_	_	_	_	_	_	_		_
		Anticorrosion	MSO-I	⊐YS	0	0	0	0	0	_	0	0	0	0	0	0	0	0	0	0	0	_	_
		Treatment	MSOD	-□YS	_	0	0	0	_	_	0	0	0	0	0	0	0	_	0	0	0	_	_
		Mechanically	MSOL	-□	—	_	_	0	_	—	0	0	0	0	0	0	0	_	0	0	0		_
		Latched Type	MSOL	D-🗆	—	—	—	0	—	—	0	0	0	0	0	0	0	—	0	0	0		—
		Standard	S-□		0	O	0	O	O	0	O	O	O	O	$\bigcirc$	O	0	O	O	0	0	0	0
		Specifications	SD-□		_	0	0	0	—	0	0	0	0	0	0	0	0	—	0	0	0	0	0
		Surge Absorber	S-⊡SA	(Note 3)	0	0	0	0	0	0	0	0	_	_	_	_	_	_	_	_	_		_
		Mounted Type	SD-⊡	SA	-	0	0	0	-	0	0	0	-	-	-	-	-	-	_	-	-		_
		Anticorrosion Treatment	S-⊡YS	3	—	—	—	—	—	—	0	0	0	0	0	0	0	0	0	0	0		0
		Streamlining	S-DB0	2	0	0	0	0	0	0	0	0	_	_	-	_	_	_	_	-	_		
		Terminal	SD-⊔I	30	-	0	0	0	-	0	0	0	-	-	_	-	-	-	-	-	-		_
ctors		With Terminal			-	_	_	_	_	_	_	_	0	0	_	_	_	_	_	-	_	_	-
ontac	ype			JW	_	_	_	-	_	_	-	-	0	0	_	-	-	_	-	-	-	_	-
Magnetic Co	en T	Mechanically			-	_	_	0	_	_	0	0	0	0	0	0	0	_	0	0	0		0
	ð	Class 2 Heat Resistance			_	_	_	0	_	_	0	0	0	0	0	0	0	_	0	0	0		0
		With Reversing Connecting	S-□1	<u>י</u> ר	-	-	-	0	-	-	0	0	-	0	0	_	0	-	0	-	0	-	-
		Conductor (Both Power and Load Sides)		SD	_	0	0	0	_	0	0	0	0	0	0	0	0	_	0	0	0	0	0
		With Power Side	S-⊡S0	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	õ	0	0	Õ
		3-Pole In-Phase Crossover Conductor	SD-DS	SG	_	0	0	0	_	0	0	0	0	0	0	0	0	_	0	0	0	0	0
		With Load Side	S-□S	<	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3-Pole In-Phase Crossover Conductor	SD-DS	SX	_	0	0	0	_	0	0	0	0	0	0	0	0	_	0	0	0	0	0
		With Load Side 3-Pole	S-DSF	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Reverse-Phase Switching Crossover Conductor	SD-DS	SF	_	0	0	0	_	0	0	0	0	0	0	0	0	—	0	0	0	0	0

Note 1. © : Permanently in stock, depending on operation coil voltage and heater designation. — : 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.





### Open Type Magnetic Starters



### 2.3.2 S-T Magnetic Contactors


### 2.3.3 TH-T Thermal Overload Relays



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



### 2.3.5 UT Optional Units



# Selection and Application



### 2.3.7 S-N Magnetic Contactors



### 2.3.8 TH-N Thermal Overload Relays



<For Magnetic Starters> N120TA, N220RH, N400RH

<For Independent Mounting>

N120TAHZ, N220HZ, N400HZ, N600

### 2.3.9 SR-K Contactor Relays



### 2.3.10 UN / UA / UQ Optional Units



### 2.4 Explanations of Terms

Item		Application	Terminology Meaning	Typical Model Name/Display $(\Box \text{ is replaced with a number})$
1. Dovico	(1)	Magnetic Starters (Magnetic Switches)	A set containing a magnetic contactor and thermal overload relay.	Enclosed: MS Open Type: MSO(D), MSOL(D)
Device	(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) (5)	Mechanically	A magnetic contactor with a solenoid activated by DC current. A magnetic contactor that can close the contact (ON) either electrically (closing coil) or mechanically	
		Latched Magnetic Contactors	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.	тн
2.	(1)	Rated Insulation Voltage	The guaranteed withstanding voltage and the voltage that determines the isolation distance.	□ V (Both AC/DC)
Rating	(2)	Rated Operational Voltage	The voltage that determines applications relating to making capacity, breaking capacity, switching frequency and switching durability.	
	(3)	Rated Capacity	The maximum applicable load capacity at the rated operational voltage.	
	(4)	Conventional Free	The current that can flow for 8 hours without causing a temperature rise	$\frac{AC-3 \square A, AC-4 \square A, DC1 \square A}{C}$
	(0)	Air Thermal Current (Ith)	exceeding the defined value when the magnetic contactor is not being switched. An expression defined in JISC8201-1 specifying the rated continuity current.	lth=⊡A
	(6)	Operation Coil	Magnetizes the solenoid for attractive force, or demagnetizes it for magnetic contactor switching operation.	
	•	Coil Designation	Shows the typical value of the rated operating current to be specified by symbol when ordering.	
3. Performance	(1)	Making Capacity	The rated operational voltage (norminal voltage) range and irequency (for AC) of the operation coll The current value that can flow when making (ON) under conditions defined hus the steadarde (steade 50 times for UEA).	
	(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 JIS)	
	(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 maximum possible number of times that the magnetic contactor can be switched and used without degraded operation under conditions defined by the standards.	□ 10,000 Times
	•	Mechanical Durability	The durability due to mechanical wear if switched under conditions defined by the standards, without any current applied to the main circuit.	🗆 10,000 Times
	•	Electrical Durability	The durability due to electrical wear if switched under conditions defined by 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 magnetic contactor operation coil. (input voltage and tripping voltage for mechanically latched types)	L 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 magnetic contactor 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 Coll	[[As per 2.(6)] The memory approximation (input VA) immediately after the operation coil is evolted angular input or below for DC operated types	
	•	Inrush Input Regular Input	I ne momentary capacity (input va) immediately after the operation coll is excited, regular input or below for DC operated types.	$AC: \Box VA, DC: \Box W (= \Box VA)$
	(1)	Inching (Inching Operation)	The conceptuative (consumed electricity) when the operation coins excited and in the closed-contact state Inching, also known as logging, is a frequent switching of starting current for minor motor rotations.	<u>AC: [] VA, DC: [] W (= [] VA)</u>
5. Operations/	(2)	Plugging (Reverse Phase Braking)	Sudden reversal of the contact connections result in stoppage of the motor.	
Actions/Others	(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 magnetic contactor 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 themal 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 + onen-phase - prose-	TH- □ KP, ET-N □ FT-N □

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### 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		Rated Capacity [kW]											
			Standard	Sequence			Inchin	g Duty	Thro	Dhooo Doo	iotivo	Insulation	
	Thre	e-Phase Squ	uirrel-cage N	1otor	Single-Phase Motor	Application Capacity	Three-Phase Squ	uirrel-cage Motor		-Filase nes		Voltage	
_ \		(Catego	ry AC-3)		(Catego	ry AC-3)	(Catego	ry AC-4)	LUac	IV1			
Frame	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	1.1	
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		
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	690	
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		
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	690	
N400	125[110]	220[200]	225[200]	250	-	_	75	150	155	310	380	(1000)	
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				Motor Load				F	Resistive Loa	d	Conventional Free Air
	Category	AC-3 Rated	Operating C	urrent [A]	Category AC-	4 Rated Operat	ing Current [A]	Category AC-	1 Rated Operat	ing Current [A]	Thermal Current (Note 2)
Frame	220 to 240V	380 to 440V	500V	690V	220 to 240V	380 to 440V	500V	220 to 240V	400 to 440V	500 to 550V	Ith [A]
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	10081008	10081008	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	Category DC2, DC Current (DC M	4 Rated Operating lotor Load) [A]	Category DC1 F Current (Resis	Rated Operating stive Load) [A]	ng 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 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	Note 1. Electrica Note 2. The app follows:	al durability of 500 licable switching	0,000 operations. frequency is as	
N150	24 48 110 220	150 100 80 60	150 130 120 80	150 120 100 100	150 150 150 150	T10 to T50 to hour <dc1 cl<="" td=""><td>T35: 1800 times/ T100, N125 to N ass&gt;</td><td>hour 800: 1200 times/</td></dc1>	T35: 1800 times/ T100, N125 to N ass>	hour 800: 1200 times/	
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)	T10 to T100 a Note 3. Connec 3-pole s below.	180: 1200 times/ nd N125 to N800 t for use in 2-pole series as per the o	hour 1: 600 times/hour 2 series or diagram	
N300	24 48 110 220	300 200 150 90	300 280 200 150	300 240 200 200	300 300 300 300	Note 4. The rate when co reliability	ed operating curre onnected in series y of the contacts	ent increases s but the decreases.	
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(800) 630(800) 630(800) 630(800)	2-Pole Seri	 ies 3-F	Pole Series	

6P(ms)

Ee

		Makina	Canad	the Toot	Break	king Cap	bacity		Elec	trical D	urability	Test			
Standards	Category	waking	Capac	ity lest	Test			Making			E	Breaking	ļ	Typical Application Example	
		Current	Voltage	*1	Current	Voltage	*1	Current	Voltage	*1	Current	Voltage	*1		
	DC1	1.1le	1.1Ee	1(ms)	1.1le	1.1Ee	1(ms)	le	Ee	1(ms)	le	Ee	1(ms)	Resistive Load	
JEM -1038	DC2	4le	1.1Ee	2.5(ms)	4le	1.1Ee	2.5(ms)	2.5le	Ee	2(ms)	le	0.1Ee	7.5(ms)	DC Shunt Motor Starting/Stopping	
-1000	DC4	4le	1.1Ee	15(ms)	4le	1.1Ee	15(ms)	2.5le	Ee	7.5(ms)	le	0.3Ee	10(ms)	DC Series-Wound Motor Starting/Stopping	
JIS															

### Standards for DC Rating

Note 1. le: Rated Operating Current, Ee: Rated Operational Voltage.

6P(ms)

1.1le

1.1Ee

Note 2. \*1 For JEM-1038: Time constant,

1.1le

C8201 DC-13

-5-1

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 le).

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.)

Ee 6P(ms)

#### Auxiliary Contact Arrangements and Ratings 2.6

1.1Ee 6P(ms)

### No. of Installed Auxiliary Contacts and Contact Arrangement

#### All Auxiliary Contacts Are Twin Contacts

		Non-	-Reversib	le Magnet	tic Contac	ctors		Reversible Magnetic Contactor (Note 4)							
Frame Model	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	1a×2+2b (Note 3)	1a1b×2+2b (Note 3)	2a2b × 2	2a2b × 2	2a2b × 2	3a3b × 2	4a4b × 2	
Special	1b	2a (Note 8)	_	2a (Note 8)	_	_	_	1b×2+2b (Note 3)	2a×2+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)

							Rated	Operati	ng Cur	rent (A)							Conventional
Frame	Catego	ory AC-18	5 (AC Co	il Load)	Category DC-13 (DC Coil Load)			Category AC-12 (AC Resistive Load)			Category DC-12 (DC Resistive Load)				Free Air Thermal		
	AC120V	AC240V	AC440V	AC500V	DC24V	DC48V	DC110V	DC220V	AC120V	AC240V	AC440V	AC500V	DC24V	DC48V	DC110V	DC220V	Current Ith [A]
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.

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DC Inductive Load

(DC Coil Load Control)

#### **Contact Reliability of Main Contacts and Auxiliary Contacts** 2.7

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







### Contactor Relays





- 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.





1×10 -7/times

### 2.8 Coil Types and Rating

### 2.8.1 AC Operated Type

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

Coil	Rated Voltage [V]	Coil Indication
Designation	50 Hz/60 Hz	Con mulcation
AC24V	24	
AC48V	48 to 50	
AC100V	100 to 127	
AC200V	200 to 240	Frequency
AC300V	260 to 300	Frequency
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-N38/N48, SR-K100 Types

Coil	Rated Vo	Coil Indication	
Designation	50Hz	60Hz	
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	Frequency
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	]

### For S-N38SA/N48SA Types

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

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

Coil	Rated Voltage [V]	Coil
Designation	50Hz/60Hz	Indication
AC24V(Note1)	24	
AC48V(Note1)	48 to 50	
AC100V	100 to 127	Rated
AC200V	200 to 240	Voltage/
AC300V	260 to 350	Frequency
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-T10SA to T50SA, B-T21SA, SR-T5SA/T9SA Types

Coil	Rated Voltage [V]	Coil	Varistor
AC24V	24	Indication	120
AC48V	48 to 50	Pated	120
AC100V	100 to 127		470
AC200V	200 to 240		470
AC300V	260 to 300	Frequency	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.

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  $\rightarrow$  Coil designation AC200V
- 380 V 50 Hz  $\rightarrow$  Coil designation AC400V
- 240 V 50 Hz  $\rightarrow$  Coil designation AC230V
- 220 V 50 Hz  $\rightarrow$  Coil designation AC230V
- 415 V 50 Hz  $\rightarrow$  Coil designation AC400V
- 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  $\rightarrow$  Coil designation AC200V
  - 240 V 50 Hz  $\rightarrow$  Coil designation AC230V
  - 220 V 50 Hz  $\rightarrow$  Coil designation AC230V
- Note 3. Models other than those on the left are not manufactured.

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

Rated Voltage [V]	Coil
50Hz/60Hz	Indication
100 to 127	Rated Voltage/
200 to 240	Frequency
	Rated Voltage [V]           50Hz/60Hz           100 to 127           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 $\square$  :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	
DC24V	DC24 V	
DC48V	DC48 V	
DC100V	DC100 V	Rated Valtage
DC110V	DC110 V	naleu vollage
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	
DC24V	DC24 V	
DC48V	DC48 V	
DC100V	DC100 V	Roted Voltage
DC110V	DC110 V	haleu vollage
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-N600/N800 Types

Coil Designation	Rated Voltage	Coil Indication
DC24V	DC24 V	
DC48V	DC48 V	
DC100V	DC100 to 110 V	Rated Voltage
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 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 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 244SHD-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			For DC	
Coil Designation	Rated Voltage (V) 50/60 Hz	Coil Indication	Coil Designation	Rated Voltage	Coil Indication
AC100V	100 to 127		DC12V (Note 2)	DC12 V	
AC200V	200 to 240	Rated	DC24V	DC24 V	
AC300V	260 to 350	Voltage/	DC48V	DC48 V	Rated
AC400V	380 to 440	Frequency	DC100V	DC100V to 110 V	Voltage
AC500V	460 to 550		DC125V	DC120V to 125 V	
			DC200V	DC200V to 220 V	

 DC100V
 DC100V to 110 V
 Votage
 Note 3. DC coils have no polarity.

 DC125V
 DC200V to 220 V
 DC200V to 220 V
 Note 3. DC coils have no polarity.

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

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

Coil Designation	Rated Voltage	Coil Indication	Varistor Voltage
DC12V	DC12 V		47
DC24V	DC24 V		47
DC48V	DC48 V		120
DC100V	DC100 V	Rated	470
DC110V	DC110 V	Voltage	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.

### 2.9 **Properties**

### AC Operated Type

Madal Nama	Input	t [VA]	Power	Operating	Voltage [V]	Coil Current	Operating	Time [ms]	Operating Transformer
Model Name	Inrush	Regular	Consumption [W]	Close	Open	[mA]	Coil ON→Main Contact ON	Coil OFF → Main Contact OFF	Capacity [VA]
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  $\approx$  (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 reg	arding model names for coils	other than S-T/N $\Box$ .	
SR-TD: Page 164	B-T/N□: Page 250	DU-N : Page 254	SH-V□: Page 260

### DC Operated Type

	Coil Properties			Operating Voltage [V]		Operating Time [ms]	
Model Name	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	ng model names for coils othe	er than SD-T/N∐.
SRD-T□: Page 166         SD           DUD-N□: Page 254         SH	D-Q□: Page 244 ID-V□: Page 260	BD-T/N□: Page 250

- 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  $\approx$  (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.

		Inrush Ir	nput [VA]		Op	perating	Voltage	[V]	Operating Time [ms]				
Frame	AC Op	erated	DC Op	erated	AC Op	erated	DC Op	erated	AC Op	erated	DC Op	erated	
	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	

### Mechanically Latched Type

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 $\Box$ . SRL(D)-T $\Box$  : Page 168 SHL(D)-V $\Box$  : 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.

Catagony	Making / Ca	apacity Test	Breaking C	apacity Test	
Calegory	JIS,	IEC	JIS,	IEC	Typical Application Example
JIS, IEC	Current	Power Factor	Current	Power Factor	
AC-1	1.5le	0.8	1.5le	0.8	Non-Inductive Or Low-Inductance Loads, Resistive Heaters
AC-2	4le	0.65	4le	0.65	Wound Motor Starting, Running, Stopping
AC-3	10le	(Note 3)	8le	(Note 3)	Cage Induction Motor Starting, Running, Stopping
AC-4	12le	(Note 3)	10le	(Note 3)	Cage Induction Motor Starting, Inching, Plugging
AC-5a	3le	0.45	3le	0.45	Switching Discharge Lamp Control Equipment
AC-5b	1.5le	(Note 4)	1.5le	(Note 4)	Switching Incandescent Lamps
AC-6a	(Not	te 5)	(No	te 5)	Switching Transformers
AC-6b	(Not	te 6)	(No	te 6)	Switching Capacitor Banks
A Q Q -	Cl-	(NI=+= 0)	Cl	(Nists O)	Control of Closed-Type Refrigerant Compressor Motors
AC-8a	ые	(Note 3)	ые	(Note 3)	with Manual Return Overload Tripping Devices
AC Ph	6lo	(Niete 2)	<u> </u>	(Niete 2)	Control of Closed-Type Refrigerant Compressor Motors
AC-0D	ole	(NOLE 3)	ble	(Note 3)	with Automatic Return Overload Tripping Devices

Note 1. le: Rated operating current. Note 2. Tested at a voltage 1.05 times greater than rated voltage.

Note 3. le  $\leq$  100 A: 0.45, le > 100 A: 0.35. Note 4. Carried out with an incandescent load.

Note 5. Class AC-6a le is 0.45 times that of class AC-3 le when switching a transformer with a peak inrush current less than 30 times greater than the rated current.

Note 6. Class AC-6b le 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.

Class AC-6b le = ik 
$$\frac{X^2}{(X-1)^2}$$
 Here, x = 13.3  $\frac{\text{Class AC-3 le}}{\text{ik}}$   
ik>205×Class AC-3 le

46 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

	Rated	Rated	Making an	d Breaking	AC Ope	erated Type	s (S-□)	DC Ope	rated Types	; (SD-□)	Mechanically	Latched Type	es (SL(D)-□)
Frame	Operational	Operational	Capac	ities [A]	Switching	Switching Dura	ability [x 10000]	Switching	Switching Dura	ability [x 10000]	Switching Frequency	Switching Dura	ability [x 10000]
Traine	Voltage [V]	Current [A]	Making	Breaking	Frequency [Times/Hour] category AC-3	Mechanical	Electrical (category AC-3)	Frequency [Times/Hour] category AC-3	Mechanical	Electrical (category AC-3)	[Times/Hour] category AC-3	Mechanical	Electrical (category AC-3)
T10	220	11	110	88	1800	1000	200	_	_	_	_	_	_
	220	12	120	10/									
T12	440	9	120	96	1800	1000	200	1800	1000	200	-	—	-
T20	220	18	180	144	1800	1000	200	1800	1000	200	_	_	_
	440	18	180	200			100			100			
T21	440	20	230	184	1800	1000	200	1800	1000	200	1200	50	50
T25	220	26	300	240	1800	1000	200	_	_	_	_	_	_
	440	25	300	240	1000	1000	200						
T32	220	32	320	256	1800	1000	200	1800	1000	200	_	_	_
	220	35	400	320									
T35	440	32	400	320	1800	1000	200	1800	1000	200	1200	50	50
TE0	220	50	550	440	1200	1000	200	1200	1000	200	1200	05	25
150	440	48	500	400	1200	1000	200	1200	1000	200	1200	25	20
T65	220	65	650	520	1200	500	200	1200	500	200	1200	25	25
	440	65	650	520	.200			.200		200			
T80	220	80	850	680	1200	500	100	1200	500	100	1200	25	25
	220	100	1050	840									
T100	440	93	1050	840	1200	500	100	1200	500	100	1200	25	25
N105	220	125	1250	1000	1200	500	100	1200	500	100	1200	05	25
N125	440	120	1200	960	1200	500	100	1200	500	100	1200	25	20
N150	220	150	1500	1200	1200	500	100	1200	500	100	1200	25	25
	440	150	1500	1200	.200			.200					
N180	<u> </u>	180	1800	1440	1200	500	100	—	_	—	—	_	_
	220	220	2500	2000	1000	500	100	1000	500	100	1000	05	05
N220	440	220	2500	2000	1200	500	100	1200	500	100	1200	25	25
N300	220	300	3000	2400	1200	500	100	1200	500	100	1200	25	25
1000	440	300	3000	2400	1200	000	100	1200	000	100	1200	20	20
N400	220	400	4000	3200	1200	500	50	1200	500	50	1200	25	25
	220	630	6300	5040									
N600	440	630	6300	5040	1200	500	50	1200	500	50	1200	10	10
N900	220	800	8000	6400	1200	500	50	1000	500	50	1000	10	10
0000	440	800	8000	6400	1200	500	50	1200	500	50	1200	10	



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

### 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.



Note 1. The heater designation is a symbol to be specified when ordering.

Note 4. () of the motor capacity indicates a special capacity.

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-□).

#### 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		1	00 to 110V					2	00 to 240V			
Capacity [kW]	Heater Designation [A] (Adjustment Range of Settling Current)		Magn	etic Starter	Frame		Heater Designation [A] (Adjustment Range of Settling Current)		Magn	etic Starter	Frame	
0.035	1.7 (1.4 to 2)						0.9 (0.7 to 1.1)					1
0.065	2.5 (2 to 3)						1.3 (1 to 1.6)					
0.1	3.6 (2.8 to 4.4)						1.7 (1.4 to 2)					
0.15	5 (4 to 6)	6	12	5			2.5 (2 to 3)			5		
0.2	5 (4 to 6)	<b>⊢</b>	<del>`</del>	1 12	55	35	2.5 (2 to 3)	2	2	1 12	55	35
0.25	6.6 (5.2 to 8)			50,	F F	P P	3.6 (2.8 to 4.4)	] <del>(</del>	<del>`</del>	50,	P	1 P
0.3	6.6 (5.2 to 8)			F F			3.6 (2.8 to 4.4)			P P		
0.4	9 (7 to 11)		1				5 (4 to 6)					
0.55	11 (9 to 13)						5 (4 to 6)					
0.75	15 (12 to 18)						6.6 (5.2 to 8)					

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.



### 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.

6lm

2lm

Direct

Star/Delta



☆ 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.

lm

Im/ √3

lm

Im

Contactors)

Contact Voltage

Em/ √3

Em

Compari	son of Dire	ct and Star	/Delta Start	ing				
Starting	St	Running (D	elta Magnetic					
Method	Starting Current Torque Contact Current Contact Voltage Full-Load Curren							

6lm

2lm

Em/ √3

Em/ √3

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

1.5T

0.5T



(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)



### Star/Delta Starter Model Selection

Applicable S Squirr	Standard Thre rel-cage Mote	ee-Phase ors	Magnetic Contactors	Star Magnetic Contactors (MCS) Note 5	Thermal Overloa	ad Relays (THR) Note 8
Rated Voltage [V]	Rated Capacity [kW]	Rated Current [A]	for Main and Delta (MCM, MCD)	Short Circuit Type: Star short circuit (Figs. 1, 2) [Delta short circuit (applicable to Fig. 1)]	Model Name	Heater Designation
	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
AC200 to 220 V	37	152	S-T100	S-T65 [S-T35]	TH-N120TAHZ	125A
A0200 10 220 V	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
	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
AC400 to 440 V	45	90	S-T65	S-T35 [S-T20]	TH-N120	82A
AC400 10 440 V	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  $6/\sqrt{3}$  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 /  $\sqrt{3}$  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	Cotogony	Making and Brea	aking Capacities	Electrical	Durability
Applications	Standard	Calegory	Making	Breaking	Making	Breaking
Switching AC	JIS	AC-1	1.5 le, 1.05 Ee, <sup>COS Ø</sup>	1.5 le, 1.05 Ee, <sup>COS Ø</sup>	le, Ee, Cos ø 0.95	le, Ee, cos ø 0.95
Resistive Ľoads	JEM	AC1	1.5 le, 1.1 Ee,      0.95	1.5 le, 1.1 Ee, cos ø 0.95	le, Ee, Cos ø 0.95	le, Ee, cos ø 0.95
Switching DC	JIS	DC-1	1.5 le, 1.05 Ee, L/R 1(ms)	1.5 le, 1.05 Ee, L/R 1(ms)	le, Ee, L/R 1(ms)	le, Ee, L/R 1(ms)
Resistive Loads	JEM	DC1	1.1 le, 1.1 Ee, L/R 1(ms)	1.1 le, 1.1 Ee, L/R 1(ms)	le, Ee, L/R 1(ms)	le, Ee, L/R 1(ms)

Note 1. le: rated operating current, Ee: rated voltage, cosq: 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.

Application	Categ	ory AC-1	Rated	Cate	gory AC-	1 Rated	Capacity	/ [kW]	Category AC-1 Rated	Cillated Category DC-1 Rated Operating Current			
	Ope	[A]	unent	I TI	hree-Pha	se	Single	-Phase	(3-Pole Parallel) [A]	3-Pole	Series (2	-Pole Se	ries) [A]
Frame	100 to 240 V	400 to 440 V	500 to 550 V	200 to 240 V	400 to 440 V	500 to 550 V	100 to 110 V	200 to 240 V	100 to 240 V	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.

Terminal Plate



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. 51

### 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	Three-Phase	, With 6% or N	lore Series Rea	ctor (Note 1)	Three-Phas	e, Without Se	eries 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	
Frame	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.



### 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

| Model Name<br>SR-T,<br>SRD-T<br>: Contactor<br>Relays<br>S-T/N,<br>SD-T/N                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Contact<br>RY1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | t Output                                                                                                             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S-T35/T50         AC100 V           S-T65/T80         0.05 mil.           S-T100         0.05 mil.           S-T100         0.05 mil.           S-N125, N150         0.03 mil.           S-N300/N400         ×           SD-QC,, QR         DC24V           SD-T12/T20         0.03 mil.           SD-N220         ×           SD-N220         ×           SD-N00/N800         ×           SD-N00/N800         ×           SD-N220         ×           SD-N00/N800         ×           SD-N00/N800         ×           SL-T65/T80         AC100 V | Contractors         AC100 V         AC200 V           SR-T5, T9         O1 mil.         O15mil.           S-T10, T12, T20         O1 mil.         O1 mil.         O15mil.           S-T35/T50         AC100 V         AC200 V           S-T32         O1 mil.         O15mil.         O1 mil.         O15mil.           S-T32         AC100 V         AC200 V         O1 mil.         O15mil.           S-T35/T50         AC100 V         005mil.         O1 mil.         O15mil.           S-T65/T80         AC100 V         005mil.         O1 mil.         O15mil.           S-T10, O15mil.         O2mil.         005mil.         O1 mil.         O05mil.           S-N125, N150         DC24V         O1 mil.         005mil.         O1 mil.           SD-T02/T, QRI         DC24V         O1 mil.         003mil.         003mil.           SD-T12/T20         DC24V         O11 mil.         003mil.         003mil.           SD-T12/T20         DC24V         O11 mil.         X         X           SD-T12/T20         DC24V         O11 mil.         X         X           SD-T12/T20         DC24V         O110V         X         X           SD-T12/T20         DC24V | SR-T5, T9         AC100 V         AC200 V           S-T10, T12, T20         O1 mil.         O15mil.           S-T35/T50         AC100 V         AC200 V           S-T35/T50         O1 mil.         O15mil.           S-T35/T50         AC100 V         005mil.           S-T65/T80         005mil.         005mil.           S-T10, N150         S-N180/N220         005mil.           S-N125, N150         DC24V         O1 mil.           SD-QCI,<br>QRI         DC24V         O1 mil.           SD-T12/T20         SD-T12/T20         O03mil.           SD-T12/T20         DC24V         DC110 V           SD-T100         DC24V         DC110 V           SD-T100         SSRLT5         SD-N800/N800           SD-N800/N800         X         X           X         X         X           SD-N800/N800         X         X           SSRL-T5         AC100 V         005mil.           SD-N800/N800         X | Contactors         Actoov         Using<br>UT-SY           SR-T5, T9         01mil.         015mil.         UT-SY           S-T10, T12, T25         01mil.         015mil.         015mil.         015mil.           S-T35/T50         Accoov         01mil.         015mil.         015mil.         015mil.           S-T35/T50         Accoov         005mil.         01mil.         015mil.         015mil.           S-T35/T50         Accoov         005mil.         005mil.         005mil.         005mil.           S-T100         S-N125, N150         Accoov         001mil.         015mil.         005mil.           S-N125, N150         Accoov         001mil.         005mil.         005mil.         005mil.           S-N600/N800         x         002mil.         002mil.         002mil.         002mil.         002mil.           SD-QD, QRI         DC24V         DC110V         V         V         V         V           SD-T12/T20         DC24V         DC110V         X         X         X         X           SD-T12/T20         DC10V         X         X         X         X         X           SD-T12/T20         DC10V         X         X         X | Contactors         Using UN-S'<br>UT-SY_DC2           SR-T5, T9<br>S-T10, T12, T25<br>S-T32<br>S-T32         AC100V         AC200V         Using UN-S'<br>UT-SY_DC2           S-T10, T12, T25<br>S-T32         O1 mil.         O1 5ml.         O           S-T35/T50         AC200V         O1 mil.         O1 5ml.         O           S-T35/T50         AC200V         O1 mil.         O1 5ml.         O           S-T35/T50         AC200V         O1 mil.         O         O           S-T100         S-T65/T80         O         O         O         O           S-T100         S-N125, N150         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O | Contactors/         Contactors/         Contactors/           SR-T5, T9         AC100/V         AC200/V         Using UN-SYII/UT-SYIDC24 V           S-T10, T12, T20         01 mil.         01 smil.         0           S-T32         01 mil.         01 smil.         0           S-T35/T50         AC200V         01 mil.         0         0           S-T35/T50         AC200V         00 smil.         0         0           S-T65/T80         01 mil.         0         0         0         0           S-T100         S-T100         00 smil.         0         0         0         0           S-T100         S-T100         00 smil.         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 | Contactors /         Actoov         Actoov         Using UN-SY[]/<br>UT-SY[] DC24 v         Actoov           SR-T5, T9<br>S-T10, T12, T20<br>S-T32         01 mil.         01 mil.         01 mil.         01 mil.           S-T32         01 mil.         01 mil.         01 mil.         01 mil.         01 mil.           S-T32         01 mil.         01 mil.         01 mil.         01 mil.         01 mil.           S-T35/T50         02 mil.         01 mil.         00 mil.         00 mil.         00 mil.           S-T65/T80         02 mil.         00 mil.         00 mil.         00 mil.         00 mil.           04 mil.         00 mil.         00 mil.         00 mil.         00 mil.         00 mil.           04 mil.         00 mil.         00 mil.         00 mil.         00 mil.         00 mil.           04 mil.         00 mil.         00 mil.         00 mil.         00 mil.         00 mil.           04 mil.         00 mil.         00 mil.         00 mil.         00 mil.         00 mil.           SPD-QLI,         DC24V         O1 mil.         00 mil.         00 mil.         00 mil.           SPD-T12/T20         DC24V         DC110 V         DC24V         00 mil.         00 mil. <t< td=""><td>Contractors         Actoov         Actoov         Using UN-SYC//<br/>UT-SYCDC24 V         Actoov         Actoo</td><td>Contractors         Action V         Accov V         Using UN-SYL/<br/>UT-SYL DC24 V         Action V         Accov V         Using<br/>UT-SYL DC24 V           S-T10, T12, T20<br/>S-T32, T32         O1 mil.         01 sml.         O1 mil.         01 sml.         O1 mil.         01 sml.         O1 sml.         01 sml.         01 sml.         O1 sml.         01 sml.         O1 sml.         01 sml.         01 sml.         O1 sml.         01 sml.         00 sml.         &lt;</td><td>Source         Actory         Actory         Using UN-SY[]/<br/>UT-SY[] DC24 V         Actory         Actory Using UN-SY[]/<br/>UT-SY[] DC24 V           SFT-15, T9         0.1 mil.         0.1 mil.</td></t<> <td>S. Collad.US         AC100V         AC200V         Using UN-SY□/<br/>UT-SY□ DC24 V         AC100V         AC200V         Using UN-SY□/<br/>UT-SY□ DC24 V           SR-T5, T9         O1ml         01sml         O         O1ml         01sml         O           S-T10,T12,T20         S-T35/T50         O1ml         01sml         O         O1ml         01sml         O           S-T35/T50         AC200V         00sml         O1ml         O1sml         O         O1ml         O           S-T35/T50         AC200V         00sml         O1ml         O.5ml         O         O           S-T6780         AC200V         00sml         O         O1sml         O         O         O           S-N125,N150         AC200V         00sml         O         O         O         O         O         O           S-N126,N160         AC200V         00sml         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O</td> <td>S. Collacuosy         Actor / Accor / Using UN-SYL/<br/>UT-SYL DC24 V         Actor / UT-SYL DC24 V<td>S. Collaboration         AC100 V         AC200 V         Using UN-SYD/UT-SYDDC24 V         AC100 V         AC200 V         UT-SYDDC24 V         AC100 V         AC200 V         IT         IT<td>S. Colladulay         Actiouv         Actiouv         Actiouv         Using UN-SYCI/<br/>UT-SYCI DC24 V         Actiouv         Actiouv</td><td>S. Colladu39         Action V         Action V</td><td>S. Outable/         Junit         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>USING UN-SYL1/<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Color ML (2mL<br/>(2mL C2mL<br/>(2mL C2</td><td>S. UDBALLINZ         Value         Using UN-SYL/<br/>UT-SYL DC24 V         Value<br/>Visure         Using UN-SYL/<br/>UT-SYL DC24 V         Value<br/>Visure         Value<br/>Visure</td><td>S. UNLAUSY         Justice UN-SYC1/<br/>UT-SYC1 DC24 V         Justice UN-SYC1/<br/>UT-SYC1 DC24 V         Actory         A</td><td>Number         Number         Number&lt;</td><td>Contact         Contact         <t< td=""><td>Cumunity         Cumunity         Using UN-SYL1/<br/>UT-SYL1 DC24V         Using UN-SYL1/<br/>UT-SYL1 DC24V     &lt;</td><td>Construction         Account         Using UN-SYL7/<br/>UT-SYL DC24 V         Using UN-SYL7/<br/>UT-SYL DC24 V</td></t<></td></td></td> | Contractors         Actoov         Actoov         Using UN-SYC//<br>UT-SYCDC24 V         Actoov         Actoo | Contractors         Action V         Accov V         Using UN-SYL/<br>UT-SYL DC24 V         Action V         Accov V         Using<br>UT-SYL DC24 V           S-T10, T12, T20<br>S-T32, T32         O1 mil.         01 sml.         O1 mil.         01 sml.         O1 mil.         01 sml.         O1 sml.         01 sml.         01 sml.         O1 sml.         01 sml.         O1 sml.         01 sml.         01 sml.         O1 sml.         01 sml.         00 sml.         < | Source         Actory         Actory         Using UN-SY[]/<br>UT-SY[] DC24 V         Actory         Actory Using UN-SY[]/<br>UT-SY[] DC24 V           SFT-15, T9         0.1 mil.         0.1 mil. | S. Collad.US         AC100V         AC200V         Using UN-SY□/<br>UT-SY□ DC24 V         AC100V         AC200V         Using UN-SY□/<br>UT-SY□ DC24 V           SR-T5, T9         O1ml         01sml         O         O1ml         01sml         O           S-T10,T12,T20         S-T35/T50         O1ml         01sml         O         O1ml         01sml         O           S-T35/T50         AC200V         00sml         O1ml         O1sml         O         O1ml         O           S-T35/T50         AC200V         00sml         O1ml         O.5ml         O         O           S-T6780         AC200V         00sml         O         O1sml         O         O         O           S-N125,N150         AC200V         00sml         O         O         O         O         O         O           S-N126,N160         AC200V         00sml         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O | S. Collacuosy         Actor / Accor / Using UN-SYL/<br>UT-SYL DC24 V         Actor / UT-SYL DC24 V <td>S. Collaboration         AC100 V         AC200 V         Using UN-SYD/UT-SYDDC24 V         AC100 V         AC200 V         UT-SYDDC24 V         AC100 V         AC200 V         IT         IT<td>S. Colladulay         Actiouv         Actiouv         Actiouv         Using UN-SYCI/<br/>UT-SYCI DC24 V         Actiouv         Actiouv</td><td>S. Colladu39         Action V         Action V</td><td>S. Outable/         Junit         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>USING UN-SYL1/<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Color ML (2mL<br/>(2mL C2mL<br/>(2mL C2</td><td>S. UDBALLINZ         Value         Using UN-SYL/<br/>UT-SYL DC24 V         Value<br/>Visure         Using UN-SYL/<br/>UT-SYL DC24 V         Value<br/>Visure         Value<br/>Visure</td><td>S. UNLAUSY         Justice UN-SYC1/<br/>UT-SYC1 DC24 V         Justice UN-SYC1/<br/>UT-SYC1 DC24 V         Actory         A</td><td>Number         Number         Number&lt;</td><td>Contact         Contact         <t< td=""><td>Cumunity         Cumunity         Using UN-SYL1/<br/>UT-SYL1 DC24V         Using UN-SYL1/<br/>UT-SYL1 DC24V     &lt;</td><td>Construction         Account         Using UN-SYL7/<br/>UT-SYL DC24 V         Using UN-SYL7/<br/>UT-SYL DC24 V</td></t<></td></td> | S. Collaboration         AC100 V         AC200 V         Using UN-SYD/UT-SYDDC24 V         AC100 V         AC200 V         UT-SYDDC24 V         AC100 V         AC200 V         IT         IT <td>S. Colladulay         Actiouv         Actiouv         Actiouv         Using UN-SYCI/<br/>UT-SYCI DC24 V         Actiouv         Actiouv</td> <td>S. Colladu39         Action V         Action V</td> <td>S. Outable/         Junit         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>USING UN-SYL1/<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         ACtory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Using UN-SYL1/<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Actory<br/>UT-SYL1 DC24 V         Color ML (2mL<br/>(2mL C2mL<br/>(2mL C2</td> <td>S. UDBALLINZ         Value         Using UN-SYL/<br/>UT-SYL DC24 V         Value<br/>Visure         Using UN-SYL/<br/>UT-SYL DC24 V         Value<br/>Visure         Value<br/>Visure</td> <td>S. UNLAUSY         Justice UN-SYC1/<br/>UT-SYC1 DC24 V         Justice UN-SYC1/<br/>UT-SYC1 DC24 V         Actory         A</td> <td>Number         Number         Number&lt;</td> <td>Contact         Contact         <t< td=""><td>Cumunity         Cumunity         Using UN-SYL1/<br/>UT-SYL1 DC24V         Using UN-SYL1/<br/>UT-SYL1 DC24V     &lt;</td><td>Construction         Account         Using UN-SYL7/<br/>UT-SYL DC24 V         Using UN-SYL7/<br/>UT-SYL DC24 V</td></t<></td> | S. Colladulay         Actiouv         Actiouv         Actiouv         Using UN-SYCI/<br>UT-SYCI DC24 V         Actiouv         Actiouv | S. Colladu39         Action V         Action V | S. Outable/         Junit         Using UN-SYL1/<br>UT-SYL1 DC24 V         ACtory<br>USING UN-SYL1/<br>UT-SYL1 DC24 V         Using UN-SYL1/<br>UT-SYL1 DC24 V         ACtory<br>UT-SYL1 DC24 V         Using UN-SYL1/<br>UT-SYL1 DC24 V         ACtory<br>UT-SYL1 DC24 V         Using UN-SYL1/<br>UT-SYL1 DC24 V         Actory<br>UT-SYL1 DC24 V         Actory<br>UT-SYL1 DC24 V         Using UN-SYL1/<br>UT-SYL1 DC24 V         Actory<br>UT-SYL1 DC24 V         Using UN-SYL1/<br>UT-SYL1 DC24 V         Actory<br>UT-SYL1 DC24 V         Actory<br>UT-SYL1 DC24 V         Using UN-SYL1/<br>UT-SYL1 DC24 V         Actory<br>UT-SYL1 DC24 V         Actory<br>UT-SYL1 DC24 V         Color ML (2mL<br>(2mL C2mL<br>(2mL C2 | S. UDBALLINZ         Value         Using UN-SYL/<br>UT-SYL DC24 V         Value<br>Visure         Using UN-SYL/<br>UT-SYL DC24 V         Value<br>Visure         Value<br>Visure | S. UNLAUSY         Justice UN-SYC1/<br>UT-SYC1 DC24 V         Justice UN-SYC1/<br>UT-SYC1 DC24 V         Actory         A | Number         Number< | Contact         Contact <t< td=""><td>Cumunity         Cumunity         Using UN-SYL1/<br/>UT-SYL1 DC24V         Using UN-SYL1/<br/>UT-SYL1 DC24V     &lt;</td><td>Construction         Account         Using UN-SYL7/<br/>UT-SYL DC24 V         Using UN-SYL7/<br/>UT-SYL DC24 V</td></t<> | Cumunity         Cumunity         Using UN-SYL1/<br>UT-SYL1 DC24V         Using UN-SYL1/<br>UT-SYL1 DC24V     < | Construction         Account         Using UN-SYL7/<br>UT-SYL DC24 V         Using UN-SYL7/<br>UT-SYL DC24 V |

Note 1. o: 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.

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MELSEC	-Q Series		MELS	SEC-FX Series			CC-Link IE			CC-Link									
I/O Combir	nation Units		Ou	utput Units			0	utput Units						Outp	ut Uni	ts			
Transisto	or Output	Contact	Output	Transisto	or Output	Contac	t Output	Transisto	or Output	(	Contac	t Outpu	ıt	Triac (	Dutput	Trar	nsistor Out	tput	
QH42P QX41Y41P	QX48Y57	FX3S- FX2NE(Y) FX2NC-16I FX-16EYR- FX3G FX3G FX3G FX5U- FX5	□MR MR(-A) R-ES(S)/UL EYR-T-DS -ES-TB/UL IMR(-A) □MR IE(Y)R	FXss-⊡MT FXzu+⊡E(Y)TESSUL FX-16EYTES-TBUL FXu-⊡MT(-A) FXus-⊡MT(-A)	FXscc-32MT FXauc-IEYT-DSS FXsuc-IIMT FXsu-IIMT FXsuc-IIMT FXs-CIET FXs-CIE(Y)T	NZ2GF2 NZ2GF2	2S2-16R 2B2-16R	NZ2GFCE3-16T NZ2GFCE3-16TE NZ2GFCM1-16T NZ2GFCM1-16T NZ2GF2S1-16TE NZ2GF2S1-16TE NZ2GF2B1N1-16TE NZ2GF2B1N1-16TE NZ2GF2B1-32TE NZ2GF2B1-32TE	NZ2EX2B1-16T NZ2EX2B1-16TE NZ2EX2S1-16T NZ2EX2S1-16TE	AJ65SB AJ65DB	TB2N-⊡R TB1-32R	AJ65BT	B2-16R	AJ65SBT	B2N-□S aristor	AJ65S8TBD-DT AJ65S8TBD-DT AJ65S8TBD-16TE AJ65BTDD-16T AJ65DTBD-16T AJ65DTBD-16T AJ65DTBD-16T AJ65DTBD-26T AJ65DFTB-22TI AJ65FBTA2-16T	AJ65SBTB1-LITE AJ65VBTCE2-LIT AJ65VBTCU2-LIT AJ65SBTC1-32T AJ65BTC1-32T AJ65VBTCE3-16TE	J65FBTA2-16TE	
Using UN-S DC	YD/UT-SYD 24 V	AC1 AC2	00 V 00 V	Using UN-S DC	Y□/UT-SY□ 24 V	AC100 V	AC200 V	Using UN-S DC2	Y□/UT-SY□ 24 V	AC100 V	AC200 V	AC100 V	AC200 V	AC100 V	AC200 V	Using l	JN-SY□/L DC24 V	JT-SY□	
(	2	03	mil.	(	)	0 1 mil.	0 <b>1.5 mil</b> .	(	)	0 2 mil.	0 2 mil.	0 2 mil.	0 <b>2 mil</b> .	0	0	0	0	0	T5/9
(	2	03	mil.	(	)	0 1 mil.	0 <b>1.5 mil</b> .	(	)	0 2 mil.	0 2 mil.	0 2 mil.	0 <b>2 mil</b> .	0	0	0	0	0	T10/12/20
(	2	03	mil.	(	)	0 1 mil.	0 1.5 mil.	(	)	0 2 mil.	0 2 mil.	0 2 mil.	0 2 mil.	0	0	0	0	0	T21/25
(	<u> </u>	03	mil.	(	)	0 1.5 mil.	0 2 mil.	(	)	0 2 mil.	0 2 mil.	0 2 mil.	0 2 mil.	0	0	0	0	0	132
	<u> </u>	03	mil.	(		0 0.5 mil.	0 1 mil.	(	<u> </u>	0 2 mil.	0 2 mil.	02 mil.	0 2 mil.	0	0	0	0	0	135/50
	5	03	mil.		) 	0 0.5 mil.	0 1 mil.		)	0 1.5 mil.	0 2 mil.	0 1.5 mil.	0 2 mil.	0	X	0	0	0	165/80
		03	mii.			0 0.5 mil.	0 0.5 mil.		) 	Olmii. Olmii	0 1.5 mil.	Olmii. Olmii	0 1.5 mil.	0	X	0	0	0	1100
	2		2 mil		<u> </u>	0.03 mil	0.0 1 mil		<u> </u>	On mil	0 1.5 mil	O n nill. O0.5 mil	0 1.3 mil. 0 1 mil	0	X	0	0	0	N120/220
	<u></u>		2 mil		<u> </u>	0.0 mil	0.4 mil.		<u></u>	0 0.5 mil	0.05 mil	0.5 mil.	0 0 5 mil	0	_ ^	0	0	0	N300/400
	×	0.2	<u>~ 11111.</u> (	,	, ,	V 0.2 mil.	0 0.2 mil	,	, ,	00.011⊪. ×	0 0 4 mil	0 0.0 mill. ¥	0.04 mil	×	x	×	×	×	N600/800
0	0	01	mil.	0	0	01	mil.	0	0	02	mil.	0 2	mil.	X	/	O DC24 V	O DC24 V	O DC24 V	Q/QR
		DC24 V	DC110 V			DC24 V	DC110 V			O DC24 V	ODC110 V	O DC24 V	O DC110 V						
O DC24 V	ODC24 V	0 0.15 mil.	х	O DC24 V	O DC24 V	0 <b>0.3 mil</b> .	0 <b>0.3</b> mil.	O DC24 V	O DC24 V	0 <b>0.4 mi</b> l.	0 0.8 mil.	0 0.4 mil.	0 <b>0.8 mil.</b>		/	O DC24 V	O DC24 V	O DC24 V	T5/9
O DC24 V	O DC24 V	0 0.15 mil.	х	O DC24 V	O DC24 V	0 <b>0.3 mil</b> .	0 <b>0.3 mil</b> .	O DC24 V	O DC24 V	0 0.4 mil.	0 0.8 mil.	0 0.4 mil.	0 <b>0.8 mil</b> .		/	O DC24 V	O DC24 V	O DC24 V	T12/20
O DC24 V	O DC24 V	0 0.1 mil.	Х	O DC24 V	O DC24 V	0 0.3 mil.	0 0.3 mil.	O DC24 V	O DC24 V	0 <b>0.4 mil</b> .	0 0.8 mil.	0 0.4 mil.	0 <b>0.8 mil</b> .		/	O DC24 V	O DC24 V	O DC24 V	T21/32
x	O DC24 V	0 0.1 mil.	Х	O DC24 V	х	х	X	O DC24 V	O DC24 V	0 0.1 mil.	0 0.3 mil.	0 0.1 mil.	0 <b>0.3 mil</b> .	/		O DC24 V	х	O DC24 V	T35/50
x	x	X	Х	х	х	х	X	x	x	х	X	х	х			x	х	х	T65/80
X	X	X	Х	X	X	X	X	X	X	х	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	N600/900
_		Closing	Tripping			Closing	Tripping			Closing	Tripping	Closing	Tripping	Closing	Tripping				
	/	∪ 0.5 mil.	∪ 0.5 mil.		/	0 0.5 mil.	∪ 0.5 mil.			∪ 0.5 mil.	∪ 0.5 mil.	∪ 0.5 mil.	∪ 0.5 mil.	0	0	-	/	/	15
	/	0 0.5 mil.	0 0.5 mil.			0 0.5 mil.	0 0.5 mil.			0 0.5 mil.	0 0.5 mil.	0 0.5 mil.	0 0.5 mil.	0	0	-			121
,	/	0.5 mil.	∪ 0.5 mil.	,	/	0 0.5 mil.	0 0.5 mil.	/	/	∪ 0.5 mil.	U 0.5 mil.	∪ 0.5 mil.	∪ U.5 mil.	0		-			135/150
/		0.025 mil.	0.025 mil.	/		0 0.25 mil.	0.025 mil.	/		0.25 mil.	0.025 mil.	0.025 mil.	0.025 mil.	0		-	/		100/180
		0.0.20 [[]]].	0.0.25 mil			0.0.05 m <sup>3</sup>	0 0.20 mill.			0.20 1111.	0.0.05 mil	0.20 IIII. 0.0.25 mil	0.20 IIIII. 0.0.25 mil	0		/	/		N125/150
		0 0.20 IIII. 0 0.25 m <sup>2</sup>	0 0.23 mil			0 0.20 mill.	0 0.25 mil			0 0.20 IIII. 0 0.25 mil	0 0.25 mil	0 0.20 IIIII. 0 0.25 mil	0.20 IIII. 0.0.25 m <sup>2</sup>	0					N220
/		0.20 IIII.	∪ 0.20 I/III. ¥			0 0 25 m <sup>3</sup>	∪ 0.20 IIII. V	/		0.20 mil. 0.0.25 mil	∪ 0.20 mil.	0.20 mil	∪ 0.20 IIIII. V	0	- U				N300/400
/		∪ 0.20 IIII. ▼	~	/		∪ 0.20 IIII. ▼	× ×	/		∪ v.20 mili. ▼		∪ 0.20 IIIII. ¥	×	v	×	/			N600/800
V	-		^	V		· ^		V		^		^	^	^		V			11000/000

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

	Applicable Models			CC-Link CC-Link Safety CC-Link LT															
							I/	O Combina	ation Un	its				Output Units	1/O Combination Units	Output	Units	I/O Combir	ation Units
		Model Name			Contact	Output				Transisto	r Output			Transistor Output	Transistor Output	Transisto	r Output	Transisto	or Output
action		(SR-T, SRD-T ; Contactor Relays)	Operation	AJ65SBTB AJ65SBTE	32-16KDR 332-16DR	AJ65BTI	B2-16DR	AJ65SBTB32-8DT AJ6 AJ65SBTB1-16DT AJ6	65SBTB1-32KDT2 165VBTS32-16DT	AJ65BTBD-16DT AJ65DBTB1-32DT1	AJ65VBTCE32-[]DT AJ65SBTC1-32DT]	AJ65SBTCF1-32DT AJ65VBTCFJ1-32DT1	AJ65FBTA42-16DTE	QS0J65BTS2-4T	QSOJ65BTB2-12DT	CL1Y4-T1B2 CL2Y8-TP1B2	CL1Y4-T1C2 CL2Y8-TP1C2V	CL1XY2-DT1D5S CL1XY4-DT1B2	CL1XY8-DT1B2 CL2XY16-DTP1C5V
ceific		S-T/N, SD-T/N : Magnetic	Coil Designation	AJ02DB1	B1-32DR			AJ65SBTB32-16UTL A	165SBTC4-16DT 165SBTC4-16DT2	AJ03VB1532-32D1	AJ65VBTCFJT-32DTT AJ65VBTCE3-16DTE					CL1Y4-1152 CL2Y8-TP1S2	CL2Y16-TP1C2V CL2Y16-TP1M1V		
- 2	5	Contactors						AJ65SBTB1-32DTE1 AJ	J65FBTA42-16DT		AJ65VBTCE3-32DTE					CL2Y8-TPE1S2	CL2Y16-TP1MJ1V		
		SD-Q : DC Interface Contactors														GL2110-IPEIMIV	UL112-11025		
-	+													Using UN-SY[7]/	Using UN-SYT/				
		00 75 70	-	AC100V	AC200V	AC100V	AC200V		Using l	JN-SY□/I	JT-SY⊡ I	DC24 V		UT-SYD DC24 V (Note 5)	UT-SYD DC24 V (Note 5)	Using	UN-SYD/	UT-SY D	C24 V
		<u>SR-T5,T9</u>		0 2 mil.	0 2 mil.	0 2 mil.	0 2 mil.	0		0	0	0	0	0	0	0	0	0	0
τ	,	S-110,112,120	-	0 2 mil.	0 2 mil.	0.2  mil.	0 2 mil.	0		0	0	0	0	0	0	0	0	0	0
+		<u>S-121,125</u>		O2mii.		0.2  mil	0.2  mil.	0								0	0	0	0
ģ	Ē ŀ	<u>5-132</u> S T35/T50	AC100V	$\bigcirc 2 \text{ mil.}$	$\bigcirc 2 \text{ mil}$	$\bigcirc 2 \text{ mil}$	$\bigcirc 2 \text{ mil}$	0		0		0	0	0	0	0	0	0	0
Ĉ	5	S-T65/T80	AC200V	0 2 mil. 01.5 mil	$\bigcirc 2 \text{ mil}$	0 2 mil. 01.5 mil	$\bigcirc 2 \text{ mil}$	0		0				0		0	0	0	0
	2	S-T100		0 1 mil	01.5 mil	$\bigcirc 1 \text{ mil}$	01.5 mil	0		0	0	0	0	0	0	0	0	0	0
	ŀ	S-N125.N150		0 1 mil.	01.5 mil.	0 1 mil.	01.5 mil.	0		0	0	0	0	0	0	0	0	0	0
	ľ	S-N180/N220	1	0 0.5 mil.	0 1 mil.	0 0.5 mil.	0 1 mil.	0		0	0	0	0	0	0	0	0	0	0
	ľ	S-N300/N400	1	0 0.5 mil.	0 0.5 mil.	0 0.5 mil.	0 0.5 mil.	0		0	0	0	0	0	0	0	0	0	0
	Ī	S-N600/N800	1	х	0 0.4 mil.	х	0 0.4 mil.	х		х	х	х	х	х	х	х	х	х	х
		SD-Q□,QR□	DC24V	0 2	mil.	0 2	mil.	ODC2	24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V
				DC24V	DC110V	DC24V	DC110V												
τ	2 [	SRD-T5,T9		0 0.4 mil.	0 0.8 mil.	0 0.4 mil.	0 0.8 mil.	ODC2	24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V
-+		SD-T12/T20		0 0.4 mil.	0 0.8 mil.	0 0.4 mil.	0 0.8 mil.	ODC2	4V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V
à	<u></u>	SD-T21/T32	DC 24V	O 0.4 mil.	0 0.8 mil.	0 0.4 mil.	0 0.8 mil.	ODC2	24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V	ODC24V
Ĉ	5	SD-T35/T50	DC110V	O 0.1 mil.	0 0.3 mil.	0 0.1 mil.	0 0.3 mil.	ODC2	24V	ODC24V	x	x	ODC24V	ODC24V	ODC24V	х	х	х	x
	3	SD-T65/T80		х	X	X	х	x		х	x	х	х	х	х	x	х	X	x
		SD-T100		X	X	X	X	X		X	X	Х	х	X	X	X	х	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
	ł	SD-N600/N400		X	X	×	X	X		×	×	×	X	×	×	X	X	X	
	+	30-11000/11000				^		^			~		· ^		~		^	~	$\sim$
Type				Closing	Tripping	Closing	Tripping												
led	٦	SRL-T5		0 0.5 mil.	0 0.5 mil.	0 0.5 mil.	0 0.5 mil.	1											
tch	ate	SL-T21	]	O 0.5 mil.	O 0.5 mil.	O 0.5 mil.	O 0.5 mil.							_					
La	Ser	SL-T35/T50	AC100V	0 0.5 mil.	0 0.5 mil.	0 0.5 mil.	0 0.5 mil.						_						
ally	ď	SL-T65/T80	AC200V	O 0.25 mil.	0 0.25 mil.	0 0.25 mil.	0 0.25 mil.					_							
Jic	AC	SL-T100		0 0.25 mil.	O 0.25 mil.	0 0.25 mil.	0 0.25 mil.				_								
har		SL-N125,N150		0 0.25 mil.	0 0.25 mil.	0 0.25 mil.	0 0.25 mil.			_									
1ec		SL-N220		0 0.25 mil.	0 0.25 mil.	0 0.25 mil.	0 0.25 mil.												
2	+	SL-N300/N400		∪ 0.25 mil.	х	∪ 0.25 mil.	х												
		SL-N600/N800		Х	I X	I X	I X												

Note 1. o: 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

			Input Magnetic C	Contactor (Note 2)	Recomm	ended Wire Size (mm <sup>2</sup>	2) (Note 3)
	Motor	Model Name of Applicable Inverter	Power Factor Cor	rection (AC or DC)	R/L1, S/	'L2, T/L3	
Voltage	Output (Note 1)	(ND Rating)	Reactor C	Connection	Power Factor Cor	rection (AC or DC)	U, V, W
	(kW)		Nia	Vee	Reactor C	onnection	- / /
	0.4	EB 4820 0 4K(00046)		FT10	2	res	0
	0.4	EB 4820 0 75K(00040)	S-110	S-110	2	2	2
	0.75	ED 4820-0.75K(00077)	S-110	S-110	2	2	2
	1.5	EB 4820 2 2K(00167)	S-110	S-110	2	2	2
	2.2	FR-A820-2.2R(00167)	S-110	S-110	2	2	2
	5.7	ED 4820 5 5K(00230)	0-121 0 T25	S-110	5.5	5.5	5.5
	7.5	EB 4820-3.5K(00340)	0-100 0 T25	0-121 0 T25	14	14	0
	7.5	FR-A820-7.3R(00490)	0 705	0 705	14	14	0
200 V	15	FR-A820-11K(00630)	S-135	5-135 8 TEO	14	14	14
Class	10.5	ED 4820-18 EK(00020)	0-100 0 T65	S-150	22	22	22
	16.5	FR-A820-18.5K(00930)	S-100	5-150 0 T65	38	22	22
	22	FR-A820-22K(01230)	S-1100	S-100	38	30	30
	30	FR-A820-30K(01540)	S-1100	S-1100	60	00	60
	37	FR-A820-37K(01870)	S-N150	5-N125	80	100	100
	45	FR-A820-45K(02330)	S-IN 160	S-N150	100	100	100
	35	FR-A820-35K(03100)	3-11220	S-N100	100	105	100
	/5	FR-A820-75K(03800)		S-N300	_	120	125
	90	FR-A820-90K(04750)		5-1\300		150	150
	0.4	FR-A840-0.4K(00023)	5-110 0 T10	S-110	2	2	2
	0.75	FR-A840-0.75K(00038)	S-110	S-110	2	2	2
	1.5	FR-A840-1.5K(00052)	S-110	S-110	2	2	2
	2.2	ED 4840-2.2K(00083)	S-110	S-110	2	2	2
	5.7	FR-A040-5.7 K(00120)	0.701	0 T10	2	2	2
	5.5	FR-A840-5.5K(00170)	5-121 0 T01	5-112 0 T01	2	2	2
	7.5	FR-A840-7.3K(00250)	5-121 0 T01	5-121 0 T01	3.5	3.5	3.5
	11	FR-A840-11K(00310)	0 T05	5-121 0 T01	5.5	5.5	5.5
	15	FR-A840-15K(00380)	S-135	S-121	8	5.5	5.5
	18.5	FR-A840-18.5K(00470)	S-135	S-135	14	8	8
	22	FR-A840-22K(00620)	5-135 0 TEO	5-135 0 TEO	14	14	14
400 V	30	FR-A840-30K(00770)	S-150	S-150	22	22	22
Class	37	FR-A840-37K(00930)	S-165	S-150	22	22	22
	45	FR-A840-45K(01160)	S-1100	S-100	38	30	38
	35	FR-A640-55K(01600)	5-1100	S-1100	60	60	60
	/5	FR-A840-75K(02160)		S-1100	_	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

			Input Magnetic C	ontactor (Note 2)	Recomme	ended Wire Size (mm <sup>2</sup>	2) (Note 3)
Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter (LD Rating)	Power Factor Cor Reactor C	rection (AC or DC) onnection	R/L1, S/ Power Factor Cor Reactor C	L2, T/L3 rection (AC or DC) connection	U, V, W
			No	Yes	No	Yes	-
	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
200 V	15	FR-F820-15K(00630)	S-T50	S-T50	22	22	22
Class	18.5	FR-F820-18.5K(00770)	S-T65	S-T50	38	22	22
Class	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
	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
400 V	37	FR-F840-37K(00770)	S-T65	S-T50	22	22	22
400 V	45	FR-F840-45K(00930)	S-T100	S-T65	38	38	38
Class	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

	Matar		Input Magnetic C	ontactor (Note 2)	Recommended Wire Size (mm <sup>2</sup> ) (Note 3)			
	IVIOLOF		Power Factor Cor	rection (AC or DC)	R/L1, S/L2, T/L3			
Voltage	Output (Note 1)	Model Name of Applicable Inverter	Beactor C	connection	Power Factor Correction (AC or DC)		II V W	
	(kW)				Reactor Connection		0, 1, 11	
	. ,		No	Yes	No	Yes		
	315	FR-CC2-H315K	-	S-N600	-	2×150	-	
400 V	355	FR-CC2-H355K	-	S-N600	_	2×200	-	
	400	FR-CC2-H400K	-	S-N800	_	2×200	-	

#### (4) FR-E700 Series

	Matan		Input Magnetic C	Contactor (Note 2)	Recommended Wire Size (mm <sup>2</sup> ) (Note 3)			
Voltage	Motor Output (Note 1) (kW)	Model Name of Applicable Inverter	Power Factor Cor Reactor C	rection (AC or DC) Connection	R/L1, S/ Power Factor Cor Reactor C	U, V, W		
			No	Yes	No	Yes		
	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	
200.1/	1.5	FR-E720-1.5K	S-T10	S-T10	2	2	2	
Class	2.2	FR-E720-2.2K	S-T10	S-T10	2	2	2	
01000	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	
	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	
400 V	2.2	FR-E740-2.2K	S-T10	S-T10	2	2	2	
Class	3.7	FR-E740-3.7K	S-T10	S-T10	2	2	2	
01000	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

			Input Magnetic C	Contactor (Note 2)	Recommended Wire Size (mm <sup>2</sup> ) (Note 3)			
Voltage	Output (Note 1) (kW)	Model Name of Applicable Inverter	Power Factor Cor Reactor C	rection (AC or DC) connection	R/L1, S/ Power Factor Cor Reactor C	U, V, W		
	. ,		No	Yes	No	Yes		
	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	
200.1/	1.5	FR-D720-1.5K	S-T10	S-T10	2	2	2	
Class	2.2	FR-D720-2.2K	S-T10	S-T10	2	2	2	
01233	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	
	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	
400 V	2.2	FR-D740-2.2K	S-T10	S-T10	2	2	2	
Class	3.7	FR-D740-3.7K	S-T10	S-T10	2	2	2	
01233	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

	Motor		Input Magnetic C	ontactor (Note 2)	Recommended Wire Size (mm <sup>2</sup> ) (Note 3)			
Voltage	Output (Note 1)	Model Name of Applicable Inverter	Reactor or Filter	Pack Connection	R/L1, S/	L2, T/L3		
	(kW)		No	Yes	Reactor or Filter	Pack Connection Yes	U, V, VV	
	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	
200.1/	2.2	FR-F720PJ-2.2K	S-T10	S-T10	2	2	2	
200 V	3.7	FR-F720PJ-3.7K	S-T21	S-T10	3.5	3.5	3.5	
Class	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	
	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	
400 V	2.2	FR-F740PJ-2.2K	S-T10	S-T10	2	2	2	
Class	3.7	FR-F740PJ-3.7K	S-T10	S-T10	2	2	2	
01833	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	Magnetic	Wire Size [mm <sup>2</sup> ] <sup>(Note 5)</sup>							
Name	Contactor (Note 3, 6)	L1, L2, L3, 🕀	L11, L21	P+, C	U, V, W, 🕀				
MR-J4-10GF(1)/B(1)/A(1)	S-T10								
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				AWG 18 to 14 (Note 4)				
MR-J4-70GF/B/A	S-T10	2 (AWG 14)							
MR-J4-100GF/B/A (Three-Phase Power Input)	S-T10								
MR-J4-100GF/B/A (Single-Phase Power Input)	S-T10			2 (AWG 14)					
MR-J4-200GF/B/A (Three-Phase Power Input)	S-T21								
MR-J4-200GF/B/A (Single-Phase Power Input)	S-T21	3.5 (AWG 12)			AWG 16 to 10 (Note 4)				
MR-J4-350GF/B/A	S-T21								
MR-J4-500GF/B/A (Note 2)	S-T35	5.5 (AWG 10)	1.25 to 2		2 to 5.5 (AWG 14 to 10)				
MR-J4-700GF/B/A (Note 2)	S-T50	8 (AWG 8)	(AWG 16 to 14)		2 to 8 (AWG 14 to 8)				
MR-J4-11KGF/B/A (Note 2)	S-T50	14 (AWG 6)		3.5 (AWG 12) <sup>(Note 1)</sup>	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) <sup>(Note 1)</sup>	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)							
MR-J4-100GF4/B4/A4	S-T10	2 (AWG 14)							
MR-J4-200GF4/B4/A4	S-T10	2 (AWG 14)			AWG 101014				
MR-J4-350GF4/B4/A4	S-T21	2 (AWG 14)		2 (AWG 14) (Note 1)					
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)							
MR-J4-15KGF4/B4/A4 (Note 2)	S-T35	8 (AWG 8)							
MR-J4-22KGF4/B4/A4 (Note 2)	S-T50	14 (AWG 6)		3.5 (AWG 12) <sup>(Note 1)</sup>	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).

Converter Unit	Drive Unit Medel Neme	MagneticContactor	Wire Size [mm <sup>2</sup> ] <sup>(Note 8)</sup>							
Model Name		(Note 1, 7)	L1, L2, L3, 🕒	L11, L21	P2, C	P1, P2				
MR-CV11K	Ν	S-T35	8 (AWG 8)		Ν	Ν				
MR-CV18K		S-T65	22 (AWG 4)							
MR-CV30K		S-N125	38 (AWG 2)							
MR-CV37K		S-N125	60 (AWG 2/0)							
MR-CV45K		S-N150	60 (AWG 2/0)	1.25 to 2 (AWG 16 to 14)						
MR-CV55K		S-N220	80 (AWG 3/0)							
MR-CV11K4		S-T21	5.5 (AWG 10)							
MR-CV18K4		S-T35	8 (AWG 8)							
MR-CV30K4		S-T65	14 (AWG 6)							
MR-CV37K4		S-T80	22 (AWG 4)							
MR-CV45K4		S-T100	22 (AWG 4)							
MR-CV55K4		S-N125	38 (AWG 2)							
MR-CV75K4		S-N150	60 (AWG 2/0)							
	Combined with MR-J4-DU30K_(-RJ)	S-N150	38 (AWG 2)			60 (AWG 2/0)				
MIN-CHOOK	Combined with MR-J4-DU37K_(-RJ)	S-N180	60 (AWG 2/0)			60 (AWG 2/0)				
	Combined with MR-J4-DU30K_4(-RJ)	S-T65	22 (AWG 4)			22 (AWG 4)				
	Combined with MR-J4-DU37K_4(-RJ)	S-T80	22 (AWG 4)		5.5 (AVVG 10)	38 (AWG 2)				
	Combined with MR-J4-DU45K_4(-RJ)	S-T100	38 (AWG 2)			38 (AWG 2)				
	Combined with MR-J4-DU55K_4(-RJ)	S-N150	38 (AWG 2)			38 (AWG 2)				

Drive Unit Model Name	Wire Size	[mm <sup>2</sup> ] <sup>(Note 8)</sup>		
Drive Onit Model Name	U, V, W 🕀	L11, L21		
MR-J4-DU900B(-RJ)	14 (AWG 6)			
MR-J4-DU11KB(-RJ)	14 (AWG 6)			
MR-J4-DU15KB(-RJ)	22 (AWG 4)			
MR-J4-DU22KB(-RJ)	38 (AWG 2)			
MR-J4-DU30KB(-RJ)	60 (A)M/G 2/0)			
MR-J4-DU30KA(-RJ)	80 (AWG 270)			
MR-J4-DU37KB(-RJ)	60 (A)M/G 2/0)			
MR-J4-DU37KA(-RJ)	80 (AWG 270)			
MR-J4-DU900B4(-RJ)	8 (AWG 8)			
MR-J4-DU11KB4(-RJ)	8 (AWG 8)	1.25 to 2		
MR-J4-DU15KB4(-RJ)	8 (AWG 8)	(AWG 16 to 14)		
MR-J4-DU22KB4(-RJ)	14 (AWG 6)			
MR-J4-DU30KB4(-RJ)	22 (A)A/G (4)			
MR-J4-DU30KA4(-RJ)	22 (AWG 4)			
MR-J4-DU37KB4(-RJ)	22 (A)M(G 4)			
MR-J4-DU37KA4(-RJ)	22 (AWG 4)			
MR-J4-DU45KB4(-RJ)	38 (A)M/G 2)			
MR-J4-DU45KA4(-RJ)	30 (ANG 2)			
MR-J4-DU55KB4(-RJ)	38 (AW/G 2)			
MR-J4-DU55KA4(-RJ)	30 (AVICI 2)			

### 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).

Servo Amplifier Model	Magnetic Contactors	Wire Size [mm <sup>2</sup> ] <sup>(Note 3)</sup>						
Name		L1, L2, L3, 🕀	L11, L21	P+, C (Note 5)	U, V, W, 🕘			
MR-J4W2-22B								
MR-J4W2-44B								
MR-J4W2-77B	Refer to the		AVA/O 10 to 14 (Note 2)					
MR-J4W2-1010B	following table		2 (AWG 14)					
MR-J4W3-222B								
MR-J4W3-444B								

### 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.

Frama	Single-Phase Transformer [kVA(A)]						Three-Phase Transformer [kVA(A)]					
Frame	220 V		440 V		55	0 V	22	0 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.

# Handling (Precautions)

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### 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	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)
control board	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 <sup>2</sup> or less
(6) Impact :	49 m/s <sup>2</sup> 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.



### 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.

### 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)

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



#### (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 MSO-T20 MSO-T20 MSO-T21 MSO-T25 MSO-T35 MSO-T35 MSO-T50 MSO-T65 MSO-T80	S-T10 S-T12 S-T20 S-T21 S-T25 S-T32 S-T35 S-T50 S-T65 S-T80	MSOD-T12 MSOD-T20 MSOD-T21 MSOD-T35 MSOD-T50	SD-T12 SD-T20 SD-T21 SD-T32 SD-T35 SD-T50 SL(D)-T21 SL(D)-T35 SL(D)-T50 SL(D)-T65 SL(D)-T65 SL(D)-T80	SR-T5, T9 SR-K100 SRD-T5 SRD-T9 SRD-K100 SRL(D)-T5 SRL(D)-K100
		Thermal Ove		
		TH-T18+UT-I TH-T25+UN-		

(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 $\ell$			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			



(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	T10	T25	TH-T18 + UT-HZ18	T35	T65
	T12 T32		SR(D)-T/K	T50	T80
	T20		SRL(D)-T/K		
Rail	T21				
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.



Minimal Mounting Space when Attaching UN-CZ

Frame	В	С
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

#### Minimal Mounting Space and Arc Space

		• •	•			
	Mi	Front	Front			
Frame	A (A1, A2)	B (B <sub>1</sub> , B <sub>2</sub> )	C (C <sub>1</sub> )	D Dimension	Arc Space	Space
	Dimension [mm]	Dimension [mm]	Dimension [mm]	[mm]	(Note 1)	E (Note 4)
T10	41(A <sub>1</sub> = 53, A <sub>2</sub> = 65)					
T12	49					
T20	(A <sub>1</sub> = 61, A <sub>2</sub> = 73)	5 (Note 3)	10			
T21	68	(B <sub>1</sub> = 17, B <sub>2</sub> = 29)	(C <sub>1</sub> = 22)	15		5
T25	(A <sub>1</sub> = 80, A <sub>2</sub> = 92)			15		(Note 5)
T32	48(A <sub>1</sub> = 60, A <sub>2</sub> = 72)				0	
T35	80	5 (Note 3)	10		0	
T50	(A <sub>1</sub> = 93.5, A <sub>2</sub> = 107)	(B <sub>1</sub> = 18.5, B <sub>2</sub> = 32)	(C <sub>1</sub> = 23.5)			
T65	98	10 (Note 3)	10			E
T80	(A <sub>1</sub> = 111.5, A <sub>2</sub> = 125)	(B <sub>1</sub> = 23.5, B <sub>2</sub> = 37)	(C <sub>1</sub> = 23.5)	25		5
T100	110	10	16	25		10
1100	(A <sub>1</sub> = 124, A <sub>2</sub> = 138)	$(B_1 = 24, B_2 = 38)$	(C <sub>1</sub> = 30)			10
Τ5	49	5 (Note 3)	10			5
	$(A_1 = 61, A_2 = 73)$	$(B_1 = 17, B_2 = 29)$	(C <sub>1</sub> = 22)	15	0	(Note 5)
Т9	49	5 (Note 3)	10			3
N125	112	12	16	25		
	$(A_1 = 126, A_2 = 140)$	$(B_1 = 26, B_2 = 40)$	$(C_1 = 30)$	20		
N150	132 (A <sub>1</sub> = 140)	12 (B <sub>1</sub> = 20)	16	30		
N180	$150 (\Delta - 160)$			50		
N220	$100 (A_1 = 100)$	12 (B - 22)	16	50	0	10
N300	175 (A - 185)	$12 (D_1 - 22)$	10			
N400	$ 175(A_1 - 100) $			an		
N600	305	15	20	30		
N800	303		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

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 snace of 3 mm must be insured when mounting IT-AX2 and UT-AX4 models.

Note 5. A space of 3 mm must be insured when mounting UT-AX2 and UT-AX4 models

### 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.



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	Terminal dimension and size/type of screw		Applicable electric				Connection Tightening torque of term		ue of terminal		
Standard type Contactor Relays	Main	circuit		Operating circuit	wire size [ømm, mm²]		Applicable Crimp Lug Size		conductor thickness(T)	conductor screw [N·m] Parenthese chickness(T) Show Standard Value	
Magnetic Contactors Thermal Overload Relays (Note 1)	Dimension of terminal portion X x Y x Z [mm] (Note 2)	Screw size	Screw type	Cross slot screw with pressure plate	Main circuit	Operating circuit	Main circuit	Operating circuit	Main circuit (Note 2)	Main circuit	Operating circuit
SR-T5, T9	_	_		M3.5x7.6	_	-	_		_	_	
S-T10, T12, T20	7.5 x 3.7 x 4.5	M3.5x7.6	Self-	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	Cross-	M3.5x7.6	ø1.6 to 2.6 1.25 to 6		1.25-4 to 5.5-4	1.25-3.5 to 2-3.5	3	1.2 to 1.9	0.9 to 1.5
S-T35, T50	13.3 x 5.5 x 6.9	M5x14.8	Screw	M3.5x7.6	ø1.6 to 3.6 1.25 to 16	ø1.6 0.75 to 2.5	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	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	3.7	3.5 to 5.7	1.2 to 1.9
S-T100	15 x 7.5 x 11.5		Screw		2 to 38 (Note 3)		1.25-6 to 60-6	0.0-04	4		
SR-K100	_	_	_	M3.5x7.5	_		_	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		_		5.5-8 to 60-8		10.5	6.28 to 10.29 (7.84)	
S-N150	20 x 10 x 15	M8x20	(With Cross)		_	ø1.6 1.25 to 2	8-8 to 100-8	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-N180, N220	25 x 12.5 x 18	M10x25		M4x10	_		14-10 to 150-10		13.5	11.8 to 19.1 (14.7)	
S-N300, N400	30 x 15 x 22.5	M12x30	Hex		_		22-12 to 200-12		15.5	19.6 to 31.3 (24.5)	
S-N600, N800	40 x 15 x 28	M16x45	DOIL		_		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	0.16	M3.5x7.6	ø1.6 1.25 to 2	ø1.6 1.25 to 2	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	Lifting		ø1.6 0.75 to 2.5		1.25-3.5 to 2-3.5 5.5-S3 (Notes 7, 9, 10)	1 05 0 5 40 0 0 5	2	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	slot	M3.5x7.6	ø1.6 to 2.6 1.25 to 6	ø1.6 0.75 to 2.5	1.25-4 to 5.5-4	1.25-3.5 10 2-3.5	2.5	1.2 to 1.9	0.9 to 1.5
TH-T50 (Load Side)	13.3 x 5.8 x 6.9	M5x14.8	Screw		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-	M4v10	2 to 22 (Note 3)	ø1.6	5.5-6 to 22-6	1.25-4 to 2-4	4	3.5 to 5.7	1 2 to 1 9
TH-T100 (Load Side)	15 x 7.5 x 10	M6x12	Screw	10147.10	8 to 38 (Note 3)	1.25 to 2	14-6 to 22-6 38-S6 (Note 10)	5.5-S4	3.7	3.5 to 5.7	1.2 to 1.9
TH-N120	15 x 10 x 12	M8x20	Hex Bolt		_		8-8 to 38-8		11.5	6.28 to 10.29 (7.84)	
TH-N120TA (Load Side) TH-N120TAHZ	20 x 10 x 15	M8x20	(With Cross)		-		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	M4x10		ø1.6 1.25 to 2	22-10 to 150-10	1.25-4 to 2-4 5.5-S4	14.5	11.8 to 19.1 (14.7)	1.18 to 1.86 (1.47)
TH-N400RH (Load Side) TH-N400HZ	30 x 15 x 22.5	M12x30	Bolt		_		22-12 to 200-12		17.5	19.6 to 31.3 (24.5)	1
TH-N600	_	_	_		_	1	_		_	_	

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.

### 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.

### 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

#### (1) Applicable wire size

Wire Forrule	Torminals	Si	ze	Length of	Maximum coated diameter
Wierendie	reminais	× 1	× 2	peeled	
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 <sup>2</sup> - 4mm <sup>2</sup> AWG20 - AWG12	0.5mm² - 4mm² AWG20 - AWG12		
Ferrule with insulating cover		0.25mm <sup>2</sup> - 2.5mm <sup>2</sup> AWG24 - AWG14	0.25mm <sup>2</sup> - 2mm <sup>2</sup> AWG24 - AWG14 *2	*4	Max φ4.2 *6
Ferrule without insulating cover		0.5mm <sup>2</sup> - 2.5mm <sup>2</sup> AWG20 - AWG14	0.5mm <sup>2</sup> - 2.5mm <sup>2</sup> AWG20 - AWG14		Max φ4.1 *5

\*1. Put one of wire in one of insertion hole.

\*2. If you use two wires of 2mm<sup>2</sup> 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  $\varphi$ 3.4, length of peeled is 9mm

- \*6. Maximum outside diameter of sleeve. When the wire size 2.1-2.5mm<sup>2</sup>, maximum sleeve outside diameter is φ4.8.
- \*7. Contact us if you might use other type of wires.

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- \*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.



#### Crimp Lug Dimensions







<sup>\*4.</sup> Follow a rule of each manufacturer's catalog.

<sup>\*5.</sup> When the coated diameter is below the  $\varphi$ 4.6 beyond  $\varphi$ 4.1, even 1 wire is applied.

#### (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.

### 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 <sup>2</sup>	AWG	Model Number	Product Description	Model Number	Product Description	Chimping tool	
0.25	24	216-301	(FE-0.25-8N-YE)	-	-		
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)		210-719
0.75	20-18	216-202 216-242	(FE-0.75-8N-GY) (FE-0.75-10N-GY)	216-142	(F-0.75-10)		210-647
1.0	18	216-203 216-243	(FE-1.0-8N-RD) (FE-1.0-10N-RD)	216-143	(F-1.0-10)	Variocrimp4	210-648
1.5	16	216-204 216-244	(FE-1.5-8N-BK) (FE-1.5-10N-BK)	216-144	(F-1.5-10)		210-119SB
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
mm²	AWG	Part Number	Туре	Part Number	Туре		
0.25	24	9025760000	(H0.25/12 HBL)	-	-		
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)		SDI
0.75	18	0462900000 9025860000	(H0.75/14 W) (H0.75/16 W)	0542500000	(H0.75/10)	PZ 10 SQR	0.4x2.5x75
1.0	17	0463000000 9025950000	(H1.0/14 GE) (H1.0/16 GE)	0282800000	(H1.0/10)		SDS 0.4x2.5x75
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	Ferrule with insulating cover		Ferrule without insulating cover		Operating tools
mm <sup>2</sup>	AWG	Part Number	Туре	Part Number	Туре		
0.25	24	3203037 3241128	(AI 0.25-8 YE) (AI 0.25-10 YE)	-	-		
0.3 0.34	22	3203066 3241129	(AI 0.34-8 TQ) (AI 0.34-10 TQ)	-	-		
0.5	20	3200014 3201275	(Al 0.5-8 WH) (Al 0.5-10 WH)	3202494	(A 0.5-10)	CRIMPFOX CENTRUS	SZF
0.75	18	3200519 3201288	(Al 0.75-8 GY) (Al 0.75-10 GY)	3200234	(A 0.75-10)	CRIMPEOX	0-0.4x2.5
1.0	18	3200030 3200182	(AI 1-8 RD) (AI 1-10 RD)	3200250	(A 1-10)	CENTRUS 10S	0.4x2.5
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.





### Wiring, remove method

### (1) Wiring remove method

	Wiring	Removing	
Solid wire, Ferrule	$\begin{array}{c} \text{II or} \\   \rightarrow    \rightarrow  V \end{array}$		
Stranded wire, Flexible stranded wire	$  \rightarrow    \rightarrow  V$		

\*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.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.

#### • 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<sup>\*</sup>. 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

#### 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  $\square$  LT type. Except for those shown below, we do not manufacture low-temperature specification magnetic contactors, or thermal overload relays. Low-temperature-based products: S-N  $\square$  LT, S-2×N  $\square$  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<sub>2</sub>), hydrogen sulfide (H<sub>2</sub>S), chlorine (Cl<sub>2</sub>), and ammonia (NH<sub>3</sub>), 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<sup>3</sup>, 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<sup>2</sup> and shock of 49 m/s<sup>2</sup> 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/ND type enclosed magnetic starters are products for the Electrical Appliance and Material Safety Law in Japan, please do not modify them.

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

4.1	Standard (AC Operated) Magnetic Starters/Magnetic Contactors
12	MS/MSO/S-L
4.2	MS/MSO/S-2x
4.3	DC Operated Magnetic Starters/Magnetic Contactors
	MSOD/SD-□91
4.4	Mechanically Latched Magnetic Starters/Magnetic Contactors
	MSOL(D)/SL(D)-□102
4.5	Delay Open Magnetic Starters/Magnetic Contactors
4.0	
4.6	
17	Magnetic Starters with Quick acting Characteristics Thermal Querload Palave
4.7	MSO-TES(KP)
4.8	Magnetic Starters with Push-Buttons
-	MS-□PM117
4.9	Magnetic Starters/Magnetic Contactors with Wiring Streamlining Terminals
	MSO/S-T□BC119
4.10	Magnetic Contactors with Spring Clamp Terminals
	$S-T \square SQ, SD-T \square SQ \dots 125$
4.11	Main Circuit 3-Pole Magnetic Contactors
1 10	S(D)-132, S-N⊔8
4.12	How to Order

# 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)

		Rate	ed Cap	bacity	[kW]	R	ated C	Operati	ing Cu	rrent [/	A]	Conventional			Compatible	
		Three-P	hase Sq	uirrel-cag	e Motor	Three-F	hase Sq	uirrel-cag	e Motor	Resistiv	/e Load	Free Air	Auxiliary	Contact	Thermal Overload	
Magnetia	Magnetic		(Catego	ry AC-3)		(Category AC-3)				(Catego	ry AC-1)	Thermal			Relays	
Contactors	Starters											Current		Additional		Heater
Contactors	(Note 12)	AC220	AC380	AC500 V	1000 V	AC220	AC380	AC500 V	V 000 V	AC100	AC380		Standard	Unit Model	Model	Designation
		to 240 V	to 440 V	AC300 V	A0090 V	to 240 V	to 440 V	AC300 V	A0090 V	to 240 V	to 440 V	lth	(Special)	Names	Name	Range
												[A]		x Pieces		[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)			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		TH-T18(BC)KP	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	(2a, 2b)			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			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	UT-AX2, 4(BC) x 1 or UT-AX11(BC) x 2	111-123(DO)KF	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 T25(BC)		11[7.5]	10 5[15]	19 5[15]	15	10[25]	10[30]	20[06]	17	60	60	60			TH-T25(BC)KP	0.24 to 22
3-133(BC)	100-100(DO)KF	11[7.3]	10.5[15]	10.0[10]	15	40[33]	40[32]	32[20]	17	00	00	00			TH-T50(BC)KP	29
S-T50(BC)	MSO-T50(BC)KP	15[11]	20[22]	25[22]	22	55(50)[50]	50[48]	38[38]	26	80	80	80			TH-T25(BC)KP	0.24 to 22
0 100(DO)	100 100(00)10	i o[i i]	ברנררן	20[22]	~~	(Note 1)	00[40]	00[00]	20	00	00	00			TH-T50(BC)KP	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			TH-T65KP	15 to 54
S-T80(CW)	MSO-T80(CW)KP	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52	120	120	120		UN-AX2, 4 x 1 or UN-AX11 x 2	TH-T100KP	0.7
	(Note IU)														(Note 4)	67
S T100	MOO TIOOKD	20[00]	55[45]	55[45]	55	105[100]	105[02]	05[75]	65	150	150	150	0-06		TH-T65KP	15 to 54
3-1100	1000-1100KF	30[22]	55[45]	55[45]	55	100[100]	100[90]	00[70]	05	150	150	150	2820	UN-AX80 x 2	TH-T100KP	67, 82
S-N125	MSO-N125KP	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70	150	150	150	1		TH-N120KP	42 to 105
S-N150	MSO-N150KP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200			(TA)	42 to 125
S-N180	MSO-N180KP	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120	260	260	260			ти เมววกเ/ มน	82 to 150
S-N220	MSO-N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260		UN-AX150 x 2		82 to 180
S-N300	MSO-N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350				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-4X600 x 1	TH-N600KP	250 to 500
S-N800	_	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800			(Note 5)	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-D).

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.

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

### MS/MSO/S-2x Reversible Magnetic Starters/ 4.2 **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.

#### Ratings/Specifications (Standard Applicability)

		Rate	ed Cap	oacity	[kW]		Rated	Operat	ting Cu	urrent [/	4]	Conventional			Compatible		
		Three-P	hase Sq	uirrel-cag	e Motor	Three-P	hase Sq	uirrel-cag	e Motor	Resisti	ve Load	Free Air	Auxiliary	Contact	Thermal	Overload	
Magnetic	Magnetic	(0	Catego	ry AC-	3)	(C	Catego	ry AC-	3)	(Catego	ry AC-1)	Thermal			Rel	ays	
Contactors	Starters (Note 12)	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	Current Ith [A]	Ith (Special)		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)			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)		TH-T18(BC)KP	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)	UT-AX2, 4(BC) x 2 or UT-AX11(BC) x 2		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				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			1H-129(BC)KP	0.24 to 22	
S-2×T32(BC)	- 1	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	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	2a2b x 2	UT-AX11(BC) x 2	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		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		UN-AX2, 4 X 2 or UN-AX11 x 2	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	1		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			(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	1			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	3a3b x 2 –			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	]			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	$4a/b \times 2$		TH-N600KP	250 to 500	
S-2×N800	-	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800	440 X Z	-	(Note 5)	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 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-D).

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
- (2) Mountable Only on Power Side (3-Pole In-Phase) ... For 2 Load Circuits (3) Mountable Only on Load Side (3-Pole In-Phase) ... For 2 Power Systems
- (4) Mountable Only on Load Side (Reverse Phase Switchable)
- : S-2xT□SD, S-2xN□SD : S-2xT□SG, S-2xN□SG : S-2xT□SX, S-2xN□SX

S-2xT□SF, S-2xN□SF

MSO-2×T21KP

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 $\Box$ , S-2 × T $\Box$  and MSO-2 × N $\Box$  types have the same mounting pitch as S-2 × N $\Box$  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.



## 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).

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	Item	Reference Page	Remarks
	Main Contact Rating	Page 39	_
	Auxiliary Contact Rating	Page 41	-
Related	Operation Coil	Page 43	-
Reference Page	· 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".)







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









#### N125





# N180/N220



# N300/N400



# N600/N800





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 doubledashed 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	

4

# Reversing Magnetic Starters (Enclosed Type)

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







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.

Madal		Dimensions													
Woder	A	AA	AB	AC	В	BA	BB	С	CA	М	N	0	Р	[kg]	
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)

		Rat	ed Cap	bacity [	kW]	R	ated C	Dperat	ing Cu	irrent [	[A]	Conventional				
Magnetic	Magnetic	Three-P	hase Sq (Catego	uirrel-cag ry AC-3)	e Motor	Three-Phase Squirrel-cage Motor (Category AC-3)				Resistive Load (Category AC-1)		Free Air Thermal	Auxiliary	Contact	Thermal Overload Relays	
Contactors	(Note 10)	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	Current Ith [A]	Standard (Special)	Additional Unit Model Names x Pieces	Model Name	Heater Designation Range [A]
SD-T12(BC)	MSOD-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	1-1-(0-)			0.12 to 11
SD-T20(BC)	MSOD-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	Ta 10(2a)			0.12 to 15
SD-T21(BC)	MSOD-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		TH-T25(BC)KP	0.24 to 22
SD-T32(BC)	—	7.5[7.5]	15[15]	15[11]	11	32[32]	32[32]	24[20]	12	32	32	32	_	- UI-AX2, 4(BC) X 1	—	—
		11[7 5]	10 5[15]	10 5[15]	15	10[25]	10[20]	20[06]	17	60	60	60			TH-T25(BC)KP	0.24 to 22
SD-135(BC)	1000D-100(DO)KP	[11[7.5]	10.0[10]	10.0[10]	15	40[33]	40[32]	32[20]		00	00	00		01-AAT 1(DO) X 2	TH-T50(BC)KP	29
		15[11]	201001	25[22]	22	55(50)[50]	50[10]	20[20]	26	20	20	20			TH-T25(BC)KP	0.24 to 22
3D-130(DC)	10000-100(DO)KF	J	حدرددا	23[22]	22	(Note 1)	50[40]	30[30]	20	00	00	80			TH-T50(BC)KP	29 to 42
SD-T65(CW)	MSOD-T65(CW)KP	18.5[15]	30[30]	37[30]	30	65[65]	65[65]	60[45]	38	100	100	100	2a2b			15 to 54
SD-T80(CW)	MSOD-T80(CW)KP (Note 8)	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52	120	120	120		UN-AX2, 4 X 1 or UN-AX11 x 2	TH-T100KP	67
	(1000)														TH-T65KP	15 to 54
SD-T100	MSOD-T100KP	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65	150	150	150		UN-AX80 x 2	TH-T100KP	67.82
SD-N125	MSOD-N125KP	37[30]	60[60]	60[60]	60	125[125]	120[120]	90[90]	70	150	150	150			TH-N120KP	42 to 105
SD-N150	MSOD-N150KP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200			(TA)	42 to 125
SD-N180	MSOD-N180KP	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120	260	260	260				82 to 150
SD-N220	MSOD-N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260	0.01	UN-AX150 x 2	TH-N220KPRH	82 to 180
SD-N300	MSOD-N300KP	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220	350	350	350	2a2b		THANKAR	105 to 250
SD-N400	MSOD-N400KP	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300	450	450	450			TH-N400KPRH	105 to 330
SD-N600	—	190[160]	330[300]	330[300]	330	630[630]	630[630]	500[500]	420	660	660	660			TH-N600KP	250 to 500
SD-N800	_	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800		UIN-AX600 X 1	(Note 4)	250 to 600

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-D).

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)



	Item	Reference Page	Remarks
	· Main Contact Rating	Page 39	_
	Auxiliary Contact Rating	Page 41	-
Related	· Operation Coil	Page 44	—
Reference Page	· 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".)



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





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





## **T100**







SD-2xN300

SD-2xN400



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

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

- 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)

		Rate	ed Cap	oacity	[kW]	Rated Operating Current [A]								ilian/ (	Contact	Compatible		
		Three-F	Phase Sq	uirrel-cag	e Motor	Three-Phase Squirrel-cage Motor				Resistiv	/e Load	Free Air	(fo	r Rove	vinaci	Thermal Overload		
Magnetic	Magnetic		(Catego	ry AC-3)	·	(Category AC-3)				(Catego	ry AC-1)	Thermal			, sing)	Relays		
Contactors	Starters	220 380			220	380			200	380	Current		For Self-	Additional	Marial	Heater		
	(Note 8)	to	to	500 V	690 V	to	to	500 V	690 V	to	to	lth	Valid	Demagnetization	Unit Wodel	Nodel	Designation	
		240 V	440 V			240 V	440 V			240 V	440 V	[A]		(Built-in)	Pieces	Name	[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					0.24 to 22	
SI_T35(BC)		11 [7 5]	18 5 [15]	18 5 [15]	15	10 [35]	10 [30]	32 [26]	17	60	60	60					0.24 to 22	
SE-105(BO)	1000L-100(DO)N	11[7.3]	10.5 [15]	10.0 [10]	15	40 [00]	40 [02]	02 [20]	17	00	00	00		x2		x2	TH-T50(BC)KP	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	2a2b		~~ <u>~</u>	TH-T25(BC)KP	0.24 to 22	
SE-130(BC)	1000L-100(DO)N	13[11]	בר [רכ]	20 [22]	~~~	33 (30)[30]	50 [40]	00 [00]	20	00	00	00	(2a2b × 2)			TH-T50(BC)KP	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			LIN-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			ONTWINE	TH-T100KP	67	
SI T100	MOOL TIOOKD	20 [20]	55 [45]	55 [45]	55	105 [100]	105 [02]	05 [75]	65	150	150	150	1a2b	1a1b		TH-T65KP	15 to 54	
SL-1100	WOUL-TIUUKP	30 [22]	55 [45]	55 [45]	55		100 [90]	00 [70]	05	150	150	150	(1a2b × 2)	(1a1b	UN-AX80x2	TH-T100KP	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)	× 2)	(UN-AX80x2)	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					42 to 125	
SL-N220	MSOL-N220KP	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150	260	260	260	1a2b		UN-AX150x2	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	(2a3b × 2)		(-)		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		UN-AX600x1	TH-N600KP	250 to 500	
SL-N800	_	220[200]	440[400]	500[400]	500	800[800]	800[800]	720[720]	630	800	800	800	(3a4b × 2)		(-)	(Note 3)	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-D).

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.



SL-T21

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	Operating	Minimum Capacitance	Capacitive	
	Transformer	For Capacitive Tripping	Tripping Device	
Frame	Capacity (For AC	(For AC200 V)	Model Name	
	Operation)	(µF)		Note 2
	(VA)	Note 1	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-C2
N800	300 to 400	600		

# Operating Transformer Capacity, Capacitive Tripping

- 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.



# 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.



#### Operation

#### Closing

- 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.







# 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 selfdemagnetizing contact (bold lines in figure below) but wire according to the caution nameplate attached to the unit.



#### 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.



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	-
Related	· Operation Coil	Page 44	-
Reference Page	· Properties	Page 46	-
	· Performance	Page 46	-
	· Outline Drawings/Contact Arrangements	Page 106	—
	· How to Order	Page 130	-
	· Combining with Optional Units	Page 194	—

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Outline Drawings/Contact Arrangements (Mechanically Latched Magnetic Starters/Magnetic Contactors)
 T21 (The diagrams show models without "BC".)



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






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).



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).



SLD-2xN400

SL-2xN400

SLN19





# 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

- 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<sup>+2</sup>/<sub>-1</sub> 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.



## Ratings/Specifications (Standard Applicability)

		Rat	ed Cap	acity	kW]	F	lated C	Operati	ng Cu	rrent [A	۸]	Conventional Free			Comp	atible
		Three	-Phase	Squirrel	-cage	Three	-Phase	Squirrel	-cage	Resistiv	e Load	Air	Auxiliary	Contact	Thermal	Overload
Magnetia	Magnetic	Mot	or (Cate	egory A	C-3)	Mote	or (Cate	egory A	C-3)	(Catego	ry AC-1)	Thermal			Rela	ays
Contactors	Starters											Current		Additional		Heater
CONTACTORS	(Note 8)	220 to	380 to	500 V	600 V	220 to	380 to	500 V	600 V	200 to	380 to		Valid	Unit Model	Model	Designation
		240 V	440 V	500 V	090 V	240 V	440 V	500 V	090 V	240 V	440 V	lth	valiu	Names	Name	Range
												[A]		x Pieces		[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	—		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-T35DI		11 [7 5]	18 5 [15]	18 5 [15]	15	40 [35]	40 [32]	32 [26]	17	60	60	60			TH-T25KP	0.24 to 22
O TOODE	WOO TOODEN	11 [7.0]	10.0 [10]	10.0 [10]	10	40 [00]	40 [02]	02 [20]	17	00	00	00			TH-T50KP	29
S-T50DL	MSO-T50DLKP	15 [11]	22 [22]	25 [22]	22	(Note 1)	50 [48]	38 [38]	26	80	80	80		- Note 3	TH-T25KP	0.24 to 22
S-T65DL	MSO-T65DLKP	18.5 [15]	30 [30]	37 [30]	30	65 [65]	65 [65]	60 [45]	38	100	100	100	1a1b		TH-T65KP	15 to 54
		00 [10]	45 [07]	45 [45]	45	05 [00]	05 [00]	75 [75]	50	100	100	100			TH-T65KP	15 to 54
5-160DL	INISU-TOUDLAP	22 [19]	45 [37]	45 [45]	45	00 [00]	00 [00]	10 [10]	52	120	120	120			(Note 8)	67
S-T100DI		30 [22]	55 [45]	55 [45]	55	105 [100]	105 [93]	85 [75]	65	150	150	150			TH-T65KP	15 to 54
	WIGO TTOUDEIN	00 [22]	55 [45]	55 [+5]	- 55	100 [100]	100 [00]	00 [70]	00	150	150	150			TH-T100KP	67, 82
S-N150DL	MSO-N150DLKP	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100	200	200	200			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	1a1h	UN-AX150x1	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	and	Note 3		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

	Input	t [VA]	Operating	Voltage [V]	Operating	Time [ms]	Operati	on Coils	Making and	Switching	Switching Dura	ability (x 10000)	
Frame	Inrush	Normal	Close	Open	Operating Power ON →Main Contact ON	Operating Power OFF →Main Contact OFF	Designation	Rated Voltage	Breaking Current	Frequency	Mechanical	Electrical (Category AC-3)	Delay Time
T12DL	70	13			7 to 100			Voltage	10 Times		100		
T21DL	100	15			1 10 100				Class AC-3		100		
T35DL	113	24			7 to 100	]			Operating		200		
T50DL	113	24	85% or	10% or	1 10 100		AC100V	100 to 110V	Current		200		
T65DL	55	26	Less of	More of				50/60 Hz		1200		100	2 <sup>+2</sup>
T80DL	55	26	Coil	Coil		10 to 100				Times/		100	Seconds
T100DL	66	27	Bated	Bated				200 to 220V	/	Hour			(Fixed)
N150DL	76	55	Voltage	Voltage	30 to 100		AC200V	50/60 Hz	8 Times		500		
N220DL	100	66	Ű	0					Class AC-3				
N300DL	140	85							Operating				
N400DL	140	85							Current			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



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  $\fbox{MCCB}$  causes  $\fbox{C}$  to charge via  $\fbox{RF}$  and  $\fbox{R_1}$ 

## 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  $MCa \rightarrow R_2 \rightarrow MC$ , 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  $R_1 \rightarrow R_2 \rightarrow MC$  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<sub>1</sub> 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



#### Variable Dimensions Table

Variable Dimensions Frame	А	AB	AC	AD	AE	В	BA	BC	BD	BE	BF	BG	вн	С	CA	СВ	CD	CE	CF	CG	СН	D	Е	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.

	Item	Reference Page	Remarks
	· Main Contact Rating	Page 39	_
Related	· Auxiliary Contact Rating	Page 41	_
helefelice rage	· 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

-														
		Ra	ted Cap	bacity [l	(W]	Rated	Operat	ing Cur	rent [A]				Compatible	
Magnetic	Starters	Three-F	Phase Sq	uirrel-cag	e Motor	Three-P	hase Sq	uirrel-cag	ge Motor	Auxilia	ry Contact	Therma	al Overload F	lelavs
	r		(Catego	ry AC-3)			(Catego	ry AC-3)	r					
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	Model	Name	Heater Designation Range
											x Pieces	With 3-Element (2E)	With 2-Element	[A]
_	MSO-T10SR	2.5[2.2]	4[2.7]	4[2.7]	4	11[11]	9[7]	7[6]	5	1a(1b)				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	1.016(0.0)	1	_	TH-T18SR	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		UT-AX2, 4(BC) x 1		TH TOPOD	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		or	10-125KF3N	10-1200h	0.24 to 22
	MOO TOFOD	11[7 5]	10 5[15]	10 5[15]	15	40[25]	40[20]	20[06]	17		UT-AX11(BC) x 2	TH-T25PSR	TH-T25SR	0.24 to 22
100-100KF0N	10130-1333n	[11[7.5]	10.0[10]	10.0[10]	15	40[35]	40[32]	32[20]	17			TH-T50PSR	TH-T50SR	29
	MSO TEOSP	15[11]	22[22]	25[22]	22	55/50\[50]	10[10]	20[20]	26			TH-T25PSR	TH-T25SR	0.24 to 22
1000-130KF3N	WIGO-1303h	13[11]	حدرددا		22	33(30)[30]	40[40]	30[30]	20			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	TH-T65PSR	TH_T65SR	15 to 5/
MSO-T80KPSB	MSO-T80SB	22[19]	45[37]	45[45]	45	85[80]	85[80]	75[75]	52		or		11-10501	10 10 04
		22[13]	40[07]	-0[-0]		00[00]	00[00]	10[10]	02	2a2b	UN-AX11 x 2	TH-T100PSR	TH-T100SR	67
MSO-T100KPSB	MSO-T100SB	30[22]	55[45]	55[45]	55	105[100]	105[93]	85[75]	65			TH-T65PSR	TH-T65SR	15 to 54
		00[22]	00[40]	00[-0]		100[100]	100[00]	00[70]	00		UN-AX80 x 2	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	TH-N120	42 to 105
MSO-N150KPSR	MSO-N150SR	45[37]	75[75]	90[90]	90	150[150]	150[150]	140[140]	100			(TA)KPSR	(TA)SR	42 to 125
MSO-N180KPSR	MSO-N180SR	55[45]	90[90]	110[110]	110	180[180]	180[180]	180[180]	120			TH-N220	TH-N220	82 to 150
MSO-N220KPSR	MSO-N220SR	75[55]	132[110]	132[132]	132	250[220]	250[220]	200[200]	150		UN-AX150 x 2	RHKPSR	RHSR	82 to 180
MSO-N300KPSR	MSO-N300SR	90[75]	160[150]	160[160]	200	300[300]	300[300]	250[250]	220			TH-N400	TH-N400	105 to 250
MSO-N400KPSR	MSO-N400SR	125[110]	220[200]	225[200]	250	400[400]	400[400]	350[350]	300			RHKPSR	RHSR	105 to 330

## Ratings/Specifications (Standard Applicability)

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.				
Related Reference Page	· 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 10/	_				

## 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.





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	А	AB	AC	В	BA	BC	D	G	Weight [kg]	Reference Diagram (Above Figure)
T10SR		94	28	30.5	150	60	10.5	79	M4	0.54	
T12/T20SR	]	94	35	30.3	150	60	10.5	79	M4	0.56	Fig. a
T21/T25SR		97.5	54	4.5	162.5	60	16	82	M4	0.78	riy.a
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	2	140	80	25	211	110	7	127	M5	2.5	FIG. D
N125SR		164	90	30	239	125	12.5	137	M4	3.9	
N150SR		164	100	32	250	130	15	145	M5	5	Fig. o
N180/N220SR	]	144	120	12	282	190	7	180.5	M6	8.2	Fig. C
N300/N400SR	]	163	145	9	360	225	9	195	M8	11.7/12.2	
T21/T25KPSR		97.5	54	4.5	162.5	60	16	82	M4	0.86	Lin o
T35/T50KPSR	]	97.5	65	5	170.5	70	13.8	91	M4	1.07	Fig. a
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	Fig. b
N125KPSR		164	90	30	269	125	12.5	137	M4	4.1	
N150KPSR	]	164	100	34	273	130	15	145	M5	5.2	Fig. o
N180/N220KPSR	]	168	120	36	282	190	7	180.5	M6	8.5	г ig. с
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

Magnetic	Starters	Rat Three-F	ed Cap hase Sq (Catego	oacity   uirrel-cao ry AC-3	[kW] ge Motor	Rated Three-P	Operat hase Sq Catego	ing Cur uirrel-caç ry AC-3	rent [A] je Motor )	Auxilia	ry Contact	C Therma	Relays	
Thermal Overload Relays With 3-Element (2E)	Thermal Overload Relays With 2-Element	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 Name x Pieces	Model	Name	Heater Designation Applicable Range
												With 3-Element (2E)	With 2-Element	[A]
MSO-T10FSKP	—	2.5[2.2]	4[2.7]	4[2.7]	4	11[11]	9[7]	7[6]	5	1a(1b)				2.1 to 9
MSO-T12FSKP	—	3.5[2.7]	5.5[4]	5.5[5.5]	5.5	13[13]	12[9]	9[9]	7	1016(00)		TH-T18FSKP	-	2.1 to 11
MSO-T20FSKP	—	4.5[3.7]	7.5[7.5]	7.5[7.5]	7.5	18[18]	18[18]	17[17]	9	1 1 1 1 (2 a)				2.1 to 15
MSO-T21FSKP	MSO-T21FS	5.5[4]	11[7.5]	11[7.5]	7.5	25[20]	23[20]	17[17]	9		1 1 UT-AX2 4/BC) x 1			2.1 to 15
MSO-T25FSKP	MSO-T25FS	7.5[5.5]	15[11]	15[11]	11	30(26)[26]	30(26)[25]	24[20]	12	1	or or	1H-120F5KP	1H-125F5	2.1 to 22
		4417 51	40 51451	40 514 51	45	40[05]	40[00]	0.010.01	47	1	UT-AX11(BC) x 2	TH-T25FSKP	TH-T25FS	2.1 to 22
MSO-135FSKP	MSO-135FS	11[7.5]	18.5[15]	18.5[15]	15	40[35]	40[32]	32[26]	11			TH-T50FSKP	TH-T50FS	29
		4 - [ 4 4 ]	001001	0.51001	00		CO[40]	001001	00	1		TH-T25FSKP	TH-T25FS	22
MSU-150FSKP	WSU-150F5		22[22]	25[22]	22	20(00)[00]	50[48]	38[38]	26	2a2b		TH-T50FSKP	TH-T50FS	29 to 42
MSO-T65FSKP	MSO-T65FS	18.5[15]	30[30]	37[30]	30	65[65]	65[65]	60[45]	38	1	UN-AX2, 4 x 1			40 E4
		00[10]	451071	455451	45	0.510.01	0.51001	751751	50	1	or	100500	11-100-0	42, 54
MSU-180FSKP	IVISU-180FS	22[19]	45[37]	45[45]	45	80]080]	ဗ၁(80)	[/5[/5]	52		UN-AX11 x 2	(Note 5)	(Note 5)	67
		20[00]	EELAEI	EELAEL	FF	105[100]	105[00]	05[75]	GE	1		TH-T65FSKP	TH-T65FS	42, 54
W50-1100F5KP	100-1100-5	30[22]	[55[45]	၁၁[45]	55		100[93]	၀၁[/၁]	05		UN-AX80 X 2	TH-T100FSKP	TH-T100FS	67, 82

## Ratings/Specifications (Standard Applicability)

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 $\Box$ FS/FSKP types can also be manufactured.

Note 5. Enclosed type heater designation 67A uses a thermal overload relay dedicated for enclosed types.

Relate	d
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.
$\cdot$ Outline Drawings/Contact Arrangements	Page 77	Same as MSO- $\Box$ type.
· How to Order	Page 131	_
$\cdot$ 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.



## Ratings/Specifications (Standard Applicability)

	Ra	ated Cap	bacity [k	W]	Rated	Operati	ing Curr	ent [A]	Auxilian/ Contact		
Magnetic Starters	Three-P	hase Squ (Catego	uirrel-cag ry AC-3)	e Motor	Three-P	hase Sqı (Catego	uirrel-cag ry AC-3)	e Motor	(Note 5)	Combinable Therm	al 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)		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		TH-T25KP	0.24 to 15
	11[7 5]	10 5[15]	10 5[15]	15	10[25]	10[15]	20[06]	17		TH-T25KP	0.24 to 22
	11[7.5]	[10.5[15]	10.5[15]	15	40[33]	40[15]	32[20]			TH-T50KP	29
	15[11]	00[00]	05[00]	22		50[10]	100100	26		TH-T25KP	0.24 to 22
			20[22]	22	55(50)[50]	50[46]	30[30]	20	2a2b	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
	20[22]	55[45]	55[45]		105[100]	105[02]	05[75]	65	]	TH-T65KP	15 to 54
	30[22]	00[45]	00[45]	55		100[93]	00[/0]	05		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.

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

## Outline Drawings



Гтото		Variable Dimensions										
Frame	A	AA	AB	В	BA	BB	BC	С	CA	М	N	[kg]
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



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

# 4.9 MSO/S-TDBC 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

Manufacturing Range List

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

#### Non-Reversing Reversing Model Terminal Magnetic Contactors Magnetic Starters Magnetic Contactors **Magnetic Starters** Cover Auxiliary Contact Frame Model Name Model Name (Note 4) Auxiliary Contact Auxiliary Contact Types Model Name Model Name (Note 4) Auxiliary Contact 1a x 2 + 2b 1a x 2 + 2b 1a 1a S-T10BC MSO-T10BCKP S-2xT10BC T10 MSO-2xT10BCKP 1b x 2 + 2b 1b x 2 + 2b 1b 1b 1a1b 1a1b 1a1b x 2 + 2b 1a1b x 2 + 2b T12 S-T12BC MSO-T12BCKP S-2xT12BC MSO-2xT12BCKP 2a, 2b 2a, 2b 2a x 2 + 2b 2a x 2 + 2b 1a1b x 2 + 2b Wiring 1a1b 1a1b x 2 + 2b 1a1b T20 S-T20BC MSO-T20BCKP S-2xT20BC MSO-2xT20BCKP 2a 2a 2a x 2 + 2b 2a x 2 + 2b Streamlining T21 S-T21BC 2a2b MSO-T21BCKP S-2xT21BC 2a2b x 2 MSO-2xT21BCKP 2a2b x 2 Terminal 2a2b 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 MSO-T50BCKP S-2xT50BC MSO-2xT50BCKP 2a2b 2a2b 2a2b x 2 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
T25 T50	TH-T25BC(KP) *2
135, 150	TH-T50BC(KP) *2

\*1: Separately arrange a UN-TH21 connecting conductor kit.

\*2: Separately arrange a UT-TH50 connecting conductor kit.

## 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.

Related Reference Page

 the same as the standard type							
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 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.					

## 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.

Outline Drawings/Contact Arrangements (AC Operated Magnetic Starters/Magnetic Contactors)
 T10BC



120

## T12/T20BC



## T21/T25BC







S-2xT50BC

auxiliary contact units mounted at the same time

## 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.

## Manufacturing Range List

Model	Non-Reve	ersing				
	Magnetic Co	ontactors	Terminal			
Frame	Model Name	Auxiliary Contact				
T10	S-T12SQ	1a1b, 2a, 2b				
112	SD-T12SQ	1a1b, 2a				
T20	S-T20SQ	1a1b, 2a, 2b	Spring Clamp Terminals			
120	SD-T20SQ	1a1b, 2a				

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



S-T12SQ

	Item	Reference Page	Remarks
	Main Contact Rating	Page 39	_
	Auxiliary Contact Rating	Page 41	-
	Operation Coil	Page 43	
Related	Properties	Page 45	-
Reference Page	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



# 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	Rate Three-P (C	ed Cap Phase Squ atego	bacity uirrel-cag ry AC-	[kW] je Motor -3)	Ra Three-P (Ca	ited O Thase Squ atego	perati uirrel-cag ry AC-	ng Cu e Motor -3)	Arrent [A] Resistive Load (Category AC-1) Thermal C		urrent [A] Resistive Load (Category AC-1)		urrent [A] Resistive Load (Category AC-1)		Resistive Load (Category AC-1)		r Resistive Load (Category AC-1)		Urrent [A] Resistive Load (Category AC-1)		Resistive Load (Category AC-1)		Irrent [A] Resistive Load (Category AC-1)		urrent [A] Resistive Load (Category AC-1)		Conventional Free Air Thermal Current	Additional Auxiliary Contact Unit Model Name	Terminal S Standard Tigh N· Parentheses Shor	tening Torque m w Standard Value	Recommended Compatible v	Crimp Lug Size vith Terminal
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	lth [A]	x Pieces (Note 2)	Main Circuit	Control Circuit	Main Circuit	Control Circuit																
S-T32(BC) SD-T32(BC)	S-2 × T32(BC) SD-2 × 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 × N38(CX)	7.5	15	15		35	32	24		60	60	60	UN-AX2, 4 x 1	M5	M3.5	1.25-5	1.25-3.5																
S-N48(CX)	S-2 × N48(CX)	11	15	15		50	35	24		80	80	80	(Front Clip-on)	(2.55)	(1.17)	to 14-5	to 2-3.5																

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

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

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	_
Related Reference Page	· 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".)







#### 2-M4 Screw Mounting Hole 4-M4 Screw Mounting Hole 30 (Mounting 5.5 Dimension M3.5 Screw (Self-Lifting) 21.5 ⊕, 🗣 ,⊕ ⊕, 🗣 🕀 0 Dimen $\odot \odot \odot \odot$ 揈 $\odot \odot \odot \odot$ ₫– c ſŪΤ 8 60 (Mounting E ų, • ۲ b, b, 10 2a2t 10.5 8.5 M4 Screw (Self-Lifting ×2 2/T· 0.84kg Model Name Model Name S-2×T32 S-2×T32BC

.

Model Name SD-2×T32 SD-2×T32BC

## SD-T32(BC)



D 'n

ГŪ

138

- 📥

10.5

Г

IEC 35 mm Bail

3.5

(For 7.5 mm Rail Height)

10

4.5

32

Contac

2a2b

×2

32

b,





# 4.12 How to Order

## MS-T Series

#### Precautions

1. Standard (AC Operated) Magnetic Starters (E.g.: M (If not ir

MS-(2x)T (Enclosed Type)

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.)



### 2. Standard (AC Operated) Magnetic Contactors



## 3. DC Operated Magnetic Starters/Contactors



## 4. Mechanically Latched Magnetic Starters/Contactors



 
 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.
 Select the coil designation from page 44.
 Select the coil designation from page 44.

## 5. Delay Open Magnetic Starters/Contactors

MSO-TODL, S-TODL Type



#### 6. Magnetic Starters with Delay Trip Thermal Overload Relays

#### MSO-T SR Type



#### 7. Magnetic Starters with Quick Trip Thermal Overload Relays

MSO-T 🗆 FS/FSKP Type



## 8. Magnetic Starters with Push-Buttons



## 9. Magnetic Starters/Magnetic Contactors with Wiring Streamlining Terminals

MSO-T 🗆 BC Type



## 10. Magnetic Contactors with Spring Clamp Terminals



## 11. Main Circuit 3-Pole Magnetic Contactors



## MS-N Series

1. Standard (AC Operated) Magnetic Starters

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



### 2. Standard (AC Operated) Magnetic Contactors



#### 3. DC Operated Magnetic Starters/Contactors

#### MSOD-N Type



## 4. Mechanically Latched Magnetic Starters/Contactors

#### MSOL-N 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				Select the coil desi	igna	tion from page 44.		
a DC operated closing coil.								

## 5. Capacitive Tripping Device



4

#### 6. Delay Open Magnetic Starters/Contactors



## 7. Magnetic Starters with Delay Trip Thermal Overload Relays

MSO-N 🗆 KPSR Type

Model Name	Motor Ca Designatio	pacity or Heater n (Knob Setpoint)	[	Main Circuit Voltage	Operation Coil Designation or Control Circuit Voltage/Frequency		(Note) Auxiliary Contact
MSO-N125KPSR	▲ <u>30kW</u>		▲ .	2007	AC200V	▲,	
Specify from page 114.	Select from pa	ge 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.

# MEMO



# TH-T/N Type Thermal Overload Relays

5

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	Protection Type Thermal Overload Relays
	TH-□/KP145
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	TH-□(KP)SR ······146
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	TH-□FS (KP) ······147
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# 5.1 Model List

Frame						T18	T25	T50	T65	T100													
			Appearance	•			TT.																
			Standar with 2-Elen	d nont	For Magnetic Starters		TH-T25	TH-T50	TH-T65	TH-T100													
	Mod	del Name	With 3-Eler	ment	For Magnetic Starters	ТН-Т18КР																	
			(2E)	nem	For Independent Mounting	UT-HZ18 + TH-T18KP	TH-T25KP	_	TH-T65KP	-													
		W H	Outline Dra	wing	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													
l	$\leq$	Σ/p	[mm] W x F		For Independent	46 x 63 x 82.7		_		-													
		r D Apr	licable Stan	dard	wounting		US C8201-4-1 JEC		17-4-1 GB140484														
					Ambient Temperature [°C]	-10 to	+40 (Standard is 20	C. Inner Panel Max	mum Temperature i	s 55°C)													
		Use Cond	itions		Frequency [Hz]			0 (DC) to 400															
		Rated	Insulation Vo	oltage	[M]			690															
		Rated	Impulse With	hstanc	d Voltage [kV]			6															
		Polluti	on Degree				1	3			1												
						0.12 (0.1 to 0.16)	0.24 (0.2 to 0.32)	29 (24 to 34)	15 (12 to 18)	67 (54 to 80)													
						0.17 (0.14 to 0.22) 0.24 (0.2 to 0.32)	0.35 (0.28 to 0.42)	35 (30 to 40)	22 (18 to 26)	82 (65 to 100)													
цi						0.35 (0.28 to 0.42)	0.5(0.4(00.6))	42 (34 10 50)	29 (24 to 34) 35 (30 to 40)	95 (65 10 105)													
Circi						0.5 (0.4 to 0.6)	0.9 (0.7 to 1.1)		42 (34 to 50)														
L						0.7 (0.55 to 0.85)	1.3 (1 to 1.6)		54 (43 to 65)														
Ма						0.9 (0.7 to 1.1)	1.7 (1.4 to 2)																
the	He	ater Designation	n (Adjustment F	Range	of Settling Current)	1.7 (1.4 to 2)	2.1 (1.7 to 2.5)																
oft			[A]			2.1 (1.7 to 2.5)	2.5 (2 to 3)																
suc	(The line in the table on the right represents the correspondence between the magnetic contactor and frame to be combined)					(The line in the table on the right represents the				(The line in the table on the right represents the				(The line in the table on the right represents the			t represents the	2.5 (2 to 3)	3.6 (2.8 to 4.4)				
atic						3.6 (2.8 to 4.4)	5 (4 to 6)																
cific						5 (4 to 6) 6 6 (5 2 to 8)	9 (7 to 11)																
bed	(Refer to the relevant text regarding the heater					9 (7 to 11)	11 (9 to 13)																
0)					g the heater	11 (9 to 13)	15 (12 to 18)																
						15 (12 to 18)	22 (18 to 26)																
	Po	wer Consumption	VA/Element] N	Minimur	m/Maximum Settling	0.8/1.8	1.0/2.1	1.6/3.2	2.4/5.5	2.5/6.0													
		<b>I</b>	erminal Scre	ew Size	e /iro Sizo [mm <sup>2</sup> ]	M3.5	M4	M5	IVI6	Mb													
		Terminal-Con	npatible			ψ1.0, 0.75 to 2.3 1 25-35 to 2-35 55-83	1 25-4 to 5 5-4	$\psi^2$ to 5.0, 4 to 14 5 5-5 to 14-5															
÷		C	ontact Arran	aemer	nt	1a1b	1a1b	1a1b	1a1b	1a1b													
ntac		Conventional	Free Air The	ermal (	Current Ith [A]	2	5	5	5	5													
ථ		Categor	ry AC-15		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)													
rcuit			Switching	· [	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)													
ol Ci	Ratin	g Make Cor	ntact/Break Con	ntact	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)													
ontro	Use	The value in parenthes	ses is the rating during a	auto reset	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)													
č	[A]	/ DC C	Contactors		DC24 V																		
of th		Coil S	Switching /	auto recet	DC220 V	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)													
Suo		Mini	mum Applica	able L	oad Level	20 V 5 mA	20 V 5 mA	20 V 5 mA	20 V 5 mA	20 V 5 mA													
icati		T	erminal Scre	w Size	e	M3.5	M3.5	M3.5	M4	M4													
vecifi		Terminal Con	nnatiblo	W	'ire Size [mm <sup>2</sup> ]	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													
Sp				C	rimp 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													
ons		Operating	g Characteris	stic Cu	Irve Page			153	2														
Incti	Vibra	ation Resistance (Vil	bration and Malfu	inction R	lesistance Performance)		1	10 to 55Hz 19.6m/s		<b>A</b>	1												
ss/Fi	Trip Free					Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable													
Dertie	Reset Method				Display)																		
Operation Indicator (Lever Display)     Manual Tripping Check				ck	Ő	Ő	Ő	0	Ő														
	-		analaire e el A.A		Cantastan	T10, T12, T20	TO1 TO5 TO5 TO	T35, T50	TEE TOO T100	T80, T100													
	F	rame of the Co	Dinipined Mag	gnetic	Contactor	112, 120 T20	121, 125, 135, 150	T50	100, 180, 1100	T100													
lucts		With Saturable	Reactor	With 2	2-Element (TH-□SR)	○ (TH-T18SR)	○ (TH-T25SR)	○ (TH-T50SR)	○ (TH-T65SR)	○ (TH-T100SR)													
Prod		[See Page	146]	With 3-E	Element (2E) (TH-□KPSR)	_	O (TH-T25KPSR)	○ (TH-T50KPSR)	○ (TH-T65KPSR)	○ (TH-T100KPSR)													
plied		Quick Trip	Type	With 2	2-Element (TH-□FS)		$\triangle$ (TH-T25FS)	$\triangle$ (TH-T50FS)	$\triangle$ (TH-T65FS)	$\triangle$ (TH-T100FS)													
Ap		[See Page	147] Dort Droto	With 3-E	ement (2E) (TH-⊡FSKP, KF)	△ (IH-I18FSKP)	C (IH-125FSKP)	△ (IH-150FSKP)	$\triangle (1H-165FSKP)$	$\triangle$ (IH-I100FSKP)													
-		Live	Part Protect		over																		
ioné		004	eration Indica	ase	amp	© (UN-TI 12)		© (UN-TI 20)															
Dpti		Independent	/IEC 35 mm	Rail M	lounting Unit	© (UT-HZ18)	© (UN-RM20)		_	_													
J		Misop	eration Preve	ention	Cover	_	© (UN-CV203)	© (UN-CV203)	© (UN-CV603)	© (UN-CV603)													
_						L																	

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 NOODH	THAMAD	
 TH-N120	TH-N120TA	TH-N220RH	TH-N400RH	
				TH-N600(Note 3)
 TH-N120KP				
				TH-INDUUKP(INDLE 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
 10 +-	JIS, JI	EM, IEC, VDE, BS, U	JL, GB	- 55%0)
 - 10 to -	+40 (Standard IS 201	C, Inner Panel Max	F0 to 60	\$ 55°C)
 0 (DC)	10 400	690	50 10 60	
 		6		
		3		
 42 (34 to 50)	105 (85 to 125)	82 (65 to 100)	105 (85 to 125)	250 (200 to 300)
54 (43 to 65)	125 (100 to 150)	105 (85 to 125)	125 (100 to 150)	(Current Transformer Ratio:
67 (54 to 80)	, ,	125 (100 to 150)	150 (120 to 180)	400/5 A)
82 (65 to 100)		150 (120 to 180)	180 (140 to 220)	330 (260 to 400)
		180 (140 to 220)	250 (200 to 300)	(Current Transformer Ratio:
		210 (170 to 250)	330 (260 to 400)	500/5 A)
				500 (400 to 600) (Current Transformer Ratio:
				1000A)
				(Current Transformer Ratio:
			*The thermal overload relay	1000/3 hj
			of 180A or less is the same as the N220 frame.	
 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)
 1(0.2)	1(0.2)	U.D(U.D)/ I(U.D)	1/0.2)	1/0 2
 0.2(0.2)	0.2/0.2/	0.2(0.2)		0 2(0 2)
 0.1(0.1)	0.2(0.2)	0.2(0.2)	0.2(0.2)	0.2(0.2)
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
15	56	1:	56	156
 		10 to 55Hz 19.6m/s	~	~ ~ ~
 Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable	Manual/Automatic Switchable
 0	0	0	0	
 V	N125_N150	N180 N220	N300_N400	
 N125, N150	N150	N220	N400	N600, N800
○ (TH-N120SR)	O (TH-N120TASR)	O (TH-N220□SR)	○ (TH-N400□SR)	O (TH-N600SR)
 O (TH-N120KPSR)	O (TH-N120TAKPSR)	O (TH-N220□KPSR)	O (TH-N400□KPSR)	O (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)

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

#### **Contact Rating** 5.2

• Main circuit specifications... as shown on page136 • Specifications of the control circuit (contact) • The contact rating is as shown in the following table

			•	,	•	•		
Fram	ne	T	18	T25	,T50	T65,T100,N	- 4	
Conta	act	Break Contact	Make Contact	Break Contact	Make Contact	Break Contact	Make Contact	E/ OFF
Conventional Free Air Thermal Current Ith [A]		2	2	5	5	5	5	
Class AC-15	AC24V	2 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)	
Rated Operating	AC120V	2 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)	3 (0.5)	2 (0.5)	
Current	AC240V	1 (0.5)	1 (0.5)	2 (0.5)	1 (0.5)	2 (0.5)	1 (0.5)	MC A
[A]	AC550V	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	1 (0.5)	0.5 (0.5)	\ AX
Class DC-13 Rated	DC24V	0.5 (0.3)	0.5 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)	
Operating Current	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)	AX
[A]	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)	
		INIC . SD 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.



THR : TH Type

#### **Operating Properties (Standard Value)** 5.3

The operating properties of the thermal overload relays are specified as shown in the table below according to the standards.

			Operation in	Operation in Un	Ambient			
Standard	Conditions	Limit Op	erations	Operation During Overload	Operation During Constraint	Non-Operation	Operation	Tomporatura
		A (Cold Start)	B (Continued From A)	C (Hot Start)	D (Cold Start)	A (Cold Start)	B (Continued From A)	
	Multiple of Sottling Current	1.05	1 0	1.5	7.0	2-Pole 1.0	2-Pole1.15	
JIS C8201-4-1	wulliple of Settilling Current	1.05	1.2	1.5	1.2	1-Pole 0.9	1-Pole 0	
				(5) Less Than 2 Minutes	(5) Tp ≤ 5 Seconds			
	Operating Time	Non-	Within 2 Hours	(10A) Less Than 2 Minutes	(10A) $2 < Tp \le 10$ Seconds	Non-	Within	20°C
		Operation		(10) Less Than 4 Minutes	(10) 4 < Tp ≤ 10 Seconds	Operation	2 Hours	
		(2 Hours)		(20) Less Than 8 Minutes	(20) 6 < Tp ≤ 20 Seconds	(2 Hours)	2110013	
				(30) Less Than 12 Minutes	(30) 9 < Tp ≤ 30 Seconds			
	Multiple of Settling Current	1.05	12	15	72	2-Pole 1.0	2-Pole1.15	
	maniple of octaining our circ	1.00	1.2	1.0	1.2	1-Pole 0.9	1-Pole 0	
IEC 60947-4-1		Non-		(10A) Less Than 2 Minutes	(10A) $2 < Tp \le 10$ Seconds	Non-		20°C
	Operating	Operation	Within 2	(10) Less Than 4 Minutes	(10) 4 < Tp ≤ 10 Seconds	Operation	Within	200
	Time	(2 Hours)	Hours	(20) Less Than 8 Minutes	(20) 6 < Tp ≤ 20 Seconds	(2 Hours)	2 Hours	
		(2 110013)		(30) Less Than 12 Minutes	(30) 9 < Tp ≤ 30 Seconds	(2110013)		
	Multiple of Settling Current	1.05	12	15	7.2	2-Pole 1.0	2-Pole1.15	
	maniple of octaining ourrent	1.00	1.2	1.0	1.2	1-Pole 0.9	1-Pole 0	
JEM 1356	Operating	Non-Operation	Within 2	(Quick) Within 4 Minutes	(Quick) Tp ≤ 5 Seconds	Non-Operation	Within	20°C
	Time	(2 Hours)	Hours	(Standard) Within 8 Minutes	(Standard) $2 \le Tp \le 15$ Seconds	(2 Hours)		
	TITIC	(2 110013)	i iouis	(Delay) Within 12 Minutes	(Delay) $9 \le Tp \le 30$ Seconds	(2 1 10u 13)	2110013	

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	Selection	Applicable Thermal Overload Relays				
Conditions, etc.	Selection	With 2-Element	With 3-Element (2E)			
Standard Start, Stop (Low Frequency)	Standard Thermal Overload Relays	ТН-⊡Туре	ТН-⊡КР Туре			
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)	-	ТН-⊡КР Туре			
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			Т	hree-Pha	ase Moto	rs			S	Single-Phase Motors				
Motor 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	Capacity [kW]	
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	I —	I —	-	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

note 2. If the full hole of poles in the timee-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

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## 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 SP (with saturable reactor)
- TH-SR (with saturable reactor) Motors with long startup time, applications with frequent inching and intermittent running.

## Application to Standard Three-Phase Motors

Select the frame and heater designation from the table below. Refer to page 139 for details.

	Heater	Setting Range			_	irom				Standard Thre	e-Phase Motor	Reference	*1 The thermal overload relay with the heater designation of 180A
	[A]	Current [A]			'	ian				200 to 220 V	280 to 140 V	Wire Size [mm <sup>2</sup> ]	or less in the N400 frame is the
	0.12	0.1 to 0.16		r	_					200 10 220 V	360 10 440 V	Wile Oize [min]	same as that of the N220 frame
	0.12	0.1 to 0.10											*2 The value in parentheses is
	0.17	0.14 to 0.22			1					0.03	0.05	15	applicable to 220 V. 132 kW
	0.24	0.2 to 0.32								0.05	0.00	1.5	
-	0.5	0.4 to 0.6								0.00	0.1	1.5	
	0.7	0.55 to 0.85								0.1	0.2	1.5	
1	0.9	0.7 to 1.1	ł								0.2		
	1.3	1 to 1.6	ł							0.2	0.4	1.5	
1	1.7	1.4 to 2	18								0.75	1.5	
1	2.1	1.7 to 2.5	-	ы						0.4		1.5	
	2.5	2 to 3	ł	T2							1	1.5	
1	3.6	2.8 to 4.4								0.75	1.5	1.5	
1	5	4 to 6								1	2.2	1.5	
1	6.6	5.2 to 8								1.5	3.7	1.5	
	9	7 to 11								2.2		1.5	
	11	9 to 13									5.5	2.5	
	15	12 to 18	1							3.7	7.5	4	
	22	18 to 26		1						5.5	11	6	
	29	24 to 34		_	35					7.5	15	10	
	35	30 to 40		T50	19						18.5	10	
	42	34 to 50								11	22	16	
	54	43 to 65				20				15	30	25	
	67	54 to 80			0	Ξ		_		18.5	37	25	
	82	65 to 100			5		N220			22	45	35	
	95	85 to 105								30	55	50	
	105	85 to 125				20TA		0		30	55	50	
	125	100 to 150				N	0	40		37	75	50	
	150	120 to 180					122	Ξ		45	90	70	
	180	140 to 220					2	Â		55	110	95	
	210	170 to 250								75	132	150	
	250	200 to 300						N400		75	132, 160	150	
	330	260 to 400						¥	000	90, 110	200	185	
	500	400 to 600							ž	132, 160	315	2 x 200 (2 x 150) *2	
	660	520 to 800	1							1 200	400	$2 \times 240$	

● TH-T□FSKP (quick trip type with 3-element [2E])

Protection of compressor motor for refrigerators

TH-FS (2-element quick trip type)

Protection of submersible motors and explosion proof motors

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]	Ę	5	8	Motor Star 10	ting Time [sec] 15	20	
T10	0.10.4-15	T10	L		T100D	I		
118	0.12 to 15	118			1185R			
T25	0.24 to 22	T25			T25SR			
T50	29 to 42	T50			T50SR			The heater of the
T65	15 to 54	T65			T65SR			thermal overload
	67, 82, 95	T100			T100SR			relay is short-
N120, N120TA	42 to 125	N120, N120TA N120SR, N120TASR					circuited during	
N220	82 to 210	N220 N220SR					the start-up.	
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- $\Box$ 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



## 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- $\Box$ 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.



## 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 change relative to the ambient temperature of 20°C (the 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).)













Note 1. The ambient temperature applied to MS type indicates the outside temperature of the box.









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 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.

	3			
Model Name	Independent Thermal Overload Relavs TH-□	Model	Name	Independent Thermal Overload Relavs TH-□
	<b>- - ,</b> -			- · · · · · · · · · · · · · · · · · · ·
TH-T18(BC)(KP) 0.12 to 2.5A	1.04	TH-N120(KP)	42A 54A	1.08
TH-T18(BC)(KP) 3.6A	1.05	TH-N120(KP)	67A 82A	1.16
TH-T18(BC)(KP) 5 to 15A	1.06	TH-N220(KP)/N	400(KP)	1.01
TH-T25(BC)(KP)	1.06	TH-N600(KP)		1.02
TH-T65(KP)	1.05			

• Compensation factor when using the thermal overload relay independently

#### 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

	5			- I · · · · · · · · · · · · · · · · · ·	
Model Name	Heater Designation [A]	Standard Electric Wire Size [mm <sup>2</sup> ]	Connecting Electric Wire Size [mm <sup>2</sup> ]	Change Rate of Minimum Operating Current [%]	
TH-T18(KP)	0.12 to 15	0	1.25	98	
TH-T25(KP)	0.24 to 11	2	2.5	103	
TH-T25(KP)	15, 22	3.5	2 6	97 104	
	29	0	5.5	96	
TH-T50(KP)	35	0	14	104	
	42	14	8	95	
	15	3.5	2 5.5	95 105	
	22, 29	5.5	3.5 8	96 105	
TH-T65(KP)	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 <sup>2</sup> ]	Connecting Electric Wire Size [mm <sup>2</sup> ]	Change Rate of Minimum Operating Current [%]
TH-T100(KP)	67	22	14 30	97 103
1111100(14)	82	38	30	97
	42	14	8 22	95 104
TH-N120(KP)	54, 67	22	14 30	96 104
	82	38	30 50	97 103
	105	60	38 60	97 103
10-111201A(KP)	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 nofuse 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.



## 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:
- Automatic  $\rightarrow$  manual switching method: Slide the switching plate to the left to align with H. (In the state as shown in Figure 6.1)



Note 1. Take precautions as follows when cutting off the stopper.  $\cdot$  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)



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.

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)



- 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.



(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.

contactors.

### Standard/Overload and Open-Phase Protection Type Thermal 5.7 **Overload Relays TH-D/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.

#### Features



 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

TH-KP has the same shape and size as TH (standard with

2-element), and can be easily combined with magnetic

- 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

## 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)

	Standard with	For Magnetic Starters	TH-T18	TH_T25	TH-T50	TH-T65	TH-T100	TH-N120	TH-N120TA	TH-N220RH	TH-N400RH	TH-N600	
Model	2-Element	For Independent Mounting	(Note 1)	111-125	-	111-105	-		TH-N120TAHZ	TH-N220HZ	TH-N400HZ	(Note 3)	
Name	With	For Magnetic Starters	TH-T18KP		TH-T50KP		TH-T100KP	TUNKOOKD	TH-N120TAKP	TH-N220RHKP	TH-N400RHKP	TH-N600KP	
	3-Element (2E)	For Independent Mounting	(Note 1)	1H-125KP	-	TH-TOOKP	_	TH-N120KP	TH-N120TAHZKP	TH-N220HZKP	TH-N400HZKP	(Note 3)	
Operati	ing Frequency	/ Range [Hz]			0	(DC) to 400 (Note	6)				50 to 60		
Heater (Adjust Current [A] (The   on the ri- correspc the mag frame to	Designation ment Range ) line in the tabli ght represents onderce betweents onderce betweents be combined	of Settling the rand	$\begin{array}{c} 0.12 \\ (0.1 to 0.16) \\ 0.17 \\ (0.14 to 0.22) \\ 0.24 \\ (0.2 to 0.32) \\ 0.35 \\ (0.28 to 0.42) \\ 0.5 (0.4 to 0.6) \\ 0.7 \\ (0.55 to 0.45) \\ 0.9 \\ (0.7 to 1.1) \\ 1.3 (1 to 1.6) \\ 1.7 (1.4 to 2) \\ 2.1 \\ (1.7 to 2.5) \\ 2.5 (2 to 3) \\ 3.6 \\ (2.8 to 4.4) \\ 5 (4 to 6) \\ 6.6 (5.2 to 8) \\ 9 (7 to 11) \\ 11 (9 to 13) \\ 116 (12 to 18) \end{array}$	$\begin{array}{c} 0.24 \\ (0.2 \ to \ 0.32) \\ (0.28 \ to \ 0.42) \\ 0.5 \\ (0.4 \ to \ 0.6) \\ (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) \$	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(24 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) 125 150 (120 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) (Curren Transformer Ratio 4005 A (260 to 400) (Current Transformer Ratio 5005 A (400 to 600) (Current Transformer Ratio 7505 A (520 to 800) (Current Transformer Ratio 10005 A	
Trip Cl (see pa	ass age 148)		10A	10A	10A	15A to 42A : 10 54A : 10A	67A : 10 82A : 10A	10	10	10	10	10A	
Frame Magne	of the Coml etic Contacto	oined or	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

## 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.

## 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.



TH-T25KPSR

#### • Manufactured model name, heater designation and combined magnetic contactor frame (with saturable reactor)

3-Element (2E)		For Independ Mounting	lent	-	(Note 5)	-	TH-T65KPSR		THEN ZONE ON	-	TH-N220HZKP SR	TH-N400HZKP SR	THENOLOGICE ST
Name	Name With	For Magnetic Starters	For Non-Reversing For Reversing	-	TH-T25KPSR	TH-T50KPSR		TH-T100KPSR		TH-N120TAKP SR	TH-N220RHKP SR	TH-N400RHKP SR	TH-N600KPSB
	For Independent	t Mounting	(See Note 1)	(14010-0)	-		-		-	TH-N220HZSR	TH-N400HZSR		
With 2-Element	Starters	For Reversing	TH-T18HZSR	TH-T25SR (Note 5)	TH-150SR TH-T655	TH-T65SR	TH-T100SR TH-T100SR T	TH-N120SR	TH-N120TASR	TH-N220RHSR	TH-N400RHSR	TH-N600SR	
		For Magnetic	For Non-Reversing	TH-T18SR									

					301	0.00				
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  2.5) 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 (6.2  to  8) 9 (7  to  11) 11 (9  to  13) 15 (12  to  13) 15 (12  to  13)	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) To 1 To 25	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 (24 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) 125 150 (100 to 150) 150 (120 to 180) 180 (140 to 220) 250 (200 to 300) 330 (260 to 400) *The famil overdar deg with head religation 180 x of this is the same as the 1220 famil.	250 (200 to 300) (Current Transformer Ratio 4005 A 330 (260 to 400) (Current Transformer Ratio 5005 A 500 (Current Transformer Ratio 7505 A 660 (520 to 800) (Current Transformer Ratio 10005 A
Frame of the Combined Magnetic Contactor	T12,T 20	T35,T50	TEO	T100	T100	11123, 11130	N120, N150	N100, N220	N400	11000, 11000

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-DFS(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

## Application

The manufactured model name, heater designation and combined magnetic contactor frame are shown in the table below.

		<b>F M H H</b>	Í.	[			711 710050
	With 2 Element	For Magnetic Starters	—	TH T25ES	IH-150F5	TH TESES	TH-I100FS
Model	With 2-Liement	For Independent Mounting	-	111-1251-5	-	11-1051-5	-
Name	With 2 Flow ant (0F)	For Magnetic Starters	TH-T18FSKP		TH-T50FSKP		TH-T100FSKP
	With 3-Element (2E)	For Independent Mounting	(See Note 1)	1H-120F5KP	-	11-100-564	-
	Operating Frequen	cy Range [Hz]			0 (DC) to 400 (Note 4)		
			2.1(1.7 to 2.5)	2.1(1.7 to 2.5)	29(24 to 34)	42(34 to 50)	67(54 to 80)
			3.6(2.8 to 4.4)	3.6(2.8 to 4.4)	35(30 to 40)	54(43 to 65)	82(65 to 93)
Heater Designation		5(4 to 6)	5(4 to 6) 6 6(5 2 to 8)	42(34 to 50)			
(Ad	djustment Range of Se	ttling Current) [A]	6.6(5.2 to 8)	9(7 to 11)			
(The -	line in the table on t	he right represents the	9(7 to 11)	11(9 to 13)			
corres	spondence between th	e magnetic contactor	11(9 to 13)	15(12 to 18)			
and fr	ame to be combined)		15(12 to 18)	22(18 to 26)			
Trip Class (see page 138)		5	5	5	5	5	
Frame of the Combined Magnetic Contactor		T10, T12, T20 T12, T20	T21, T25, T35, T50	T35, T50	T65, T80,	T80, T100	
		T20	T25, T35, T50	T50	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".)

 $\oplus \oplus \oplus$ 

**U** 4/12

16.7

. <del>(</del>

Cannot be used in independent mounting

M3.5 Screw (Self-Lifting)

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

M5 Screv

0.2kg

(Self-Lifting)



4/T2 6/T3

5 5

TH-T50BC

Model Name

98 96

29 A

35 A/42 A

2/11

1/L1 3/L2 5/L3 97 95

2/T1 4/T2 6/T3

TH-T50KF

Model Name

TH-T50

29 A

35 A/42 A



## N120/N120TA







# 5 TH-T/N Type Thermal Overload Relays



## 5.11 Operating Characteristic of Thermal Over Relay (Ambient Temperature of 20°C)



Refer to page 143 regarding the connecting electric wire size.

Current (Multiple of Settling Current)

Current (Multiple of Settling Current)









## 5.12 How to Order

Follow the steps below when ordering. (Enter a space in  $\blacktriangle$  .)

## TH-T Thermal Overload Relays



## Model Name Codes of Thermal Overload Relays

TH – T18	КР	▲ Heater Designation
Frame	Symbol	Specifications
T18	None	With 2-Element
T25	KP	With 3-Element (2E)
T50	FS	Quick Trip Type
T65	SR	With Saturable Reactor
T100	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 designat When the full-load current of designations, give priority to page 48.	ion from pages 145, 146 or 147. of the motor is included in 2 heater o the heaters listed in the table on

## Model Name Codes of Thermal Overload Relays

TH – N220	KP A Heater	Designation
Frame	Symbol Specifica	tions
N120	None With 2-Ele	ement
N120TA	KP With 3-Elem	ent (2E)
N220	RH For Magneti	c Starter
N400	HZ For Independer	nt Mounting
N600	SR With Saturabl	e 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 Independent Mounting	For DIN Rail Mounting
TH-T18 + UT-HZ18 *2	TH-T18 + UT-HZ18 *2
TH-T25	TH-T25 + UN-RM20 *2
_	_
TH-T65	—
—	—
TH-N120	—
TH-N120TAHZ	-
TH-N220HZ	-
TH-N400HZ	-
TH-N600 + CT <b>*</b> 3	_
	For Independent Mounting           TH-T18 + UT-HZ18 *2           TH-T25           —           TH-T65           —           TH-N120           TH-N120TAHZ           TH-N20HZ           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)

# MS-T Series Contactor Type Contactor Relays

6

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## 6.1 Model List

		Appearance		SR-T5	SR-T9					
		Frame		T5	T9					
		Number of Contac	cts	5	9					
				5a	9a					
		Contact Arrangem	ent	4a1b	7a2b					
				3a2b	5a4b					
	Rate	ed Insulation Voltage	M	69	90					
	App	licable Standard		JIS C8201-5-1, IEC60947-5-	1, EN60947-5-1, GB14048.5					
	Rate	d Impulse Withstand \	/oltage [kV]	6	)					
	Rate	d Frequency	[Hz]	50/	/60					
	Pollu	ution Degree			3					
	Cor	ventional Free Air Therma	al Current Ith [A]	1	0					
	Z		AC120 V	E	) )					
	rent	Category AC-15	AC240 V	3						
	3	(Coil Load)	AC440 V	1.5						
Ω	tiona		AC550 V	1.2						
fe	bera	Category AC-12 (Resistive Load)	AC120 V	10						
Ž	be		AC240 V	8						
g (	Rat		AC440 V	5						
tin	] AC		AC550 V	<u> </u>						
ñ	ant [A	Category DC-13 (Coil Load)		3						
act	Ourre		DC48 V	1.5 0.6 (2)						
nti	onal		DC220 V	0.3	(0.8)					
ö	erati		DC24 V	1	0					
	dob	Category DC-12	DC48 V	8	3					
	Rate	(Resistive Load)	DC110 V	5 (8)						
	8		DC220 V	1 (	(3)					
	Mi	nimum Applicable Loa	d Level	20 V 3 m/	A (Note 5)					
:	Star	ndard Type	SR-□	O	O					
	DC (	Operated Type	SRD-□	0	0					
	Mec	hanically Latched	SRL-D	0						
	Type	)	SRLD-□	0	_					
1	With	Large Rated Auxiliary	SR-□JH	0	0					
	Cont	acts	SRD-□JH	0	0					
,	With	Overlan Contacts	SR-□LC	0	0					
	vvici		SRD-□LC	0	0					
	Dela	y Open Type	SR-□DL	0	0					
1	With	Wiring Streamlining	SR-□BC	0	0					
	Term	ninals	SRD-DBC	0	0					
	With	Spring Clamp	SR-⊡SQ	0	_					
	lern	ninals	SRD-USQ	0						
	With	Surge Absorbers	SR-⊔SA	0	0					
\$	(vari	stors)	SRD-⊔SA	0	0					
l Unit	Su	rge Absorber	(Note 3)	U O	U					
tional	Ad	attional Auxiliary Conta	act (Note 4)	0						
d I		AC Interface		U	U					
IEC	35 C	mm Rail Mounting		O	0					

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 $\Box$ , SRLD-T $\Box$ ), 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 ApplicationFeatures

- 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

## Type Designations





Model Name		Model			
SR		AC Operated			
SRD		DC Operated			
SRL		Mechanically Latched Type (AC Operated)			
SRLD		Mechanically Latched Type (DC Operated)			

BC	4a1b	

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 Ar	rangement
Select a conta	ct arrangement
according to the	e model.



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-tendent of the series o
  - 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).

6

	Function and	Operation	Classification	by	Application	Туре
--	--------------	-----------	----------------	----	-------------	------

		•	-	• •	•••		
Model Name	Operation Category	Application	Reference Page	Model Name	Operation Category	Application	Reference Page
SR-T□	AC	General control circuit sequence	Page 163	SR-T□LC SRD-T□LC	AC DC	Applications that require the overlap switching of the make and break contacts	Page 171
SRD-T□	DC	command contacts etc.	Page 166	SR-T⊡DL	AC	For 2 <sup>+2</sup> -Second Delayed Release	Page 172
SRL-T□ SRLD-T□	AC DC	Same applications as SR and SRD types and also those requiring memory functionality	Page 168	SR-T⊡BC SRD-T⊡BC	AC DC	With Wiring Streamlining Terminal	Page 173
SR-T□JH SRD-T□JH	AC DC	AC100 to 220 V, 3 to 10 A control of large breakers and solenoids	Page 170	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.



Note 1. The contact reliability indicates a 60% confidence rate for a \\060 failure rate (no. of faults/times switching, no. of contacts)

	Item	Reference Page	Remarks
	Working Environment	Page 64	_
Related	· Mounting	Page 64	-
Reference Page	· 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

touch, the C-R type and indicator type are available aside from the varistor type.

## Rating (SR, SRD, SRL, SRLD, SR-T DL, SR-T BC, SRD-T BC, SR-T SQ and SRD-T SQ)

		Frame		T5	Т9					
		No. of Contacts	;	5	9					
				5a	9a					
		Contact Arrangem	ent	4a1b	7a2b					
				3a2b	5a4b					
		Rated Insulation Vo	ltage [V]	69	90					
	Con	ventional Free Air Therma	al Current Ith [A]	1	0					
	t [A]		AC120V	6	3					
	Irren.	Category AC-15	AC240V	3						
	al Cu	(Coil Load)	AC440V	1.5						
	ation		AC550V	1.2						
bu	ed Opera		AC120V	10						
lati		Category AC-12	AC240V	8						
ц	Rat	(Resistive Load)	AC440V	5						
tac	AC		AC550V	5						
õ	nt [A]		DC24V	3	3					
0	urreı	Category DC-13	DC48V	1.	5					
	al C	(Coil Load)	DC110V	0.6	5(2)					
	atior		DC220V	0.3(	0.8)					
	Dper		DC24V	1	U					
	ted (	Category DC-12	DC48V	5	3					
	CRai	(Resistive Load)		5(	8)					
	ЫN		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 I	Breaking Capa	cities	Switching	Switching Durability			
		Category	Rated Operational Voltage	Making Current [A]	Breaking Current [A]	Frequency	Electrical	Mechanical		
SR - T Series	T5 T9	AC-15	AC120V AC240V AC550V DC24V	66 55 33 20	66 55 33 20	1800 Times/Hour [Standard Type] 1200 Times/Hour	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		
		DC-13	DC48V DC110V DC220V	10 2(5) 0.4(1.5)	10 2(5) 0.4(1.5)	Delay Open Type		0.5 mil. times [Delay Open Type]		

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)

	Coil Input [VA]		Coil			Operating Voltage [V]		Operating Time [ms]			
Frame	Inrush	Normal	Power Consumption [W]	Current [A]	Contact Arrangement	Close	Open	Coil ON → Make Contact ON	Coil ON → Break Contact OFF	Coil OFF → Make Contact OFF	Coil OFF → Break Contact ON
Τ5	45	7	2.2	0.03	5a	115 to 145	75 to 115	12 to 20		4 to 16	
15					3a2b	120 to 150	75 to 115	12 to 20	7 to 14	4 to 16	6 to 17
то					9a	125 to 156	85 to 125	12 to 20		4 to 16	
19					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	Т9	
Contact	5a	9a	
Arrangement	4a1b	7a2b	
Anangement	3a2b	5a4b	
		$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
	5a	9a	
Contact Placement	A2 A1 13 23 33 43 51	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	
	4a1b	7a2b	
	A2 A1 11 23 33 43 51	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	3a2b	5a4b	

	Item	Reference Page	Remarks
Related	· Operation Coil	Page 43	_
Thereference if uge	· 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.

Auxil	Front clip-on					Side clip-on			
Contactor Relay	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
	5a	9a	8a1b	7a2b	7a	6a1b	5a2b	7a2b	6a1b
	4a1b	8a1b	7a2b	6a3b	6a1b	5a2b	4a3b	6a3b	5a2b
3HD-13(BC)	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".)



## 6.4 SRD-TDDC 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)

	Coil		Operating Voltage [V]		Operating Time [ms]				
Frame	Current	Power Consumption	Time Constant	Close	Onon	Coil ON →	Coil ON →	Coil OFF →	Coil OFF $\rightarrow$
	[A]	[A] [W] [ms] Close Open		Make Contact ON	Break Contact OFF	Make Contact OFF	Break Contact ON		
T5	0.033	33 33(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
Т9	0.035	3.3(2.2)	40(43)	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  $\approx 2.2W \div 24V$
- 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	_
Related	·Rating	Pages 160, 163	_
Reference Page	· 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".)

## 6.5 SRL-TD, SRLD-TD 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	Model	Tripping Coil Self-	Closing Coil Self-	Contact Arrangement	Switching Frequency Switching Durability (Ten Thousand T		Ten Thousand Times)
Operation Category	Name	Demagnetizing	Demagnetizing	(Valid)	[Times/Hour]	Electrical	Mechanical
AC Operated	SRL-T5(BC)	Incl	Incl	Fa dath 2a0h	1200	50	50
DC Operated	SRLD-T5(BC)	inci.		5a, 4a m, 5azb	1200	50	50

## Properties

	Frame		Operation	Contact	Operating	Voltage [V]	Operating Time [ms]			
			Coil Input [VA]	Arrangement	Close	Trip	Closing Coil ON →	Closing Coil ON →	Tripping Coil ON →	Tripping Coil ON $\rightarrow$
				Ŭ			Make Contact ON	Break Contact OFF	Make Contact OFF	Break Contact ON
U	ated		Closing 80	5a	122 to 128	90 to 96	10 to 16	_	9 to 14	-
∢	Ope	3HL-13(BC)	Tripping 110	3a2b	139 to 147	90 to 94	10 to 15	8 to 13	8 to 13	10 to 15
υ			Closing 90	5a	60 to 70	44 to 60	10 to 20	—	8 to 15	—
Oper Oper	SULD-19(BC)	Tripping 180	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.

	Item	Reference Page	Remarks
Related	·Rating	Pages 160, 163	Same as SR-□.
Reference Page	$\cdot$ Operation Coil of SRL/SRLD- $\Box$	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.



(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

LS

#1

#1MC

#2

SRL

SB

• 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.



#### 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)
5	ia	4a	1b	3a	2b
$\begin{array}{c} & Closing \\ A2 A1 & 13 & 23 & 33 & 43 \\ \hline \\ $	$-\frac{1}{53}$ $\frac{1}{65}$ $E1$ $-\frac{1}{54}$ $\frac{1}{66}$ $-\frac{1}{-\frac{1}{10}}$ $\frac{1}{10}$ $\frac{1}{$	$\begin{array}{c} Closing \\ A2 A1 13 23 33 43 \\ \hline \\ $		$\begin{array}{c c} & Closing \\ A2 & A1 & 11 & 23 & 33 & 43 \\ \hline \\ \hline \\ \hline \\ MC \\ \hline \\ MC \\ \hline \\ \\ MC \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	51 65 E1 

## • Outline Drawings (The diagrams show models without "BC".)



## 6.6 SR-TDJH, SRD-TDJH Contactor Relays with Large Rated

## **Auxiliary Contacts**

Through the use of S-T12 magnetic contactor contacts, the SR(D)-T $\Box$ JH type is suitable for applications requiring use of comparatively large currents and great electrical durability.

## Rating

		Model Name	SR-T5JH	SR-T9JH		
		Model Martie	SRD-T5JH	SRD-T9JH		
			5a	9a		
		Contact Arrangem	ent	4a1b	7a2b	
				3a2b 5a4b		
		Rated Insulation Vo	ltage [V]	69	90	
	Cor	ventional Free Air Therma	I Current Ith [A]	2	0	
	[A]		AC120V	10	(6)	
	rrent	Category AC-15 (Coil Load)	AC240V	10	(5)	
	lal Cu		AC440V	5(3)		
D	ratior		AC550V	4(3)		
ti	l Ope	Category AC-12	AC120V	20		
Ва	Ratec	(Resistive Load)	AC240V	10		
act	AC	(	AC550V	10		
ont	A		DC24V	7	7	
Ó	rrent	Category DC-13	DC48V	5	5	
	al Cui	(Coil Load)	DC110V	1.	2	
	ation		DC220V	0.	.2	
	Open	a	DC24V	10		
	ated	Category DC-12	DC48V	8	3	
	DC.B.	(nesistive Load)		5		
			002200		I	

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
	Operation Coil	Pages 43, 44	Same as SR- $\Box$ and SRD- $\Box$ .
Related	· Properties	Pages 164, 166	Same as SR- $\Box$ and SRD- $\Box$ .
Reference Page	· Contact Arrangement/Contact Placement	Page 164	Same as SR- $\Box$ and SRD- $\Box$ .
	· Outline Drawings	Pages 165, 167	Same as SR- $\Box$ and SRD- $\Box$ .
	· 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)

		Frame	T5LC	T9LC			
		Contact Arrangem	4a1b	7a2b			
		Contact Arrangen	3a2b	5a4b			
		Rated Insulation Vo	ltage [V]	69	90		
	Con	ventional Free Air Therma	al Current Ith [A]	1	6		
	[A]		AC120 V	e	3		
	rrent	Category AC-15	AC240 V	5	5		
	al Cu	(Coil Load)	AC440 V	3	3		
ີ ແ	tion		AC550 V	3	3		
fe	pera		AC120 V	16			
20	ed C	Category AC-12	AC240 V	12			
0 ()	Rat	(Resistive Load)	AC440 V	Ę	5		
tin	AC		AC550 V	Ę	5		
Ba.	ft [A]		DC24 V	3	3		
сt	urren	Category DC-13	DC48 V	2	2		
nta	al Ct	(Coil Load)	DC110 V	0.	.5		
<sup>o</sup>	ation		DC220 V	0.	.1		
0	pera		DC24 V	8	3		
	ed C	Category DC-12	DC48 V	5	5		
	: Rat	(Resistive Load)	DC110 V	3	3		
	8		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,  $COS\phi = 0.3$  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	SR-T9LC
SRD-15LC	SRD-19LC
4a1b	7a2b
3a2b	5a4b
A2 A1 13 23 33 43 51 $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
4a1b	7a2b
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
3a2b	5a4b

	Item	Reference Page	Remarks
	Operation Coil	Pages 43, 44	Same as SR- $\Box$ and SRD- $\Box$ .
Related	· Properties	Pages 164, 166	Same as SR-□ and SRD-□. However, break contact operating times differ.
	· Outline Drawings	Pages 165, 167	Same as SR- $\Box$ and SRD- $\Box$ .
	· How to Order	Page 177	-
7	· 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 $\square$ DL functions to hold the contactor relay for 2<sup>+2</sup><sub>-1</sub> 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	Designation	Switching	Switching Dura	ability [x 10000]	Retention Time
	Arrangement (Valid)	(Rated Voltage)	Frequency	Mechanical	Electrical	
SR-T5DL	2a1b	AC100V (100 to 110 V 50 Hz/ 100 to 110 V 60 Hz)	1800 Times/Hour	50	50	2 <sup>+2</sup> Seconds
SR-T9DL	6a1b, 4a3b	AC200V (200 to 220 V 50 Hz/ 200 to 220 V 60 Hz)	1000 Times/Tiour	50	50	(Fixed)

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

	Input	t [VA]	Operating Voltage [V]		Operating Time [ms]	
Model Name	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-T⊡DL

## Contact Arrangement



#### 172 Note: 43-44 and 51-52 terminals are internally wired.

## Connection Diagram



## 6.9 SR-T BC, SRD-T BC Contactor Relays with Wiring Streamlining Terminals

## SR(D)-T□BC

SR-TDBC with wiring streamlining terminal is capable of crimp lug wiring and bare wire wiring without removing the terminal cover.



## Specifications

(1) Specifications of the Contactor Relay With Wiring Stream	ining Terminal SR-T5BC		
Standard Specifications (Terminal Cover) + Wiring Streamlining Terminal			
Model Name	Contact Arrangement		
SR-T5BC	5a, 4a1b		
SRD-T5BC	3a2b		
	9a		
	7a2b		
1980	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	
	2a		
UT-AX2BC	1a1b		
	2b		
	4a	SR, SRD-T5BC	
UT-AX4BC	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-□.
Related	· 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



## 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.

## Manufacturing Range List

Frame	Model Name	Auxiliary Contact	Terminal	
ТБ	SR-T5SQ	5a, 4a1b	Spring Clamp Terminals	
SRD-T5SQ		3a2b	Spring Clamp Terminal	

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



SR-T5SQ

	Item	Reference Page	Remarks
Related Reference Page	· 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.

## Outline Drawings











Model Name SRD-T5SQ

## 6.11 How to Order

Specify from page 172.

Follow the steps below when ordering. (Enter a space in  $\blacktriangle$  .)



Specify from the contact

arrangement on page

172.

The operation coil

designation is available

in AC100V and AC200V.

# MEMO


# MS-K Series Contactor Type Contactor Relays

Model List ······180
Selection and Application181
Standard Type (AC Operated) Contactor Relays
SR-K100182
DC Operated Contactor Relays
SRD-K100185
Mechanically Latched Contactor Relays
SRL-K100, SRLD-K100186
Contactor Relays with Large Rated Auxiliary Contacts
SR/SRD-K100JH188
Contactor Relays with Overlap Contacts
SR/SRD-K100LC189
How to Order190

# 7.1 Model List

		Appearance		SR-K100				
		Frame		K100				
		No. of Contacts	6	10				
				10a, 9a1b				
		Contact Arrangem	ient	8a2b, 7a3b				
				6a4b, 5a5b				
	C	onventional Free Air Therma	al Current Ith [A]	16				
	ent [A	Catagony AC 15	AC110 V	6				
	Curre	(Coil Load)	AC220 V AC440 V	3				
	onal		AC550 V	3				
te	oerati		AC110 V	16				
۶ N	0 0 0	Category AC-12	AC220 V	12				
b	Rate	(Resistive Load)	AC440 V	5				
Rati	] AC		AC550 V	5				
ц	nt [A	0.1	DC24 V	5				
nta	Ourre	(Coil Load)	DC48 V	3				
õ	onal (		DC110 V DC220 V	0.8 (2)				
	erati		DC24 V	10				
	ğ	Category DC-12	DC48 V	8				
	Rate	(Resistive Load)	DC110 V	5 (8)				
	8		DC220 V	1 (3)				
	Star	ndard Type	SR-□	O				
	JC	Operated Type		0				
		chanically Latched		0				
	Ni+k	e Large Bated		0				
		iliary Contacts	SBD-D.IH	0				
	-un			0				
1	Nith	n Overlap Contacts	SRD-□LC	0				
Jnits	Su	rge Absorber (Note	e 3) (Note 4)	0				
ional (	DC	C/AC Interface	(Note 4)	0				
Opti	Liv	ve Part Protection Co	over	-				
IE	C 3	35 mm Rail Mounting		0				
69	90 /	/ Application		<b>O</b>				

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	— <b>K100</b>	JH	9a1b			
Model Name	Model	Frame	No. of Poles	Symbol	Specifications	Contact Arrangement
SR	AC Operated	K100	10-Pole	None	Standard	Specify by the contact arrangement
SRD	DC Operated			 JH	With Large Rated Auxiliary Contacts	of each model name on pages 184,
SRL	Mechanically Latched Type (AC Operated)			LC	With Overlap Contacts	187 and 189.
SRLD	Mechanically Latched Type (DC Operated)					

## Function and Operation Classification by Application Type

Model Name	Operation Category	Application	Reference Page	Model Name	Operation Category	Application	Reference Page
		General control circuit sequence relay for	Daga 195	SR-K100LC	AC	Applications that require the overlap	Dogo 100
5RD-R100	DC	magnetic contactor command contacts etc	Page 165	SRD-K100LC	DC	switching of the make and break contacts	Page 169
SRL-K100	AC	Same applications as SR and SRD types and	Dage 196				
SRLD-K100	DC	also those requiring memory functionality	Page 100				
SR-K100JH	AC	AC100 to 220 V, 3 to 10 A control	Dama 100				
SRD-K100JH	DC	of large breakers and solenoids	Page 188				

#### • 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.



• 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
	· Working Environment	Page 64	_
Related	· Mounting	Page 64	-
Reference Page	·Wiring	Page 68	-
	· Control Circuit Power Supply Voltage Fluctuation Range	Page 71	_
	<ul> <li>Applicable Wire Size and Terminal Screw Tightening Torque</li> </ul>	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.





- 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
				10a, 9a1b (9a, 8a1b)
		Contact Arrange	ment	8a2b, 7a3b (7a2b, 6a3b)
				6a4b, 5a5b (5a4b, 4a5b)
	Rat	ted Insulation Volta	age [V]	660
	Con	ventional Free Air Thern	nal Current Ith [A]	16
	t [A]		AC110 V	6
	Irren	Category AC-15	AC220 V	5
	D D	(Coil Load)	AC440 V	3
e 2	Vote 2		AC550 V	3
đ			AC110 V	16
6		Category AC-12	AC220 V	12
tin,	Rat∈	(Resistive Load)	AC440 V	5
Rai	AC		AC550 V	5
t	t [A]		DC24 V	5
nta	Len	Category DC-13	DC48 V	3
ပိ	2	(Coil Load)	DC110 V	0.8 (2)
	tiona		DC220 V	0.2 (0.8)
	pera		DC24 V	10
	0 p	Category DC-12	DC48 V	8
	Rate	(Resistive Load)	DC110 V	5 (8)
	В		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.

Perform	Performance (SR, SRD-KT00/SRL, SRLD-KT00)									
Fromo		Making and	Breaking Capac	cities	Switching	Switching Dura	ability			
Traine	Category	Rated Operational Voltage	Making Current [A]	Breaking Current [A]	Frequency	Electrical	Mechanical			
K100	AC-15 DC-13	AC110V AC220V AC550V DC24V DC48V DC110V DC220V	66 55 33 20 10 2(5) 0.4(1.5)	66 55 33 20 10 2(5) 0.4(1.5)	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]			

#### 

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)

	Coil Input [VA]		Coil Dowor		Operating Voltage [V]		Operating Time [ms]			
Frame	Inrush	Normal	Consumption [W]	Contact Arrangement	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	
	50	10	3.0	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.

	Item	Reference Page	Remarks
Related	· Operation Coil	Page 43	_
Reference Page	· How to Order	Page 190	-
	· Combining with Optional Units	Page 196	_



## Contact Arrangement/Contact Placement

## Outline Drawings



## 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.



- 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	Power Time		Close	Open	Coil ON→	Coil ON→	Coil OFF→	Coil OFF→	
	[A]	Consumption [W]	Constant [ms]	Close	Open	Make Contact ON	Break Contact OFF	Make Contact 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.

	Item	Reference Page	Remarks
	· Operation Coil	Page 44	_
Related	·Rating	Pages 180, 182	_
Reference Page	· Performance	Page 183	_
	· Contact Arrangement/Contact Placement	Page 184	_
	· How to Order	Page 190	_
	· Combining with Optional Units	Page 196	_

## Outline Drawings



#### SRL-K100, SRLD-K100 Mechanically Latched Contactor Relays 7.5

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

#### Performance

Closing Coil	Model	Tripping Coil Self-	Closing Coil Self-	Contact Arrangement	Switching Frequency	Switching Durability	(Ten Thousand Times)
Operation Category	Name	Demagnetizing	Demagnetizing	(Valid)	[Times/Hour]	Electrical	Mechanical
AC Operated	SRL-K100	Incl	Incl	9a, 8a1b, 7a2b, 6a3b,	1200	50	100
DC Operated	SRLD-K100	Inci.	Inci.	5a4b, 4a5b	1200	50	100

#### Properties

Frame		Operation	Contact	Operating	Voltage [V]	Operating Time [ms]					
		Coil Input	Arrangement	Close	Trip	Closing Coil ON→	Closing Coil ON→	Tripping Coil ON→	Tripping Coil ON→		
		[VA]		CIOSE		Make Contact ON	Break Contact OFF	Make Contact OFF	Break Contact ON		
Cated	SRL-K100	Closing 100	8a1b	115 to 156	68 to 110	8 to 16	6 to 15	10 to 18	11 to 20		
Oper Oper		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			For DC		
Coil Designation	Rated Vo	oltage [V]	Coil Indicator	Coil	Batad Valtaga	Coil Indiantor	
Coll Designation	50Hz	60Hz	Conmucator	Designation	naleu vollage	Con maicator	
AC24V	24	24		DC12V	DC12 V		
AC48V	48 to 50	48 to 50		DC24V	DC24 V		
AC100V	100	100 to 110		DC48V	DC48 V	Data d Malta aa	
AC120V	110 to 120	115 to 120		DC100V	DC100V to 110 V	Rated voltage	
AC200V	200	200 to 220	Rated Voltage/	DC125V	DC120V to 125 V		
AC220V	208 to 220	220	Frequency	DC200V	DC200V to 220 V		
AC260V	240 to 260	260 to 280		No	te 1 DC coils have	no polarity	
AC400V	380 to 415	400 to 440		NO		no polanty.	
AC440V	415 to 440	460 to 480					
AC500V	500	500 to 550					

The designation is a symbol to be specified when ordering.

	Item	Reference Page	Remarks
Related	·Rating	Pages 180, 182	Same as SR- $\Box$ .
ference Page	·Handling	Page 169	Same as SRL, SRLD- $\Box$ .
	· How to Order	Page 190	-
	· Combining with Optional Units	Page 196	-

Re



**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

#### SRL-K100 SRLD-K100 SRL-K100 SRLD-K100 SRL-K100 SRLD-K100 9a 8a1b 7a2b Closing Closing Closing Tripping Tripping Tripping 53 43 33 53 гМТ МТ гМТ (E1 81 9 A1/a MC 9 A1/a L MC A2/b A2/b SRL-K100 SRLD-K100 SRL-K100 SRLD-K100 SRL-K100 SRLD-K100 5a4b 4a5b 6a3b Closing Closing Closing Tripping Tripping Tripping 53 гMT MT MT 4 Ļ M MC мс A2/b A2/b 72 82 03 A2/b

## Contact Arrangement/Contact Placement

## Outline Drawings



# 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

		Madal Nam		SR-K100JH					
		Model Nam	le	SRD-K100JH					
				10a, 9a1b					
		Contact Arrange	ement	8a2b, 7a3b					
				6a4b, 5a5b					
	Ra	ated Insulation Volt	age [V]	660					
	Co	nventional Free Air Therr	mal Current Ith [A]	20					
	t [A]		AC110 V	10 (6)					
	Ineni	Category AC-15	AC220 V	10 (5)					
	al Cu	(Coil Load)	AC440 V	5 (3)					
	tion		AC550 V	4 (3)					
	pera		AC110 V	20					
ng	ed O	Category AC-12	AC220 V	16					
lati	Rati	(Resistive Load)	AC440 V	10					
ц	AC		AC550 V	10					
tac	t [A]		DC24 V	5					
ы Б	Irren	Category DC-13	DC48 V	3					
0	al CL	(Coil Load)	DC110 V	0.8					
	ation		DC220 V	0.2					
	pera		DC24 V	10					
	ed C	Category DC-12	DC48 V	8					
	Rat	(Resistive Load)	DC110 V	5					
	8		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- $\Box$ and SRD- $\Box$ .
Related	· Properties	Pages 183, 185	Same as SR- $\Box$ and SRD- $\Box$ .
Reference Page	· Contact Arrangement/Contact Placement	Page 184	Same as SR- $\Box$ and SRD- $\Box$ .
	· Outline Drawings	Pages 184, 185	Same as SR- $\Box$ and SRD- $\Box$ .
	· 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 Nam	ie	K100LC				
		Contact Arrange	omont	8a2b				
		Contact Arrange	emeni	6a4b, 5a5b				
	Ra	ated Insulation Volt	age [V]	600				
	Со	nventional Free Air Ther	mal Current Ith [A]	16				
	[A]		AC110 V	6				
	rrent	Category AC-15 (Coil Load)	AC220 V	5				
	0		AC440 V	3				
	tiona		AC550 V	3				
ng	pera		AC110 V	16				
Rati	ed O	Category AC-12	AC220 V	12				
нц	Rat	(Resistive Load)	AC440 V	5				
Itac	Ą		AC550 V	5				
DO.	E		DC24 V	3				
0	Irrent	Category DC-13	DC48 V	2				
	U C C	(Coil Load)	DC110 V	0.5				
	tion		DC220 V	0.1				
	pera		DC24 V	8				
	ed O	Category DC-12	DC48 V	5				
	Rat	(Resistive Load)	DC110 V	3				
	8		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,  $COS\phi = 0.3$  to 1.0) Note 2. The contacts may wear out through current switching and may not overlap. Take sufficient precautions.

## Contact Arrangement/Contact Placement

	SR-K100LC SRD-K100LC	
8a2b	6a4b	5a5b
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$

	Item	Reference Page	Remarks			
	· Operation Coil	Pages 43, 44	Same as SR- $\Box$ and SRD- $\Box$ .			
Related	· Properties	Pages 183, 185	Same as SR-□ and SRD-□. However, break contact operating times differ.			
Reference Page	· Outline Drawings	Pages 184, 185	Same as SR- $\Box$ and SRD- $\Box$ .			
	· 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  $\blacktriangle$  .)

### SR, SRD-K Type Contactor Relays



#### SRL, SRLD-K Type Mechanically Latched Contactor Relays



# **Optional Units**

8.1	Model List (for MS-T/N Series) 192
8.2	Applicable Model List (for MS-T/N Series) 194
8.3	Auxiliary Contact Units UT/UN-AX
8.4	Auxiliary Contact Units with Contact for Low-Level Signals UN-LL22 ··· 203
8.5	Operation Coil Surge Absorber Units UT/UN-SA
8.6	Main Circuit Surge Absorber Units UT/UN-SA33 212
8.7	Mechanical Interlock Units UT/UN-MLD 213
8.8	Main Circuit Conductor Kits UT/UN-SD□, SG□, YD□, UN-YG□··· 216
8.9	3-Pole Array Connection Units UT/UN-YY 217
8.10	DC/AC Interface Units for Operation Coils
	UT/UN-SY
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	UA-SY⊡236
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# 8.1 Model List (for MS-T/N Series)

Model Name				Auxili	ary Contact E	llocks			-	Auxiliary Contact Units for Low-level Signals	
Туре	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								4 4 4			
(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 with UT-/	d in combination AX11(BC).	Cannot be used in combination with UT-AX2 or 4(BC).	Cannot be used with UN-	I in combination 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	C/AC Inte	rface Uni	ts for Op	eration C	oils		Protection Cover Units								
Туре	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	Тор	-On	For Independ	dent Mounting	9	Тор	-On		Front Clip-on								
	Enables	AC-ope	rated ma	gnetic co at D0	ontactors C24 V	and relay	/s to be o	operated		Live Part Protection Cover						Terminal Cover	
Specification/ Functions	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 SFor Thermal Overload Relays (TH-)	For Magnetic Contactors For Magnetic Starters For Thermal Overload Relays							
Appearance		•••		1	1	No.	88		I	in,						3	
(Typical Example)	UT-S	SY21	UN-	SY11	UN-	SY21	UN-	SY32	UN-CV250	UN-CZ605	UN-C	CZ500	UN-C	CZ501	UN-CV203	UT-CW800	
Other	_								_								
Reference Page				2	18				221 227					227			

Note 1. There are limitations on models, rated voltage and combined use.

			Opera	r 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
				Тор	-On					Front Clip-on	Independent Mounting
Surge Absorbers for Operation Coils											ers for Main Circuits
With CR	With Varistor	With Varistor + Indicator Lamp	With Varistor + CR	With Varistor	With Varistor + Indicator Lamp		With CR With CR		With Varistor + CR	V	Vith CR
UT-SA23 AC200V UT-SA13 DC200V	AC24 V (DC Shared Use) AC48 V (DC Shared Use) AC200 V (DC Shared Use) AC400 V	AC200 V (DC Shared Use)	AC48 V (DC Shared Use) AC200 V (DC Shared Use)	AC48 V (DC Shared Use) AC100 V (DC Shared Use) AC200 V (DC Shared Use) AC400 V	AC100 V (DC AC200 V (DC	Shared Use) Shared Use)	DC200 V	AC200 V	AC48 V (DC Shared Use) AC100 V (DC Shared Use) AC200 V (DC Shared Use)	A (AC1)	C240 V 00 to 240 V)
R											Manager and a second se
UT-S	SA21	UT-SA22		UN-SA721	UN-SA712	UN-SA722	UN-SA713	UN-SA723	UN-SA725	UT-SA33	UN-SA33
				-	_					-	
				20	05						212

Mech Interloc	anical k Units	cal Main Circuit Conductor Kits						3-Pole Array Connection Units	Connecting Conductor Kits	Fault Detection Units	Re Rele	set ases	Fluorescent Display Lamps	Indepe Mountir	endent ng 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 C	Clip-on				Ν	1ain Circu	it				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.	Connect Conduct for Rever Type Magnetic Contacto	ing ors rsing ors	Connect Conduct for Reve Type Ma Contacto Crossove	ing ors rsing gnetic ors er	3-Pole Short- Circuit Connecting Conductors	2-Pole Cirr Conne Conde	Short- cuit ecting uctors	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 Ther Reset From Ou Panel 200 mm 400 mm 550 mm 700 mm	mal tside the	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	IF ~		1	1			600	177	ууу ллл	UN-FD4		/		UT-HZ18	UN-RM20
-					_						_			-	-	
213					216				217	231	232, 327	228	228	229	23	30

Type Designation S	Symbol	Product Name	Symbol	Product Name		
		AX	Auxiliary Contact Units	ML	Mechanical Interlock Units	
(E.g.) <b>UT – SA</b>	21 🛆 AC200V		Auxiliary Contact Units with	SD	Reversing Main Circuit Conductor Kits	
			Contact for Low-level Signals	SG	Main Circuit Conductor Kits for Crossover	
Symbol Indicates Unit Symbol Indicates	Rated Voltage Designation	SA	For Operation Coils or Main	YG	3-Pole Short Circuit Main Circuit Conductor Kits	
	Indicates specifications,		Circuit Surge Absorber Units	YD	2-Pole Short Circuit Main Circuit Conductor Kits	
	applicable models etc. of the units. (Enter a space in $\blacktriangle$ .)	SY	DC24 V->AC100 to 240 V DC/AC Interface Units for	RR	Thermal Overload Relay Reset Release Units	
(Table at right)		CV CZ	Live Part Protection Covers	TL	Thermal Overload Relay Trip Indicator Lamps	
			Missesstian Drawstian Osume (Magazitia	HZ	Independent Mounting Units	
		CV	Misoperation Prevention Covers (Magnetic Contactors, Relays, Thermal Overload Relays)		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

					Applicable Models						
Section	Product	Model	Specifications	See		Magn	etic Starters, N	Agnetic Conta	actors		
Jecuon	Name	Name	opecilications	Page	AC Operated	DC Operated	Latched Type	Enclosed Type (MS-N□)	Delay Open Type (S-N□DL)	With Saturable Reactor (MSO-N□SR)	
		UT-AX2	2-Pole				, v				
		UT-AX4	4-Pole		S-T10 to T50	SD-T12 to T50		x	x	MSO-T10SR to T50SR	
		UT-AX11	2-Pole 1A1B				SL(D)-T21				
		UN-AX2	2-Pole		S-T65, T80	SD-T65, T80				NOO TOFOD TOOD	
	Auxiliary	UN-AX4	4-Pole		S-N38, N48 DU-N30	DUD-N30	X	X	X	MSO-165SR, 180SR	
1	Contact Units	UN-AX11	2-Pole 1A1B	197	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	х	х	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	
	Operation	UT-SA13	C + R		х		SLD-T21 to T50 (Closing Coil)	х	х	х	
		UT-SA21	Varistor			SD-112 to 150	CL/D) TO1 to TEO (Closing Col)	MS-T10SA to T50SA	х		
		UT-SA22	Varistor + Indicator Lamp		S-T10 to T50	SQ			х	MOO TIOOD	
		UT-SA23	C + R		B-T21	x	SL-T21 to T50 (Closing Coil)	×	х	to T50SR	
		UT-SA25	Varistor + CR	205	S-N38, N48	SD-T12 to T50 BD-T21 SQ	SL(D)-T21 to T50 (Closing Coil)		х		
3		UN-SA712	Varistor + Indicator Lamp		x	x	SL(D)-T21 to T50 (Tripping Coil)	х	x	х	
	Units	UN-SA713	C + R		x x	SD-T65, T80	SLD-T21 to T80 (Tripping Coil)	х	x	х	
		UN-SA721	Varistor				SL(D)-T21 to T80 (Tripping Coil)	x	x	х	
		UN-SA722	Varistor + Indicator Lamp		x		SL(D)-T65, T80 (Tripping Coil)	x	x	x	
		UN-SA723	C + R		х	x	SL(D)-T65, T80 (Tripping Coil)		х		
		UN-SA725	Varistor + C + R		x	SD-T65, T80 DUD-N30	SL(D)-T21 to T80 (Tripping Coil)	х	x	X	
	Main Circuit	UT-SA3320			S-T10 to T20	SD-T12, T20	x	x	S-T12DL	MSO-T10SR to T20SR	
4	Surge	UT-SA3332	C + R	212	S-T21 to T32	SD-T21, T32	x	x	S-T21DL	MSO-T21SR to T25SR	
	Absorber Units	UN-SA33	Delta Connection		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	
		UT-SY21	Triac Output		S-T10 to T50					MSO TINSE to TENSE	
		UT-SY22	Contact Output		B-T21					100-1100h to 1300h	
	DC/AC	UN-SY11	Triac Output		S-T10 to T100						
5	Units for	UN-SY12	Contact Output	218	S-N125 to N400	x	x	x	x		
Ű	Operation	UN-SY21	Triac Output		S-N38 N/48	X	X		MSO-N125SR to N/00SR		
	Coils	UN-SY22	Contact Output								
		UN-SY31	Triac Output		S-T65, T80						
		UN-SY32	Contact Output								

						Applicable Models										
Castion	Product		0	oifications	See		Magnetic Starters, Magnetic Contactors									
Section	Name		Spe	ecifications	Page	AC Operated	DC Operated	Latched Type	Enclosed Type (MS-N□)	Delayed Release Type (S-N□DL)	With Saturable Reactor (MSO-N□SR)					
		UT-CV107	evention Covers	Magnetic Contactors/ Contactor Relays		S-T10 to T50, B-T21 <u>SQ</u>	SD-T12 to T50, BD-T21 <mark>SQ</mark>	×	×	×	×					
		UN-CV117	Operation Pr	Manual Operation Prevention		S-T65,T80	SD-T65,T80	×	×	×	×					
		UN-CZ500		Power		S-T65,T80, DU-N30	SD-T65,T80, DUD-N30	SL(D)-T65, T80 *1								
		UN-CZ800	Su∣ T€	pply Side erminals		S-T100, B-N65	SD-T100, BD-N65	SL(D)-T100 *2								
		UN-CZ1250	T€ For	Terminals For Magnetic Contactors		S-N125, B-N100, DU-N60	SD-N125, BD-N100, DUD-N60	SL(D)-N125 *2								
		UN-CZ1500	For	Magnetic		S-N150, DU-N120	SD-N150, DU-N120	SL(D)-N150 *2								
		UN-CZ2200	( Su	(Power pply Side		S-N180,N220, DU-N180	SD-N220, DUD-N180	SL(D)-N220 *2								
		UN-CZ3000	Te	Terminals)		S-N300,N400, DU-N260	SD-N300,N400, DUD-N260	SL(D)N300, N400 <sup>*2</sup>	●No UN-CZ□	types can be	combined					
		UN-CZ501				MSO-T65,T80	MSOD-T65,T80	MSOL(D)-T65,T80 *1	with enclose	ed types, delay	open types					
		UN-CZ801	Eor	Magnotio		MSO-T100	MSOD-T100	MSOL(D)-T100 *2	or saturable	reactor attach	ed types.					
	Destantion	UN-C71251	101	Starters		MSO-N125	MSOD-N125	MSOI (D)-N125 *2	Use the follo	wing covers fo	r the latch					
c	Protection	UN-C71501		oad Side	001	MSO-N150	MSOD-N150	MSOL(D)-N150 *2	mechanism							
6	Cover		Te	erminals)	221	MSO N190 N220	MEOD N220	MSOL (D) N000 *2	* 1 : UN-C	Z506(1 pc)						
	Units	UN-022201		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		MSO-N180,N220		1VISOL(D)1V220	* 2 : UN-C	Z806(1 pc)						
		UN-CZ3001		For		MSO-N300,N400	MSOD-N300,400	MSOL(D)-N300,N400	* 3 : UN-C	Z506(2 pcs)						
		UN-CZ502				S-2×T65,T80	SD-2×T65,T80	SL(D)-2×T65,T80 *3	<b>*</b> 4 : UN-C	Z806(2 pcs)						
		UN-CZ802				S-2×T100	-2×T100 SD-2×T100 SL(D)-2×T100 *4									
		UN-CZ1252	Reversible			S-2×N125	SD-2×N125									
		UN-CZ1502	Magnetic Contactors	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				MSO-2×T65,T80	MSOD-2×T65.T80	MSOI (D)-2×T65.T80 *3								
		UN-C7804	For Reversible Magnetic Starters		MSO-2×T100	MSOD-2×T100	MSOI (D)-2×T100 *4									
		UN-C71254			MSO-2×N125 MSOD-2×N125 MSOL(D)-2×N125*4											
		UN-C71504			MSO-2×N150	MSOD-2×N150	MSOL (D)-2×N150 *4									
		UN-C72204			MSO-2×N180 N220	MSOD_2×N220	MSOL(D)-2×N130									
					MSO-2×N100,N220											
		UN-023004			4	IVISU-2×IN300,IN400	INISOD-2×IN300,IN400	MSOL(D)-2×N300,N400								
		UN-CZ506	Me	Latch echanism		×	×	MSOL(D)-(2×)165,180 MSOL(D)-(2×)T65,T80	×	×	×					
		UN-CZ806	L Pr (	ive Part rotection Covers		×	×	SL(D)-(2×)1100 MSOL(D)-(2×)T100 SL(D)-(2×)N125 to N400 MSOL(D)-(2×)N125 to N400'	×	×	×					
		UT-ML20	Fo	r Reversing		S-T10 to T20(Note1)	SD-T12,T20	×	×	×	×					
	Mechanical	UN-ML21	Co	onfiguration		S-T21 to T80	SD-T21 to T80	SL(D)-T21 to T80	×	×	×					
7	Interlock	UN-ML80	l	Electrical Interlock	213	S-T100, S-N125	SD-T100, SD-N125	SL(D)-N125	×	×	×					
		UN-ML150	2-Br	reak Contact		S-N150	SD-N150	SL(D)-N150	×	×	×					
		UN-ML220	BI	ulit-in Type		S-N180 to N400	SD-N220 to N400	SL(D)N220 to N400	×	×	×					
		UT-SD	For Revers	sing (for Magnetic Contactors)		S-2×T10 to T25	SD-2×T12,T20	SL(D)-2×T21								
		UT-SG	For Crosso	over (for Magnetic Contactors)			121,132	、, <b>_</b> .								
0	Main Circuit	UN-SD⊔ UN-SG□	For Revers For Crosso	sing (for Magnetic Contactors) over (for Magnetic Contactors)	010	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	names and	applicable mod	lels.					
8	Kits	UN-YG□	For 3-	Pole Short-Circuit	216	S-T21 to T100, S-N125 to N400	SD-T21 to T100 SD-N125 to N400	SL(D)-N125 to N400	enclosed ty	pes, delay oper	n types or					
		UT-YD20	For 2-	Pole Short-Circuit		S-T10 to T20	SD-T12 to T20	×	saturable reactor attached types.							
		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								
0	Fault	UN-FD	200 V M	lain Circuit, 1c Output	232,	S-T10 to T100	SD-T12 to T100	×	MS-T10 to T100	×	MSO-T10SR to T100SR					
9	Detection Units	UN-FD4	400 V Ma	ain Circuit, 1a/1b Output	327	S-N125 to N400	SD-N125 to N400	×	(External)	×	MSO-N125SR to N400SR					

Note 1. The units can be combined only with S-T10 to T20 produced in March, 2019 and later.

## Thermal Overload Relays (Including ET-N Electronic Thermal)

Section	Product Name	Model Name	Specifications	See Page	Applicable Models Thermal Overload Relays
		UN-CZ605	Live Part Protection Cover		TH-T65
	Protection Cover	UN-CV203	Current Setting Dial	221	TH-T25/T50
	(Note 1) Units	UN-CV603 (Note 2)	Misoperation Prevention Covers	343	TH-T65/T100, TH-N120 to N600
		UN-CV602	Terminal Cover		ET-N60
		UT-RR□5			TH-T18
11	Reset Releases	UN-RR⊡0	Release Length 200 mm to	228	TH-T25/T50
	neleases	UN-RR□6 (Note 3)	700 mm		TH-T65/T100 TH-N120 to N600
		UN-TL12			TH-T18
12	Fluorescent Display	UN-TL20	Tripping Display	229	TH-T25, T50
	Lamps	UN-TL60 (Note 4)			TH-T65, T100
	Indopondent	UT-HZ18	Screw Mounting, IEC 35 mm Mounting		TH-T18
13	Mounting Units	UN-RM20	IEC 35 mm Rail Mounting	230	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

				0	Applicable Models					
Section	Product Name	Model Name	Specifications	Page		Contactor Rel	ays			
				. uge	AC Operated	DC Operated	Latched Type			
		UT-AX2	2-Pole				Y			
1	Auxiliary Contact Units	UT-AX4	4-Pole	197	SR-T5	SRD-T5	X			
	0111to	UT-AX11	2-Pole 1A1B				SRL(D)-T5			
		UT-SA21	Varistor							
		UT-SA22	Varistor + Indicator Lamp		SR-15, 19 SQ	SRD-T5, T9				
		UT-SA13	C + R		х	SQ	SRL(D)-T5 (Closing Coil)			
		UT-SA23	C + R			х				
		UT-SA25	Varistor + CR		SR-15, 19 SQ	SRD-T5, T9 <mark>SQ</mark>				
		UN-SA712	Varistor + Indicator Lamp		SR-K100		SRL(D)-K100(Closing Coil), SRL(D)-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)			
3	Operation Coil Surge Absorber Units	UN-SA713	C + R	205	x	SRD-K100	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		SP K100	x	SRL-K100(Closing Coil), SRL-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)			
		UN-SA725	Varistor + C + R		SHERIOO	SRD-K100	SRL(D)-K100(Closing Coil), SRL(D)-K100(Tripping Coil) SRL(D)-T5(Tripping Coil)			
		UT-SY21	Triac Output			х	х			
		UT-SY22	Contact Output	218	01-10, 19	x	Х			
5	DC/AC Interface	UN-SY11	Triac Output	210	SR-T5, T9	x	х			
Ŭ	for Operation Coils	UN-SY12	Contact Output		SR-K100	x	х			
		UA-SY21	Triac Output	236	SB-K100	x	х			
		UA-SY22	Contact Output	200	ON KING	х	Х			
6	Protection Cover Units	UT-CV107	Magnetic Contactors/Contactor Relays Manual Operation Prevention	221	SR-T5	SRD-T5	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.





## 🕨 Туре

		11 11 84 11	Marial Manage of Arrulia	able Manuatia Oantaatan	Delava		
Unit Model Name	Contact Arrangement	Unit Mounting	Model Names of Applic	able Magnetic Contactor	s and Contactor Relays	Iotal Number of Units That Can	
	Per Unit	Method	AC Operated	DC Operated	Mechanically Latched Type	Be Added to Non-Reversible Type	
	2a						
	1a1b	Front Clip-on				-	
UT-AA2BC	2b				_		
	4a		S-T10 to T50	SD-T12 to T50,			
	3a1b	Front Clip-on	SR-T5	SRD-T5		1	
01-47400	2a2b				—	I	
UT-AX11	1a1b	Side Clip-on			SL(D)-T21,T35,T50	2(Note 2)	
UI-AX11BC					SRL(D)-15	_()	
	2a						
	1a1b	Front Clip-on			-	1	
	2b		S-T65, T80	SD-T65, T80			
	4a		S-N38, N48	DUD-N30			
UN-AX4	3a1b	Front Clip-on	DU-N30		_	1	
UN-AX4CX	2a2b		(Note 6)	(Note 6)			
UN-AX11	1a1b	Side Clin-on	S-T65, T80	SD-T65, T80	SL(D)-T65,T80	2 (Note 2)	
UN-AX11CX	1415		DU-N30 (Note 6)	DUD-N30 (Note 6)	(Note 6)	2 (1000 2)	
LIN-AX80	1a1b	Side Clin-on	S-T100, S-N125,	SD-T100, SD-N125,	SL(D)-T100	2 (Note 4)	
0117000	1415		DU-N60	DUD-N60	SL(D)-N125		
			S-N150,	SD-N150	SI (D)-N150		
UN-AX150	1a1b	Side Clip-on	S-N180, N220,	SD-N220	SI (D)-N220	2 (Note 4)	
	1415		S-N300, N400,	SD-N300, N400,	SI (D)-N300 N400	2 (NOLE 4)	
			DU-N120, N180, N260	DUD-N120, N180, N260	32(2) 11300, 11400		
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 N	ame	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]			je [V]	690							
	Appl	icable Standard		JIS C8201-5-1,IEC60947-5-1,EN60947-5-1,GB14048.5							
	Rate	d Impulse Withstand	Voltage [kV]	6							
	Rate	d Frequency	[Hz]		50/60						
	Pollu	ition Degree				3					
Conventional Free Air Thermal Current Ith [A]			mal Current Ith [A]			10					
	nt (A)		AC120V	6	5	6	6				
Ê	E.	Category AC-15	AC240V	3	5	3	3				
e.	fonal	(Coil Load)	AC440V	1.	5	1.5	1.5				
đ	beild	(Note 2)	AC550V	1.	2	1.2	1.2				
5	ated (	Category AC-12	AC120V	10	0	10	10				
iŋ	AC H	(Resistive Load) (Note 2)	AC240V	8	8	8	8				
Rat	nt (Å		DC24V		5	3	3				
ц.	l S	Category DC-13	DC48V	1.	5	1.5	1.5				
ac	fional	(Coil Load)	DC110V	0.6	(2)	0.6(2)	0.6				
Tu l	Bell	(Note 2)	DC220V	0.3(	0.8)	0.3(0.8)	0.3				
ŏ	ated	Category DC-12	DC110V	5(	8)	5(8)	5				
	ВСF	(Resistive Load) (Note 2)	DC220V	1(;	(3) 1(3) 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.

## Combination With Contactor Relays

Contactor relays and auxiliary contact units can be used in the contact arrangements of the following combinations.

	Auxiliary Contact			Side Clip-on					
Contactor Relays	Unit	UT-AX4(BC)			UT-AX2(BC)			UT-AX11(BC)	UT-AX11(BC)
Model	Contact Arrangement	4a	3a1b	2a2b	2a	1a1b	2b	1a1b + 1a1b	1a1b
	5a	9a	8a1b	7a2b	7a	6a1b	5a2b	7a2b	6a1b
	4a1b	8a1b	7a2b	6a3b	6a1b	5a2b	4a3b	6a3b	5a2b
3ND-13(BC)	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



#### 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

8

## MS-T Series

Outline Drawings (Figure Has No BC)



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)



Model Name	Model Name
UN-AX2	UN-AX2CX
UN-AX4	UN-AX4CX
UN-AX11	UN-AX11CX

# **Optional Units**

## Outline Drawings



Applicable Models	L Dimension	Applicable	Applicable	Terminal Screw		
S-T100	7.5	Terminal Wire Size	Crimp Lug	Tightening Torque		
S-N125	11	[φ mm, mm <sup>2</sup> ]	Size	N∙m		
SD-T100	37.5	φ1.6	1 05 / to 0 /	1 10 +0 1 06		
SD-N125	36	1.25 to 2	1.23-4 10 2-4	1.10 10 1.00		
SL(D)-T100	7.5	L		J		
SI (D)-N125	11					

ntact Arrange mont

Contact Arrang	ement				
53	61		83	71	
	¥			¥	
54	62		84	72	
When addition left side of the	nally mounted on t magnetic contac	When additiona right side of the	ally mounted c e magnetic co	on the ntactor	

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**



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.



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.

Applicable Models	Applicable	Applicable	Terminal Screw
S-N600, N800	Terminal Wire Size	Crimp Lug	Lightening lorque
SD-N600, N800	[φ mm, mm <sup>-</sup> ]	Size	N∙m
SL(D)-N600, N800	φ 1.6	1.25-4 to 2-4	1.18 to 1.86
	1.25 to 2		
Contract Amongoment			

53 61 83 71 4  $\langle |$ ſ 4 62 72 54 84

## 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

#### • Туре

Lipit Model Name	Contact Ar	rangement	Unit Mounting	Model Names of Applicable Magnet	Total Number of		
	Name	Contact	Method	AC Operated	DC Operated	Addable Units	
UN-LL22	Low-Level Contact	1a1b	Front Clin on	S-T65, T80	SD-T65,T80	1 (Noto 1)	
UN-LL22CX	Standard Contact	1a1b		DU-N30	DUD-N30	T (NOLE T)	

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		
ted	Category DC-12	Resistive Load	DC24 V 100 mA, DC48 V 100 mA	DC110 V 1.5 A, DC220 V 0.25 A		
n Ra	Category DC-13	Large Coil Load	-	DC110 V 0.6 A, DC220 V 0.3 A		
kimur acity	Category AC-12	Resistive Load	AC48 V 200 mA, AC240 V 20 mA	AC110 V 10 A, AC220 V 8 A		
Cap Cap	ੇ ਤੋਂ 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 Insulat	ion Voltage	AC250 V	AC500 V		
Cuvitations Durability Electrical		Electrical	0.5 mil. times 0.5 mil. times			
Switc	Thing Durability	Mechanical	2.5 mil	I. 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<sub>60</sub> (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 <sup>-8</sup>	5 × 10 <sup>-7</sup>
DC12 V 5 mA	1 × 10-7	-
DC 5 V 5 mA	1 × 10 <sup>-6</sup>	-
AC100 V 10 mA	1 × 10 <sup>-8</sup>	5 × 10 <sup>-8</sup>

[Conditions] 1. One million times switching.

In a typical environment without a large amount of dust or corrosive gas.
 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)



## Contact Arrangement



(When viewed from the front)

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.

## Proper Use



UT-SA21

Surge Suppressing Element	Performance	Surge Waveform (Representative) Example
None	· Waveform with no surge suppressing element.	Coil OFF
Varistor	<ul> <li>Limits the peak voltage.</li> <li>High-frequency components below the limit voltage cannot be limited.</li> </ul>	Coil OFF
Varistor + Indicator Lamp	Limits the peak voltage     Displays the operation.     Indicates that voltage is applied to the     operation coil.	
CR ⊶⊢∕∕∕∕~⊸∘	<ul> <li>Limits the high-frequency components. (There are types for AC coils and DC coils.)</li> </ul>	
Varistor + CR	<ul> <li>Limits both the peak voltage and high- frequency components.</li> </ul>	

## Types and Ratings

Surae	Mode	Model		Applicable Voltage Range															
Absorber	Absorber		Internal Element Specifications	AC 50/6			50/60Hz	Iz						D	С				
Element		Designation		12V	24V	50V	100V	127V 200V	240V	346V	480V	12V	24V	48V	60V	100V	125V 2	00V	220V
		AC24V	Varistor Voltage 47 V														·		
Variator		AC48V	Varistor Voltage 120 V																
Varistor 01-3A21	AC200V	Varistor Voltage 470 V																	
		AC400V	Varistor Voltage 910 V																
Varistor + Indicating Lamp	UT-SA22	AC200V	Varistor Voltage 470 V																
0.0	UT-SA13	DC200V	0.5 μF120 Ω																
CR	UT-SA23	AC200V	0.2 μF120 Ω																
Varistor		AC48V	Varistor Voltage 120 V 0.1 μF47 Ω																
+ CR OT-SA25 AC200V Variate		Varistor Voltage 470 V 0.1 μF47 Ω																	
		AC48V	Varistor Voltage 120 V																
Variator		AC100V	Varistor Voltage 270 V																
varistor	UN-5A721	AC200V	Varistor Voltage 470 V																
		AC400V	Varistor Voltage 910 V																
Varistor	UN-SA712	AC100V	Varistor Voltage 270 V																
Lamp	UN-SA722	AC200V	Varistor Voltage 470 V																
CP	UN-SA713	DC200V	0.5 μF120 Ω																
Un	UN-SA723	AC200V	0.2 μF120 Ω																
Varistor + CR UN-		AC48V	Varistor Voltage 120 V 0.1 μF47 Ω																
	UN-SA725	AC100V	Varistor Voltage 270 V 0.1 μF47 Ω																
		AC200V	Varistor Voltage 470 V 0.1 μF47 Ω																

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 intermediate (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		DO Oracinata d	Mechanically Latche	d Type (AC Operated)	Mechanically Latched (DC Operated)		
Absorber Element	AC Operated	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	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	_	SL-T21 to T50 SRL-T5	_	_	_	
UT-SA25	S-T10 to T50, B-T21 S-N38, N48 SR-T5, T9	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

- 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

For the spring clamp terminal models, refer to pages 125 and 175.

## Outline Drawings





# 8 Optional Units



SR-K100

SRD-K100

SRL(D)-K100

17.5

11.5

17.5

5.5

## Mounting Method

(1) UT-SA13, SA21, SA22, SA23, SA25



#### (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

Model Name	Mounting Method	Internal Element Specifications	Rated Voltage/Frequency	Applicable Models
UT-SA3320	Front Clip-on	(0.3µF + 60Ω)×3		S-T10, T12, T20(BC) SD-T12, T20(BC)
UT-SA3332	Front Clip-on	(0.3µF + 60Ω)×3	AC240V	S-T21, T25, T32(BC) SD-T21, T32(BC)
UN-SA33	Independent Mounting	(0.5μF + 50Ω)×3	50/60Hz	S-T10 to T100 SD-T12 to T100 S-N125 to N800 SD-N125 to N800 SD-Q11, SD-Q12

Specifications

-							
Withstand Voltage		Insulation	Superimposed Pulse	Conditions (Maximum)	Maximum	Mechanical Durability	
Between Terminals	Between Terminal - Case	Resistance	Peak Value	Pulse Width	Applied Voltage	(Front Clip-on Type)	
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

Type



## Outline Drawings



#### UT/UN-ML Mechanical Interlock Units 8.7

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-SDD, SGD) 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.

## Format

Mechanical Interlock	Applicable Magnetic Contactor Model						
Model Name	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				



UT-ML20

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.)

	0 M4 Carry									
. /	2-W4 Screw	Model	Applicable		imensions	[mm]	Applica	able Terminal Wire	Applicable Crimp	Terminal Screw
-,	Ø	Model	Frames	A ±0.2	B ±0.2	C ±0.3	3 Size	e [φmm, mm²]	Lug Size	Tightening Torque N·m
Τī			T10	74	-	60	_	φ1.6	1.25-3.5 to 2-3.5	0.94 to 1.51
O		UT-ML20(BC)	S-T12,T20	89	-	60		0.75 to 2		
			SD-T12,T20	89	-	60				
-	A					· ·				
				Dim		1				
		Mechanical	Applicable							
	4-M4 Screw	interiook	T21 T25	54	19	60				
Å		-	T35.T50	65	20	70				
		UN-ML21	S-T32	30	23	60				
	0		SD-T32	32	21	67				
		-	N38,N48	40	24	80				
		·								
. A										
-	<del>7 7 7</del> 7									
	4-N	M4 Screw								
i i										
	-@ <u>+</u> @									
	03	Mechanical Interlock Applicable Frames								
	- <u>7</u> 5		UN-ML21 T65,T80							
70+0.2	28									
	********									
	4-M5	Screw								
			Mechanica	al App	licable					
	070		Interlock	Fra	ames					
			UN-ML80	) T	100					
φ										
< 80±0.3	±0.2 × 80±0.3 ×									
	0 0 0	Scrow								
1	i i i i	00101	Mechanica	al App	licable		Dime	nsions		
··			Interlock	Fra	ames	A±0.2	B±0.2	C±0.3	D	
			UN-ML80	N125		90	49	125	M4	
	0		UN-ML150	) N150		100	39.5	125	M5	
				N180	N220	120	40	190	M6	
А	BA		UN-ML220	) N300	N400	145	37	225	M8	
4	- <del>7 7 7</del>			1.000						

#### UT-ML20(BC)

- 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)  $\rightarrow$  To Right Magnetic Contactor Coil Terminal A1

Lead L02 (Black)  $\rightarrow$  To Left Magnetic Contactor Coil Terminal A1

(6) Wire the control circuit as follows.

Right Coil  ←	Right Contactor -	> Interlock
Terminal A2	Control Circuit	Unit
		Terminal R01
Left Coil 🗲	Left Contactor -	> Interlock
Terminal A2	Control Circuit	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.


# 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-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.



# 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<sup>-</sup>) and electrical interlock when configuring the reversible type.



Applicable	Reversing Type	Crossover Type	3-Pole Short-Circuit Type	2-Pole Short-Circuit Type
Magnetic Contactor Frame	b. b. b. b. b.		b, b, b,	d d d
T10	UT-SD10	UT-SG10	-	
T12,T20	UT-SD20	UT-SG20	-	01-1020
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	LIN XG25	
N38,N48	—	—	014-1625	011-1025
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	—	—
Bemarks	The kit contains six conductors per set. Power supply side and load side	The kit contains three conductors per set.	2 conductors are required when configuring the 3-pole parallel circuit.	2 conductors are required when configuring the 3-pole series circuit.
. ioniario	conductors are available, and therefore care should be taken when connecting.	the power supply terminal.	When using on the power supply s	ide, mount after wiring the coil.

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<sup>-</sup> and SG<sup>-</sup> 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

### UT/UN-YY 3-Pole Array Connection Units 8.9

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

Linit Model	A	pplicable Mode	ls	Rating [A]	Terminal	Switching
Name	AC Operated Product	DC Operated Product	Latched Type	AC-1 AC100 to 220 V	1 Screw L 220 V Size [x 10	
UT-YY20	S-T10/T12/T20	SD-T12/T20	-	40		
	S-T21	SD-T21	SL(D)-T21	65	MC	
UN-YY21	S-T25	_	—	80	IVIO	50
	S-T32	SD-T32	—	- 100		
	S-T35	SD-T35	SL(D)-T35	125		
014-1135	S-T50	SD-T50	SL(D)-T50	200	140	
	S-T65	SD-T65	SL(D)-T65 250		IVIO	
011-1150	S-T80	SD-T80	SL(D)-T80	915		25
UN-YY80	S-T100	SD-T100	SL(D)-T100	315	M8×2	25
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



Model Name	Model Name
UT-YY20	UN-YY50
UN-YY21	UN-YY80
UN-YY35	UN-YY125
	UN-YY150

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					
UT-SY21BC	(Triac Output)	Top-On	S-T10 to T50			
UT-SY22	Contact Output	Mounting	SR-T5, T9			
UT-SY22BC	(Relay Output)	l				
UN-SY11	Contactless Output (Triac Output)	Independent	S-T10 to T100 SR-T5, T9			
UN-SY12	Contact Output (Relay Output)	Mounting	S-N125 to N400 SR-K100			
UN-SY21	Contactless		S-N38, N48			
UN-SY21CX	Output		S-N38CX, N48CX			
UN-SY31	(Triac Output)	Top-On	S-T65, T80			
UN-SY22	Contact	Mounting	S-N38, N48			
UN-SY22CX	Output		S-N38CX, N48CX			
UN-SY32	(Relay Output)		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 $\square$ BC is the model name with wiring streamlining terminals. Note 3. UN-SY $\square$ CX is the model name with CAN terminals.

# Specifications

	Mode	1	UT-SY21(BC)	UT-SY22(BC)	UN-SY11	UN-SY21(CX)	UN-SY31	N-SY31 UN-SY12 UN-SY22(CX)				
	Rated Operatio	nal Voltage	DC2	24 V	DC24 V							
no	Tolerable Voltage	Tolerable Voltage Fluctuation 85 to 110% of Rated				85 to	110% of Rated	ated Operational Voltage				
ecti	Current		15 mA	10 mA		15 mA			10 mA			
rt S	Power Consumption 0.4		0.4 W	0.24 W	0.4 W				0.24 W			
npu	Minimum Clos	ing Voltage	18 V	18 V		18 V			18 V			
_	Maximum Openning Voltage 4 V 1 V					4 V			1 V			
	Output Spec	cifications	Contactless Output (Triac Output)	Contact Output	t Contactless Output (Triac Output)							
드	Rated workin	d working Voltage AC100 to AC240 V 50/60 Hz		AC100 to AC240 V 50/60 Hz								
ctio	Rated Operation	onal Current	0.5 A,	AC-15	0.5 A, AC-15							
Sec	Leakage Curren	t when open	5 mA/240 V	None		5 mA/240 V			None			
utput	Operating 7	Time	1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit	10 ms or less	1 ms in Operat	1 ms in Operation, 0.5 Cycles + 1 ms or Less in Open Circuit 10 ms or le						
0	Durability	Mechanical	-	5 mil. times		_			5 mil. times			
	Durability	Electrical	-	5 mil. times		_		1 mil. times (Note 1)	5 mil. times	1 mil. times		
Ν	lorking Temp	oerature	-10°C t	o 55°C	-10°C to 55°C							
Operating Til Durability M Working Tempe Applicable	Wire	φ1.6mm, 0.7	'5 to 2.5mm <sup>2</sup>			φ1.6mm,1.	25 to 2mm <sup>2</sup>					
Te	rminal Wire	Crimp minal	1.25-3.	5, 2-3.5			1.25-3.	5, 2-3.5				
10		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)



# 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.



## (2) UT-SY21, SY22



## UN-SY21(CX), SY22(CX) [Figure Has No CX]



<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.



### (3) UN-SY31, SY32



## <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.



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		
		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)	-		
agnetic Starters/Magnetic Contactors		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)	-		
	D	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)	_		
	sinç	S-N150,DU-N120	SD-N150,DUD-N120	SL(D)-N150	UN-CZ1500 (2 Units Required for Power Supply and Load Sides) (Note 8 $^{\ast\prime}$	-		
	evei	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 $^{\ast 2}$	—		
	Von-R	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)	-		
ε	-	MSO-T65/T80	MSOD-T65/T80	MSOL(D)-T65/T80	UN-CZ500 (Power Supply Side), UN-CZ501 (Load Side) (Note 8 *1)	-		
acto		MSO-T100	MSOD-T100	MSOL(D)-T100	UN-CZ800 (Power Supply Side), UN-CZ801 (Load Side) (Note 8 *2)	—		
onta		MSO-N125	MSOD-N125	MSOL(D)-N125	UN-CZ1250 (Power Supply Side), UN-CZ1251 (Load Side) (Note 8 *2)	_		
Ŭ		MSO-N150	MSOD-N150	MSOL(D)-N150	UN-CZ1500 (Power Supply Side), UN-CZ1501 (Load Side) (Note 8 *2)	-		
neti		MSO-N180/N220	MSOD-N220	MSOL(D)-220	UN-CZ2200 (Power Supply Side), UN-CZ2201 (Load Side) (Note 8 *2)	—		
Mag		MSO-N300/N400	MSOD-N300/N400	MSOL(D)-N300/N400	UN-CZ3000 (Power Supply Side), UN-CZ3001 (Load Side) (Note 8 *2)	—		
irters//		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)	-		
ignetic Sta		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)	-		
Ма		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)	-		
	rsing	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)	-		
	Reve	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	4 (Note 8 *4)		
		MSO-2 x N150	MSOD-2 x N150	MSOL(D)-2 x N150	UN-CZ1504	4 (Note 8 *4)		
		MSO-2 x N180/N220	MSOD-2 x N220	MSOL(D)-2 x N220	UN-CZ2204	4 (Note 8 *4)		
		MSO-2 x N300/N400	MSOD-2 x N300/N400	MSOL(D)-2 x N300/N400	UN-CZ3004	4 (Note 8 *4)		
		TH	I-T65 (Not available with S	SR)	_	UN-CZ605 (Live Part Protection Cover)		
Ther	mal		TH-T25/T50		_	UN-CV203 (Current Setting Dial Misoperation Prevention Cover) (Note 10)		
Rela	ays	TH	-T65/T100,TH-N120 to N	600		UN-CV603 (Current Setting Dial Misoperation Prevention Cover) (Note 10)		
			ET-N60		-	UN-CV602(Live Part Protection Cover)		
		UN-	AX2	-				
		UN-	AX4	-	UN-CV	20		
0+	hor	UN-	LL22	_				
Uli			UN-AX80		UN-CZ	808		
		S-T65/T80	SD-T65/T80	-	UN-CV117 (Magnetic Contactor Manua	al 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 Classic 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

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		ر Inc)	Auxiliary Contact Units (Including Low-Level Signals)				Reset Releases	Fluorescent Display Lamps	Main ( Cond Ki	Circuit luctor its
Туре	Model Name	UN-AX2 UN-AX4 UN-LL22	UN-AX11	UN-AX80	UN-AX150	UT-SA3320 UT-SA3332	UT/UN-RR□□	UN-TLDD	UT/UN-SD UT/UN-SG	UN-YG UT/UN-YD UT/UN-YY
Contactor Manual Operation Prevention Cover	UT-CV107/UN-CV117	x	0	-	—	x/—	-	—	0	0
Live Part Protection Cover for UN-AX2/4	UN-CV20	0	<b>°*1</b>	-	_	-	х	х	_	-
	UN-CZ500	<b>°*2</b>	<b>°*1</b>	_	_	_	-	_	-	x
Contactor Live Part	UN-CZ800, CZ1250	_	_	<b>°*3</b>	_	_	_	_	_	х
Protection Cover	UN-CZ1500, CZ2200, CZ3000	_	_	_	0	_	_	_	_	х
	UN-CZ501	O <b>*</b> 2	<b>°*1</b>	-	-	-	x	х	-	-
Live Part	UN-CZ801, CZ1251	-	-	O <b>*</b> 3	-	-	х	х	-	-
Protection Cover	UN-CZ1501, CZ2201, CZ3001	-	-	-	0	-	х	х	-	-
	UN-CZ502	O <b>*</b> 2	<b>°*1</b>	—	—	—	—	—	0	-
Contactor Live Part	UN-CZ802, CZ1252	-	-	O <b>*</b> 3	-	-		—	0	-
Protection Cover	UN-CZ1502, CZ2202, CZ3002	-	-	-	0	-	-	_	0	-
Contactor/Thormal Dalay	UN-CZ504	O*2	O*1	_	_	_	x	x	_	_
Live Part Protection Cover	UN-CZ804, CZ1254	_	_	<b>°*3</b>	_	_	x	x	_	-
	UN-CZ1504, CZ2204, CZ3004	_	_	_	0	_	x	x	_	_
Latch Mechanism Live Part	UN-CZ506	x	O*1	_	_	_	_	_	x	x
Protection Cover	UN-CZ806	_	_	○*3	_	_	_	_	x	х
TH-T65 Live Part Protection Cover	UN-CZ605	-	_	-	-	-	х	х	-	_
Thermal Dial Misoperation Prevention Cover	UN-CV203, CV603	_	_	_	_	_	х	х	_	_

Note 1. Meaning of the Symbols:  $\bigcirc$  : 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  $\Box$  (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.)



(2) UN-CZ500 to CZ3000 (Table at right)



### (3) UN-CZ501 to CZ3001 (Table at right)



### (4) UN-CZ502 to CZ3002 (Table below)



	Set			Outline Drawings													
	Frame	Model	C	П	F	FF	G	н				ĸ					
		Name	Name	Name	Name	Name	Name	Ľ	ů D			ŭ		S	SD	Ŭ	
actors	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					
Cont	N125	UN-CZ1252	34.5	125	204	243	6.5	86	62	87	276	16.5					
atic (	N150	UN-CZ1502	52	125	229	294	7	96	60	84.5	296	1					
gne	N180/N200	UN-CZ2202	42	190	274	330	7	113	76	101.5	370	-20					
Š	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.

Model Name	Variable Dimensions								
WOUEI Marrie	A	В	С	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					

	Combined	Unit Name		Outline Drawings									
	Power Supply Side Unit	Load Side Unit	с	D	Е	F	G	н	S/MSO	SD/SMOD	J (Body)	к	L
SI	UN-CZ500	UN-CZ500	32.5	75	140	92	-3.5	60.5	45.5	72.5	88	2	2
actc	UN-CZ800	UN-CZ800	36.5	110	183	104	2	67.5	59.5	89.5	100	2	2
Cont	UN-CZ1250	UN-CZ1250	34.5	125	204	104	6.5	86	51	76	100	2	2
ţic (	UN-CZ1500	UN-CZ1500	49.5 to 52	125 to 130	229	154	7	96	49	73.5	120	17	17
igne	UN-CZ2200	UN-CZ2200	42	190	274	170	7	113	62	87.5	138	16	16
Ma	UN-CZ3000	UN-CZ3000	46.5	225	318	192	7	126	69	95	163	14.5	14.5
ers	UN-CZ500	UN-CZ501	32.5	75	188	96	-3.5	60.5	45.5	72.5	90	4	2
arte	UN-CZ800	UN-CZ801	36.5	110	254	104	2	67.5	59.5	89.5	100	2	2
ŝ	UN-CZ1250	UN-CZ1251	34.5	125	296	125	6.5	86	51	76	*112	*9.8	*3.2
etic	UN-CZ1500	UN-CZ1501	49.5 to 52	125 to 130	325	154	7	96	49	73.5	120	17	17
agn	UN-CZ2200	UN-CZ2201	42	190	363	170	10	128	47	72.5	144	13	13
Ĕ	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.

### (5) UN-CZ504 to CZ3004 (Table below)



		Set				Out	line [	Drawi	ings			
	Frame	Model Name	с	D	Е	F	G	н	MSO	MSOD	J	к
	TOF /TOO	1111 07504	00	100	100	100	0.5	CO F	<b>F4 F</b>	70.5	010	10
Sie	165/180	UN-CZ504	23	100	188	190	-3.5	60.5	51.5	78.5	216	-13
arte	T100	UN-CZ804	58.5	100	254	241	2	67.5	69.5	99.5	270	-14.5
ğ	N125	UN-CZ1254	34.5	125	296	260	6.5	86	62	87	276	0.5
etic	N150	UN-CZ1504	52	125	325	294	7	96	60	84.5	296	1
gu	N180/N220	UN-CZ2204	42	190	363	330	7	113	76	101.5	370	-20
Ŝ	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.

# **Optional Units**





### (10) UN-CV602



### UN-CZ806 79 0.5 49 0 12

# Dimensions when mounted on the magnetic contactor (figure at left shows SL-N125.)

<b>e==e</b> .,					
Applicable Magnetic	ble Magnetic Outline Drawing				
Contactors	A	В	С	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	

# Mounting Method

Live Part Protection Cover	Mounting Method						
UN-CV20	Positioning Part Claw Part	<ol> <li>Align the positioning portion of the cover between the barriers of the body as in the dashed line.</li> <li>Push in the direction of Arrow A, and hook the claw of the cover to the protrusion of the body barrier.</li> </ol>					
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-CZ2200 UN-CZ2200 UN-CZ2201 UN-CZ2202 UN-CZ2204 UN-CZ3000 UN-CZ3001 UN-CZ3002 UN-CZ3004		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		UN-CZ50C Latch Part UN-CZ50G Tightening Torque:0.8 #aN-m Magnetic Contactor	'n	Tighten attach tl	the enclosed two he cover.	M3 screws, then
UN-CZ806	U-C206 a show at 2 some	[A Detailed View] With Rectifier Rectifier Rectifier UN-CZ806	As shown at left, loosen screws that are tightenir rectifier, place UN-CZ80 the B section of the rect tighten the screws.	the ng the 6 under ifier, then	Without Rectifier M3 Tapping Screw Washer UN-C2806	Tighten using the provided screws and washers. (Place the washer between the screw and UN-CZ806.)
UN-CV602	Fig. (1)	nal Cover Body Growe B Fig. (2) Fig. (3)	1. Insert groov 2. Press direct the E	protrusion e A of the E s the live tion of the T-N lower s	A of the live part ET-N upper surface part protection of arrow and insert it surface. (Figs. (1) a	protection cover into . (Figs. (1) and (2)) cover B claw in the : into the B groove of ind (2))



# 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		Slide (in the direction of the arrow at left) the stopper to the UNLOCK position to remove the lock of the cover.				
UN-CZ1504 UN-CZ2200 UN-CZ2201 UN-CZ202 UN-CZ204 UN-CZ3000 UN-CZ3001 UN-CZ3002 UN-CZ3004		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<sup>□</sup> 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	Model Name	Applicable Models: Thermal
Woder Name	AC Operated	DC Operated	NOUEI Marrie	Overload Relays
UT-CW800	S-T65,T80	SD-T65,T80	UT-CW655	TH-T65 (Not available with SR)

# 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.



	Poloaso Longth		
For TH-T18 Note 2	For TH-T25/T50	For TH-T65/T100, TH-N120 to N600	nelease Lengin
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



Note 1. When using UN-RR206 to RR706, the live part terminal cover/protection cover units cannot be used.

# Outline Drawings



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

TRIC

UN-TL12

# 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		0.2 W
UN-TL12 AC100V	AC100 to 127 V	TH-T18	0.18 W
UN-TL12 AC200V	AC200 to 240 V	]	0.2 W
UN-TL20 DC24V	AC24 V/DC24 V		0.2 W
UN-TL20 AC100V	AC100 to 127 V	TH-T25/T50	0.18 W
UN-TL20 AC200V	AC200 to 240 V		0.2 W
UN-TL60 DC24V	AC24 V/DC24 V	TH-T65/T100	0.2 W
UN-TL60 AC100V	AC100 to 127 V	TH-N120 to	0.18 W
UN-TL60 AC200V	AC200 to 240 V	N600	0.2 W

Note 1. UN-TL60 cannot be combined with TH-N120TAHZ.

# Outline Drawings



UN-TL20

UN-TL12

UN-TL60

UN-TL12





Note. UN-TL20 fluorescent display lamp is a combination of UN-TL12 and operation prevention cover (UN-CV203).

UN-TL60	UN-TL60							
		Indicator Lamps	Applicable Models		Variable	e Dime	nsions	
		Model Names	Thermal Overload Relays	Α	AB	В	С	CA
			TH-N220					
			TH-N400	77.5	63	42	89	83.5
		UN-TL60	TH-N600					
			TH-T65,T100	103.5	88	53	89	83.5
AB (Thermal Overload Relay Width)	CA (Thermal Overload Relay Depth)		TH-N120	117.5	103	67	105	105
A (Maximum Width)	C (Maximum Depth)							
Model Name Model	l Name		Note. Mir	imum	Order l	Jnit		

odel Name
UN-TL20

### UN-TL12, TL20 : 5 (5-Piece Set) UN-TL60 :1

# 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.

# 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.  $\Box$ BC is the model name with wiring streamlining terminals.



UT-HZ18 + TH-T18



# Outline Drawings

# 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**

	Parts Included in the Kit		Model Names of Applicable Thermal Overload Relays and Magnetic Contactors			
Kit Model Name			Thermal Overload	Magnetic Contactors		
	Part Name	Quantity	Relays	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



# Mounting Method

- For MSO-T10/T12/T20 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)



Fig. 3

Main Circuit Conductor





Thermal Overload Relay





Fig. 4





Fig. 4

# 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.

# Outline Drawings





UN-FD4

# Ratings/Specifications

Applic	cation	For 200 V N	Aain Circuit	it For 400 V Main Circuit			
Madel Neme		UN-FD AC100V	UN-FD AC200V	UN-FD4 AC100V 1A	UN-FD4 AC100V 1B	UN-FD4 AC200V 1A	UN-FD4 AC200V 1B
woder	Name	UN-FDCX AC100V	UN-FDCX AC200V	UN-FD4CX AC100V 1A	UN-FD4CX AC100V 1B	UN-FD4CX AC200V 1A	UN-FD4CX AC200V 1B
Rated Operationa	al Voltage (Note 1)	AC100 to 120 V 50/60 Hz	AC200 to 240 V 50/60 Hz	AC100 to 12	0 V 50/60 Hz	AC200 to 24	0 V 50/60 Hz
Rated Main C	Circuit Voltage	AC200 to 24	40 50/60 Hz		AC380 to 44	0 V 50/60 Hz	
Input C	Current	17	mA		Operation (A1-A2): 17	mA, Signal (24): 10 mA	N N
Output	Contact Arrangement	1	с	1a	1b	1a	1b
Output	Contact Rating	AC120 V 1.5 A, AC	240 V 1 A (AC-15)		AC120 V 1.5 A, AC	C240 V 1 A (AC-15)	
Minimum Con	trol Input Time	20	ms		20	ms	
Detectio	on Time	0.2 to	0.5 s		0.2 to	0.5 s	
Allowable Detection	on Retention Time	1 s (Short T	ïme Rating)		Continuo	us Rating	
Allowable Volta	age Fluctuation	85 to 110% of Rated Voltage (Bot	h Main Circuit and Control Circuit)	85 to 110%	of Rated Voltage (Bot	h Main Circuit and Cor	ntrol Circuit)
Operating Temp	erature/Humidity	-10 to 60°C/4	5 to 85% RH		-10 to 50°C/4	15 to 85% RH	
Operation	Indicator	No	ne	Lights When Power is Applied (LED Green)			
operation	Thucator	None		Lights in Fault Condition (LED Red)			
Combined Protection		No-Fuse Breaker With	Voltage Tripping Device	No-Fuse Breaker	Magnetic Contactors	No-Fuse Breaker	Magnetic Contactors
Devices		<ul> <li>Magnetic Contactor</li> </ul>	S	With Voltage Tripping Device		With Voltage Tripping Device	
Fault Detection Retention No Retention Function			Electric Retention via Operating Power Supply				
Fault Detec	ction Reset	When Main Circuit P	ower 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.  $\Box$ 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



# 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, 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.)

- 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).



UN-FD4 UN-FD4CX

# 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.



# 8.18 How to Order

Follow the steps below when ordering. (Enter a space in  $\blacktriangle$ .)

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	1 Coil Surge Absorber Units
Model Name	Voltage Designation
UT-SA21 UT-SA22 UT-SA25	▲ AC400V ▲ AC200V ▲ AC48V
Refer to page 206	Select according to the control circuit voltage.
UT-ML Mechanic	cal 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) Au	xiliary Contact Units
Model Name	Contact Arrangement
UN-AX4 UN-AX11CX	▲ 2A2B
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) Au	xiliary Contact Units With Contact for
Low-level Signal	s
Model Name	
UN-LL22 UN-LL22CX	
Refer to page 203	Default contact arrangement is 1A1B low-level contact plus 1A1B standard contact.
UN-SA Operat	ion Coil Surge Absorber Units
Model Name	Voltage Designation
UN-SA721 UN-SA722 UN-SA725	▲ AC400V ▲ AC200V ▲ 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	N-SY (CX) DC/AC Interface Units for
Operation Coils	
Model Name	
UT-SY21 UT-SY21BC UN-SY21	

Refer to	page 218
110101 10	pugozio

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 10
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
Refer to page 228
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)

I	Product Name	DC/AC Interface Units for Operation Coils					
	Format	UN-SY11	UN-SY12	UA-SY21	UA-SY22		
	Mounting	Independer	nt Mounting	Top-On			
Enables AC-operated contactor relays and contactors to operated at DC24 V					ictors to be		
ę	Specifications/ Functions	Triac Output	Relay Output	Triac Output	Relay Output		
		Input DC24 V 15 mA	Input DC24 V 10 mA	Input DC24 V 15 mA	Input DC24 V 10 mA		
Aco	quired Standards						
Mass (g)		60		40			
e Models	Contactor Relays	SR-ł	<100	SR-K100			
Applicabl	Thermal Overload Relays	ys — —					
F	leference 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		
ole 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		
Applica	Thermal Overload Relays	-	-	—	-	-		
Reference Page				205				

# 8.20 Applicable Model List (for MS-K Series)

ion				Applicable Models				
ectio	Product Name	Model Name	Specifications	Contactor Relays				
0)				AC Operated	DC Operated	Mechanically Latched Type		
		UN-SA712	Varistor + Indicator Lamp	K100	SRD-K100	SRL(D)-K100		
	Operation Coil Surge Absorber Units	UN-SA713	C + R		SRD-K100	SRLD-K100		
1		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		
		UN-SY11	Triac Output	K100				
0	DC/AC Interface	UN-SY12	Contact Output	K100				
2	Units for Operation Coils	UA-SY21	Triac Output	K100				
		UA-SY22	Contact Output	K100				

Note. UN-D indicates shared application with MS-N Series optional units. For more information, refer to the MS-N Series optional units.



Symbol	Product Name
SY	$\begin{array}{ll} \mbox{(Input)} & \mbox{(Output)} \\ \mbox{DC24 V} \rightarrow \mbox{AC100 to 240 V} \\ \mbox{DC/AC} \\ \mbox{Interface Units for Operation Coils} \end{array}$
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	Independent Mounting	SR-K100
UA-SY21	(Triac Output)	Top-On Additional Mounting	SR-K100
UN-SY12	Contact Output	Independent Mounting	SR-K100
UA-SY22	Contact Output	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		
	Rated Operation	nal Voltage	DC24 V					
ij	Allowable Voltage	Fluctuation	85 to 110% of Rated Operational Voltage					
<u>ک</u> [	Current		15 mA		10 mA			
put	Power Consumption		0.4 W		0.2	4 W		
느	Minimum Closing Voltage		18	3 V	18	3 V		
	Maximum Openning Voltage		4 V		1 V			
	Output Specifications		Contactless Output (Triac Output)		Contact Output			
÷	Rated Operational Voltage		AC100 to AC240 V 50/60 Hz					
5	Output Current		0.5 A, AC-15					
Int	Open Circuit Leakage Current		5 mA/	240 V	None			
utp	Operating Time		1 ms in Operation, 0.5 Cycles	+ 1 ms or Less in Open Circuit	10 ms or less			
0	Switching Durability	Mechanical	-	_	5 mil.	times		
	Switching Durability	Electrical	-	_	1 mil. times (Note 1)	5 mil. times		
Operating Temperature		-10°Cto 55°C						
	Appliable Terminal Wires	Electric Wires		φ1.6 mm,1.2	25 to 2 mm <sup>2</sup>			
Applicable lerminal Wires		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)



# 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.







# 8.22 How to Order

Follow the steps below when ordering. (Enter a space in  $\blacktriangle$ .)

### 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

# Magnetic Starters/Magnetic Contactors/Contactor Relays According to Application

$n \wedge c$
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# 9.1 Model List

	Series	SD-Q□	B-T□, B-N□	DU-N	S-N□KG	
App	blication 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.	<ul> <li>Main circuit break contact (normally closed contact) can be used for motor control and power switching for lighting circuits.</li> <li>Applications         <ul> <li>For Motor Starting Resistance Short-circuits</li> <li>For Cushioned Starting of AC Motors</li> <li>For Dynamic Brakes</li> </ul> </li> </ul>	<ul> <li>Can be used for applications controlling DC motors at 440 V or less and other general DC circuits.</li> <li>Applications <ul> <li>For Variable Speed Motor Control</li> <li>For Dynamic Brakes</li> </ul> </li> </ul>	<ul> <li>Ideal for applications with frequent inching operations such as with hoists and cranes.</li> <li>Has reinforced main contacts.</li> </ul>	
A  Re	External ppearance of epresentative Model	SD-Q11	B-T21	DU-N30	S-N125KG	
	Magnetic Starters	MSOD-Q11 MSOD-Q12 MSOD-QR11 MSOD-QR12				
Type	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-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
<ul> <li>Suitable for standard products in which the auxiliary break contact is a mirror contact.</li> <li>Can be applied to mechanical safety category 4 circuits. (Can detect malfunction of break contacts)</li> </ul>	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-V320         SHLD-V400           SHD-V400         SHD-V400
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### SD/MSOD-Q DC Interface Contactors 9.2

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  $\varphi$  220 V 2.5 kW motor loads. SD-Q11, SD-Q12 / With Thermal Overload Relay: MSOD-Q11, MSOD-Q12



(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
- 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

Capable of preventing both left and right contactors from being closed simultaneously



SD-QR11

• Surge Absorber Comes Standard Built-in The integrated surge absorber

100

- 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

Model			Model Name		
		Model	Q11/Q12		
	Non-Reversible	Auxiliary Contact 1-Pole	SD-Q11		
Magnetic	Туре	Auxiliary Contact 2-Pole	SD-Q12		
Contactors	Reversible	Auxiliary Contact 2-Pole	SD-QR11		
	Туре	Auxiliary Contact 4-Pole	SD-QR12		
	Non- Reversible	Auxiliary Contact 1-Pole	MSOD-Q11		
		Auxiliary Contact 2-Pole	MSOD-Q12		
		With 2E Thermal	MSOD-Q□KP Note 1		
Magnetic	туре	With Thermal Wiring Streamlining Terminal (with 2E Thermal) Note 4	MSOD-Q□BC(KP) Note 1		
Starters		Auxiliary Contact 2-Pole	MSOD-QR11		
	Reversible	Auxiliary Contact 4-Pole	MSOD-QR12		
	Туре	With 2E Thermal	MSOD-QR KP Note 1		
		With Thermal Wiring Streamlining Terminal (with 2E Thermal) Note 4	MSOD-QR□BC(KP) Note 1		
	Front Clin-	on Auxiliany Contact Unit	UQ-AX2 Note 2		
Units		Auxiliary Contact Onit	UQ-AX2KR Note 3		
	Indicator La	amp Unit	UQ-PL		

# Manufactured Model List

Note 1. The  $\Box$  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

		Туре		Non-Reversing Reversing		ersing		
Model Name	I	Magnetic Conta	ctor SD-	Q11	Q12	QR11	QR12	
	1	Magnetic Starter	· MSOD-	Q11	Q11 Q12 QR11 QR12			
	Rated Insula	ation Voltage [V]		690				
	Three Dhees	Squirrol oogo	200 to 240 V		1	2		
	Motor (Coto	Squirrei-caye	380 to 440 V		ç	)		
	Wotor (Category AC-3)		500 to 550 V		7	7		
	Single-Ph	ase Motor	100 to 110 V		8	3		
	(Catego	ry AC-3)	200 to 220 V	6				
	Resistiv	/e Load	100 to 220 V		10	(15)		
	(Catego	ry AC-1)	380 to 440 V		1	Reversing           QR11         QR12           QR11         QR12           QR1         QR12           S		
	(1119)		24 V		1	2		
	DC Motor	2-Pole Series	48 V		6	6		
	*		100 to 110 V		1.	2		
	(Category		24 V	12				
Rated Operating	DC2, DC4)	3-Pole Series	48 V		10			
Current			100 to 110 V		2.	5	Reversing           QR11         QR12           QR11         QR12	
[A]			24 V		3			
		Single Dele	48 V		1.	5		
		Single i ble	100 to 110 V		0.	6		
			200 to 220 V	0.3				
	DC Salanaid		24 V	5				
	Cotogon/	2 Delo Sorios	48 V		2.	5		
		2-Pole Series	100 to 110 V		1.	QR11         QR12           QR11         QR12           90         12           90         12           9         7           8         6           (15)         10           12         6           .2         2           12         0           66         .2           12         0           66         .2           12         .2           10         .2           12         .2           10         .2           .2         .2           .12         .2           .2         .2           .12         .2           .2         .2           .3         .5           .2         .2           .2         .2           .2         .2           .2         .2           .2         .2           .2         .2           .2         .2           .2         .2           .2         .2           .2         .2           .2         .2           .2		
	00-10)		200 to 220 V		0.	6		
			24 V		$     \begin{array}{r}       12 \\       9 \\       7 \\       8 \\       6 \\       10 (15) \\       10 \\       12 \\       6 \\       1.2 \\       12 \\       10 \\       2.5 \\       3 \\       1.5 \\       0.6 \\       0.3 \\       5 \\       2.5 \\       1.2 \\       0.6 \\       0.3 \\       5 \\       2.5 \\       1.2 \\       0.6 \\       5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       2.5 \\       3 \\       3 \\       10 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       100 \\       10 \\       10 \\       10$			
		2 Dolo Sorioo	48 V	2.5				
			100 to 110 V		2	2		
			200 to 220 V	1				
	Three-Phase	Squirrel-cage	200 to 240 V		2.	5		
Rated Canacity	Motor (Cate	agony AC-3)	380 to 440 V		4	1		
			500 to 550 V		2	1		
[[(]]]]	Single-Pha	ase Motor	100 to 110 V			2		
	(Catego	ry AC-3)	200 to 220 V	0.4				
Co	nventional Free	Air Thermal Cur	rent [A]	20				
Bre	aking Capacity		220 V		120			
[A]			440 V		90			
Making	g Current Capac	ity	220 V		12	20		
	[A]		440 V	90				
	Switching Freq	uency [Times/Ho	our]		18	00		
Switching Durability	E	lectrical (Catego	bry AC-3)	100				
[x 10000] Mechanical			al		10	00		

Note 1. Electrical durability when operated with the following ripple rate after three-phase full-wave rectification. 0.8 mil. times for singlephase 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.

### (2) Auxiliary Contact Rating

	Туре		Body	Front Clip-on Auxiliary Contact Unit
Model Name			SD-Q11/Q12/ QR11/QR12	UQ-AX2(KR)
Rated	Category	AC240V	3	3
Operating	AC-15	AC440V	1	1
Current	Category DC-12	DC24V	10	10
[A]	Category DC-13	DC110V	0.6	0.6
Conventional Free Air Thermal Current [A]			10	10
Electrical D	urability [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	Non-Reve	rsible Type	Reversible Type		
Model	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	Туре	Non-Re	eversing	Reversing			
WOUEI Name		Q11	Q12	QR11	QR12		
C	Closing Voltage		85% or Less of	f Rated Voltage			
Op	penning Voltage		10% or More o	f Rated Voltage			
Operating Time	Coil ON → Main Contact ON	50 ms or less					
Operating Time	Coil OFF → Main Contact OFF	20 ms or less					
Operation Cail	Average Coil Current	55 mA					
Operation Coll	Average Power Consumption	1.3 W (1.65 W)					
Fiopenties	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	Compatible	Heater	Adjustment	Standard Three-Phase	e Motor Capacity [kW]	Control Circuit (Contact)	
Model Name	Relay Model Name	[A]	Current [A]	200 to 220 V	380 to 440 V	Contact Arrangement	Rating
		0.12	0.1 to 0.16				
		0.17	0.14 to 0.22			]	
		0.24	0.2 to 0.32	0.03	0.05	]	
MSOD-Q12(KP)		0.35	0.28 to 0.42	0.05	0.1	]	
MSOD-QR11(KP)	TH-T18(KP)	0.5	0.4 to 0.6	0.07		]	Class AC-15 AC110 V: 2 A AC220 V: 1 A
MSOD-QR12(KP)		0.7	0.55 to 0.85	0.1	0.2	101b	
		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			DC110 V: 0.2 A
MSOD-Q11BC(KP)		2.5	2 to 3		1		
MSOD-Q12BC(KP)	TH-T18BC(KP)	3.6	2.8 to 4.4	0.75	1.5	]	
MSOD-QR11BC(KP) MSOD-QR12BC(KP)		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
Тор	Top	Тор	Тор	Тор	Тор
Bottom	Bottom	Bottom	Bottom	Bottom	Bottom
Standard Mounting	Diagonal Mounting	Horizontal Mounting	Reverse Mounting	Floor Mounting	Ceiling Mounting
0	0	х	O (MSOD: x)	0	○ (MSOD: x)

### Connecting

		Main Circuit		Control Circuit			
Model Name	Applicable Wire	Applicable Crimp	Tightening Torque N·m Parentheses	Applicable Wire	Applicable Crimp	Tightening Torque N·m	
	Size	Lug Size	show standard value	Size	Lug Size	Parentheses show standard value	
Q11 Q12 QR11 QR12	φ 1.6, 1.25 to 2 mm <sup>2</sup>	1.25-3.5 to 2-3.5	0.94 to 1.17 (1.0)	φ 1.6, 1.25 to 2 mm <sup>2</sup>	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)
P	rotection Method	Zener Diode	e or Varistor	Protection Diode
Co	nnection Method			(+) (+) (SD-Q) A2/b (-)
الله الله الله الله الله الله الله الله		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
б		Proximity Switches Photoelectric Switches	Proximity Switches Photoelectric Switches	Various Programmable Controllers
	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





- 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



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



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



 Improved Environmental Applicability Materials used are indicated on main plastic components

# Rating/Performance

Operating Model Name Main Contact		DC DC Mot	Rated Opera	tional Current DC Resis	[A] tive Load	Conventional Free Air Thermal	Rated Insulation	Auxiliary	
Method	WOUEI Marrie	Arrangement	(Category DC-3,	DC-5, DC2, DC4)	(Category I	DC-1, DC1)	Current	Voltage	Arrangement
			100 to 110 V	200 to 220 V	100 to 110 V	200 to 220 V	Ith [A]	[V]	Analigement
	B-T21(BC)	100h 2h	8 (15)	1 (5)	15 (20)	5 (10)	25		2a2b
AC Operated	B-N65	Tazb, 50	20 (50)	3 (20)	30 (65)	10 (30)	80		2a2b
	B-N100	1a2b	30	3	40	20	120	600	2820
	BD-T21(BC)		8	1	15	5	25	090	2a2b
DC Operated	BD-N65	1a2b	20	3	30	10	80		202h
	BD-N100		30	3	40	20	120		2820

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.

			AC Rated Operational Current [A]						
Operating	Madal Nama	Main Contact		Break	Contact		Make Contact		
Method	woder name	Arrangement	Three-	Phase	2-Pole Series Single Phase	1-Pole Single Phase	1-Pole Single Phase		
			200 to 220 V	380 to 440 V	200 to 220 V	200 to 220 V	200 to 220 V		
	B-T21(BC)	102h 2h	18	13	18	18	18		
AC Operated	B-N65	1820, 30	50	35	50	50	50		
	B-N100	1a2b	80	55	80	80	80		
	BD-T21(BC)		18	13	18	18	18		
DC Operated	BD-N65	1a2b	50	35	50	50	50		
	BD-N100		80	55	80	80	80		
Making/Breaking Duty Conditions/		onditions/	Making Only, Without Breaking/		Making and Breaking/	Making Only, Without	Making and Breaking/		
Sv	Switching Durability		500,000	) Times	500,000 Times	Breaking/500,000 Times	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.

	Item	Reference Page	Remarks
Related	Auxiliary Contact Rating	Page 41	_
Reference Page	· Operation Coil	Pages 43, 44	-
	How to Order	Page 263	-
	· Combining with Optional Units	Page 194	_

# Properties

	Madel Name Input [VA] P		Power Consumption	Operating	Voltage [V]	Coil Current	Operating Time [ms]		
woder Name	Inrush	Normal	[W]	Close	Open	[mA]	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	50 to 65	10 to 30	33	45 to 60	10 to 30	
			(2.2)				(70 to 85)		
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	A2 A1 13 21 1/L1 3/L2 5/L3 43 31	A2 A1 13 21 1/L1 3/L2 5/L3 43 31 	BD-T21	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	_
	Aux. 2a2b	Aux. 2a2b		Aux. 2a2b	
B-N65	$\begin{array}{c} 13 & 21 \\ A1 & A2 & (13) & (31) & 1/L & 1^{3/L25/L3} & (43) & 31 \\ \downarrow \downarrow \downarrow \downarrow - & $	$\begin{array}{c} 13 & 21 \\ A1 & A2 & (13) & (31) & 1/L & 1^{3/L2} & 5/L3 & (23) & (41) \\ \hline & & - & - & - & - & - & - & - & - \\ 14 & 22 & -7 & - & - & - & - & - & - \\ 14 & (22) & 27 & 1_4/T2 & 6/T3 & 44 & 32 \\ (14) & (32) & 27 & 1_4/T2 & 6/T3 & (24) & (42) \end{array}$ Aux. 2a2b	BD-N65	A1 A2 (13) (31) $\frac{1}{L^{13/L25/L3}(23)}$ (41) $\frac{1}{L^{13/L25/L3}(23)}$ (42) Aux. 2a2b	_
B-N100	$\begin{array}{c} 13 & 21 \\ A1 & A2 & (13) & (31) \\ \hline \\ 1 & - & - & - & - & - & - & - \\ 14 & 22 & 2/T1_{4/T2} & -T & - & - & - \\ 14 & (14) & (32) \\ \hline \\ Aux. & 2a2b \end{array}$	_	BD-N100	A1 A2 (13) (31) 1/L13/L25/L3(23) (41) A1 A2 (13) (31) 1/L13/L25/L3(23) (41) -11111111	_
# Handling

• Applicable Wire Size and Terminal Screw Tightening Torque

	Terminal Dimensions Main Circuit Circu			Applicable Wire Size [mm²]		Applicable Ci	rimp Lug Size	Terminal Screw Tightening Torque N·m Parentheses show standard value	
Model Name	Screw Size	Terminal Dimensions A x B x C [mm]	Screw Size	Main Circuit	Control Circuit	Main Circuit	Control Circuit	Main Circuit	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	—	φ1.6	1.25-6 to 60-6	1.25-4 to 2-4	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	_	1.25 to 2	5.5-8 to 60-8	5.5-S4	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





# 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

			Main C	`ontoot		Rated	l Operati	ng Curre	ent [A]		Rated	Capacit	y [kW]	Conventional	Deted	Auxilian
Operating	Model	Main Contact	Iviain C Sei	ries	Variable Speed	d Motor Control:	Make Contact	Gene	ral DC M	otors	Gene	ral DC M	otors	Free Air Thermal	Insulation	Contact
Method	Name	Arrangement	Conne	ection	Dynamic	Braking: Break	Contact	(Catego	ry DC2 a	nd DC4)	(Catego	ry DC2 a	nd DC4)	Current	Voltage	Arrangement
					DC110V	DC220V	DC440V	DC110V	DC220V	DC440V	DC110V	DC220V	DC440V	Ith [A]	ronago	, indigenient
			Make	Single Pole	40	40	15	30	20	_	2.2	3.7	—	60		
	DU-N30		Contact	2-Pole	50	50	40	40	30	20	3.7	5.5	7.5			
			Break Contac	t Single-Pole	120 *1	120 *1	120 *1	20	15	-	1.5	2.2	—	50		
			Make	Single Pole	80	80	30	60	40	-	5.5	7.5	—	120		
0	DU-N60		Contact	2-Pole	90	90	80	80	60	40	7.5	11	15	120		
			Break Contac	t Single-Pole	240 *1	240 *1	240 *1	40	30	-	3.7	5.5	_	100		
AC Operated			Make	Single Pole	160	160	60	120	80	-	11	15	-		660V	2a2b
	DU-N120	2a1b	Contact	2-Pole	160	160	160	160	120	80	15	22	30	160		
			Break Contac	t Single-Pole	480 *1	480 *1	480 *1	80	60	-	7.5	11	—			
	DU-N180		Make	Single Pole	260	260	90	180	120	-	15	22	-	270		
			Contact	2-Pole	260	260	260	240	180	120	22	35	45	210		
			Break Contac	t Single-Pole	720 *1	720 *1	720 *1	100	75	-	7.5	11	—	260		
			Make	Single Pole	360	360	130	260	175	-	22	30	-			
	DU-N260		Contact	2-Pole	360	360	360	350	260	175	30	45	55	360		
			Break Contac	t Single-Pole	1040 *1	1040 *1	1040 *1	150	100	-	11	18.5	—			
	DUD-N30		Make	Single Pole	40	40	15	30	20	_	2.2	3.7	_	60		
	000 1100		Contact	2-Pole	50	50	40	40	30	20	3.7	5.5	7.5			
	DUD-N60		Make	Single Pole	80	80	30	60	40	-	5.5	7.5	_	120		
	202 1100		Contact	2-Pole	90	90	80	80	60	40	7.5	11	15	.20		
DC	DUD-N120	2a	Make	Single Pole	160	160	60	120	80	-	11	15	_	160	660V	2a2b
Operated			Contact	2-Pole	160	160	160	160	120	80	15	22	30			2420
	DUD-N180		Make	Single Pole	260	260	90	180	120	-	15	22	—	270		
	202 11100		Contact	2-Pole	260	260	260	240	180	120	22	35	45		<u> </u>	
	DUD-N260		Make	Single Pole	360	360	130	260	175		22	30	—	360		
	JUD-N260	Contact	2-Pole	360	360	360	350	260	175	30	45	55	000			

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<sup>II</sup>, DUD-2xN<sup>II</sup>) can also be manufactured.

# Performance

							1	r		
M	odol Namo	Main C	Contact	Breaking	Capacities [/	A] Note 1	Making Current	Switching Frequency	Switching Dura	bility [x 10000]
IVIO		Series Co	onnection	DC110 V	DC220 V	DC440 V	Capacity [A] Note 2	[Times/Hour]	Mechanical	Electrical
		Make	Single Pole	120	80	—				
	D0D-1130	Contact	2-Pole	160	120	80	160			
	DU-N30	Break Contac	t Single-Pole	Single-Pole 80 60 —						
		Make	Single Pole	240	160	—				
	DOD-IN60	Contact	2-Pole	320	240	160	320			
L	DU-N60	Break Contact Single-Pole		160	120	_				
		Make	Single Pole	480	320	_				
	DOD-IN120	Contact	2-Pole	640	480	320	640	1200	250	50
ĺ	DU-N120	Break Contac	t Single-Pole	320	240	_				
		Make	Single Pole	720	480	_				
	DOD-IN160	Contact	2-Pole	960	720	480	960			
Ĺ	DU-N180	Break Contac	t Single-Pole	400	300	—				
		Make	Single Pole	1040	700	—				
	DUD-N260	Contact	2-Pole	1400	1040	700	1400			
Ĺ	DU-N260 Break Conta		t Single-Pole	600	400	_	1			

Note 1. Time constant L/R = 15 ms, 25 shut-off transitions.

Note 2. Time constant L/R = 15 ms, 100 closings

# Properties

Model	Inpu	t [VA]	Power Consumption	Operating	Voltage [V]	Coil Current		Operating	Time [ms]	
Name	Inrush	Normal	[W]	Close	Open	[mA]	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.

	Item	Reference Page	Remarks
Related	· Auxiliary Contact Rating	Page 41	_
Reference Page	· Operation Coil	Pages 43, 44	_
	· How to Order	Page 263	_
	· Combining with Optional Units	Page 194	_

# Outline Drawings



9



# Contact Arrangement/Connection Diagram



## Handling

#### Applicable Wire Size and Terminal Screw Tightening Torque

	Te	erminal Dimensior	าร					Terminal Screw Tightening	
Model Name	Main Circuit		Control Circuit	Applicable Wi	re Size [mm <sup>2</sup> ]	Applicable Cr	imp Lug Size	Torque N·m Parentheses show standard value	
	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	_		1.25-6 to 22-6 38-S6	1.05 4 to	3.53 to 5.78(4.41)	
DU-N60, DUD-N60	M8	15 x 8.5 x 16	M4	—	φ 1.6	5.5-8 to 60-8	2_4	6.28 to 10.29(7.84)	1.18 to 1.86
DU-N120, DUD-N120	M8	20 x 10 x 16	M4	—	1.25 to 2	8-8 to 100-8	5 5-S4	6.28 to 10.29(7.84)	(1.47)
DU-N180, DUD-N180	M10	25 x 12.5 x 18	M4	—		14-10 to 150-10	0.0 04	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.



# 9.5 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)

Application	Inc	ching Duty -	Category AC	C-4	Sta	ndard Duty -	Category A	C-3	Conventional Free
Application	Rated Cap	bacity [kW]	Rated Operating Current [A]		Rated Capacity [kW]		Rated Operating Current [A]		Air Thermal Current
WOUEI Name	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	Ith [A]
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



# Rating/Performance

_				Frame	1	60	3	20	4	00	600		
_			N	Nodel Name	SH-V160	SHL-V160	SH-V320	SHL-V320	SH-V400	SHL-V400			
Ra	ting/Perfor	mance			SHD-V160	SHLD-V160	SHD-V320	SHLD-V320	SHD-V400	SHLD-V400	31-7000		
	Rate	ed Insulat	tion Volta	age [V]			15	00 (Three-P	hase 50/60	Hz)			
		Three-Pha	ase Motor	AC220V	180	(45)	320 (75)		400	(95)	630 (160)		
		Categor	ry AC-3	AC440V	180 (90)		320	(150)	400	(200)	630 (300)		
		Rated Operati	ng Current [A]	AC550V	180 (110)		320	(200)	400	(250)	630 (350)		
	Deting	() Shows Rat	Rated Capacity	AC1000V	160	(220)	320	(400)	400	(500)	600 (750)		
ಕ	nating	[kV	W]	AC1500V	160 (315)		320	(600)	400	(750)	600 (1000)		
nta		Three-Phase	e Capacitor	AC220V	150	(50)	250	(75)	300	(100)	580 (200)		
ပိ		Rated C	Capacity	AC440V	150 (100)		250	(150)	300 (200)		580 (400)		
ain		A [k	(VA]	AC550V	150	(125)	250	(200)	300	(250)	580 (500)		
Ŝ	Convention	onventional Free Air Thermal Current Ith [A]			2	00	3	50	4	50	750		
	Switchi	Switching Frequency [Times/Hour]				1200							
	Switching	Electrical	Three-Phase I	Motor (Category AC-3)	50	25	50	25	50	25	25		
	Durability	LIECTICA	Three-Ph	ase Capacitor	10	10	10	10	10	10	5		
	[x 10000]		Mechar	lical	250	25	250	25	250	25	250		
	(	Complian	it Standa	rds			JISC820	1-4-1, JEM	1038, IEC 6	0947-4-1			
act	Rated	Categor	$v AC_{-15}$	AC220V				Ę	5				
ont	Operating	Calegor	y AO-13	AC440V					3				
2	Current	Catagon	V DC 12	DC110V				0	.6				
xilia	[A]	Calegor	y DO-13	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	SH-V160	SHD-V160				
			SH-V320	SHD-V320	SH-V600			
		Uperating SH-V4		SHD-V400				
IVIEUTOU			AC Operated Constant Excitation Type	DC Operated Constant Excitation Type	AC Operated Constant Excitation Type			
Operating	Close	е	85% or Less of Rated Voltage (40°C Ambient Temperature, After Coil Temperature Rise Saturation)					
Voltage	Oper	า	10% or More of Ra	ated Voltage (20°C Am	bient Temperature)			
Operating Time	Main Conta	act ON	40	40	65			
(Average) [ms]	[ms] Main Contact OFF		130	130	80			
<b>Operation Coil</b>	Operating Or	Inrush	480	480	1,150			
Input [VA]	Tripping	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	Operating Motion	SHL-V160, SHLD-V160 SHL-V320, SHLD-V320 SHL-V400, SHLD-V400				
	Method	AC Operation	DC Operation			
Operating	Close	85% or Less of Rated Voltage (40°C Ambient Temperature)				
Voltage	Trip					
Operating Time	Main Contact ON	4	0			
(Average) [ms]	Main Contact OFF	3	0			
Inrush Coil	Closing	480	480			
Input [VA]	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-V1 SH-V1	60, 320, 400 60, 320, 400	AC Operatior Closing/Tripp	n Coils ing Coils		SH-V	/600 AC Oper	ation Coil
Coil	Rated Vo	oltage [V]	Coil Indicator	Coil	Rated Vo	oltage [V]	Coil Indicator
Designation	50Hz	60Hz	Coll Indicator	Designation	50Hz	60Hz	Con indicator
AC100V	100 to 127	100 to 127		AC100V	100 to 127	100 to 127	Rated Voltage/
AC200V	200 to 240	200 to 240		AC200V	200 to 240	200 to 240	Frequency
AC300V	260 to 350	260 to 350	Rated Voltage/ Frequency				
AC400V	380 to 440	380 to 440					
AC500V	460 to 550	460 to 550					

(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	Potod Voltago
DC200V	DC200 to 220V	naleu vollage

The designation is a symbol to be specified when ordering.

# Outline Drawings





# Contact Arrangement/Connection Diagram



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



#### Production Range

F۱	rame	160A	320A	400A	600A
Constant	AC Operated	O (Note 3)	O (Note 3)	O (Note 3)	O (Note 2)
Excitation Type	DC Operated	O (Note 3)	O (Note 3)	O (Note 3)	_
Latched	AC Operated	0	0	0	_
Туре	DC Operated	0	0	0	

Note 1. O : 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  $\blacktriangle$ .)

# 1. DC Interface Contactors

# Model Name Operation Coil Designation or Control Circuit Voltage (Note) Auxiliary Contact SD-Q11 SD-QR12 ▲ DC24V ▲ DC24V ▲ 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 MSOD-QR12KP	▲ 9A ▲ 9A	▲ 200V ▲ 200V	▲ DC24V ▲ 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 BD-N100	▲ AC200V ▲ DC100V	3B
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 DUD-N180	▲ AC200V ▲ 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	<b>A</b>
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	<b>A</b>
Refer to page 259. The model name is SHLD if using a DC operated closing coil.	Specify the closing (MC) and tripping (MT) on page 260.	Specify the closing (MC) and tripping (MT) operation coil designation from the ratings on page 260.	

# 10

# Application to Domestic and International Standards

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	(NK, KR, Lloyd, BV)
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# **10.1 Standards Application List**

# Application to Domestic and International Standards

				Co	mplian	ice and Standa	d Appli ards	cable	Safety Certification Standards Note 5				EC Directives	Third Party <sup>Note 5</sup> Certification Body	Note 5 CCC Certification	Marine Certification Standards Note 5					Heat Resistance Note 5 Certification Standards
eries		Model	Format	JIS	JEM	IEC	DIN VDE	BS EN	Electrical Appliance	L	IL	CSA	CE Mark	ΤÜV	GB	NK	KR	BV	LR	ccs	Class 2 Heat Resistant
s			, official					United	Japan	U	IS	Canada	Europe		China	Japan	South Korea	France	United	China	
				Japan	Japan	International	Germany	Kingdom Europe	PS	₽7 <sub>ë</sub>			CE		<b>&gt;&gt;</b>	۲	٢		Kingdom	٢	Japan
		Non-Reversing	S-T10 to T100	0	-	0	0	0	*	-	O	O	0	0	O	0	0	O	O	-	☆
	Magnetic	Reversing	S-2xT10 to T100	0	-	0	0	0	*	-	Note 7	Note 7	0	-	O	-	-	-	-	-	☆
	Contactors	DC Operated	SD-T12 to T100	0	-	0	0	0	*	-	O	O	0	O	O	0	-	O	O	0	-
		Mechanically Latched Type	SL(D)-T21 to T100	0	-	0	0	0	*	_	☆	☆	-	_	0	_	_	-	-	-	☆
		Non-Reversing 2-Element	MSO-T10 to T100	0	-	0	0	0	*	-	-	-	-	—	—	-	_	-	-	-	_
		Non-Reversing 3-Element (2E)	MSO-T10KP to T100KP	0	-	0	0	0	*	-	-	-	0	-	O	-	-	-	-	-	-
	Open Type	Reversing 2-Element	MSO-2xT10 to T100	0	-	0	0	0	*	_	_	_	-	_	_	-	-	-	_	-	-
	Starters	Reversing 3-Element (2E)	MSO-2xT10KP to T100KP	0	-	0	0	0	*	-	-	-	0	-	0	-	-	-	-	-	-
(0		DC Operated Type 2-Element	MSOD-T12 to T100	0	-	0	0	0	*	-	-	-	-	_	—	-	-	-	-	-	-
erie		DC Operated Type 2-Element (2E)	MSOD-T12KP to T100KP	0	-	0	0	0	*	_	-	-	0	—	0	-	_	-	-	-	-
ΤS	Enclosed	Non-Reversing 2-Element	MS-T10 to T100	0	-	0	0	0	0	_	_	_	_		_	_	-	_	_	_	-
<b>ASI</b>	Magnetic Starters	Non-Reversing 3-Element (2E)	MS-T10KP to T100KP	0	_	0	0	0	0		_	_				_	-				
2	Thermal	2-Element	TH-T18 to T100	0	-	0	0	0	*	_	-	-	-	-	_	*	*	-	-	-	_
	Overload	2 Element (0E)	TH-T18KP to T50KP	0	-	0	0	0	*	_	O	$\odot$	0	0	O	*	*	O	O	-	_
	Relays	3-Element (2E)	TH-T65KP to T100KP	0	-	0	0	0	*	-	0	0	0	0	0	*	*	0	0	0	-
		AC Operated	SR-T5/T9	0	-	0	0	0	*	-	Note 7	Note 7	0	0	0	*	*	0	0	-	☆
	Contactor	DC Operated	SRD-T5/T9	0	-	0	0	0	*	-	Note 7	Note 7	0	0	0	*	*	0	0	-	-
	nelays	Mechanically Latched Type	SRL(D)-T5	0	-	0	0	0	*	_	-	-	-	_	0	-	-	-	-	-	☆
		Additional Auxiliary Contact	UT-AX2, 4, 11	0	-	0	0	0	*	Note 7	-	-	0	0	0	*	*	0	0	0	-
	Optional Units Mechanical Ir	Surge Absorber	UT-SA13 to 25	0	-	0	0	0	*	0	-	-	-	_	*	*	*	-	-	-	_
		Mechanical Interlock	UT-ML20	0	-	0	0	0	*	0	-	-	0	_	*	*	*	-	-	-	_
c Use	NC Main	AC Operated	B-T	0	0	0	0	0	*	_	_	-	-	_	0	_	_	_	-	-	-
Specifi	Contact Type	DC Operated	BD-T	0	0	0	0	0	*	_	_	-	-	_	0	_	_	-	-	-	_
		Non-Reversing	S-N125 to N400	0	0	0	0	0	*	0	0	0	0	0	0	0	0	0	0	0	\$
	Magnetic	Reversing	S-2xN125 to N400	0	0	0	0	0	*	0	0	0	0	_	0	_	_	_	-	- 1	\$
	Contactors	DC Operated	SD-N125 to N400	0	0	0	0	0	*	0	0	0	0	0	0	0	_	0	0	0	_
		Mechanically Latched Type	SL-N125 to N400	0	0	0	0	0	*	☆	_	_	_	_	0	\$	_	_	-	-	☆
		Non-Reversing 2-Element	MSO-N125 to N400	0	0	0	0	0	*	_	_	-	-	_	-	_	_	-	-	-	-
		Non-Reversing 3-Element (2E)	MSO-N125KP to N400KP	0	0	0	0	0	*	0	0	0	0	_	0	_	_	0	0	-	_
	Open Type	Reversing 2-Element	MSO-2xN125 to N400	0	0	0	0	0	*	-	-	-	-	-	-	_	-	-	-	-	_
eries	Magnetic	Reversing 3-Element (2E)	MSO-2×N125KP to N400KP	0	0	0	0	0	*	\$	\$	☆	0	_	0	_	_	_	- 1	- 1	_
l Se	Starters	DC Operated Type 2-Element	MSOD-N125 to N400	0	0	0	0	0	*	_	_	_	_	_	_	_	_	0	0	-	_
ISIN		DC Operated Type 3-Element (2E)	MSOD-N125KP to N400KP	0	0	0	0	0	*	_	_	_	0	_	0	_	_	Ô	Ō	- 1	_
Σ	Enclosed	Non-Reversing 2-Element	MS-N125 to N400	0	0	0	0	0	*	-	-	-	_	_	_	_	_	_	<u> </u>	- 1	_
	Magnetic Starters	Non-Reversing 3-Element (2E)	MS-N125KP to N400KP	0	0	0	0	0	*	_	_	_	_	_	0	_	_	_	- 1	- 1	_
	Thermal Overload	Standard 2-Element	TH-N120 to N400	0	0	0	0	0	*	-	-	_	_	_	_	*	*	_	- 1	- 1	_
	Relays	3-Element (2E)	TH-N120KP to N400KP	0	0	0	0	0	*	-	0	0	0	0	0	*	*	0	0	0	_
		Additional Auxiliary Contact	UN-AX2, 4, 11/80, 150	0	0	0	0	0	*	0	<u> </u>	<u> </u>	0	Ő	Ő	*	*	Ő	Ő	0	_
	Optional	Surge Absorber	UN-SA	0	0	0	0	0	*	Ő	-	_	_	_	*	*	*	_	<u> </u>	-	_
	Units	Mechanical Interlock	UN-ML	0	0	0	0	0	*	Õ	_	_	*	_	*	*	*	_	- 1	- 1	_
	DC Interface	Non-Reversing	SD-Q	0	0	0	0	0	*	Ô	0	0	0	0	0	_	_	_	- 1	- 1	_
ė	Contactors	Reversing	SD-QR	0	0	0	0	0	*	Ő	Ő	Ő	0	Ő	Ő	_	_	_	- 1	- 1	_
c Us	Magnetic	Non-Reversing	DU(D)-N	0	0	0	0	0	*	_	_	_	_		Ő	_	_	-	-	- 1	_
scific	Contactors for DC	Reversing	DU(D)-2XN	0	0	0	0	0	*	_	-	-	_	_	Ő	_	_	-	- 1	- 1	_
Spe	NC Main	AC Operated	B-N	0	0	0	0	0	*	_	_	_	_	_	Ő	_	_	_	- 1	- 1	_
	Contact Type	DC Operated	BD-N	0	0	0	0	0	*	-	_	_	_	_	ě	_	_	_	- 1	- 1	_
	Reference Page		age						267	20	59	269 270	280	282	285	301	301	301	301		
			Standard Number									275									
	Produc iei diei	n Marking	Certification Mark							Note 2	Note 2		Note 3	Note 2	Note 2						
	pro	oduct)	Certification Number							1010 2	1010 2										
Cert		Continuation multiper	1			1								1				1	1		

\*: 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.

266 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)

Туре	Model Name	Standards	Application		
Magnetic Starters	MS-T/N, MSO-T/N				
Magnetic Contactors	S-T/N, SD-T/N	JIS C8201-4-1	Applicable with standard products		
Thermal Overload Relays	TH-T/N		Applicable with standard products		
Contactor Relays	SR-T/K	JIS C8201-5-1			

# International Standards (Standards and Conformance Methods)

Model	NEMA Standards	IEC Standards	EN Standards	s 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       Size 3 : S-T100         0 : S-T20       4 : S-N150         1 : S-T25       5 : S-N300         2 : S-T50       6 : S-N600	Applicable with stanc (690 V or le	lard product E ss) E	EC 60947-4-1 EN 60947-4-1 3S EN 60947-4-1 DIN EN 60947-4-1(VDE	0660-102)
Thermal Overload Relay TH-T/N Note 1	Applicable with the standard select	IEC 60947 EN 60947 BS EN 60 DIN EN 60	7-4-1 -4-1 947-4-1 )947-4-1(VDE 0660-	102)	
Contactor Relay SR-T	Standard products are compliant with A600 and Q300	Applicable with classes AC The rated current is the sar (see page 160)	-15 and DC-13 ne as the standard E D	EC 60947-5-1 EN 60947-5-1 3S 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  $\phi$ ), and 3-element (3  $\phi$ ) 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.

ets.		S	)

#### Table 1. Enclosed Magnetic Starter

	Circuit					Three-Phase	200 to 220 V					
	Model Name	MS-	- (Thermal C	overload Relay	y with 2 Eleme	ents)	MS-□KP (Thermal Overload Relay with 3 Elements)					
	Capacity [kW]	0.75 or 1 000	Over 0.75 and	Over 2.2 and	Over 3.7 and	Over 7.5 and	ver 7.5 and		Over 2.2 and	Over 3.7 and	Over 7.5 and	
Model Name		0.75 OF Less	2.2 or Less	3.7 or Less	7.5 or Less	12 or Less	0.75 OF Less	2.2 or Less	3.7 or Less	7.5 or Less	12 or Less	
MS-T10		PS	PS	—	_	—	PS	PS	—	—	—	
MS-T12		PS	PS	(2.7 kW or Less)	-	-	PS	PS	Ps (2.7 kW or Less)	-	-	
MS-T21		PS	PS	PS	-	-	PS	PS	PS	-	-	
MS-T35		PS	PS	PS	PS	—	PS	PS	PS	PS	—	
MS-T50		_	-	PS	PS	PS	-	—	PS	PS	PS	
MS-T65		—	-	PS	PS	PS	-	—	PS	PS	PS	
MS-T80		—	—	PS	PS	PS	-	—	PS	PS	(PS)	
MS-T100		_	_	PS	PS	PS	-	_	PS	PS	PS	

Single-Phase 100 to 110 V								
MS-DDP (TI	hermal Overlo	ad Relay with	2 Elements)					
	Over 0.75 and							
0.2 or Less	0.4 or Less	0.75 or Less	1.5 or Less					
PS	PS	—	-					
PS	PS	—	-					
PS	PS	PS	-					
_	_	PS	PS					
	MS-□DP (T 0.2 or Less ເອ ເອ ເອ ເອ -	Single-Phase           MS-□DP (Thermal Overlo           0.2 or Less           0.4 or Less           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)           (?)	Single-Phase 100 to 110 V           MS-□DP (T⊢ermal Overload Relay with 0.2 or Less         Over 0.2 and 0.4 or Less         Over 0.4 and 0.75 or Less           10         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0					

#### Table 2. Motor Circuit Breakers

$\frown$	Circuit		Single-Phase 200 to 220 V							
Capacity [kW]		0.75 or Less	Ove	r 3.7						
Model Name	Rated Current [A] Heater Designation		30 or Less		30 or More					
	0.75 to 4A	PS	-	_	-					
	6.3 to 18A	—	PS	—	-					
MMP-132	25A	-	_	PS	_					
	32A	_	_	_	PS					

Note 1. The single-phase reversible type and 200 V class cannot be manufactured.

Note 2. In the table, the @ mark indicates that the " @ mark is displayed on the product", whereas "-" indicates that there is no product with the targeted capacity.

# 10.4 MS-T/N series Certification Standards/CE Mark List

		Eur	ope		North An	nerica/UL		China		Stee	Ship Stan	dards	
	Format	CE Mark	TÜV A		Ling Jus ED Canada	Reco C US US	ognition Wus Canada Canada	CCC Certification	United Kingdom	France Bureau	South Korea Korean Register of	Japan	China China Classification
	S-T10(BC) S-T12(BC)(SQ)/T20(BC)(SQ) S-T21(BC)/T25(BC) S-T32(BC) S-T35(BC)/T50(BC)	(Note 2)	(Note 2)	(Not	LISTED		-	© (Note 2, 4)	(Note 2, 4)	(Note 2, 4)	(Note 2, 4)	© (Note 2, 4)	
	S-T65(CW)/T80(CW) S-T100	O	0	C	)				0	0	0	0	
AC Operated Magnetic	S-N38(CX) S-N48(CX)	(Note 2)	(Note 2)	(Not	) :e 2)				_	-	_	(Note 2)	
Contactors	S-N125 S-N150 S-N180 S-N220 S-N300 S-N400	O	O	¢	٥	(CULISTED	© णs Mark)	O	0	0	0	O	0
	S-N600 S-N800		_	_	_	©☆					_		
	TH-T18(BC)KP TH-T25(BC)KP TH-T50(BC)KP		O				_		0	0			_
Thermal T Overload T	TH-T65(CW)KP TH-T100KP	O		C	٢			0	0	0	_	_	0
Tiologo	TH-N120(TA)KP TH-N220RHKP/HZKP TH-N400RHKP/HZKP		0			(CUL)	(¢U) us Mark)		0	0			_
	SD-T12(BC)(SQ) SD-T20(BC)(SQ) SD-T21(BC) SD-T32(BC) SD-T35(BC) SD-T50(BC)	(Note 2)	(Note 2)	(Not	) le 2)		_	© (Note 2)	O (Note 2, 4)	(Note 2, 4)	_	© (Note 2, 4)	
DC Operated Magnetic	SD-T65(CW) SD-T80(CW) SD-T100							0	0	0		O	0
Magnetic Contactors	SD-N125 SD-N150 SD-N220 SD-N300 SD-N400	O	O	C	)		© us Mark)	O	0	0	_	O	
	SD-N600		_	-	_		_						
AC Operated Contactor Relays	SR-T5(BC)(SQ) SR-T9(BC)	(Note 2)	(Note 2)	(No	ote 2) -		_	(Note 2)	0 (Note 2, 4)	O (Note 2, 4)	_	_	
DC Operated Contactor Relays	SRD-T5(BC)(SQ) SRD-T9(BC)	(Note 2)	(Note 2)	(No	ote 2) -		_	(Note 2)	0 (Note 2, 4)	0 (Note 2, 4)	_	_	_

		Eur	оре		North Arr	nerica/UL		China		Steel Ship	Standards	
	Format	CE Mark	TÜV			Recognition		CCC Certification	United Kingdom	Jnited Kingdom France		Japan
		(E				US <b>RN</b> ®	Canada	۲	Lloyd's Register of Shipping	Bureau Veritas	Korean Register of Shipping	Class NK
UT-	UT-AX2(BC)			_								
	UT-AX4(BC)					-	_					
	UT-AX11(BC)											
Auxiliary	UN-AX2(CX)							O I		0		
Unit	UN-AX4(CX)	O	0			(	©		0		-	_
	UN-AX11(CX)											
	UN-AX80				-				1			
	JN-AX150					0	_					

Note 1. O: 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.
- O: 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 A. Declarate 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<sup>TM</sup>" 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.

#### SI<sup>®</sup>: 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.



# : 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

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
- Mu:Listing for both United States and Canada
  - UL/CSA standards product certification by the UL testing organization

# 10.5.1 UL/CSA Certified Model List

# Magnetic Contactors/Starters

T Series: UL60947-4-1, CSA C22.2 No.60947-4-1 N Series: UL508, CSA C22.2 No.14

	AC Op	perated Mag	gnetic Cont	actors	DC Op Magnetic (	erated Contactors	Mechanica Conta	Ily Latched	AC Operated M (Oper	AC Operated Magnetic Starters (Open Type)	
Frame Size	Non-Re (S	eversing S-)	Reve (S-	Reversing (S-2x)		Reversing (SD-2x)	Non-Reversing (SL, SLD-)		Non-Reversing (MSO-□KP)	Reversing (MSO-2x□KP)	
	c <b>AL</b> ®us	c UL US	c <b>AL</b> ®us	CUL US	CUL US	c UL US	c <b>AL®</b> us	c UL US	CUL US	CUL USTED	
T10	_	0	-	0	-	-	-	_	(4)	(4) (Note 1)	
T12	-	0	-	O	0	0	—	—	(4)	(4) (Note 1)	
T20	—	0	—	0	0	O	—	—	(4)	(4) (Note 1)	
T21	—	0	_	0	0	O	—	(3)	(4)	(4) (Note 1)	
T25	_	0	_	0	-	_		_	(4)	(4) (Note 1)	
T32	_	0	_	_	0	_	_	_	_	_	
T35	_	0	_	0	0	0	_	(3)	(4)	(4) (Note 1)	
T50	_	0	_	0	0	0	_	(3)	(4)	(4) (Note 1)	
T65	_	0	_	0	0	0	_	(3)	(4)	(4) (Note 1)	
T80	_	0	_	0	0	0	_	(3)	(4)	(4) (Note 1)	
T100	_	0	_	0	0	0	_	(3)	(4)	(4) (Note 1)	
N125	©(No	ote 2)	©(No	ote 2)	0	0	(1)	_	©(Note 2)	●(Note 1)(Note 2)	
N150	©(No	ote 2)	©(No	ote 2)	0	0	(1)	_	©(Note 2)	●(Note 1)(Note 2)	
N180	©(Nc	ote 2)	©(No	ote 2)	_	_		_	©(Note 2)	●(Note 1)(Note 2)	
N220	©(Nc	ote 2)	©(No	ote 2)	0	0	(1)	_	©(Note 2)	●(Note 1)(Note 2)	
N300	©(Nc	ote 2)	©(Note 2)		0	0	(1)	_	©(Note 2)	●(Note 1)(Note 2)	
N400	©(No	ote 2)	©(Note 2)		0	0	(1)		©(Note 2)	●(Note 1)(Note 2)	
N600	0	_	0	_	-				_	_	
N800	(2)	_	-	_	-	_	_	_	_	_	

**Subs:** UL/CSA Component Certification (Recognition)

- ·∰.: UL/CSA Product Certification (Listing)
- $\bigcirc$ : Standard Product and Certified
- : Dedicated Product (MSO-2xN□KPCS) and Certified (no model name on the product)
- (1): Dedicated Product (SL(D)-N $\Box UR)$  and Certified
- (2): Dedicated Product (S-N800UR) and Certified
- (3): Dedicated Product (SL(D)-T $\Box$ 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)

Model			Rated Cap	pacity [HP]			Rated Energizing	Auvilian	Contact		
Magnetic	Single-Phase (Nor	n Reversible Type)		Three-	Phase		Current	Auxiliary	Remarks		
Contactors	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Ra			
S-T10(BC)(SA)	1/2	$1\frac{1}{2}$	3	3	5	5	13				
S-T12(BC)(SA)(SQ)	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	A600	Q300	The standard product	
S-T32(BC)(SA)	2	5	10	10	20	15	32.5	AC600 V max	DC250 V max	is certified with CUUs	
S-T35(BC)(SA)	2	5	10	10	20	20	40	Breaking 720 VA	Breaking 69 VA	LISTED .	
S-T50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65	5	5.0		
S-T65(CW)	3	10	15	20	40	40	95				
S-T80(CW)	5	15	20	25	50	50	100				
S-T100	7 1/2	15	25	30	60	60	100				

## (2) AC Operating Magnetic Contactor (Non-Reversing) N Series (Certification Standard UL508)

Model			Rated Ca	pacity [HP]			Rated Energizing	Aunilian	Contact	
Magnetic	Single-Phase (No	n Reversible Type)		Three-	-Phase		Current	Auxiliary	Contact	Remarks
Contactors	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Rat	ing	
S-N125	10	20	40	40	75	75	125			
S-N150	15	25	40	50	100	100	150			The standard product is
S-N180	15	30	60	60	125	125	220	4600	B300	certified with <sup>C</sup> .
S-N220	15	40	60	75	150	150	220	AC600 V max	DC250 V max	
S-N300	50	100	100	100	200	200	300	Making 7200 VA	Making 28 VA	LISTED
S-N400	50	150	125	150	300	300	400	Breaking 720 VA	Breaking 28 VA	
S-N600	-	-	150	200	400	400	680		-	Standard product and cmuscertified.
S-N800UR	-	-	250	300	600	600	910			Dedicated product and constrained.

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are control of the certified for solderless terminal structure.

### (3) AC Operating Magnetic Contactor (Reversing) T Series (Certification Standard UL60947-4-1)

Model		Rated Ca	pacity [HP]		Rated	Auvilian	Contact		
Magnatia Cantastara		Three	-Phase		Energizing Current	Auxiliary	Oomaor	Remarks	
Magnetic Contactors	200 V 220 to 240 V 440 to 480 V 550 to 600 V				[A]	Rat	ting		
S-2xT10(BC)(SA)	3	3	5	5	13				
S-2×T12(BC)(SA)	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20				
S-2×T20(BC)(SA)	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20			The standard product is	
S-2xT21(BC)(SA)	5	5	10	10	30	A600	Q300		
S-2xT25(BC)(SA)	$7\frac{1}{2}$	$7\frac{1}{2}$	15	15	30	AC600 V max	DC250 V max	۵. ۱	
S-2xT35(BC)(SA)	10	10	20	20	40	Making 7200 VA	Making 69 VA	certified with CUL .	
S-2xT50(BC)(SA)	15	15	30	30	65	Breaking 720 VA	Breaking 69 VA	LISTED	
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 Operating Magnetic Contactor (Reversing) N Series (Certification Standard UL508)

Model		Rated Cap	pacity [HP]		Rated	Auvilian	Contact	Remarks	
Magnatia Cantastara		Three-	Phase		Energizing Current	/ tuxindi y	Contact		
Magnetic Contactors	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Ra	ting		
S-2xN125	40	40	75	75	125				
S-2xN150	40	50	100	100	150				
S-2xN180	60	60	125	125	220	A600	R300	The magnetic contactor is certified as a curve us standard product.	
S-2xN220	60	75	150	150	220	AC600 V max Making 7200 VA	DC250 V max Making 28 VA		
S-2xN300	100	100	200	200	300	Breaking 720 VA	Breaking 28 VA		
S-2xN400	125	150	300	300	400				
S-2xN600	150	200	400	400	680			Standard products are applicable to c sugeries.	

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are control of the solderless terminal structure.

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(File No. E58968)

(5) DC	Operated Magnetic	Contactor (Non-Re	eversing/Reversing)	<b>F</b> Series (Certification	Standard UL60947-4-1)	°∰us(File No.	E58968)
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	Model	Rated Capacity [HP]						Rated Energizing		Contact		
Non Poversing	Deversion (0)	Single-Phase (No	n Reversible Type)	Three-Phase				Current		Contact	Remarks	
Non-neversing	Reversing (2)	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Rat	uxiliary Contact Rating Q300 DC250 V max pro Making 69 VA Breaking 69 VA with		
SD-T12(BC)(SA)(SQ)	SD-2×T12(BC)(SA)	1/2	$1\frac{1}{2}$	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20				
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	4600	0200	The standard	
SD-T32(BC)(SA)	-	2	5	10	10	20	15	32.5	A000	DC250 V may	product is certified	
SD-T35(BC)(SA)	SD-2xT35(BC)(SA)	2	5	10	10	20	20	40	Making 7200 VA	DC250 V max		
SD-T50(BC)(SA)	SD-2xT50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65	Breaking 7200 VA	Breaking 69 VA	with CU us	
SD-T65(CW)	SD-2xT65(CW)	3	10	15	20	40	40	95	Diodining / 20 1/1	Diodaning oo int	LISTED	
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)

	Model		Rated Capacity [HP]						Austilian	Contont		
Nen Deversing	Devention (0)	Single-Phase (No	n Reversible Type)	Three-Phase				Current	Auxinary Contact		Remarks	
Non-Reversing	Reversing (2)	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Ra	ting		
SD-N125	SD-2xN125	10	20	40	40	75	75	125	4600	P200	The standard	
SD-N150	SD-2xN150	15	25	40	50	100	100	150	A000	DC250 V may		
SD-N220	SD-2xN220	15	40	60	75	150	150	220	ACOUD V IIIdX	Making 00 VA	product is certified	
SD-N300	SD-2xN300	50	100	100	100	200	200	300	Dreaking 7200 VA	Dreeking 20 VA	with c(VL)us	
SD-N400	SD-2xN400	50	150	125	150	300	300	400	breaking 720 VA	breaking 20 VA	LISTED	

Note 1. 125 A frames or higher with "UL" at the end of the model name are we certified for solderless terminal structure.

#### (7) Mechanically Latched Magnetic Contactor T Series (Certification Standard UL60947-4-1)

	Model			Rated Ca	pacity [HP]		Rated Energizing	A			
Non-Reversing	Bayaraina	Single-Phase (Non Reversible Type)		Three-Phase				Current	Auxiliary Contact		Remarks
Non-neversing	neversing	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Ra	ting	
SL(D)-T21UL(BC)(SA)	SL(D)-2xT21UL(BC)(SA)	1	3	5	5	10	10	30			
SL(D)-T35UL(BC)(SA)	SL(D)-2xT35UL(BC)(SA)	2	5	10	10	20	20	40	A600	Q300	The dedicated
SL(D)-T50UL(BC)(SA)	SL(D)-2xT50UL(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65	AC600 V max	DC250 V max	product is certifie
SL(D)-T65UL	SL(D)-2xT65UL	3	10	15	20	40	40	95	Making 7200 VA	Making 69 VA	In
SL(D)-T80UL	SL(D)-2xT80UL	5	15	20	25	50	50	100	Breaking 720 VA	Breaking 69 VA	with COLUS .
SI (D) T100U	SI (D)-2xT100LII	71	15	25	20	60	60	100	1		

#### (8) Mechanically Latched Magnetic Contactor N Series (Certification Standard UL508)

				-				-			
Model		Rated Capacity [HP]					Rated	Auxilian/Contact			
New Devenier	Poversing	Single-Phase (No	n Reversible Type)	Three-Phase				Current	Advinary Contact		Remarks
Non-neversing	neversing	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Ra	ting	
SL(D)-N125UR	SL(D)-2xN125UR	10	20	40	40	75	75	125			
SL(D)-N150UR	SL(D)-2xN150UR	15	25	40	50	100	100	150	A600	R300	The dedicated
SL(D)-N220UR	SL(D)-2xN220UR	15	40	60	75	150	150	220	AC600 V max Making 7200 VA	DC250 V max Making 28 VA	product is certified
SL(D)-N300UR	SL(D)-2xN300UR	-	-	100	100	200	200	300	Breaking 720 VA	Breaking 28 VA	with c Wus ·
SL(D)-N400UR	SL(D)-2xN400UR	_	-	125	150	300	300	400			1

#### (9) Thermal Overload Relays T Series (Certification Standard UL60947-4-1)

#### Model Heater Designation [Adjustment Range (RC Value) (A) of Settling Current] Auxiliary Contact 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), C600 AC600 Vmax Rating Code 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), TH-T18(BC)KP Making Breaking 1800 VA (15 A max) 180 VA (1.5 A max) 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 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), TH-T25(BC)KP 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) B600 Rating Code AC600 Vmax TH-T50(BC)KP 29A (24 to 34), 35A (30 to 40), 42A (34 to 50) 3600 VA (30 A max) Making 15A (12 to 18), 22A (18 to 26), 29A (24 to 34), 35A (30 to 40), 42A (34 to 50), TH-T65(CW)KP 360 VA (3 A max) Breaking 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.

#### c 🔊 (File No. E58968)

⁰**₩**⁰"(File No. E58968)

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#### ⁰**₩**℠(File No. E58969)

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#### (10) Thermal Overload Relays N Series (Certification Standard UL508)

د (File No. E58969)

Model	Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]	Au	uxiliary Contact	
TH-N120KP	42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100)			
Model         Heater Designation [Adjustment Range (RC Value) (A) of Settling Current           TH-N120KP         42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100)           TH-N120TAKP ☆         105A (85 to 125)           TH-N120TAHZKP ★         125A (100 to 150)           TH-N220RHKP ☆         82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180)           TH-N220HKP ☆         180A (140 to 220)           TH-N400RHKP ☆         105A (85 to 125), 125A (100 to 150), 150A (120 to 220), 250A (2000)	105A (85 to 125)	Doting	Penn	
TH-N120TAHZKP ★	Iodel         Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]           42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100)           ⟨P ☆         105A (85 to 125)           12KP ★         125A (100 to 150)           KP ☆         82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180)           KP ★         180A (140 to 220)           IKP ☆         105A (85 to 125), 125A (100 to 150), 150A (120 to 180), 180A (140 to 220), 250A (200 to 300)           KP ★         330A (260 to 400)	Code	AC600 Vmax	
TH-N220RHKP	82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180)	Making	3600 VA (30 A max)	
TH-N12010KP ☆         105A (8           TH-N120TAKP ☆         125A (1           TH-N120TAHZKP ★         125A (1           TH-N220RHKP ☆         82A (65           TH-N220RHKP ☆         180A (1           TH-N220HZKP ★         180A (1	180A (140 to 220)	D I'		
TH-N400RHKP ☆	105A (85 to 125), 125A (100 to 150), 150A (120 to 180), 180A (140 to 220), 250A (200 to 300)	Breaking	360 VA (3 A max)	
TH-N400HZKP ★	330A (260 to 400)			

Note 1.  $\pm$  is for combination with the magnetic contactor and cannot be independently mounted.  $\star$  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 🚇 certified for solderless terminal structure.

#### (11) Contactor Relays T Series (Certification Standard UL60947-4-1)

Model				Pa	tod	Pomorko		
A	C Operating	C	OC Operating	na	leu	nemarks		
	SR-T5(BC)(SA)(SQ)	c UL US	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 $e_{USTED}^{US}$ .		

#### (12) Optional Unit T Series (Certification Standard UL60947-4-1) (File No. E58969)

Model	c <b>AL</b> ®us
UT-AX11(BC) Note 2	0
UT-ML20(BC)	(1)
UT-SA13, SA21, SA22, SA23, SA25	0

Note 1. O: Standard product and certified. (Mark displayed on the product)

(1): Certified as a contactor component.

(mark not displayed on the product)

Note 2.	
Rat	ed
A600	Q300
AC600 V max	DC250 V max
Making 7200 VA	Making 69 VA
Breaking 720 VA	Breaking 69 VA

#### (File No. E58969) (13) Optional Unit N Series (File No. E58968 (AX80/AX150/AX600/UN-ML21 to ML220))

Model Name	c <b>RL</b> ®us
UN-AX2 (CX), AX4 (CX), AX11 (CX) Note 3	0
UN-AX80, AX150, AX600	(1)
UQ-AX2(KR) Note 4	0
UN-ML21, ML80, ML150, ML220	(1)
UN-SA721, SA725	O
UN-SA33	Ô

Note 1.  $\bigcirc$ : 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 4.

Rat	ting		Rat	ting
A600	R300		A300	Q300
AC600 V max	DC250 V max		AC240 V max	DC250 V max
Making 7200 VA	Making 28 VA		Making 7200 VA	Making 69 VA
Breaking 720 VA	Breaking 28 VA		Breaking 720 VA	Breaking 69 VA
		-		

(File No. E58969)

#### (14) DC Interface Contactors (Certification Standard UL508)

Mada	Nome		Rat	ed Capacity	[HP]		Rated	Auxilian	Cantaat	
IVIOUEI	Name	Single-Phase (Non-F	Reversible Type Only)		Three-Phase		Continuity Current	Auxiliary	Remarks	
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	[A]	Rat		
SD-Q11	SD-QR11						20	A300	Q300	
SD-Q12	SD-QR12	1	1	2	2	5		AC240 V max	DC250 V max	The standard product is
MSOD-Q11(KP)	MSOD-QR11(KP)	3		3	3	5	10	Making 7200 VA	Making 69 VA	certified with c 🖳 us .
MSOD-Q12(KP)	MSOD-QR12(KP)						13	Breaking 720 VA	Breaking 69 VA	LISTED

#### (15) Vacuum Magnetic Contactors (Certification Standard UL508)

Model Name		Rated Cap Three-	pacity [HP] Phase		Rated Continuity Current	Auxiliary Contact	Remarks
	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Rating	
SH-V160	60	60	150	150	200	A600	The standard
SH-V320	100	125	250	300	350	AC600 V max	product is
SH-V400	125	150	350	400	450	Making 7200 VA	
SH-V600	200	250	500	600	610	Breaking 720 VA	c 🔁 us ·

#### (16) Solid State Contactors for Motor/Heater Loads (Certification Standard UL508)

Model Name Rated Capacity [HP] Rated Continuity Single-Phase Three-Phase 3-Pole 3-Element Remarks 3-Pole 2-Element Current Туре Туре 110 to 120 V 220 to 240 V 220 to 240 V 440 to 480 V [A] US-N5SS US-N5SSTE  $\frac{1}{10}$ 1/4 3 \_ 5 US-N8SS US-N8SSTE 3 4 1 10 1 \_ 8 US-N20(CX)(RM) US-N20TE(CX)(RM) 2  $1\frac{1}{2}$ 3 5 20 30 US-N30(CX) US-N30TE(CX) 1 3 5 10 US-N40(CX) US-N40TE(CX) 2 3 7-20 40 The standard product is 50 US-N50(CX) US-N50TE(CX) 2 3  $7\frac{1}{2}$ 20 certified with 🖓 🗤 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)

Model Name Rated Continuity Current [A] Remarks Batch Control Type Individual Control Type US-H20(RM)(HZ)(UF) US-H20DD(RM)(HZ)(UF) 20 US-H30DD(RM)(HZ)(UF) US-H30(RM)(HZ)(UF) 30(27) (Note 4) The standard product is certified with 🖤 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.

## **c N**<sup>®</sup> (File No. E58968)

(File No. E58968)

# ديانية:(File No. E144063)

°∰™(File No. E144063)

# 10.5.3 CSA Standards Certified Product

There are the following 2 types of certification marks.

CSA Standards Certification by the UL Testing Organization

Model Name			Rated Ca	bacity [HP]			Rated Continuity	Auvilion	Contact			
Magnetic	Single-Phase (Non-F	Reversible Type Only)		Three-	-Phase		Current	Auxiliary	Contact	Remarks		
Contactors	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Ra				
S-T10(BC)(SA)	1/2	$1\frac{1}{2}$	3	3	5	5	13					
S-T12(BC)(SA)(SQ)	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	A600	Q300	The standard product		
S-T32(BC)(SA)	2	5	10	10	20	15	32.5	AC600 V max	DC250 V max			
S-T35(BC)(SA)	2	5	10	10	20	20	40	Breaking 7200 VA	Breaking 69 VA	is certified with CLISTED .		
S-T50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65	g				
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					

## (1) AC Operated Magnetic Contactor (Non-Reversible) T Series (Certification Standard CSA C22.2 No.60947-4-1)

# (2) AC Operated Magnetic Contactor (Non-Reversible) N Series (Certification Standard CSA C22.2 No.14)

Model Name			Rated Ca	bacity [HP]			Rated Continuity	Auxilion		
Magnetic	Single-Phase (Non-F	Reversible Type Only)		Three-	-Phase		Current	Auxiliary	Contact	Remarks
Contactors	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Rat		
S-N125	10	20	40	40	75	75	125			
S-N150	15	25	40	50	100	100	150			The standard product
S-N180	15	30	60	60	125	125	220	4600	B300	
S-N220	15	40	60	75	150	150	220	AC600 V max	DC250 V max Making 28 VA	is certified with CUUs.
S-N300	-	-	100	100	200	200	300	Making 7200 VA		LISTED
S-N400	-	-	125	150	300	300	400	Breaking 720 VA	Breaking 28 VA	
S-N600	-	-	150	200	400	400	680			Standard product and cmsss
S-N800UR	-	-	250	300	600	600	910			Dedicated product and c w scattified.

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are was certified for solderless terminal structure.

#### (3) AC Operated Magnetic Contactor (Reversible) T Series (Certification Standard CSA C22.2 No.60947-4-1)

				LIST	EU			
Model Name		Rated Cap	pacity [HP]		Rated	Auxilian	Contact	
Magnatia Cantastara		Three-	Phase		Continuity	Auxiliary	Contact	Remarks
Magnetic Contactors	200 V	220 to 240 V	440 to 480 V	550 to 600 V	Current [A]	Rating		
S-2xT10(BC)(SA)	3	3	5	5	13			
S-2×T12(BC)(SA)	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
S-2×T20(BC)(SA)	3	5	$7\frac{1}{2}$	$7\frac{1}{2}$	20	]		
S-2xT21(BC)(SA)	5	5	10	10	30	A600	Q300	The standard product
S-2xT25(BC)(SA)	$7\frac{1}{2}$	$7\frac{1}{2}$	15	15	30	AC600 V max	DC250 V max	
S-2xT35(BC)(SA)	10	10	20	20	40	Making 7200 VA	Making 69 VA	is certified with 😲 🖤 .
S-2xT50(BC)(SA)	15	15	30	30	65	Breaking 720 VA	Breaking 69 VA	USTED
S-2xT65(CW)	15	20	40	40	95	1		
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)

Model Name		Rated Ca	pacity [HP]		Rated	Auxilion	Contact				
Magnetia Contactora		Three-	-Phase		Continuity	Auxiliary	Contact	Remarks			
Magnetic Contactors	200 V	220 to 240 V	440 to 480 V	550 to 600 V	Current [A]	Rating					
S-2xN125	40	40	75	75	125						
S-2xN150	40	50	100	100	150	]		The magnetic contactor is			
S-2xN180	60	60	125	125	180	A600	R300				
S-2xN220	60	75	150	150	220	AC600 V max Making 7200 VA	DC250 V max Making 28 VA	certified as a LISTED standard			
S-2xN300	100	100	200	200	300	Breaking 720 VA	Breaking 28 VA	Breaking 28 VA	Breaking 28 VA	product.	
S-2xN400	125	150	300	300	400	]					
S-2xN600	150	200	400	400	680	]		Standard product and cmost certified.			

Note 1. 125 A to 400 A frames with "UL" at the end of the model name are Wuster certified for solderless terminal structure.

(1)								-	,	40120	
Mo	del Name			Rated Cap	pacity [HP]			Rated	Austilian	Contont	
Non-Reversible	Bevereible Turse (2)	Single-Phase (Non-F	Reversible Type Only)		Three-	Phase		Continuity	Auxiliary Contact		Remarks
Туре	Reversible Type (2)	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	Current [A]	Rating		
SD-T12(BC)(SA)(SQ)	SD-2×T12(BC)(SA)	1/2	$1\frac{1}{2}$	3	3	$7\frac{1}{2}$	$7\frac{1}{2}$	20			
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	1600	Q300	
SD-T32(BC)(SA)	-	2	5	10	10	20	15	32.5	A000		The standard product is
SD-T35(BC)(SA)	SD-2xT35(BC)(SA)	2	5	10	10	20	20	40	Moking 7200 VA	Making 60 VA	
SD-T50(BC)(SA)	SD-2xT50(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65	Breaking 7200 VA	Breaking 69 VA	certified with LISTED .
SD-T65(CW)	SD-2xT65(CW)	3	10	15	20	40	40	95	Diodaning / 20 M	Diodating of the	
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			

# (5) DC Operated Magnetic Contactor (Non-Reversible/Reversible) T Series (Certification Standard CSA C22.2 No.60947-4-1) (File No. E58968)

## (6) DC Operated Magnetic Contactor (Non-Reversible/Reversible) N Series (Certification Standard CSA C22.2 No.14) (Here No. E58968)

Mo			Rated Ca	pacity [HP]			Rated	Auxilian Contact			
Non-Reversible	Deversible Type (2)	Single-Phase (Non-Reversible Type Only)			Three-	Phase		Continuity		Contact	Remarks
Туре	Reversible Type (2)	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	Current [A]	Rat	Rating	
SD-N125	SD-2xN125	10	20	40	40	75	75	125	4600	P200	
SD-N150	SD-2xN150	15	25	40	50	100	100	150	ACCOUNT MON	DC250 V may	The standard product is
SD-N220	SD-2xN220	15	40	60	75	150	150	220	ACOUD V Max	Making 00 VA	
SD-N300	SD-2xN300		-	100	100	200	200	300	Dreaking 7200 VA	Dreeking 20 VA	certified with CULUS.
SD-N400	SD-2xN400		-	125	150	300	300	400	breaking / 20 VA	breaking 26 VA	

Note 1. 125 A frames or higher with "UL" at the end of the model name are www.scertified for solderless terminal structure.

#### °∰™(File No. E58968) (7) Mechanically Latched Contactor T Series (Certification Standard CSA C22.2 No.60947-4-1)

Mo			Rated Cap	oacity [HP]			Rated	Auxilians Contact			
Non-Reversible	Roversible Type	Single-Phase (Non-F	Reversible Type Only)		Three	-Phase		Continuity		Contact	Remarks
Туре	Туре		220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	Current [A]	Rating		
SL(D)-T21UL(BC)(SA)	SL(D)-2xT21UL(BC)(SA)	1	3	5	5	10	10	30			The dedicated
SL(D)-T35UL(BC)(SA)	SL(D)-2xT35UL(BC)(SA)	2	5	10	10	20	20	40	A600	Q300	
SL(D)-T50UL(BC)(SA)	SL(D)-2xT50UL(BC)(SA)	3	$7\frac{1}{2}$	15	15	30	30	65	AC600 V max	DC250 V max	product is
SL(D)-T65UL	SL(D)-2xT65UL	3	10	15	20	40	40	95	Making 7200 VA	Making 69 VA	certified with
SL(D)-T80UL	SL(D)-2xT80UL	5	15	20	25	50	50	100	Breaking 720 VA	Breaking 69 VA	c (L) us
SL(D)-T100UL	SL(D)-2xT100UL	$7\frac{1}{2}$	15	25	30	60	60	100			USTED

#### (8) Mechanically Latched Contactor N Series (Certification Standard CSA C22.2 No.14)

Mo	del Name			Rated Car	pacity [HP]			Datad	Auxiliary Contact		
Non-Reversible	Bevereible Ture	Single-Phase (Non-F	Reversible Type Only)	Thated Ou	Three-	Phase		Continuity			Remarks
Туре	Reversible Type	110 to 120 V	220 to 240 V	200 V	220 to 240 V	440 to 480 V	550 to 600 V	Current [A]	Rat	ting	]
SL(D)-N125UR	SL(D)-2xN125UR	10	20	40	40	75	75	125			
SL(D)-N150UR	SL(D)-2xN150UR	15	25	40	50	100	100	150	A600 R300 AC600 V max DC250 V max Making 7200 VA Making 28 VA	R300	The dedicated
SL(D)-N220UR	SL(D)-2xN220UR	15	40	60	75	150	150	220		DC250 V max Making 28 VA	product is certified
SL(D)-N300UR	SL(D)-2xN300UR	-	-	100	100	200	200	300	Breaking 720 VA	Breaking 28 VA	with c Wus .
SL(D)-N400UR	SL(D)-2xN400UR	-	-	125	150	300	300	400			

(File No. E58968)

#### °∰™(File No. E58969) (9) Thermal Overload Relay T Series (Certification Standard CSA C22.2 No.60947-4-1) Model Name Heater Designation [Adjustment Range (RC Value) (A) of Settling Current] Auxiliary Contact 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), Rating Code C600 AC600 Vmax 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), TH-T18(BC)KP 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), 1800 VA (15 A max) 180 VA (1.5 A max) Making Breaking 11A (9 to 13), 15A (12 to 18) Note 2 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), TH-T25(BC)KP 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 B600 Code AC600 Vmax TH-T50(BC)KP 29A (24 to 34), 35A (30 to 40), 42A (34 to 50) 3600 VA (30 A max) 360 VA (3 A max) Making 15A (12 to 18), 22A (18 to 26), 29A (24 to 34), 35A (30 to 40), 42A (34 to 50), TH-T65(CW)KP Breaking 54A (43 to 65)

67A (54 to 80), 82A (65 to 100)

TH-T100KP

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)

د (File No. E58969)

(File No. E58969)

Model Name	Model Name Heater Designation [Adjustment Range (RC Value) (A) of Settling Current]							
TH-N120KP	42A (34 to 50), 54A (43 to 65), 67A (54 to 80), 82A (65 to 100)							
TH-N120TAKP ☆	105A (85 to 125)	Pating	REOD					
TH-N120TAHZKP ★	125A (100 to 150)	Code	AC600 Vmax					
TH-N220RHKP ☆	82A (65 to 100), 105A (85 to 125), 125A (100 to 150), 150A (120 to 180)	Making	3600 VA (30 A max)					
TH-N220HZKP ★	180A (140 to 220)	Dreaking						
TH-N400RHKP ☆	105A (85 to 125), 125A (100 to 150), 150A (120 to 180), 180A (140 to 220), 250A (200 to 300)	Breaking	360 VA (3 A max)					
TH-N400HZKP ★	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 "

(11) Contactor Relay T Series (Certification Standard CSA C22.2 No.60947-4-1)

	Mode	el Name		Poi	ing	Bemarks		
AC Operated DC Operated			DC Operated	ndi	ing	Remarks		
	SR-T5(BC)(SA)(SQ)		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 $e_{USTED}^{US}$ .		

#### (12) Optional Unit T Series (Certification Standard CSA C22.2 No.60947-4-1) (File No. E58969)

Model Name	c <b>RL</b> ®us
UT-AX11(BC) Note 2	0
UT-ML20(BC)	(1)
UT-SA13, SA21, SA22, SA23, SA25	0

Note 1. O: Standard product and certified. (mark displayed on the product)

(1): Certified as a contactor component. (mark not displayed on the product)

Ra	ting
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	c <b>RL</b> <sup>®</sup> us
UN-AX2 (CX), AX4 (CX), AX11 (CX) Note 3	0
UN-AX80, AX150, AX600	(1)
UQ-AX2(KR) Note 4	0
UN-ML21	(1)
UN-ML21, ML80, ML150, ML220	(1)
UN-SA721, SA725	O
UN-SA33	0

Note 1. O: 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 4.

Note 3.

Rat	ing	Ra	ting
A600	R300	A300	Q300
AC600 V max	DC250 V max	AC240 V max	DC250 V max
Making 7200 VA	Making 28 VA	Making 7200 VA	Making 69 VA
Breaking 720 VA	Breaking 28 VA	Breaking 720 VA	Breaking 69 VA

Note 2.

10

#### (14) DC Interface Contactors (Certification Standard CSA C22.2 No.14)

(File No. E58968)

c 🔊 (File No. E58968)

د (File No. E144063)

Model Name		Rated Capacity [HP]						Auxilion		
		Single-Phase (Non-Reversible Type Only)		Three-Phase			Continuity Current	Advinary Contact		Remarks
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	[A]	Rat		
SD-Q11 SD-Q12	SD-QR11 SD-QR12	1	1	2	2	5	20	A300 AC240 V max	Q300 DC250 V max	The standard product is
MSOD-Q11(KP) MSOD-Q12(KP)	MSOD-QR11(KP) MSOD-QR12(KP)	3		5	5	5	13	Making 7200 VA Breaking 720 VA	Making 69 VA Breaking 69 VA	certified with CULSTED US .

#### (15) Vacuum Magnetic Contactors (Certification Standard CSA C22.2 No.14)

		Rated Cap	Rated	Auxilian/ Contact			
Model Name		Three-	Current	Auxiliary Contact	Remarks		
	200 V	220 to 240 V	440 to 480 V	550 to 600 V	[A]	Rating	
SH-V160	60	60	150	150	200	A600	The standard
SH-V320	100	125	250	300	350	AC600 V max	product is
SH-V400	125	150	350	400	450	Making 7200 VA	certified with
SH-V600	200	250	500	600	610	Breaking 720 VA	c Sus .

#### (16) Solid State Contactors for Motor/Heater Loads (Certification Standard CSA C22.2 No.14)

Model Name Rated Capacity [HP] Rated Continuity Single-Phase Three-Phase Remarks 3-Pole 2-Element 3-Pole\_3-Element Current [A] Type Type 110 to 120 V 220 to 240 V 220 to 240 V 440 to 480 V US-N5SS US-N5SSTE 3 4 1 10 4 5 US-N8SS US-N8SSTE 3 8 1 10 4 \_ US-N20(CX)(RM) US-N20TE(CX)(RM)  $1\frac{1}{2}$ 3 5 20 2 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 The standard product is certified US-N50(CX) US-N50TE(CX) 2 3 50 with 🖓 🗤 ·  $7\frac{1}{2}$ 20 US-N70NS US-N70NSTE 3 70  $7\frac{1}{2}$ 15 \_ US-N80NS 3  $7\frac{1}{2}$ 80 US-N80NSTE 15 \_ 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)

⁰∰™(File No. E144063)

Mode	Name	Rated Continuity Current	Bemarks		
Batch Control Type	Individual Control Type	[A]	nemarks		
US-H20(RM)(HZ)(UF)	US-H20DD(RM)(HZ)(UF)	20			
US-H30(RM)(HZ)(UF)	US-H30DD(RM)(HZ)(UF)	30(27) (Note 4)	The standard product is certified		
US-H40(HZ)	US-H40DD(HZ)	40	with 🕲 🗤		
US-H50(HZ)	US-H50DD(HZ)	50	LISTED		

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.

Model	S-	T10/S(D)-T12/T	20		S(D)-T2		S(D)-T32		
Terminal	Main	Auxiliary	Control	Ma	ain	Auxiliary	Control	Main	Control
Screw Size	M3.5	M3.5	M3.5	M4		M3.5	M3.5	M4	M3.5
Wire Strip Length									
	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-\$3	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 8-NK4		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.	ty. 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 l (1.69	b-in 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)

# 10.5.4 Applicable Wire Size, Lug Size and Tightening Torques under UL Certification

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)-T	65/T80	S(D)-T100			
Terminal	Main	Auxiliary	Control	Ma	Main		Control	Main	Auxiliary	Control
Screw Size	M5	M3.5	M3.5	N	16	M4	M4	M6	M4	M4
Wire Strip Length	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 Ter	minal - 2 Wire	s or 2 Crimp l	_ugs 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 (4.41	lb-in 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-T	18KP	TH-T	25KP	TH-T	50KP	TH-T	65KP	TH-T1	00KP	SR(E	))-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												
	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	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-\$3	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. gty.	Each Terminal - 2 Wires or 2 Crimp Lugs Note 5											

 Tightening Torque
 10.3 lb-in
 10.3 lb-in
 15 lb-in
 10.3 lb-in
 22.5 lb-in
 10.3 lb-in
 39.1 lb-in
 39.1 lb-in
 39.1 lb-in
 15 lb-in
 10.3 lb-in
 10.3 lb-in

 10.17 N·m)
 (1.17 N·m)
 (1.17 N·m)
 (1.17 N·m)
 (2.54 N·m)
 (1.17 N·m)
 (4.41 N·m)
 (1.69 N·m)
 (1.17 N·m)
 (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			
	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.

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)T30(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	
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)N20KP, 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)	Displayed on the product name plate
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	(Note 2)
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	US-H20(DD), US-H30(DD), US-H40(DD), US-H50(DD),	

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.





Note: Connect the varistor (NVD05UCD039 [KOA]) in the location shown in the figure above.

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

(1) TÜV Certified Magnetic Contactor T Series (Certification Standard EN60947-4-1)



	Certified Rating [A] (AC-3)		Cortification	Mirror Contact (Sa	afety Separation Function) (Note 3)		
Model Name	220 to 240 V	380 to 440 V	Number	Body Built-In Auxiliary Break Contact	Auxiliary Contact Unit Auxiliary Break Contact	Remarks	
S-T10(BC)(SA)	11	9		⊖(Note 4)			
S-T12(BC)(SA)(SQ)	13	12	R50255938				
S-T20(BC)(SA)(SQ)	18	18					
S-T21(BC)(SA)	25	23			0		
S-T25(BC)(SA)	30	30	R50255941		(UT-AX2(BC), UT-AX4(BC))		
S-T32(BC)(SA)	32	32		-			
S-T35(BC)(SA)	40	40	P50210775				
S-T50(BC)(SA)	55	50	H30319773				
S-T65(CW)	65	65	P50210817		0		
S-T80(CW)	85	85	N30319017		(UN-AX2(BC), UN-AX4(BC))	Standard product with the certification mark.	
S-T100	105	105	R9851138	0	—		
SD-T12(BC)(SA)(SQ)	13	12	D50255028				
SD-T20(BC)(SA)(SQ)	18	18	H30233930	0			
SD-T21(BC)(SA)	25	23	P502550/1		0		
SD-T32(BC)(SA)	32	32	N30233941	-	(UT-AX2(BC), UT-AX4(BC))		
SD-T35(BC)(SA)	40	40	P50210775				
SD-T50(BC)(SA)	55	50	H30319773	0			
SD-T65(CW)	65	65	D50210817		0		
SD-T80(CW)	85	85	NJUJ 19017		(UN-AX2(BC), UN-AX4(BC))		
SD-T100	105	105	R9851138	0	_		

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	
Operation Coil	

: 550 V or Less at AC-15 Rating and Rated Continuity Current

S-T10 to T80 : AC Operation : AC24V Coil to AC500V Coil : AC24V Coil to AC500V Coil S-T100 : DC12V Coil to DC220V Coil

DC Operation

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)

	Cartified Bati	ing $[A] (AC_3)$		Mirror Contact (Sa	fety Separation Function) (Note 3)			
Model Name	220 to 240 V	380 to 440 V	Certification Number	Body Built-In Auxiliary Break Contact	Auxiliary Contact Unit Auxiliary Break Contact	Remarks		
S-N38(CX)(SA)	39	32	D0651100					
S-N48(CX)(SA)	50	40	R9031169	_	—			
S-N125	125	120	R9851169	0	_			
S-N150	150	150	R9851167					
S-N180	180	180	D0051164	]		Standard product with the		
S-N220	250	250	R9651164	0	(UN-AX150)			
S-N300	300	300	D0051171		(014-24130)			
S-N400	400	400	R9031171			certification mark.		
SD-N125	125	120	R9851169	0	_			
SD-N150	150	150	R9851167					
SD-N220	250	250	R9851164					
SD-N300	300	300	D0951171		(UN-AX150)			
SD-N400	400	400	1110061					

Note 1. Certification Rating: Certified in the following range.

Operation Coil

M	Main	Circ	uit (	Cor	ntact	: 440	) V o	r Less	at	AC	-3 R	ating	and	Rat	ed	Cor	ntinu	ity	Curr	ent
			-																-	

Auxiliary Contact : 550 V or Less at AC-15 Rating and Rated Continuity Current

: AC24V Coil to AC440V Coil : AC Operation S-N38. N48

S-N125 to N150 : AC24V Coil to AC500V Coil S-N180 to oil

to N400	: AC48V Coil to AC500V Co

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.

	Certified Rat	ing [A] (AC-3)	Cartification	Mirror Contact (Sa	afety Separation Function) (Note 2)	Remarks	
Model Name	220 to 240 V	380 to 440 V	Number	Body Built-In Auxiliary Break Contact	Auxiliary Contact Unit Auxiliary Break Contact		
SD-Q11	12	9	R50004919	⊖(Note 1)	ି(UQ-AX2)		
SD-Q12	12	9	R50004919	0	-	Standard product and	
SD-QR11	12	9	R50004919	-	-	certified.	
SD-QR12	12	9	R50004919	-	_		

#### (3) TÜV Certified DC Interface Contactor (Certification Standard: EN60947-4-1)

Note 1. When ordering SD-Q11 with 1b, indicate that it is with 1b.

Note 2. The  $\bigcirc$  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			
TH-T25(AR)(BC)KP(YS)	R50257062			
TH-T50(AR)(BC)KP(YS)	R50319830	Standard product and certified.		
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		
TH-N120TAKP	J9851168		
TH-N220RHKP	J9851166	Standard product	
TH-N220HZKP	J9851166	and certified.	
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			
UT-AX4(BC)	R50255937	Standard product and certified.		
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		
UN-AX4(CX)	J9551337		
UN-AX11(CX)	J9551337	Standard product and certified.	
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).

`													
	Model Name	Certification Number	Remarks	Model Name	Certification Number	Remarks							
	SR-T5(BC)(SA)(SQ)	R50255933	Standard product	SRD-T5(BC)(SA)(SQ)	R50255933	Standard product							
	SR-T9(BC)(SA)	R50255933	and certified.	SRD-T9(BC)(SA)	R50255933	and certified.							

#### (8) TÜV Certified Contactor Relay T Series (Certification Standard EN60947-5-1)

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	N8SS	N20	N30	N40	N50	N70NS	N80NS	NH70NS	NH80NS	
	Load	Category	Voltage	Ambient Temperature	(TE)	(TE)	(TE)	(TE)	(TE)	(TE)	(TE)	(TE)	(TE)	(TE)
		AC-51	AC100 to 240 V	40°C	5	8	20	30	40	50(45)	70	80	-	—
Oright	Heater		AG 100 10 240 V	60°C	3	4.8	12	18	24	30(27)	42	48	-	-
Deting	Healer		AC-01	40°C	-	—	20	30	40	50(45)	—	-	65	75
	ig		AG200 10 440 V	60°C	-	-	12	18	24	30(27)	-	-	39	45
(A)	Motor	AC 52	AC200 to 240V	40°C	3.2	3.2	11.1	17.4	26	26	48	48	48	48
	WOLDI	AC-53	AC400 to 440V	40°C	-	—	11.1	17.4	26	26	—	-	48	48
	Standard	d Product	US	S-□	R500	37627		R500	37628		R50037629 R50			37630
Туре	CAN Termi	nal Product	US-	□CX	_			R50037628			-			
	Rail Mount	ing Product	US-	□RM	-	_	R50037628	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			LI30(DD)		(חס)				
	Load	Category	Voltage	Ambient Temperature	1120(DD)	1130(DD)	1140(DD)	1130(DD)			
Certified	Heater	AC-51	AC24 to	40°C	20	30	40	50			
Rating (A)			480 V 60°C		12	18	24	30			
	Standard Product US-			6-D	R50018958						
Tuno	No Cooling Fin US-□HZ			□HZ	R50018958						
туре	Rail Mount	Rail Mounting Product US-□RM		R500	18958	-					
	Width Reduced Product US-□UF			□UF	R500	18958	-				

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
 O: Standard product and certified, Out of production range

	Draduat Specifications	Madal Nama	Frame Size										
	Product Specifications	Model Name	T10	T12	T20	T21	T25	T32	T35	T50	T65	T80	T100
S	With 2E Thermal	MSO-□KP	O	O	O		O		O	O	O	O	0
arte	Wiring Streamlining Terminal, With 2E Thermal	MSO-□BCKP	0	O	0		O		O	O			
おい	Surge Absorber Built-in Type with 2E Thermal	MSO-□KPSA	O	O	O		O		O	O			
hetio	With Terminal Cover, With 2E Thermal	MSO- CWKP									O	O	
lagr	Drop Time Shortened Type, With 2E Thermal	MSO-□KPQM									O	O	0
≥	DC Operated Type, With 2E Thermal	MSOD-□KP		O	O				O	0	O	O	0
Ţ	DC Operated, Wiring Streamlining Terminal, With 2E Thermal	MSOD-DBCKP		O	O				O	O			
Den	DC Operated Surge Absorber Built-in Type, With 2E Thermal	MSOD-□KPSA		O	O				O	O			
ð	DC Operated Type With Terminal Cover and 2E Thermal	MSOD-DCWKP									O	O	
	Standard Specifications	S-□	O	O	O	O	O	O	O	O	O	O	0
	Wiring Streamlining Terminal	S-□BC	O	O	O	O	O	O	O	O			
	Surge Absorber Built-in Type	S-⊟SA	O	O	O	O	O	0	O	O			
	With Terminal Cover	S-□CW									O	O	0
S	Drop Time Shortened Type	S-□QM									O	0	O
tor	DC Operated	SD-□		O	0	0		O	O	O	O	O	O
itac	DC Operated, Wiring Streamlining Terminal	SD-⊟BC		O	O	0		O	O	O			
۲ C	DC Operated Surge Absorber Built-in Type	SD-□SA		O	0	0		O	O	O			
ic O	DC Operated Type with Terminal Cover	SD-□CW									O	O	O
Inet	Spring Clamp Terminals	S(D)-□SQ		O	0								
/ag	Mechanically Latched Type	SL(D)-□				0			O	O	O	O	O
2	Mechanically Latched, Wiring Streamlining Terminal	SL(D)-□BC				0			O	O			
	Mechanically Latched, Surge Absorber Built-in Type	SL(D)-□SA				Ô			Ô	O			
	NC Main Contact Type	B(D)-□				Ô							
	NC Main Contact, Wiring Streamlining Terminal	B(D)-□BC				0							
	NC Main Contact, Surge Absorber Built-in Type	B(D)-□SA				0							

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

	Draduat Specifications	Madal Nama		Frame Size										
	Product Specifications	Woderwarne	N38	N48	N65	N100	N125	N150	N180	N220	N300	N400	N600	N800
ers	With 2E Thermal	MS-□KP					۲	۲	۲	۲	۲	۲		
Start	Surge Absorber Built-in Type	MS-⊟SA												
atic	With Push Button, with ON/OFF/Reset	MS-□PM												
agne	With Push Button, with ON/OFF/Reset	MS-□KPPM												
Щ	With Push Button, with ON/OFF	MS-□PS												
lose	With Push Button, with ON/OFF	MS-□KPPS												
Ē	Drop Time Shortened Type	MS-□KPQM					۲	۲	۲	۲	۲	۲		
rlers	With 2E Thermal	MSO-□KP					O	0	0	O	0	0		
tic Sta	With Saturable Reactor with 2E	MSO-□KPSR					O	0	0	0	0	0		
Magne	Drop Time Shortened Type with 2E Thermal	MSO-□KPQM					O	0	0	0	0	0		
Type	DC Operated	MSOD-												
Oper	DC Operated Type with 2E Thermal	MSOD-DKP					0	0		O	0	0		
tors	Standard Specifications	S-□	0	0			0	0	0	0	0	0	O	0
ntac	Drop Time Shortened Type	S-□QM					O	O	O	O	O	O		
S	DC Operated	SD-□					O	O		O	O	O	O	0
jneti	Mechanically Latched Type	SL (D)-					Ô	0		0	0	Ô	۲	۲
Mac	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.

#### • Reversible Magnetic Starter, Magnetic Contactor T Series

#### Frame Size **Product Specifications** Model Name T10 T12 T20 T21 T25 T32 T35 T50 T65 T80 T100 With 2E Thermal MSO-2x□KP $\bigcirc$ 0 0 0 $\bigcirc$ $\bigcirc$ $\bigcirc$ 0 0 0 00 00 0 Wiring Streamlining Terminal, With 2E Thermal MSO-2x BCKP 0 0 $\bigcirc$ 0 Magnetic Stai Surge Absorber Built-in Type with 2E Thermal MSO-2x KPSA 0 0 0 0 With Terminal Cover, With 2E Thermal MSO-2x CWKP $\bigcirc$ $\bigcirc$ 0 0 Drop Time Shortened Type, With 2E Thermal MSO-2x KPQM O 0 DC Operated Type, With 2E Thermal MSOD-2x KP Ô 0 $\bigcirc$ O O C $\bigcirc$ Type 0 0 DC Operated, Wiring Streamlining Terminal, With 2E Thermal MSOD-2xDBCKP 00 00 0 0 DC Operated Surge Absorber Built-in Type, With 2E Thermal MSOD-2x KPSA C Operated Surge Absorber Built-in type, With 2E Inermal NSOD-2X 0 0 0 $\bigcirc$ $\bigcirc$ $\bigcirc$ Standard Specifications S-2x□ O C O $\bigcirc$ S-2x□BC 0 Wiring Streamlining Terminal $\bigcirc$ 0 0 0 0 0 0 Surge Absorber Built-in Type S-2x⊟SA 0 0 0 0 $\bigcirc$ $\bigcirc$ 0 With Terminal Cover S-2x□CW O O Contactor Drop Time Shortened Type S-2x□QM $\bigcirc$ 0 0 DC Operated SD-2x□ 0 0 0 0 $\bigcirc$ 0 0 0 $\bigcirc$ 0 DC Operated, Wiring Streamlining Terminal SD-2x□BC 00 $\frac{0}{0}$ 0 $\frac{0}{0}$ C Magnetic DC Operated Surge Absorber Built-in Type SD-2x SA DC Operated Type with Terminal Cover SD-2x CW $\bigcirc$ 0 $\bigcirc$ S(D)-2x□SQ $\bigcirc$ 0 Spring Clamp Terminals Mechanically Latched Type SL(D)-2x□ 0 $\bigcirc$ 0 $\bigcirc$ $\bigcirc$ $\bigcirc$ Mechanically Latched, Wiring Streamlining Terminal SL(D)-2xDBC 0 $\bigcirc$ 0 Mechanically Latched, Surge Absorber Built-in Type SL(D)-2x SA C $\bigcirc$

 $\bigcirc$  : Standard product and certified,

: Out of production range

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

	Broduct Specifications	Model Name		Frame Size										
	Froduct Specifications		N125	N150	N180	N220	N300	N400	N600	N800	N38	N48		
Type ter	With 2E Thermal	MSO-2x□KP	0	0	Ô	0	Ô	0						
Open	With Saturable Reactor with 2E	MSO-2x□KPSR	0	0	0	0	0	0						
agneti	Drop Time Shortened Type with 2E Thermal	MSO-2x□KPQM	0	0	O	0	Ô	O						
Reve	DC Operated Type with 2E Thermal	MSOD-2x□KP	0	0		0	Ô	Ô						
netic	Standard Specifications	S-2x□	0	0	0	0	Ô	Ô	0	0	Ô	O		
Mag	Drop Time Shortened Type	S-2x□QM	0	0	Ô	0	Ô	Ô						
Conta	DC Operated	SD-2x□	0	0		0	0	0	0	0				
Reve	Mechanically Latched Type	SL(D)-2x□	Ó	Ó		Ó	Ó	Ó		Ó				

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								
FIGUUCI Specifications	would maine	T18	T25	T50	T65	T100				
Open-Phase Protection (2E)	TH-□KP	0	O	0	0	0				
2E with Automatic Reset	TH-DARKP	0	0	0	0	0				
2E with Wiring Streamlining Terminal	TH-DBCKP	O	O	0						
2E with Anti corrosion Treated Terminal	TH-□KPYS	0	0	0	0	0				

#### • 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									
FIDUUCI Specifications		N120	N120TA	N220RH	N220HZ	N400RH	N400HZ	N600			
Overload and Open-Phase Protection (2E)	TH-□KP	0	0	0	0	0	0	۲			
Overload and Open-Phase Protection (for Independent Mounting)	TH-DHZKP		0								
2E With Saturable Reactor	TH-□KPSR	0	0	0	0	0	0	۲			
2E with Automatic Reset	TH-DARKP	O	0	0	0	0	0	0			
### Solid State Contactors

©: Standard product and certified, \_\_\_\_\_: Out of production range

Product Specifications		Model Name	Frame Size									
		Nouel Name	N5SS	N8SS	N20	N30	N40	N50	N70NS	N80NS	NH70NS	NH80NS
0 Element	Standard Specifications	US-🗆	0	0	O	0	0	0	0	0	0	0
Z-Element Type	With Terminal Cover	US-□CX			0	0	0	0				
	IEC Rail Mounting	US-□RM	Standard I	Standard Equipment								
3-Element Type	Standard Specifications	US-DTE	0	0	0	0	0	0	0	0	0	0
	With Terminal Cover	US-DTECX			O	0	0	0				
	IEC Rail Mounting	US-DTERM	Standard I	Equipment	0							

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	
FIOUU	Product Specifications		T5	T9
	Standard Specifications	SR-□	O	O
AC Operated	Wiring Streamlining Terminal	SR-□BC	0	O
Туре	Surge Absorber Mounted Type	SR-⊟SA	O	O
	Spring Clamp Terminals	SR-□SQ	O	
	DC Operated	SRD-□	O	O
DC Operated	Wiring Streamlining Terminal	SRD-□BC	0	0
Туре	Surge Absorber Mounted Type	SRD-□SA	0	0
	Spring Clamp Terminals	SRD-□SQ	0	
Machanically	Mechanically Latched Type	SRL(D)-□	O	
Intechanically	Wiring Streamlining Terminal	SRL(D)-□BC	0	
Latoneu Type	Surge Absorber Mounted Type	SRL(D)-□SA	0	

### Contactor Relay K Series

O: Standard product and certified, : Out of production range

Produc	at Specifications	Model Name	Frame Size
Product Specifications		Would Maine	K100
Mechanically	Mechanically Latched Type	SRL(D)-□	0
Latched Type	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 O: Standard product and certified

Draduct Specifications	Madal Nama	Frame Size			
Floduct Specifications	Model Name	2	4	11	
Standard Specifications	UT-AX	O	O	0	
Wiring Streamlining Terminal	UT-AX□BC	0	O	O	

### • Auxiliary Contact Unit N Series

O: Standard product and certified, O: Certified (add "CN" at the end of the model name when ordering), Lund : Out of production range

Product Specifications	Model Name	Frame Size							
Flouder Specifications	Woder Name	2	22	4	11	80	150	600	
Standard Specifications	UN-AX	O		O	O	۲	۲	۲	
With Terminal Cover	UN-AX CX	0		0	0				
With Low-Level Signal Contact	UN-LL		0						

### DC Interface Contactors

#### ©: Standard product and certified

		Frame Size					
Product Specifications	Model Name	Non-Reve	rsible Type	Reversible Type			
		Q11	Q12	QR11	QR12		
Standard Specification - Magnetic Starter	MSOD-	0	0	O	0		
With 2E Thermal	MSOD-□KP	0	0	0	0		
Wiring Streamlining Terminal	MSOD-□BC	0	0	0	0		
Wiring Streamlining Terminal, With 2E Thermal	MSOD-DBCKP	0	0	0	0		
Standard Specifications - Magnetic Contactor	SD-	0	0	O	0		

Note 1. The DC12 V coil voltage designation is not certified.

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### • Auxiliary Contact Units for DC Interface Contactors

	©: Standard pr	oduct and	d certified	
Product Specifications	Madal Nama	Frame Size		
Froduct Specifications	Woder Name	2	2KR	
Standard Specifications	UQ-AX□	0	0	

### Magnetic Contactors for DC

	: Certifie	ed (add "CN	I" at the end	l of the mod	el name wh	en ordering)
Draduat Crasifications	Madal Nama	Frame Size				
Product Specifications	woder warne	N30	N60	N120	N180	N260
Standard Specifications	DU(D)-	۲			۲	۲

### • Vacuum Magnetic Contactors

•: Certified (add "CN" at the end of the model name when ordering), \_\_\_\_\_: Out of production range

Product Specifications		Madal Nama	Frame Size				
		woder Name	V160	V320	V400	V600	
AC Operated Type		SH-□	۲	۲	۲	۲	
DC Operated Type		SHD-□	۲	۲	۲		
Mechanically Latched	AC Operated Type	SHL-□	۲	۲	۲		
Туре	DC Operated Type	SHLD-	۲	۲	۲		

### • Voltage Detection Relays

• Certified (add "CN" at the end of the model name when ordering)

	Product Specifications	Model Name	Application
For Standard	Operating Voltage AC100 to 110, 200 to 220 V for 50/60 Hz	SRE-AA	۲
Detection	Operating Voltage AC115 to 120, 230 to 240 V for 50/60 Hz	SRE-AAU	۲
For Power	Set Value (Scale) is OFF Voltage	SRE-K	۲
Detection	Set Value (Scale) is ON Voltage	SRE-KT	۲

### Instantaneous Stop/Restart Relays

Certified (add "CN" at the end	of the model name when ordering	ng
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Model Name	Application
UA-DL2	۲
	Model Name UA-DL2

### Fault Detection Units

: Certified (add "CN" at the end of the model name when ordering)

Product Sp	ecifications	Model Name	Application
For 200 V Main Circuit	Standard Specifications	UN-FD	۲
For 200 V Wain Circuit	With Terminal Cover	UN-FDCX	۲
For 400 V Main Circuit	Standard Specifications	UN-FD4	۲
	With Terminal Cover	UN-FD4CX	۲

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	Madal Nama		Frame Size	
Specifications	woder Name	12	22	32
Standard Specifications	UN-SY	۲	۲	۲
With Terminal Cover	UN-SY□CX		۲	

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	Certified Rating (220 to 240 V)	Category AC-3 /380 to 440 V)	Heater Designation Pange Coil Designation Range		Applicable Range of Model Name	Auxiliary Contact Arrangement	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)	Range	, is inge	** (Combinable)	Standard	
MS-N125CNKP	37/60	125/120	42 to 105A	AC24V to		2a2b	20030103 04093067
MS-N150CNKP	45/75	150/150	42 to 125A	AC500V		2a2b	20030103 04093079
MS-N180CNKP	55/90	180/180	82 to 150A			2a2b	20020102 04002070
MS-N220CNKP	75/132	250/250	82 to 180A	AC48V to	An, Qivi	2a2b	20030103 04093070
MS-N300CNKP	90/160	300/300	105 to 250A	AC500V		2a2b	20020102 04002066
MS-N400CNKP	125/220	400/400	105 to 330A			2a2b	20030103 04093000

### <Open Type>

Model Name MSO: AC Operated	Certified Rating (220 to 240 V	Category AC-3 /380 to 440 V)	Heater Designation	Coil Designation	Designation Bange Applicable Range of Model Name	Auxiliary Contact Arrangement	Certification Number		
2x: Reversible	Rated Capacity (kW)	Rated Operating Current (A)	Range	Range	** (Combinable)	Reversing Standard			
MSO-(2x)T10KP**	2.5/4	11/9	0.12 to 9A	AC24V to AC500V		1a/1a x 2 + 2b			
MSO(D)-(2x)T12KP**	3.5/5.5	13/12	0.12 to 11A			1a1b/1a1b x 2 + 2b	2015010304817542		
MSO(D)-(2x)T20KP**	4.5/7.5	18/18	0.12 to 15A	DC12V to DC220V					
MSO(D)-(2x)T21KP**	5.5/11	25/23	0.24 to 15A	DOTEV to DOLLOV	AR, BC, SA, FS		2015010204817518		
MSO-(2x)T25KP**	7.5/15	30/30	0.24 to 22A	AC24V to AC500V	]		2013010304017318		
MSO(D)-(2x)T35KP**	11/18.5	40/40	0.24 to 29A						2016010204825055
MSO(D)-(2x)T50KP**	15/22	55/50	0.24 to 42A	]			2010010304033033		
MSO(D)-(2x)T65KP**	18.5/30	65/65	15 to 54A	AC24V to AC500V	AR,CW,FS,QM	2a2b/2a2b x 2	201601030/835278		
MSO(D)-(2x)T80KP**	22/45	85/85	15 to 67A	DC12V to DC220V	(AC Operation Only)	(AC Operation Only)		2010010304033278	
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			20030103 04093067		
MSO(D)-(2x)N150KP**	45/75	150/150	42 to 125A		AR. QM (AC		20030103 04093079		
MSO-(2x)N180KP**	55/90	180/180	82 to 150A		Operation Only),		20020102 04002070		
MSO(D)-(2x)N220KP**	75/132	250/250	82 to 180A	AC48V to AC500V	SR	2a2b/3a3b x 2	20030103 04093070		
MSO(D)-(2x)N300KP**	90/160	300/300	105 to 250A	DC12V to DC220V			20020102 04002066		
MSO(D)-(2x)N400KP**	125/220	400/400	105 to 330A	]			20030103 04093066		

### Magnetic Contactors (Certification Standard: GB/T14048.4)

### <Standard Type>

Model Name S: AC Operated SD: DC Operated	Certified Rating (220 to 240 V/ Rated Capacity (kW)	Category AC-3 /380 to 440 V) Rated Operating Current (A)	Conventional Free Air Thermal Current Ith (A)	Coil Designation Range	Applicable Range of Model Name ** (Combinable)	Auxiliary Contact Arrangement Non-Reversing/ Beversing Standard	Certification Number
S-(2x)T10**	2.5/4	11/9	20		BC. SA	$1a/1a \times 2 + 2b$	
S(D)-(2x)T12**	3.5/5.5	13/12	20				20130103 04604263
S(D)-(2x)T20**	4.5/7.5	18/18	20		BC, SA, SQ	1a1b/1a1b x 2 + 2b	
S(D)-(2x)T21**	5.5/11	25/23	32				
S-(2x)T25**	7.5/15	30/30	32			2820/2820 X 2	20130103 04604262
S(D)-(2x)T32**	7.5/15	32/32	32	DC12V to DC220V	BC, SA	- /2a2b x 2	
S(D)-(2x)T35**	11/18.5	40/40	60	0012010002200			20150102 04700002
S(D)-(2x)T50**	15/22	55/50	80	QM (		2a2b/2a2b x 2 2	20130103 047 30332
S(D)-(2x)T65**	18.5/30	65/65	100		QM (AC Operation Only), CW 2a2b/2a2b		20150103 04700006
S(D)-(2x)T80**	22/45	85/85	135			2020/2020 X 2	20130103 04790990
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			20020103 04024706
S(D)-(2x)N150**	45/75	150/150	200	DC12V to DC220V			20020103 04024707
S-(2x)N180**	55/90	180/180	260				20020102 04024708
S(D)-(2x)N220**	75/132	250/250	260	AC48V to AC500V	(AC Operation Only)	2a2b/3a3b x 2	20020103 04024700
S(D)-(2x)N300**	90/160	300/300	350	DC12V to DC220V	(Crity)		20020103 04024700
S(D)-(2x)N400**	125/220	400/400	450				20020103 04024709
S(D)-(2x)N600	190/330	630/630	660	AC100V to AC500V	0-0h (4-4h 0	00000100 04005500	
S(D)-(2x)N800	220/440	800/800	800	DC24V to DC220V		2a20/4a40 X 2	20030103 04093309

### <Mechanically Latched Type>

Model Name SL: AC Operated SLD: DC Operated 2x: Reversible	Certified Rating (220 to 240 V/ Rated Capacity (kW)	Category AC-3 /380 to 440 V) Rated Operating Current (A)	Conventional Free Air Thermal Current Ith (A)	Coil Designation Range	Applicable Range of Model Name <b>**</b> (Combinable)	Auxiliary Contact Arrangement Non-Reversing/ Reversing Standard (Effective Contact)	Certification Number
SL(D)-(2x)T21**	5.5/11	25/23	32		DC SA		20130103 04604262
SL(D)-(2x)T35**	11/18.5	40/40	60		BC, 3A		20150102 04700002
SL(D)-(2x)T50**	15/22	55/50	80	AC24V to AC500V		2a2b/2a2b x 2	20150103 04790992
SL(D)-(2x)T65	18.5/30	65/65	100	00120100002000	-		20150102 04700006
SL(D)-(2x)T80	22/45	85/85	135				20150105 04790990
SL(D)-(2x)T100	30/55	105/105	150				20150103 04790995
SL(D)-(2x)N125	37/60	125/120	150			1a2b/1a2b x 2	20020103 04024706
SL(D)-(2x)N150	45/75	150/150	200	10/00//			20020103 04024707
SL(D)-(2x)N220	75/132	250/250	260	AC100V to AC500V	_	1-0h/0-0h v 0	20020103 04024708
SL(D)-(2x)N300	90/160	300/300	350	0012110002000		1820/2830 X 2	20020102 04024700
SL(D)-(2x)N400	125/220	400/400	450				20020103 04024709
SL(D)-(2x)N600CN	190/330	630/630	660	AC100V to AC500V		100h/204h x 0	20020102 04005560
SL(D)-(2x)N800CN	220/440	800/800	800	DC24V to DC200V	C24V to DC200V		20020103 04095569

### <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	Coil Designation Range	Applicable Range of Model Name <b>* *</b>	Auxiliary Contact Arrangement Non-Reversing/ Beversing	Certification Number
	Rated Capacity (kW)	Rated Operating Current (A)	Ith (A)		(Combinable)	Standard	
S-(2x)N38**	11/15	39/32	60			—/2a2b x 2	20020102 04024694
S-(2x)N48**	15/18.5	50/40	80	AC24V 10 AC300V	UA, 3A	—/2a2b x 2	20020103 04024004

## • 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**				2a2b	20020103 04024704
DU(D)-N60CN**	DUI: 2o1b	DC12V to DC220V		2a2b	20020103 04024706
DU(D)-N120CN**	DU: 2a1b DUD: 2a		QM (AC Operation Only)	2a2b	20020103 04024707
DU(D)-N180CN**		AC48V to AC500V		2a2b	20020103 04024708
DU(D)-N260CN**		DC12V to DC220V		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		SA	2a	20130103 04604262
B(D)-N65CN**	BD: 1a2b	AC24V to AC500V		2a2b	20020103 04024705
B(D)-N100CN**	B: 1a2b BD: 1a2b	DC12V to DC220V	QM (AC Operation Only)	2a2b	20020103 04024706

Note 1. Refer to page 249 for ratings.

## Thermal Overload Relays (Certification Standard: GB/T14048.4)

<with 3-e<="" th=""><th>lement</th><th>(2E)&gt;</th></with>	lement	(2E)>
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Model Name	Heater Designation	Applicable Range of Model Name <b>**</b> (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		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	- An, DO, F3, F3	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		
TH-N120TAKP**	1054 1054	AR, SR	S-N125, N150	20020103 09024724	
TH-N120TAHZKP**	105A, 125A	AR	Independent Mounting Only		
TH-N220RHKP**	200 10EA 10EA 1EOA 120A		S-N180, N220		
TH-N220HZKP**	-62A, 105A, 125A, 150A, 160A		Independent Mounting Only	00000100 00004710	
TH-N400RHKP**	1054 1054 1504 1004 0504 0004	AR, SR	S-N300, N400	20020103 09024719	
TH-N400HZKP**	- IUDA, IZDA, IDUA, IDUA, ZDUA, 330A		Independent Mounting Only		
TH-N600KPCN**	250A. 330A. 500A. 660A	1	For Independent Mounting	20020103 04095454	

Note 1. TH-N $\square$  becomes the quick trip type when changed from KP to KF.

## • 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	20120102 02604260
SR(D)-T9**	DC12V to DC220V	BC, SA	9a, 7a2b, 5a4b	20130103 03004280

### <Mechanically Latched Type>

Model Name SRL: AC Operated SRLD: DC Operated	Coil Designation Range	Applicable Range of Model Name <b>*</b> * (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 <b>**</b> (Combinable)	Applicable Magnetic Contactors	Certification Number	
UT-AX2**	2a, 1a1b, 2b				
UT-AX4**	4a, 3a1b, 2a2b	BC	S-T10 to T32	20130103 04608269	
UT-AX11**	1a1b				
UN-AX2**	2a, 1a1b, 2b		S-T65, T80, S-N38, N48		
UN-AX4**	4a, 3a1b, 2a2b	CX	S-T65, T80, S-N38, N48	20020103 03024700	
UN-AX11**	1a1b		S-T65,T80		
UN-AX80CN	1a1b		S-T100, S-N125	20020103 03024720	
UN-AX150CN	1a1b	-	S-N150 to N400	00000100 00001700	
UN-AX600CN	2a2b		S-N600CN, N800CN	20020103 03024722	
UQ-AX2**	1a1b	-	SD-Q11, SD-QR11 (Left Side)	20050102 04140221	
UQ-AX2KR**	1a1b	-	SD-QR11 (Right Side)	20030103 04149321	
UN-LL22**	Low-Level Contact: 1a1b Standard Contact: 1a1b	СХ	S-T65, T80, S-N38, N48	20020103 03024700	

# • DC Interface Contactors (Certification Standard: GB/T14048.4)

### <Magnetic Starters>

Model Name Q: Non-Reversible	Certified Rating (220 to 240 V	Category AC-3 /380 to 440 V)	Heater Designation	Coil Designation Range	Applicable Range of Model Name **	Auxiliary Contact Arrangement	Certification Number					
QR: Reversible	Rated Capacity (kW)	Rated Operating Current (A)	Range (Note 1)	DC Operated	(Combinable)	Standard						
MSOD-Q11**	2/4	10/0	0.10 to 114	DC04V		1a	00000100 04000000					
MSOD-Q12**	3/4	12/3 0.12	12/9	12/9	12/9	12/9	0.12 10 11A	D024V	00240	AN, DU, NF	1a1b	20030103 04093009
MSOD-QR11**	2/4	10/0	0.12 to 114			1b x 2	20020102 04002060					
MSOD-QR12** 3/4		12/9	0.12 10 TTA	D024V	AN, DO, NF	1a1b x 2	20030103 04093009					

### <Magnetic Contactors>

Model Name Q: Non-Reversible	Certified Rating (220 to 240 V	Category AC-3 /380 to 440 V)	Conventional Free Air Thermal Current	Coil Designation Auxiliary Contact Range Arrangement		Certification Number	
QR: Reversible	Rated Capacity (kW)	Rated Operating Current (A)	Ith (A)	DC Operated	Standard		
SD-Q11	3/4	12/0	20		1a	20020102 04005567	
SD-Q12	2 3/4		20	D024V	1a1b	20030103 04093307	
SD-QR11	3/4	12/0	20		2b	20030103 04005567	
SD-QR12 3/4		12/9	20	D024V	2a2b	20030103 04093307	

# • 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 <b>* *</b> (Combinable)	Certification Number
US-N5SS	0.4(3.2)/			20060103 04174448
US-N8SS	0.4(3.2)/		_	20000103 04174440
US-N20**	2.2(11.1)/3.7(8.7)		CX, RM	
US-N30**	3.7(17.4)/7.5(17.4)		СХ	20050103 04162980
US-N40**	5.5(26)/11(26)	DC12 V to 24V		
US-N50**	5.5(26)/11(26)	DC12 V to 24V		
US-N70NS	11(48)/—			
US-N80NS	11(48)/—			00060102 04174451
US-NH70NS	11(48)/22(48)		—	20060103 04174431
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 <b>* *</b> (Combinable)	Certification Number
US-N5SSTE	0.4(3.2)/			20060102 04174448
US-N8SSTE	0.4(3.2)/		_	20000103 04174448
US-N20TE**	2.2(11.1)/3.7(8.7)		CX, RM	
US-N30TE**	3.7(17.4)/7.5(17.4)		сх	20050103 04162980
US-N40TE**	5.5(26)/11(26)	DC12 V to 24V		
US-N50TE**	5.5(26)/11(26)	DC12 V to 24V		
US-N70NSTE	11(48)/—			
US-N80NSTE	11(48)/—			20060102 04174451
US-NH70NSTE	11(48)/22(48)		_	20000103 04174431
US-NH80NSTE	11(48)/22(48)			

### Vacuum Magnetic Contactors

Model Name SH: AC Operated SHD: DC Operated SL: Mechanically Latched (AC Operated)	Certified Rating (220 to 240 V/380	Category AC-3 to 440 V/1,000 V)	Conventional Free Air Thermal Current	Coil Designation Range	Auxiliary Contact Arrangement Standard	Certification Number
SLD: Mechanically Latched (DC Operated)	Rated Capacity (kW)	Rated Operating Current (A)	Ith (A)			
SH(D)-V160CN	45 /90/ 220	180 /180/ 160	200			
SH(D)-V320CN	75 /150/ 400	320 /320/ 320	350	AC100V to AC500V	2a2b	20060103 04201618
SH(D)-V400CN	95 /200/ 500	400 /400/ 400	450	501001, 502001		
SHL(D)-V160CN	45 /90/ 220	180 /180/ 160	200	10/00//		
SHL(D)-V320CN	75 /150/ 400	320 /320/ 320	350	AC100V to AC500V	SHL: 2a2b SHLD: 2a4b	20060103 04201618
SHL(D)-V400CN	95 /200/ 500	400 /400/ 400	450	001000, 002000	ONED. 2440	
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		
SRE-AAUCN	DC0.1V to 250V	1.	00070100 0000 4000
SRE-KCN	AC75V to 250V, DC9V to 105V	IC	20070103 03224330
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

C

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	CY	1c	00000102 02200000
UN-FD4CN**	AC100V, AC200V		1a, 1b	20090103 03329692

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	
UN-SY22CN**	CX	S-N38, N48	20090103 03329884
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.

Model Name	Global Rating (	3-Phase Motor) (	Note 1, Note 2)	Electrical Durability	Selection by Electrical Durability of 2 mil. times (Rating is the same as indicated at left)		
	200 V	220 to 240 V	380 to 440 V	(Note 3)	Model Name	Electrical Durability (Note 3)	
S-T10	11 A	9.6 A	7 A *3		S-T10		
S-T12	11 A	9.6 A	9 A *3		S-T12		
S-T20	15.2 A *1	15.2 A	14 A		S-T20		
S-T21	17.5 A	15.2 A	18 A		S-T21		
S-T25	25 A	22 A	27 A	2 mil. times	S-T25		
S-T32	32 A	28 A	32 A		S-T32	2 mil. times	
S-T35	32 A	28 A	27 A		S-T35		
S-T50	48 A	42 A	40 A		S-T50		
S-T65	54 A *1	54 A	52 A		S-T65		
S-T80	68 A *1	68 A	65 A	1 mil timos			
S-T100	80 A *1	80 A	77 A	i mii. umes	5-11/25		
S-N125	119 A	104 A	96 A				
S-N150	130 A *1	130 A	124 A		5-N100		
S-N180	177 A	156 A *2	156 A	1 mil. times	S N200	2 mil. times	
S-N220	192 A *1	192 A	180 A		3-11300		
S-N300	285 A	248 A	240 A		S-N600		

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: Shows the JIS rating (JEM rating).

Note 2. Compatible with UL Certification ((), TÜV Certification (), and CE Mark ((). 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<sup>I</sup> 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)

# 10.11 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 lp 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 lp 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.
- 296 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.

# 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.

	Main Circuit V	oltage: AC600 V Maximum		1	Main Circuit	Voltage: AC240 V Maximum	Ma	Main Circuit Voltage: AC480 V Maximum			
Magnetic	Short		Short				Short				
Contactor	Current	Maximum	Current	Maximum	<u> </u>	Voltage Circuit Breakers	Current		Circuit B	reakers	
Model	Rating	of Fuse	Rating	Rated	Minimum Breaking	Recommended Model Name (Note 1)	Rating	Maximum	Minimum Breaking	Recommended	
	(SCCR)	(Class K5)	(SCCR)	Current	Current		(SCCR)	Rated Current	Current	Model Name (Note 1)	
S-(2x)T10		30 A	10 kA	30 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU		30 A	18 kA		
S(D)-(2x)T12			25 kA	15 A	35 kA	NF100-SRU, NV100-SRU		007	10101		
SD-(2x)T12			14 kA	20 A	25 KA 14 kA	NE50-SVEU_NV50-SVEU		15 A	10 kA	NF100-HRU,	
			10 kA	2071	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	10 kA			NF125-SVU,	
S(D)-(2x)T20			25 kA	50 A	35 kA	NF100-SRU, NV100-SRU		30 A	18 kA	NV125-SVU	
SD-(2x)T20		70 A	14 kA	30 A	14 kA	NF50-SVFU, NV50-SVFU	1	15 A	10 kA		
S(D)-(2x)T21			10 kA	50 4	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU					
SL(D)-(2x)T21UL			35 kA	50 A	50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU	1	50 A			
SD-(2x)T21			14 kA	40 A	14 kA	NF50-SVFU, NV50-SVFU					
S (0))T05			10 kA		14 kA	NF100-CVFU, NV100-CVFU	35 kA		50 kA	NF125-HVU,	
5-(2X)125		100 4	35 kA	75 4	50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU		75 4		NV125-HVU	
0(D) 700		100 A	10 kA	75 A	14 kA	NF100-CVFU, NV100-CVFU		75 A			
S(D)-132			35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU	1				
	5 kA		10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU				NE100-HRU NV/100-HRU	
S(D) (2x)T25			14 kA	40 A	14 kA	NF50-SVFU, NV50-SVFU	18 kA		18 kA	NF125-SVU, NV125-SVU	
SL(D)-(2x)T35UL		125 A	18 kA		18 kA	NF100-SRU, NV100-SRU,		75 A			
			25 kA	75 A	35 kA	NF100-HRU, NV100-HRU	35 kA		50 kA	NF125-HVU,	
			35 kA	50.4	50 kA	NF100-HRU, NV100-HRU				NV125-HVU	
			10 KA	50 A	10 KA	NF50-SMU, NF50-SVFU, NV50-SVFU	18 kA		18 kA	NF100-HRU, NV100-HRU,	
S(D)-(2x)T50		200 A	14 KA	10 K	14 KA	NE100-SRL NV100-SRL		100 A	10101	NF125-SVU, NV125-SVU	
SL(D)-(2X)150UL			25 kA	100 A	35 kA	NF100-HRU, NV100-HRU	25 1.4		50 kA	NF125-HVU,	
			35 kA		50 kA	NF100-HRU, NV100-HRU	30 KA		50 104	NV125-HVU	
			14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU,	
SL(D)-(2x)T65UL		250 A	18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, 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	
			14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU	18 kA	100 A	18 kA	NF100-HRU, NV100-HRU,	
S(D)-(2x)180 SL(D)-(2x)T80UL		300 A	18 kA	100 A	18 kA	NF100-SRU, NV100-SRU, 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)T100	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	
3L(D)-(2X)11000L			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		350 A		250 A		NF250-CVU, NV250-CVU	25 kA	250 A	35 kA	NF250-SVU, NV250-SVU	
S(D)-(2x)N150						11/230-370, 11/230-370	50 kA	150 A	50 kA	NF250-HVU, NV250-HVU	
S-(2x)N180 S(D)-(2x)N220	10 kA	500 A		350 A		NF400-SWU, NV400-SWU	25 kA	350 A	35 kA	NF400-SWU, NV400-SWU NF400-HWU, NV400-HWU	
S(D)-(2x)N220			25 kA		35 kA		50 kA	250 A	50 kA	NF250-HVU, NV250-HVU	
S(D)-(2x)N300		600 A					25 kA	600 A	35 kA	NF630-SWU, NF630-HWU	
		-		600 A		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	50 kA	400 A	65 kA	NF400-HWU, NV400-HWU	
			5 kA	30 A	10 kA	NF50-SMU					
SD-Q(R)11	5 kA	kA 40 A 14 kA 25 kA 25 kA	14 kA	20 A	14 kA	NF50-SVFU, NV50-SVFU	_	_	_	_	
SD-Q(R)12			15 A	25 kA	NE100-SBU NV100-SBU			-			
			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.

		Main Circuit Voltage: AC600 V Maximum		Ν	/lain Circuit V	oltage: AC24	10 V Maximum	Main Circuit Voltage: AC480 V Maximum			
Thermal Ove	erload	Short	Maritan	Short Circuit				Short			
Relay Mo	del	Current	Rated Current	Current	Movimum	Circuit Br	eakers	Current	Maximum	CIRCUIT Breeking	eakers
	Heater Designation	Rating (SCCR)	of Fuse (Class K5)	Rating (SCCR)	Rated Current	Current	Name (Note 1)	(SCCR)	Rated Current	Current	Name (Note 1)
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	5 kA	15 A	10 kA / 25 kA	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	
	5A 6.6A		20 A								
	9A 11A		30 A		30 A	10 KA /			30 A	18 kA	
	15A		40 A		50 A	35 kA			50 A		
TH-T25KP	0.24A 0.35A 0.5A 0.7A 0.9A 1.3A 1.7A 2.1A 2.5A 3.6A	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
	5A 6.6A		20 A 30 A	00 10 1						-	
	9A	40 A 50 A		30 A				30 A			
	11A 15A		50 A 70 A		50 A				50 A		
	22A		100 A	70 A 100 A	75 A	14 kA / 50 kA	NF100-CVFU, NV100-CVFU / NF100-HRU, NV100-HRU NF125-SVU, NV125-SVU		75 A		
				10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU				NF100-HRU,
				14 kA	40 A	14 kA	NF50-SVFU, NV50-SVFU	18 kA		18 kA	NV100-HRU, NF125-SVU,
	29A		125 A	18 kA 25 kA	75 A	18 kA 35 kA	NF100-SRU, NV100-SRU, NF100-HRU, NV100-HRU		75 A		NV125-SVU
				35 kA		50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU	35 kA		50 kA	NV125-HVU
				10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU, NV50-SVFU	18 64		18 kA	NF100-HRU, NV100-HRU,
TH-T50KP	35A	5 kA	150 A	14 kA	75 A	14 kA	NF50-SVFU, NV50-SVFU				NF125-SVU,
				25 kA 35 kA	100 A	100 A 18 kA 35 kA 50 kA	NF100-SR0, NV100-SR0, NF100-HRU, NV100-HRU NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU	35 kA		50 kA	NF125-HVU, NV125-HVU
				10 kA	50 A	10 kA	NF50-SMU, NF50-SVFU,		100 A		NF100-HRU,
			200 A	14 kA	KA 75 A	14 kA	NF50-SVFU, NV50-SVFU	18 kA		18 kA	NF125-SVU,
	42A			18 kA		18 kA	NF100-SRU, NV100-SRU,				NV125-SVU
				25 kA 35 kA	100 A	50 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU	35 kA		50 kA	NF125-HVU, NV125-HVU

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.

<b>T</b> I 10		Main Circuit Vo	ltage: AC600 V Maximum	N	/ain Circuit \	/oltage: AC24	10 V Maximum	N	lain Circuit \	/oltage: AC48	30 V Maximum
Thermal Ove	rioad	Short		Short				Short			
Model		Circuit	Maximum Batad Current	Current		Circuit Br	eakers	Current		Circuit Br	eakers
		Rating	of Fuse	Rating	Maximum	Minimum	Recommended Model	Rating	Maximum	Minimum	Recommended Model
	Heater Designation	(SCCR)	(Class K5)	(SCCR)	Rated Current	Breaking Current	Name (Note 1)	(SCCR)	Rated Current	Breaking Current	Name (Note 1)
	15A		70 A	14 KA	75 A	14 KA 18 kA	NF100-CVF0	18 kA	50 A	18 kA	NF100-HRU, NV100-HRU, NF125-SVU, NV125-SVU
	224			25 kA	50 A	20 kA	NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
				25 KA 14 kA	75 A	14 kA	NE100-CVEU				NE100-HBU NV100-HBU
			100 A	18 kA	- 60 A	18 kA		18 kA	60 A	18 kA	NF125-SVU, NV125-SVU
				25 kA		30 kA	NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
				14 kA	kA 14 kA NF100-CVFU 18 kA	18 44		18 kA	NF100-HRU, NV100-HRU,		
	29A		125 A	18 kA	75 A	18 kA	NF100-SRU, NV100-SRU,		75 A		NF125-SVU, NV125-SVU
		5 kA		25 kA		30 kA	NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
TH-T65KP	35A			14 kA	100 A	14 kA	NF100-CVFU	18 kA		18 kA	NF100-HRU, NV100-HRU,
			150 A	18 kA	75 A	18 kA	NF100-SRU, NV100-SRU,	05 1.4	75 A	00.1-0	NF125-SVU, NV125-SVU
				25 kA		30 kA		25 KA		30 KA	NF125-SVU, NF125-HVU
	42A		200 A	14 kA		14 KA	NF100-GVFU	18 kA		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	100 A	30 kA	NE125-SVI NE125-HVI
				25 KA		30 KA	NE100 CV/EU	20101		00101	
			250 A	14 KA	100 A	14 KA	NF100-SBU NV100-SBU	18 kA	100 A	18 kA	NF125-SVU, NV125-SVU
	54A					30 kA	NF100-HRU, NV100-HRU	25 kA		30 kA	NF125-SVU, NF125-HVU
		10 kA	225 A	25 kA	150 A	35 kA	NF250-SVU	20 104	150 A	35 kA	NF250-SVU
	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
III-IIOORF	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
	42A		200 A		100 A	-	NF125-HVU		100 A		NF125-HVU
TH-N120KP	54A		250 A		100 A	-					
	67A	10 kA	300 A	25 kA	225 A	35 kA		25 kA	225 A	35 kA	
	02A 105A		350 A		225 A	•	NF225-CWU NF250-SVU				NF250-SVU
TH-N120TAKP	125A		350 A		250 A		1.1.200 010		250 A		
	82A		400 A			Į.					
	105A										
TH-N220RHKP	125A	10 kA	500 A			-				-	
	150A		500 A								
	180A										
	105A		500 A								
	120A	10 kA									
TH-N400RHKP	180A	10104	600 A								
	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

	<b>U</b>				
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
	S-T10(BC)(SA), T12(BC)(SA), T20(BC)(SA), T21(BC)(SA), S-T25(BC)(SA),	14/10008		Applicable with
	T32(BC)(SA), SD-T12(BC)(SA), T20(BC)(SA), T21(BC)(SA), T32(BC)(SA)	14/10000	38175	class AC-3
Magnetic	S-T35(BC)(SA), T50(BC)(SA), T65(CW), T80(CW), T100	16/10003	00170	standard product
Contactors	SD-T35(BC)(SA), T50(BC)(SA), T65(CW), T80(CW), T100	10/10000		at 440 V or less.
Contactors	S-N125 N150 N180 N220 N300 N400 N600 N800			Applicable with class
	SD-N125, N150, N220, N300, N400, N600, N800	98/10016	07095	AC-3 standard product
	00 N123, N130, N220, N000, N400, N000, N000			at 690 V or less. (Note 2)
	TH-T18(AR)(BC)KP(YS), T25(AR)(BC)KP(YS)	14/10010		Applicable with
		10/10004	38176	standard product
Thermal Overload	IH-I50(AR)(BC)KP(YS), 165KP, 1100KP	16/10004		at 440 V or less.
Relays			07905	Applicable with
	TH-N220BH(KP) N220HZ(KP) N400BH(KP) N400HZ(KP) N600(KP)	98/10017		standard product
				at 690 V or less.
Contactor Belays	SR-T5(BC)(SA), T9(BC)(SA)	14/10009	38177	
	SRD-T5(BC)(SA), T9(BC)(SA)	14/10000	00117	Applicable with
	UT-AX2(BC), AX4(BC), AX11(BC)	14/10009	38174	class AC-15
Auxiliary Contact Unit	UN-AX2 (CX), AX4 (CX), AX11 (CX)	95/10010	06139	standard product at 550 V or less.
	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.

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# Magnetic Contactors and Thermal Overload Relays Certified by China Classification Society (CCS)



# 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 **A** 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.

# **Related Equipment**

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	US-N□, US-H□306
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11.10	How to Order

# 11.1 Model List (US-N, US-H Series)

# ● US-N□ Solid State Contactors (Standard Models)

	Category AC-1 Rated Operating Current (A) (Note 6)	5	8	20	30	40	50	70	80
	Heater 1φ 200 V Capacity (Note 1)	1	1.6	4	6	8	10	14	16
	(kW) 3φ 200 V	1.7	2.7	6.9	10.3	13.8	17.3	24.2	27.7
Type	Maximum Applicable Motor Capacity (kW) 3φ 200 V (Note 2)	0.4	0.4	2.2	3.7	5.5	5.5	11	11
AC200 \	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
	Category AC-1 Rated Operating Current (A) (Note 6)			20	30	40	50	70	80
	Heater 10 400 V Capacity (Note 1)			8	12	16	20	28	32
AC400 V Type	(kW) 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
IE	C 35 mm Rail Mounting	Possible With St	andard Products	(Note 5)					
Liv	e Part Protection Cover Units			(	I	Equipped With S	Standard Product	s	
	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 \	/ Main Circuits)/U	N-FD4 (For 400 V	Main Circuits)
	Options (Note 4)	UA-SH8	UA-	DR1	UA-SH1	UA-PC		-FD	UA-PC

Category AC-1 Current (A) (-10	Rated Operating to 40°C) (Note 6)	20	30	40	50
Heater	1φ 200 V	4	6	8	10
(kW)	3φ 200 V	6.9	10.3	13.8	17.3
(Note 6, Note 7)	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 Redu	ced Product)	US-H20UF US-H20DDUF	US-H30UF US-H30DDUF	_	-
IEC 35 mm	US-H□	(Not	te 5)	-	-
Mounting	US-H□UF	Standard I	Equipment	-	-
	Fault Detection Units	UN-FD (For 200	V Main Circuits)/	UN-FD4 (For 400	V Main Circuits)
Optional	Power Control Units		UA-	-PC	
	Live Part Protection Cover Units		UN-CV	501US	

# US-H Solid State Contactors

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.  $\Box$  in the optional unit column indicates the applicable range.
- Note 5. Possible with a dedicated product (US- $\Box$ 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.

US-N20TE

# 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 (M)

(US-H types are not subject to CCC certification)

# Type Designations

(1) US-N Solid State Contactors (3-Pole Type)



Note 1. N5SS(TE) and N8SS (TE) types can be rail mounted as the standard product.





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).

#### (2) US-H Solid State Contactors US DD H20 ΗZ \_ Symbol Circuit Control Method Symbol Specifications Symbol Rated Voltage Rated Operating Current (Category AC-1) H20 20A None Batch Control None Standard Specifications H30 30A DD Individual Control ΗZ No Cooling Fin AC24 to 480 V H40 40A Rail Mounting Only RM H50 50A (20 A, 30 A Only) Width Reduced Product UF (20 A, 30 A Only) (3) Optional Units UA DR1 AC100V Unit Name Symbol Rated Operational Voltage Symbol DR1 Drive Units AC100V AC100 to 120 V 50/60 Hz AC200V SH1 AC200 to 240 V 50/60 Hz Drive Units with Outputs Drive Units with Outputs (For US-N5/N8SS(TE) Only) SH8 Rated Operational Voltage Symbol Unit Name Symbol RE Reversing Unit AC100V AC100 to 120 V 50/60 Hz AC200V AC200 to 240 V 50/60 Hz DC24V DC24 V Symbol Unit Name Symbol Rated Operational Voltage PC Power Control Units AC100V AC100 to 120 V 50/60 Hz AC200V AC200 to 240 V 50/60 Hz Symbol Unit Name Symbol Resistor/Application UA-DR1/UA-SH1 Live Part Protection Cover Unit CVDR1 VR10 10 kΩ/Gradient Setter CVSH8 UA-SH8 Live Part Protection Cover Unit VR1 1 kΩ/Main Setter

UN	-	FD	AC100V

 Symbol	Unit Name	<u> </u>	Symbol	Rated Operational Voltage	-	Symbol	Output Contact Arrangement (Note 1)
FD	200 V Main Circuit Fault Detection Units		AC100V	AC100 to 120 V 50/60 Hz		1 A	1a Make Contact
FD4	400 V Main Circuit Fault Detection Units		AC200V	AC200 to 240 V 50/60 Hz		1B	1b Break Contact
			DC24V	DC24 V			
 Symbol	Unit Name	]			_		

CV501US US-H Live Part Protection Cover Unit

Note 1. Output contact arrangement must be specified only for UN-FD4.

# 11.2.1 US-N Solid State Contactors

# Ratings/Specifications

			3-Pole Type						
	Appearan	ice			1777 H	FFFFA			
		Single-Pole Type	_	_	_	_			
	Standard	3-Pole 2-Element Type	US-N5SS	US-N8SS	US-N20	US-N30			
me		3-Pole 3-Element Type	US-N5SSTE	US-N8SSTE	US-N20TE	US-N30TE			
N N	3-Pole 2-Element Typ			_	US-N20CX	US-N30CX			
ode	With CAN Terminal	3-Pole 3-Element Type	_	_	US-N20TECX	US-N30TECX			
ž		3-Pole 2-Element Type	(Note 1)	(Note 1)	US-N20RM	_			
	IEC 35 mm Rail Mounting	3-Pole 3-Element Type	(Note 1)	(Note 1)	US-N20TERM	_			
	Pated Operating Current	JEM (Category AC-1)	5 A	8 A	20 A	30 A			
	(-10 to 40°C) (Note 2)	IEC (Category AC-51)	5 A	8 A	20 A	30 A			
		1φ200 V (Note 4)	1 kW	1.6 kW	4 kW	6 kW			
_	Applicable Heater Capacity	3ø200 V	1.7 kW	2.7 kW	6.9 kW	10.3 kW			
ting	(-10 to 40°C)	10400 V (Note 4)		_	8 kW	12 kW			
Ra		30400 V	_	_	13.8 kW	20.7 kW			
	Maximum Applicable Motor	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)			
	Capacity (Maximum	3φ400 V			3.7 kW (8.7 A)	7.5 kW (17.4 A)			
	Minimum Load Current		150	mA	300	mA			
	Main Circuit Control Method			Batch Control					
S	Rated Operational Voltage		AC100 to 24	0 V 50/60 Hz	AC100 to 48	0 V 50/60 Hz			
ion	Operating Voltage			85 to 110% of Rated	l Operational Voltage				
icat	Rated Insulation Voltage		AC2	50 V	AC5	00 V			
ecif	Making Voltage Drop			1.5 V/	Phase				
it Sp	Open Circuit Leakage Curre	nt	15 mA or Less (	AC240 V 60 Hz)	30 mA or Less (	AC480 V 60 Hz)			
Circu	Surge ON Current (60 Hz, 1 Value)	Half-Wave Cycle Peak	160	0 A	800 A	1300 A			
ain	Tolerance I <sup>2</sup> t (A <sup>2</sup> s)		10	06	2600	7000			
Σ	Trigger System			Zero Voltage T	Frigger System				
	Making and Breaking Capac	cities	32 A	50 A	111 A	174 A			
	Rated Operational Voltage		DC12 to 24 V (10% or Less Voltage Ripple)						
	Operating Voltage Fluctuation	on Range	85 to 110% of Rated Operational Voltage						
suo	Control Circuit Maximum Ap	plied Voltage		DC2	6.4 V				
cati	Control Circuit Input Current		20 mA (DC	12 to 24 V)	5 mA (DC12 to 24 V)				
ecifi	Input Impedance		0.6 to	1.2 kΩ	2.4 to 4.8 kΩ				
Spe	Closing Voltage			DC9 V	or Less				
cuit	Openning Voltage			DC3 V	or More				
ö	Response Time			Max. 1 ms	+ 1/2 Cycle				
to	Operation Indicator		LE	D Indicator (Lights When	Operating Voltage Applie	ed)			
O	Cooling Fan Rated operation	nal Voltage (Note 6)		-	-				
Ean Fault Datastian Output				-	-				
	Contact Capacity			-	-				
s	withstand Voltage		2	kV	2.5	kV			
tion	Insulation Resistance			100	MΩ				
fica	Rated Impulse Withstand Vo	oltage (Note 7)	4	kV	61	<٧			
)eci	Operating Ambient Tempera	ture	-10	to 60°C (Use at Reduced	Current When 40°C or M	ore)			
l Sp	Relative Temperature			45% to	85% RH				
non	Altitude			2,000 m	or below				
omr	Vibration-Resistant			10 to 55 H	z 19.6 m/s²				
0	Shock-Resistant		98 m/s <sup>2</sup>						

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-Pol	е Туре	
PERES	FFF A		
_	_	_	_
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 48	0 V 50/60 Hz	AC100 to 24	0 V 50/60 Hz
	85 to 110% of Rated	Operational Voltage	
AC5	00 V	AC2	50 V
	1.5 V/	Phase	
30 mA or Less (	AC480 V 60 Hz)	30 mA or Less (	AC240 V 60 Hz)
	180	00 A	
	13	500	
	Zero Voltage	Frigger System	
260	A	480	A C
	DC12 to 24 V (10% o	r Less Voltage Ripple)	
	85 to 110% of Rated	d Operational Voltage	
	DC2	6.4 V	
5 mA (DC	12 to 24 V)	20 mA (DC	12 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 24	0 V 50/60 Hz
	-	Break 0	Contact
-	_	DC5 to 24 V/AC1	00 to 240 V 0.1 A
2.5	kV	21	kV
	100	ΜΩ	
61	<٧	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 H	z 19.6 m/s <sup>2</sup>	
	98	m/s <sup>2</sup>	

# Circuits

Figures 1 to 4 show the block circuit diagrams for US-N(H) $\square$  types.









Note 1. The main circuit and control circuit are isolated via a photocoupler.

Note 2. US-N(H) $\Box$  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)  $\Box$  types.

Use a low signal contact if using a contact in place of a transistor as the drive signal for US-N(H)  $\Box$  /K(H)  $\Box$  types.



Note. Refer to page 281 for information regarding CE Mark compliance.



# 11.2.2 US-H Solid State Contactors

# Ratings/Specifications

arance	US-H□									
Appe	US-H□UF				_	_			_	_
ame	Stand	dard	US-H20	US-H30	US-H40	US-H50	US-H20DD	US-H30DD	US-H40DD	US-H50DD
del N	IEC 35 mm R	ail Mounting	US-H20RM	US-H30RM	_	_	US-H20DDRM	US-H30DDRM	-	—
Mo	Width Reduc	ed Product	US-H20UF	US-H30UF		_	US-H20DDUF	US-H30DDUF	_	
	Rated Operating	JEM (Category AC-1)	20A	30A	40A	50A	20A	30A	40A	50A
	40°C) (Note 1)	IEC (Category AC-51)	20A	30A	40A	50A	20A	30A	40A	50A
p	Applicable	1φ200 V	4kW	6kW	8kW	10kW	4kW	6kW	8kW	10kW
Ratir	Capacity	3φ200 V	6.9kW	10.3kW	13.8kW	17.3kW	-	_	_	_
ш	(-10 to	1φ400 V	8kW	12kW	16kW	20kW	8kW	12kW	16kW	20kW
	40°C)	3φ400 V	13.8kW	20.7kW	27.7kW	34.6kW	-	—	—	—
	Minimum Lo	ad Current				0.3 A				
	Main Circuit Co	ntrol Method		Batch	Control	10011 10		Individua	I Control	
suc	Rated Operation	ional voltage			05.4	AC24 to 48	J V 50/60 Hz			
catio	Operating vo	viage			000					
scifi	Making Volt					AUC AUC	Current			
Spe	Open Circuit Lea	akage Current	Max. 30 mA (AC480 V 60 Hz)							
Circuit	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
ain (	Tolerance I <sup>2</sup>	²t (A²s)	450	2600	4100	7000	450	2600	4100	7000
ŝ	Trigger Syst	tem		1		Zero Voltage	Trigger System			
	Making and Break	king Capacities	28 A	42 A	56 A	70 A	28 A	42 A	56 A	70 A
SL	Rated Operati	ional Voltage			DC12	2 to 24 V (10% o	r Less Voltage Ri	pple)		
atio	Operating Voltage F	Fluctuation Range			85 te	o 110% of Rated	d Operational Vol	tage		
cific	Control Circuit Maximu	um Applied Voltage				DC2	6.4 V			
Spe	Control Circuit	Input Current				10 mA or Less	(DC12 to 24 V)			
cuit	Input Imped	dance				1.2 to	2.4 kΩ			
Ö	Closing Vol	tage				DC9 V	or Less			
ating	Openning V	/oltage				DC3 V	or More			
pera	Response 1	Гime				Max. (1 ms	+ 1/2 Cycle)			
0	Operation I	ndicator			LED Indica	tor (Lights When	Operating Volta	ge Applied)		
SU	Withstand \	/oltage				2.5	5 kV			
atio	Insulation F	Resistance				100	ΜΩ			
Cific	Rated Impulse Wi	thstand Voltage				6	kV			
pec	Operating Ambier	nt lemperature			-10 to 60°	C (Use at Reduc	ed Current If 40°	C or More)		
S LC	Relative Ter	nperature				45% to	85% RH			
nmc	Altitude					2,000 m	or below			
Cor	Vibration-R	esistant				10 to 55 H	z 19.6 m/s <sup>-</sup>			
	SHOCK-RES	รเสทเ				98	11/5			

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





# Connecting



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.



Note 1. The solid line — indicates  $\sqrt{3}$  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 $\Box$ DD (individual control) types.





- 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  $\Box$  (DD)HZ solid state contactors are US-H  $\Box$  (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  $\Box$  (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.



### (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 US-H□HZ US-H□DDHZ	A Dimension 20 mm or More 30 mm or More

# 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)).

	Rated Operating Current (A)		Applicable Heater Capacity (kW)						
Model Name				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:√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.



(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)

		Starting Time						
Motor Capacity (3φ 200 V)	0.1 s	0.2 s	0.3 s	0.4 s	0.5 s	0.	6s 0.7s	
0.4 kW (3.2 A)		US-N5 US-N8 US-N8						
0.75 kW (4.8 A)	US-N5	US-N5□ US-N8□ US-N20□						
1.5 kW (8.0 A)		US-N20						
2.2 kW (11.1 A)	US-N20	]	US-N30					
3.7 kW (17.4 A)	US-N	30□	US-N	10/N50🗆	US-N7	′0□/N80□	]	
5.5 kW (26.0 A)	US-N40/N50			US-	N70□/N80□			
7.5 kW (34.0 A)		US-N70□/N80□						
11 kW (48.0 A)	US-N70□/N80□							

 Selection Criteria B (Switching Frequency: 600 Times/Hour, Utilization: 40%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

			Starting Time					
Motor Capacity (3q 200 V)	0.1 s 0.	2 s 0.	3s 0.4	4s 0.5	5 s	0.6 s	0.7 s	
0.4 kW (3.2 A)		US-N5						
0.75 kW (4.8 A)	US-N5	US-N5 US-N8 US-N20						
1.5 kW (8.0 A)		US-N20□						
2.2 kW (11.1 A)	US-N20□	US-N20			US-N30			
3.7 kW (17.4 A)		US-N30		US-N40	0/N50□	US-N700/N80		
5.5 kW (26.0 A)	US-N40/N50		l	JS-N70□/N80□	]			
7.5 kW (34.0 A)	US-N70□/N80□							
11 kW (48.0 A)	US-N70□/N80□							

 Selection Criteria C (Switching Frequency: 150 Times/Hour, Utilization: 60%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

	Starting Time								
Motor Capacity (3q 200 V)	0.1 s 0.	2s (	).3 s	0.4 s	0.5 s	0.6 s	0.7 s		
0.4 kW (3.2 A)		US-N5							
0.75 kW (4.8 A)	US-N5	US-N5 US-N8 US-N20							
1.5 kW (8.0 A)	US-N20								
2.2 kW (11.1 A)	US-	N20□			US-N	130□			
3.7 kW (17.4 A)		US	-N30□			US-N40	)/N50□		
5.5 kW (26.0 A)	US-N40/N50	US-N40/N50							
7.5 kW (34.0 A)	US-N70□/N80□								
11 kW (48.0 A)	US-N70□/N80□								

(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

		Starting Time								
Motor Capacity (3q 400 V)	0.1 s	0.2 s	0.3 s	0.4 s	0.5 s	0.6 s	0.7 s			
3.7 kW (8.7 A)	US-N20 US-N30									
5.5 kW (13.0 A)	US-N30									
7.5 kW (17.4 A)	US-N	US-N4	0/N50□	US-NH70	□/NH80□					
11 kW (26.0 A)	US-N40/N50			US-NH70	□/NH80□					
15 kW (34.0 A)	US-NH70□/NH80□									
22 kW (48.0 A)	US-NH70□/NH80									

 Selection Criteria B (Switching Frequency: 600 Times/Hour, Utilization: 40%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

	Starting Time						
Motor Capacity (3q 400 V)	0.1 s	0.2 s	0. 3s	0.4 s	0.5 s	0.6 s	0.7 s
3.7 kW (8.7 A)			US-	N20□		·	
7.5 kW (17.4 A)		US-N30			US-N40/N50	US-NH70□/I	NH80
11 kW (26.0 A)	US-N40/N50			US-NH70	□/NH80□		
15 kW (34.0 A)			US-NH70	□/NH80□			
22 kW (48.0 A)	US-NH70□/NH80□						

 Selection Criteria C (Switching Frequency: 150 Times/Hour, Utilization: 60%, Starting Current: 6 Times Full-Load Current, Ambient Temperature 40°C)

	Starting Time						
Motor Capacity (3q 400 V)	0.1 s	0.2 s	0.3 s	0.4 s	0.5 s	0.6 s	0.7 s
3.7 kW (8.7 A)	US-N20						
7.5 kW (17.4 A)	US-N30 US-N40/N50					/N50□	
11 kW (26.0 A)	US-N40/N50 US-NH70 // NH80						
15 kW (34.0 A)	US-NH70□/NH80□						
22 kW (48.0 A)	US-NH7	0□/NH80□					

# 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.** 





### • 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)).

	Rated Operati	ing Current (A)	Applicable Heater Capacity (kW)				
Model Name		ing Current (A)		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)

# **11.4 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<sup>2</sup> or Less
- (5) Shock
- : 98 m/s<sup>2</sup> 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

US-N	US-H
-	H20 to H50
N20 to N50	-
N5, N8, N70, N80	_
NH70, NH80	-
	US-N — N20 to N50 N5, N8, N70, N80 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





# 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.

 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.
 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





(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 <sup>2</sup>	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 <sup>2</sup> )	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 $\square(\mbox{TE})\mbox{CX}$  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	M2.5	φ1.6 mm	1.25-3.5 to	0.94 to 1.51 N·m
All Models	1013.5	1.25 to 2 mm <sup>2</sup>	2-3.5	(Standard 1.17 N·m)
UA, UN-□	M2 5	φ1.6 mm	1.25-3.5 to	0.94 to 1.51 N·m
All Option Models	1013.5	1.25 to 2 mm <sup>2</sup>	2-3.5	(Standard 1.17 N·m)



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.

# 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.

<ul> <li>Quick-Trip Fuse S</li> </ul>	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 <sup>2</sup> t of the Fuse and Allowable I <sup>2</sup> t of the Element	Protection of the Element with Respect to Short Circuit of a Half Cycle or Less	(Total Breaking I <sup>2</sup> t of Fuse) < (Allowable I <sup>2</sup> t 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





### (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<sup>2</sup>t values to withstand over-current situations. Protection against the rated surge ON consists of a balance of thyristor protector operating characteristics and allowable I<sup>2</sup>t and is limited to the protectable region applicable when short-circuited (shorted time region) with restricted thyristor protector current (continuous I<sup>2</sup>t).



### 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.

		<b>-</b> 1 12.		Circuit Thyristor Protector Rated Current						
	Model Name	IName (A <sup>2</sup> s)	Voltage	10 A	15 A	20 A	25 A	30 A	40 A	50 A
			Fontago	Thyristor Protector (SP50-K 1P/2P/3P 3x) Short-Circuit Protection Current						
			Single-Phase AC110 V	8	5	3	2	-	-	-
	US-N20□	2600	3-Phase AC220 V	4	3	2.2	1.6	-	-	-
			3-Phase AC440 V	1.7	1.5	1.2	1	-	-	-
			Single-Phase AC110 V	10	10	8.5	6	4.3	3.2	-
	US-N30□	7000	3-Phase AC220 V	5	5	5	3.9	2.8	2.1	-
Solid State			3-Phase AC440 V	2.5	2.5	2.5	2.1	1.3	-	-
Contactors			Single-Phase AC110 V	10	10	10	10	8.6	6	4.4
for General Loads	US-N40⊡ US-N50□	13500	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
		450	Single-Phase AC110 V	0.6	0.5	0.4	-	-	-	-
	US-H20□		3-Phase AC220 V	0.55	0.42	0.39	0.3	-	-	-
			3-Phase AC440 V	0.38	0.34	0.3		-		—
			Single-Phase AC110 V	8	5	3	2	1.7	1.2	1
	US-H30□	2600	3-Phase AC220 V	4	3	2.2	1.6	1.3	0.9	0.8
Solid State			3-Phase AC440 V	1.7	1.5	1.2	1	0.85	0.75	0.67
for Heater Loads			Single-Phase AC110 V	10	8.2	5	3.5	2.7	2	1.6
	US-H40□	4100	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
			Single-Phase AC110 V	10	10	8.5	6	4.3	3.2	2.5
	US-H50□	7000	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

### • US-N, US-H Series Combination Chart

### Motor Load

Thyristor protectors are not applicable. Use a no-fuse breaker and quick-trip fuse with the US-N unit.

# Device Selection

At AC200 V Rating

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.

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
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	•		
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  $\Box$  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

	•		
Notor 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)  $\Box$  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**

				0:	Applicable, x: Not Applicable	
		Applicable Models				
Optional Unit Names	Model Name	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	O (Note 2)	0 (Note 2)	x	
Drive Units with Outputs	UA-SH8	O (Note 1)	x	x	x	
	UA-SH1	x	O (Note 2)	0 (Note 2)	x	
Reversing Unit	UA-RE	0	0	0	x	
Fault Detection Units	UN-FD	0	0	○ (N70/N80(TE))	0	
	UN-FD4	x	0	О (NH70/NH80(ТЕ))	0	
Power Control Units	UA-PC	0	0	0	0	
Live Part Protection Cover Units	UN-CV501US	x	x	x	0	
		Applicable Models				
Optional Unit Names	Model Name	UA-DR1	UA-SH1	UA-SH8		
Live Part Protection Cover Units	UA-CVDR1	0	0	x		

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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.

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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)

UA-CVSH8

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 Vol	tage/Current	DC12 to 24 V/20 mA		
Response Time	OFF→ON	Max. 30 ms + 1/2 Cycle + 1 ms (When Combined With US		
	ON→OFF	Max. 30 ms + 1/2 Cycle + 1 ms (When Combined With U		
Allowable Voltage Fluctuation Range		85 to 110% of Rated Operational Voltage		
Operating Temperature/Humidity		-10 to 60°C/45 to 85% RH		

#### Circuit



0

#### 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.



# US-N Connections

Connect as per Figure 4 if using a combination of UA-DR1 unit.



## Thermal Overload Relay Connection

Connect as shown in Figure 3 if using a thermal overload relay with circuits combined with UA-DR1 types.



# 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							
App	earance							
Mo	del Name		UA-SH1 AC100V	UA-SH1 AC200V	UA-SH8 AC100V	UA-SH8 AC200V		
	Rated Operation	onal 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		
۲	Input Curre	nt	20	mA	45 mA			
Drive	. Rated Output Voltage/Current		DC12 to 24 V/20 mA		DC24 V/30 mA			
	Response	OFF→ON	Max. 50 ms (When C	ombined With US-N)	Max. 50 ms (When Combined With US-N5/N8SS(TE))			
	Time	ON→OFF	Max. 50 ms (When C	ombined With US-N)	Max. 50 ms (When Combined With US-N5/N8SS(TE))			
uts	Rated Load	Voltage	AC100 to 240 V 50/60 Hz					
utp	Rated Load	Current	0.5 A (Class AC-15)					
2	Output Meth	nod	Triac Output (1 Circuit/Built-in Surge Absorber)					
xilia	Leakage Cu	rrent	3 mA or Less					
Au	Making Volta	age Drop	1.5 V or Less					
UD	Allowable Voltage Flu	wable Voltage Fluctuation Range 85 to 110% of Rated Voltage						
шu	Operating Tempera	ature/Humidity	nidiy -10 to 60°C/45 to 85% RH					
ပိ	Operation In	dicator	— Lights When Operating Voltage Applied					

#### Circuits/Connections





#### 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.



# 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	g			
Appearance				
Model Name		UA-RE AC100V	UA-RE AC200V	UA-RE DC24V
Rated Operation	onal 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 Vo	Itage/Current	DC12 V/20 mA		
Interlock Time	)	Max. 100 ms		
Response	OFF → ON	Max. 20 ms + 1/2 Cycle + 1 ms (When Combined With US-N)		
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



# 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 Oper	ating Pattern Diagram
Input Signal (Forward)	ON OFF
Input Signal (Reverse)	
US-N (Forward)	
US-N (Reverse)	ON OFF

# 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
Туре	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	<ul> <li>Detects When 1 or More of 2 Elements Have Continuity Failure For 2-Element Types</li> <li>Detects When 2 or More of 3 Elements Have Continuity Failure For 3-Element Types or Opening Faults</li> </ul>	<ul> <li>Detects When 1 or More of 2 Elements Have Continuity Failure For 2-Element Types or When Both Elements Have Opening Faults</li> <li>Detects When 2 or More of 3 Elements Have Continuity Failure For 3-Element Types or Opening Faults</li> <li>Fault Detection For When the Control Input Signal is ON and Main Circuit Power Supply is OFF</li> </ul>
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 Operation	onal Voltage	AC100 to 120 V 50/60 Hz	AC200 to 240 V 50/60 Hz	DC24 V	
Rated Main Cir	cuit Voltage	AC2	00 to 240 V 50/6	0 Hz	
Input Current		17 mA			
Output	Contact Arrangement	1c			
Output	Contact Rating	AC240 V 1 A, AC120 V 1.5 A (Class AC-15), DC24 V 1 A (Class DC12)			
Minimum Contro	ol Input Time		20 ms		
Detection Tim	е		0.2 to 0.5 s		
Allowable Detection	Retention Time	1 Second (Minimum Rating)			
Allowable Voltage Flu	uctuation 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		<ul> <li>(1) No-Fuse Breakers with Voltage Tripping Device</li> <li>(2) Magnetic Contactors</li> <li>Operate the above (1) or (2) within 1 second to shut off power to the main circuit.</li> </ul>			



 $\cdot$  Capacitive Load Circuits  $\cdot$  Star-Delta Starting Circuits  $\cdot$  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.





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# Connecting





# Operating Conditions

- 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 O	perating Pattern Diagram
Control Input Signal	ON
Load Voltage (Detection Input Voltage)	ON
UN-FD Output Make Contac	ON Tripping
No-Fuse Breakers with Voltage Tripping Device	ON OFF

# 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 selfretaining 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								
Madal Nama		UN-FD4	UN-FD4	UN-FD4	UN-FD4	UN-FD4	UN-FD4	
Model Name	;	AC100V1A	AC100V1B	AC200V1A	AC200V1B	DC24V1A	DC24V1B	
Rated Operat	tional Voltage	AC100 to 12	0 V 50/60 Hz	AC200 to 24	0 V 50/60 Hz	DC2	24 V	
Rated Main C	ircuit Voltage	ge AC380 to 440 V 50/60 Hz						
Input Current	t		(	Control (A1 to A2): 17	mA, Signal (24): 10 mA	A		
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 Cont	trol Input Time			20	ms			
Detection Tir	me	0.2 to 0.5 s						
Allowable Detection	on Retention Time			Continuo	us Rating			
Allowable Voltage F	Fluctuation Range	85 to 110% of Rated Voltage (Both Control Circuit and Main Circuit)						
Operating Tempe	erature/Humidity	ity -10 to 60°C/45 to 85% RH						
Operation In	dicator	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	on Retention	n Electric Retention via Operating Power Supply						
Fault Detecti	ion Reset			Resetting By Turning	OFF Operating Power			
				3, 3	<u> </u>			

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



#### 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. 10 Connecting UN-FD4 A Types and No-Fuse Breakers (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. 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.



Note. It is also possible to use DC24V circuits alone if using DC operated magnetic contactors (DC24V coils).

Fig. 12 Operating Pattern Diagram
Control Input ON Signal OFF
Load Voltage ON (Detection Input Voltage) OFF
UN-FD4 ON Utput Make ContactOFF
No-Fuse Breakers ON with Voltage Tripping Device OFF

#### 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-NDTE 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

Appearance				
Model Nar	ne	UA-PC AC100V	UA-PC AC200V	
Rated Ope	rational Voltage	AC100 to 110V 50/60Hz	AC200 to 220V 50/60Hz	
Input Current		201	mA	
Control Method		Cycle Control (Zer	ro 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 S	Setting	0 to 100%(Adjustable Via Setter)		
Control Pe	eriod	0.2 to 1s (Adjustable Via Setter)		
Combining	Adjustment Range of Output Voltage	0 to 100%		
US-N/US-H	Applicable Loads	Resistor/Heating Element		
Operation Indicator	Power Indicator	Lights With Control Circu	t 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		



## Properties



# Operating Circuit



#### 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.



#### (2) Signal Input Circuit Example

(1) to (18) show the possible signal input circuits.





#### (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.





#### 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.



t=0.2

# 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  $\Box$  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



#### Mounting Method



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#### Removal Method



#### 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



## US-H Solid State Contactors



# Optional

Model Name	Appearance	Outline Drawings	Hole Drilling Dimensions	Weight (kg)
UA-SH8		M3.5 Screw Connecting Conductor	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	And a second sec	M3.5 Screw 4.5 2 *1 50 *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		M3.5 Screw M3.5 Screw	2-M4 Screw	0.1
UA-PC		M3.5 Screw	2-M4 Screw	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

<ul> <li>Optimal Protection to Suit Load Properties</li> </ul>	
Protection function and overload operating time can be selected to	
suit the load via the mode setting switch.	100 r
Protection Function: Overload, Open-Phase and Reverse-Phase	Contraction (Second
Combination	
Operating Time: Select Among 3/5/7/15/30 Seconds	EL-NOS TA Pin
(At Current 600% of Setpoint)	ality of H
<ul> <li>Wide Current Settling Range</li> </ul>	1000
Applicable with a current settling range 3 to 4 times the minimum scale.	
<ul> <li>Easy Fault-Finding Via Operation Indicator Lamp</li> </ul>	
Indicators: Power/Overload/Open-Phase/Reverse-Phase	
<ul> <li>Indicates Load Equipment Running State</li> </ul>	
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	Compact
Has settings/operation displays located on the front surface to make	ET-N60 ha
initial settings and maintenance easy.	which is e
Settings/operation displays have protective covers to prevent	control pa
misoperation.	<ul> <li>Simple W</li> </ul>

- 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

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



	AC10	)0V		
Symbol		nbol	Rated Operational Voltag	e
AC100V		00V	AC100 to 120 V 50/60 Hz	
	AC2	200V	AC200 to 240 V 50/60 Hz	

· Terminal Cover Units

UN	-	-	CV602		
Symbo	bl		Symbol I	ndicating	Unit Product Name
Unit	65		ET-N	60 Ter	minal Cover

#### Rating

Madal Nama		Range of Settling	Applicable Motor Capacity [kW]		Madal Nama		Range of Settling	Applicable Motor Capacity [kW]	
Model N	ame	[A]	200 to 220 V	400 to 440 V	wodel name		[A]	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					

mhient Temper rature 10 to 59

ating Properties

Fig. 2. Overload Protection Properties

Multiple of Settling Current

Reverse-Phase O

(Cold-Start, Average Valu

(30 s 4, 9, E

11

(15 s; 3, 8,

(7 s; 2, 7, C) (5 s; 1, 6, B)

(3 s; 0, 5, A

#### Properties

Main Circuit Rate	d 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 Rat	ed Operational Voltage			100 to 12	0V or 200 to 240'	V 50/60Hz				
Allowable Operating	Voltage Fluctuation Range			85 to 110%	of Rated Operati	onal Voltage				
Control Circuit Ir	iput	F	or AC100 V: 7 VA	A (With AC100 V /	Applied)/For AC2	00 V: 14 VA (With	AC200 V Applied	l)		
	Contact Arrangement				1a1b					
Output Contact	Rating			AC240 V 1 /	A, AC120 V 2 A (0	Class AC-15)				
	Reset				Manual Reset					
Protection Mode			Overload/Ov	erload + Open-Pl	nase/Overload +	Open-Phase + Re	everse-Phase			
	Operating Current		115±5%							
Overload	Operating Time	3/5/7/15/30 Seconds (at 600% Current)								
	Operating Method		Hea	t-Accumulating C	peration (Inching	/Hot Start Protec	tion)			
	Operating Current				70% or More					
Open Phase	Imbalance Sensitivity				30 to 50%					
	Operating Time		3±1 s							
	Detection Method				Current Detection	ו				
Reverse-Phase	Operating Current				70% or More					
	Operating Time				0.5 s or Less					
Property Fluctuations	s As Voltage Fluctuates		Operating Current ±5%, Operating Time ±10%							
Property Fluctuations As Temperature Fluctuates Operating C					ng Current ±5%, Operating Time ±10%					
<b>Operation Indica</b>	tor Lamp		Power/Over	load/Open-Phase	e/Reverse-Phase	Individual Trippin	g Indicators			
Withstand Voltag	je	1	Main Circuit: AC2	500 V for 1 Minu	te, Operation Cor	ntrol Circuit: AC20	000 V for 1 Minute	9		

#### 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<sup>2</sup> or Less
- (4) Shock: 49 m/s<sup>2</sup> or Less
- (5) Altitude: 2000 m or Below

#### 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.



Operating Time

Current Settling Dial Protection Mode Setting Switch 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	Α	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	В	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	С	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	
ос	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  $\pm 10\%$  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.



Fig. 3. Terminal and Internal Connections

Magnetic contactors should be mounted separately and terminal connections made with the wires from the table at right.

#### 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.



#### 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 reversephase 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.

#### **Applicable Wires**

		Mai	in Circuit			Control Circuit			
Model Name	Terminal Screw Size	Applicable Wires	Applicable Crimp Lugs	Tightening Torque N-m Parentheses show standard value	Terminal Screw Size	Applicable Wires	Applicable Crimp Lugs	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 mm <sup>2</sup> 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)					

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. 5. For Single-Phase Motors

Fig. 6. For Phase Advanced Capacitors

#### Outline Drawings

1 נ

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Fig. (1)

(Figs. (1) and (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))

Minimum Order Unit

5 (5-Pack)

Groove B

Fig. (3)

Model Name

UN-CV602

Fig. (2)

# **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 High Precision Capability The detector uses an IC for high The integrated surge absorber accuracy and high reliability. circuit delivers excellent external High Input Impedance surge withstanding capacity. Has a high input impedance so as to Simple Wiring not affect other equipment. Adopts self-lifting terminal Wide Detection Range screws for simple wiring. 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

AA SRE – CN 015 D Symbol Rated Operational Voltage Detection Voltage (V) Symbo Symbol Detection 0P5 AA AC100 to 110, 200 to 220 V 50/60 Hz Shared Use DC 0.1 to 0.5 D DC AAU AC115 to 120, 230 to 240 V 50/60 Hz Shared Use 1P5 DC 0.3 to 1.5 А AC 005 DC 1 to 5 DC \*AC \*AC \*AC 015 3 to 15 Specifications 050 10 to 50 Symbol None Standard 150 30 to 150 CN CCC Certified Products 250 50 to 250 \*A

Symbol	For Power Detection	Symbol	Specifications	Voltage			
	Set Value	None	Standard	AC100 V			
K	(Scale)	CN	CCC Certified Products	AC120 V			
L	IS OFF Voltage			AC200 V			
KT	Set Value			AC240 V			
	is ON Voltage			DC 12 V			
		1		DC 24 V			

DC100 V

2. For Power Detection

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	Outp	out Contact	Rated Operational Voltage
		0P5D	DC 0.1 to 0.5 V	±100 V	20 KΩ			
		1P5D	DC 0.3 to 1.5 V	±100 V	50 KΩ			
		005D	DC 1 to 5 V	±150 V	<b>100 K</b> Ω			
		015D	DC 3 to 15 V	±150 V	<b>100 K</b> Ω			AC100 to 110, 200 to 220 V
For		050D	DC 10 to 50 V	±200 V	500 KΩ			50/60 Hz Shared Use
Standard	SRE-AA	150D	DC 30 to 150 V	±300 V	<b>800 K</b> Ω			or
Detection		250D	DC 50 to 250 V	±300 V	<b>800 K</b> Ω			AC115 to 120, 230 to 240 V
		015A	AC 3 to 15 V	AC150 V	<b>100 Κ</b> Ω	Contact	t Arrangement	50/60 H2
		050A	AC 10 to 50 V	AC200 V	500 KΩ	Rated Operating Current		
		150A	AC 30 to 150 V	AC300 V	<b>800 K</b> Ω			
		250A	AC 50 to 250 V	AC300 V	<b>800 K</b> Ω	Class AC-15	Electrical Durability	
		AC100V	AC 75 to 105 V	AC120 V	Input 1.8 VA	of 0.5 mil. times AC110 V 1.5 A AC220 V 1 A Class DC-13 Electrical Durability	AC100 V 50/60 Hz Shared Use	
		AC120V	AC 90 to 125 V	AC132 V			1.5 A 1 A	AC120 V 50/60 Hz Shared Use
		AC200V	AC 150 to 210 V	AC240 V			Electrical Durability	AC200 V 50/60 Hz Shared Use
	SRE-K	AC240V	AC 180 to 250 V	AC264 V			of 0.25 mil. times	AC240 V 50/60 Hz Shared Use
		DC12V	DC 9 to 12.5 V	DC 14 V	Input	DC110 V	0.2 A	DC 12 V
		DC24V	DC 18 to 25 V	DC 28 V	1.7 W	Bated Co	ntinuity Current	DC 24 V
For Power		DC100V	DC 75 to 105 V	DC120 V			Ith 3 A	DC100 V
Detection		AC100V	AC 80 to 115 V	AC120 V				AC100 V 50/60 Hz Shared Use
		AC120V	AC 95 to 130 V	AC132 V	Input			AC120 V 50/60 Hz Shared Use
		AC200V	AC 160 to 230 V	AC240 V	1.8 VA			AC200 V 50/60 Hz Shared Use
	SRE-KT	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			DC 12 V
		DC24V	DC 20 to 28 V	DC 28 V	1.7 W			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<sup>2</sup> or Less
- (4) Shock : 49 m/
- (5) Altitude
- : 49 m/s<sup>2</sup> or Less : 2000 m or Below
- 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

- $\cdot$  For Emergency Power Supply Switching Detection
- · For Household Generated Power Switching Detection
- · General Power Supply Voltage Drop Detection
- Battery Voltage Drop Detection

#### Connection Method



#### Outline Drawings



# Operation



# 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 <sup>2</sup> / Shock: 98 m/s <sup>2</sup>					
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 Dura	bility	0.5 mil. times					
Output Contact	Contact Arrangement	1a					
Output Contact	Contact Capacity	AC220 V 1 A, AC110 V 1.5 A (Class AC-15)					
Applicable Mac	netic 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.)



#### 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



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

#### Outline Drawings

#### Model Name Hole Drilling Dimensions **Outline Drawings** Weight [kg] Instantaneous Operation Indicator Lamp Stop/Restart Relays UA-DL2 0.1 58.3 Time Limit Switch (Set to 2 seconds at shipping. Configure to "1" if using 1 second time limits during momentary power failures. Pass the B section of the socket through the A section of the stop spring hole and pull in the direction of the Timers 50 \*A" **—** Stop Spring symbol \*Stop spring is attached to the body. Socket Up to 2 2-3.5 Sized Crimp Lugs Self-Liftin PF-08RM Compliant with Terminal Uross-slot Screw M3.5×8 Up to 2 1.25 to 2 mm<sup>2</sup> Sized Wires Conforming to Terminal 2-ø4.5 Mounting Hole IEC 35 mm Rail Cente 0.05 5 ~ 15 ₫۵ IEC Rail 35 mn 22.5 Socket Up to 2 2-3.5 Sized Crimp Lugs Self-Lifting Cross-slot Screw M3.5×8 PF-08TM Conforming to Terminal Up to 2 1.25 to 2 mm<sup>2</sup> Sized Wires 2-M4 Screw Mounting Ho Conforming to Terminal 34 to 35 2-M4 Screv Mounting Hole - 2-M4 Screv 0.05 2-M4 50 to 52 Screw 33 to 35 10 Æ 33 to 35 34 to 35 23.5 43.5 43.5

(2) Socket



PF-08RM Surface Connection Socket (For Panel Mounted

PF-08TM Surface Connection Socket (For Panel Mounting)

Rail Mounting)

11

# 11.10 How to Order

Follow the steps below when ordering. (Enter a space in  $\blacktriangle$  .)

#### 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	1)	Drive Units with Output (UA-SH1, UA-SH8)
Model Name	Rated Operational Voltage	Model Name Rated Operational Voltage
UA-DR1	AC100V	UA-SH1 AC100V
Specify from page 323.	Select the rated operational voltage from page 323.	CAC200V 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 Unit	s (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	s (UA-PC)	Variable Resistors for Power Control Units (UA-PC-VR <sup>D</sup> )
Model Name	Rated Operational Voltage	Model Name
UA-PC	AC100V	UA-PC-VB10

Specify from page 334.

Specify from page 221		Select the rated operational voltage from page 221					
Specify from page 331.		Select the rated operational voltage from page 331.					

#### ■ Live Part Protection Cover Units (UA-CV□, UN-CV501US)

Model Name					
UA-CVDR1					
Specify from page 335.	1				

#### 4. Electric Motor Protection Relays

Model Name	Settling Current Designation	Rated Operational Voltage
-N60	20A	▲ AC100V
Specify from page 340.	Select from page 340.	Select an operating voltage designation (symbol) from page 340.
ET Live Part Protection	n Cover	
Model Name		
I-CV602		
Specify from page 343.		
. Voltage Relays		
SRE-AA Type		
Model Name		Detection Voltage Designation
RE-AA	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
RE-K	AC100V DC100V	
RE-KT		

# 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.	٦				

# MEMO


# 12

# Motor Circuit Breakers MMP-T32

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\* 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



 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.

- 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.
- <Wiring Example of Connecting Conductor Units> No wires are required, and products can be modularized.

#### <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	3				
Handle Shape							Tumbler	Handle				
Rated Current	In [A]						0.1 t	o 32				
Rated Operation	onal Voltage	e Ue [V]					100 t	o 690				
Rated Operation	ng Frequen	cy [Hz]					50/	/60				
Rated Insulation	on Voltage I	Ji [V]					69	90				
Rated Impulse V	Vithstand Vo	ltage Uimp [kV]		6								
Rated Short	Rated Operat	ting Current le [A]*2	200/240 V		400/415 V		440/460 V		500 V		600/690 V	
Breaking	Heater Designation	Current Setting Range	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs	lcu	lcs
Capacity	0.16	0.1 to 0.16	100		1	00	10	00	1(	00	1(	)0
[1~7]	0.25	0.16 to 0.25	1	00	10	00	10	00	10	00	10	)0
	0.4	0.25 to 0.4	1	00	1	00	10	100		00	100	
	0.63	0.4 to 0.63	100		10	00	10	100		00	100	
	1	0.63 to 1	1	00	1	00	100		1(	00	100	
	1.6	1 to 1.6	100		1	00	10	00	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		10	00	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							3
Category of	Selectivity	Category	Cat.A									
Use	Utilization	Category					AC	;-3				
Tripping Class (JI	S C8201-4-1	, IEC 60947-4-1)	10									
Instant Trippin	g Characte	ristics	13x Max. le									
Switching	Mechanic	al [Times]	0.1 mil.									
Life	Electrical	Times] (AC-3)	0.1 mil.									
Tripping Durab	oility [Times		1,000									
Open-Phase F	rotection		Yes									
Tripping Display			Yes									
Test Trip Function			Yes									
Auxiliary Contact Unit			UI-MAX (1a or 1b)									
Alarm Contact Unit			U I-MAL (1a or 1b)									
Short-circuit D	isplay Unit			_			UT-	10				
IVIASS IGI			1					SU				

\*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



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<sup>2</sup> or Less
- (6) Shock :  $49 \text{ m/s}^2$  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
- product, the temperature must be within the working temperature. : Set the position of the adjusting dial in consideration of the panel interior temperature and the mounting conditions.





<Fig. 1. Temperature compensation properties>



ISET = I/XSET x 100

<Test Tripping> Test Trip

I : Motor Rated Current

ON

OFF

- XSET : 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) x 100  $\approx$  3.3 A
  - $\rightarrow$  Set the adjusting dial to position 3.3 A.

TRIP

Reset

Move the lever as far as it will go.



<Handle locking> Handle lock



(10) Connecting

	Model Name	MMP-T32	UT-MAX(LL), UT-MAL(LL)	
Terminal Screw Siz	e	M4	M3.5	
Recommended Lei to be Peeled off W	ngth L of Insulation Layer hen Wired with Bare Wire	10 mm	8.5 mm	
	Single Wire [mm]	φ 1.6, φ 2.6	φ1.6	
	Stranded Wire [mm <sup>2</sup> ]	1 to 6	0.5 to 2	
3120	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	0.5-3.74 to 2-834 (Note 3)	
Oninp Lug Size		8-4NS (Note 3)	0.3-3.7 to 2-334 (Note 3)	
Terminal Screw Tig	htening 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

# 12.4 Operating Characteristic Curve



# 12.5 Selection and application

#### 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.

#### 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-e	efficiency	/ Motor	Motor Circuit Breakers				
Main Circuit	No. of Poles	Output	Model	Heater	Current Setting		
Voltage	[P]	[kW]	Name	Designation	Range		
		0.75		4A	2.5 to 4A		
		1.5		6.3A	4 to 6.3A		
	2 polo	2.2		10A	7 to 10A		
	z-pole	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		
Three Phase		1.5		8A	5.5 to 8A		
200V50Hz		2.2		10A	7 to 10A		
		3.7	1011017-132	18A	12 to 18A		
200-230700H2		5.5		25A	18 to 25A		
		7.5		32A	24 to 32A		
		0.75		4A	2.5 to 4A		
		1.5		8A	5.5 to 8A		
	6 polo	2.2		10A	7 to 10A		
	o-pole	3.7		18A	12 to 18A		
		5.5		25A	18 to 25A		
		7.5		32A	24 to 32A		
Nate 1. The table shows reference bester designations for when MMD T20 is used							

Note 1. The table shows reference heater designations for when MMP-132 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	No. of Poles	Output	Model	Heater	Current Setting	
Voltage	[P]	[kW]	Name	Designation	Range	
		0.75		2.5A	1.6 to 2.5A	
		1.5		4A	2.5 to 4A	
		2.2		6.3A	4 to 6.3A	
	2-nole	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	
Three-Phase	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	
		4-pole	3.7	MMP-T32	10A	7 to 10A
380-415V50Hz		5.5	101101 102	13A	9 to 13A	
		7.5		18A	12 to 18A	
		11		25A	18 to 25A	
		15		32A	24 to 32A	
		0.75		2.5A	1.6 to 2.5A	
		1.5		4A	2.5 to 4A	
		2.2		6.3A	4 to 6.3A	
	6-nole	3.7		10A	7 to 10A	
	o poic	5.5		13A	9 to 13A	
		7.5		18A	12 to 18A	
			11		25A	18 to 25A
		15		32A	24 to 32A	



(Refer to page 362.)

\* Information on the UL standard is for products that bear the UL mark only.

Single-phase Motor Wiring

# **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	
		UT-MAX				
(1)	Auxiliary Contact (Interior)	Ι ΙΤ-ΜΔΧΙ Ι	1D 1a	The contacts of this unit operate in unison with the turning ON/OFF of the main unit		
		(For Very Small Loads)	1b			
			1a			
( <b>0</b> )	Alarma Contact (Interior)	UI-MAL	1b	The contacts of this unit operate (either short-circuits, overloads, open-		
(2)	Alarm Contact (Interior)	UT-MALLL	1a	phase) in unison with the trip operation of the main unit.		
		(For Very Small Loads)	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.		
		45m				
		01-264	Row of 2		MMP-132	
		UT-3B4	45mm Clearance			
(4)	Bus Bar	Bar		A unit that can supply power (parallel connection) to 2 or 3 units		
(.)		UT-2B5	57mm Clearance	individually without use of electric wire.		
		UT-3B5				
			Row of 3			
(5)	Power Side Terminal			Power side terminal cover for UL60947-4-1A, Type E/F.		
(3)	Cover	Cover 01-CV3			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

		Contract	Operation of MMP-T32				
Unit Types	Model Name	Arrangement	ON	Short Circuit Tripping	Overload/Open-Phase Tripping (Test Tripping)	OFF	
Auxilian/ Contact Unit	UT-MAX(LL)	1a	ON	OFF	OFF	OFF	
Auxiliary Contact Unit		1b	OFF	ON	ON	ON	
Alarma Cantaat Linit		1a	OFF	ON	ON	OFF	
Alarm Contact Unit	UT-IVIAL(LL)	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

				Minimum	Rated Operating Current [A]								
Model Name	Contact Arrangement	Dura	bility	Applicable	AC-12 (Resistive Load)		DC-12 (Resistive Load)						
		Mechanical	Electrical	Load	125V	250V	30V	48V	125V	250V			
UT-MAX	1a, 1b			5 V/160 mA	5	2	2		0.4	0.2			
UT-MAL	1a, 1b	0.1 mil timos	10,000 times	10,000 times -	s 10,000 times	10 000 times 24 V/40 mA	24 V/40 mA	5 5	5	_		0.4	0.2
UT-MAXLL	1a, 1b	0.1 mil. times				5 V/1 mA	0.1		0.1	0.00			
UT-MALLL	1a, 1b						24 V/0.25 mA	0.1	-	0.1	0.03	_	_

#### Specifications of Power Supply Block and Bus Bar

Model Name	Conventional Free Air Thermal Current Ith [A]	Rated Conditional Short-Circuit Current lq [kA]	Applicable Electrical Wire
UT-EP3	63	50	Flexible Stranded Wire: 1 x 6: 25 mm <sup>2</sup> Stranded Wire: 1 x 6: 16 mm <sup>2</sup> (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

- 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-DBD 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



· 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
		UT-MT20			
		UT-MT32			
(1)	Connecting Conductor Unit	UT-MQ12		Unit for electrically and mechanically connecting MMP-T32 and a magnetic contactor.	
		UT-MT20D			
		UT-MT32D			
		UT-BT20			
(2)	Mounting Base Unit	UT-BT32		Plate for mounting a combination starter by combining MMP-T32 and a magnetic contactor. Can be rail mounted or screw mounted.	MMP-T32
		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.	
		UT-RT10			
(4)	Jointing Block Unit	UT-RT20		A block that connects the 2 mounting base units mechanically.	
	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



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Motor Circuit Breaker (Type E Optional Unit)	Magnetic Cont	actors	Connecting Conductor Unit	Mounting Base Unit	Mounting Method	Jointing Block Unit
	S-T10		UT-MT20	Configurable without	IEC Rail (1 pc)	-
	S-T12/T20		UT-MT20	the base unit if screw	IEC Rail (1 pc)	-
	S-T32	Non-	UT-MT32	mounting is not required	IEC Rail (1 pc)	-
	S-T10	Reversing	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)	_
MMP-T32	S-2xT10		UT-MT20	UT-BT20 (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT10
	S-2xT12/T20	Reversing	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	IEC Rail (1 pc)	_
(01-013, 01-10)	SD-QR11/QR12	Reversing	UT-MQ12	(Screw Mounting Not Possible)	IEC Rail (1 pc)	Not Required
				UT-BT32D	Screw Mounting or IEC Rail (2 pcs)	_
	50-112/120	Non-	01-101200	UT-BT32DMP	IEC Rail (1 pc)	_
	SD 133	Reversing		UT-BT32D	Screw Mounting or IEC Rail (2 pcs)	_
	30-132		01-101320	UT-BT32DMP	IEC Rail (1 pc)	_
:	SD 2712/T20			UT-BT32D (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT20
	30-22112/120	Г12/T20 Ц		UT-BT32DMP (2 Units)	IEC Rail (1 pc)	UT-RT32DMP
	SD 2722	rieversilly		UT-BT32D (2 Units)	Screw Mounting or IEC Rail (2 pcs)	UT-RT32
	00-22102			UT-BT32DMP (2 Units)	IEC Rail (1 pc)	UT-RT32DMP

#### Combinations of Devices to Make Combination Starters

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.



Mounting Base Units (UT-BT20, BT32, and BT32D)



 $\cdot$  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-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.

	Motor Circuit E	Breakers	Magnetia Contestora	Rate	d Conditional Shor	t-Circuit Current lo	q [kA]
Model Name	Heater Designation	Rated Current Setting Range [A]	Magnetic Contactors	200/240 V	400/415 V	440/460 V	500 V
	0.16	0.1 to 0.16		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
MMP-T32	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	Refer to the	50	50	50	50
	4	2.5 to 4	Combination List (Table Below)	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

#### Combining Motor Circuit Breakers and Magnetic Contactors (Type 1 Coordination)

The following table shows the magnetic contactors that can be combined with each rating of the motor circuit breaker.

Mo	Motor Circuit Breakers										N	lagn	etic (	Cont	acto	rs (N	on-R	ever	sing/	/Rev	ersin	g)								
IVIO		It breakers													N	lodel	Nam	ne												
Model	Heater	Rated Current			201	0/240	n v					40	0/41	5 V					44	0/46	οv						500 \	,		
Name	Designation	Setting Range [A]			200	0/240								<u> </u>						0/ +0	<u> </u>							<u> </u>		
	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		BC)	BC)	BC)		BC)	~		BC	BC)	BC)		BC)	~		BC)	BC)	BC)	] ୍ [	BC	~		BC	BC)	BC)		BC)	
	1.6	0.1 to 1.6	BC BC	()T12(E)	T12(I T20(I	T21(	B	T32(	11	10(B(	T12(	T20(	T21(	5(BC	T32(	117	B	T12(	T20(	T21(	2 B C B C	T32(	11	۱ <u>۳</u>	T12(	T20(	T21(	6(BC	T32(	] = [
	2.5	1.6 to 2.5	T1	-(2x)	-(2X)	(2X)	×)T2	-(2x)	Э. Ш	LT(X	-(2x)	-(2x)	-(2x)	x)T2	-(2x)	СШ) СШ)	Ē,	-(2X)	-(2x)	-(2x)	×)T2	-(2X)	СШ)	Ę	\$X	-(2x)	-(2x)	x)T2	-(2x)	СШ)
	4	2.5 to 4	S-(2	S(D)	S(D)	S(D)	S-(2	S(D)	SD	S-(2	S(D)	S(D)	S(D)	S-(2	S(D)	- S D	S-(2	S(D)	S(D)	S(D)	S-(2	S(D)	ß	S-(2	S(D)	S(D)	S(D)	S-(2	S(D)	- S
132	6.3	4 to 6.3					] [		] [												] [			≤ 6	] [					] [
	8	5.5 to 8				] [	] [			≤7							≤7				] [				] [					≤7
	10	7 to 10									≤ 9					≤ 9		≤ 9					≤ 9		≤ 9					
	13	9 to 13	≤ 11	≤ 13		] [			≤ 12												] [									
	18	12 to 18			≤ 18							≤ 18							≤ 18							≤ 17	≤ 17			
	25	18 to 25				≤ 20							≤ 20	≤ 25						≤ 20	≤ 25							≤ 20	≤ 20	
	32	24 to 32					≤ 26	≤ 32							≤ 32							≤ 32								

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

# 12.8 Applicable Standard

#### Regulatory/Legal Conformity and Compliance

Sta	ndards/F	Regulatio	Model Name	MMP-T32	UT-MAX UT-MAL	UT-TU	UT-CV3	UT-MT20 UT-MT32 UT-MT20D UT-MT32D UT-MQ12	UT-BT20 UT-BT32	UT-BT32D UT-BT32DMP	UT-2B4/3B4 UT-2B5/3B5	UT-EP3
			IEC60947-2	0	*	*	*	*	*	*	0	0
	Interna	ational	IEC60947-4-1	0	*	*	*	0	0	0	0	0
			IEC60947-5-1	*	0	*	*	*	*	*	*	*
		CE.	EN60947-2	0	*	*	*	*	*	*	*	*
		( <del>(</del>	EN60947-4-1	0	*	*	*	*	*	*	*	*
pping	Europe		EN60947-5-1	*	0	*	* *		*	*	*	*
Overseas Tripp	TÜV	EN60947-2	(R50269663) (R50269663) (R50269678) (R50269688) (R50269690)	*	*	*	*	*	*	*	*	
		RoHS	3 Directive	0	0	0	0	0	0	0	0	0
	China	CC (	GB/T14048.2	(2012010307533513)	*				¥			
	Grina	(Certification Number)	GB/T14048.2	*	(2012010304563726)				т			
	North America	UL/CSA	UL60947-4-1	Refer to Note 1. (Single Unit : E361855)	0	0	0	0	0	0	_	_
	Canada	(File Number)	CSA C22.2 No.60947-4-1	Combination: E319418	(E361855)	(E319418)	(E319418)	(E319418)	(E319418)	(E319418)		
			JIS C8201-2-1 Ann.1	0	*	*	*	*	*	*	0	0
estic	Jap	oan	JIS C8201-4-1	0	*	*	*	0	0	0	0	0
Dom			JIS C8201-5-1	*	*	*	*	*	*	*	*	*
	Electrical Ap Materials	pliances and Safety Act	Non-Specified Electric Appliances	0				×	k			

O: 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.



Individual protection using motor circuit breakers will solve such concerns.

#### Individual Protection Using Motor Circuit Breakers

(2)

(1)

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

#### $\Rightarrow$ 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.

• Advantages Seen in Type E/F Circuit Example



Combination Motor Controller Type F

Circuit Breakers (60 kA Breaking Capacity) SCCR: 60 kA TypeF (MMP-132+5-T20) SCCR: 50 kA 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):

 $\cdot$  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



MCP

BCP

MMS

Contactor

Motor

MMS

Contactor

Motor

MMS

Contactor

Motor

 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.

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)

В

С



Individual Protection Circuit Example Using Type E/F

#### 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

		Certified Rating											
Motor Cire	cuit Breaker	110 tc	120V	20	0 V	20	8 V	220 to	240V	440 to	480V	550 to	600V
(Current Se	etting Range)	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]										
	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	1	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
MMP-T32	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

							Certified	d Rating					
Motor Cir	cuit Breaker	110 to	o 120V	20	0 V	20	8 V	220 to	240V	440 to	480V	550 to	600V
(Current Se	etting Range)	Maximum Rated Capacity [HP]	Maximum Rated Operating Current [A]										
	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
MMP-T32	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 Motor Circuit Breaker Power Side Terminal Short-circuit Display Combination = + + Arrangements MMP-T32 Cover Kit UT-CV3 Unit UT-TU [Certified Rating] 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 0.1 to 0.16 0.16 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 50kA MMP-T32 UT-CV3 UT-TU 240V 2.5 to 4 4 1 6 4 to 6.3 1-1/2 5.5 to 8 6.8 9.6 7 to 10 9.6 9 to 13 12 to 18 5 15.2 18 to 25 7-1/2 22 25kA 28 24 to 32 10

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 Combina	tion			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]	SC	CR
	0.1 to 0.16			—	0.16		
	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	480Y	
	1.6 to 2.5			1	2.1	/	50kA
MMP-T32	2.5 to 4	UT-CV3	UT-TU	2	3.4	0771	
	4 to 6.3			3	4.8	2770	
	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		ZUKA

Note 1. Since "-" has no horsepower setting by standard, select the maximum rated operating current [A].

(2) Type F [Certified Ra	Combination		Combination Arrangements		= Ty	pe E Combination (See (1))	+	Connecting Condu UT-MT 🗆 /UT-N	Ictor Unit / MQ12 + S	Magnetic Contacto S(D)-(2x)T		actor (R) □
◆ Main Circ	uit Three Phase 22	0 to 240	v	Note. Some	e combinat	ions require the mounting	base	e unit (UT-BT 🗆) and jo	inting block unit	(UT-RT	$\Box$ ) for ins	stallation.
Type F Combination Certified Rating												
Type E Combinat	tion (Current Setting Range)		Magnetic Contactors			Connecting Conductor L	Unit	Maximum Rated Capacity [HP]	Maximum Rated Operating (	Current (A)	SCO	CR
	0.1 to 0.16					UT-MT20		-	0.16			
	0.16 to 0.25					(For S-T10/T12/T2	0)	-	0.25			
	0.25 to 0.4						-	0.4				
	0.4 to 0.63	C (0))T10				01-1011200		1	0.63			
		S-12811 111										

IVIIVIP-132	0.63 to 1	0 (2/)110			$\vee$	UT-BT32D/BT32DMP	-	1		
+	1 to 1.6	]	S-(2x)T12			(For SD-T12/T20)	_	1.6	]	
LIT-CV3	1.6 to 2.5	SD-Q(R)11	SD-(2x)T12				1/2	2.2	]	
01010	2.5 to 4	/O(B)12				(For S-T32)	1	4	240V	50kA
+	4 to 6.3	/ 3(1)/2		S-(2x)T20		(1013-132)	1-1/2	6	]	
UT-TU	5.5 to 8	]		SD-(2x)T20	S-(2x)T32	UT-MT32D	2	6.8		
	7 to 10	]			SD-(2x)T32		3	9.6	]	
	9 to 13	1			· · /	(Ear SD T22)	3	9.6	1	
	12 to 18			1		(FOI 3D-132)	5	15.2	1	
	18 to 25	1 /			1	UT-MQ12	7-1/2	22	1	
	24 to 32	$\vee$				(For SD-Q11/Q12)	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



Note 1. Since "—" has no horsepower setting by standard, select the maximum rated operating current [A].

#### 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 Con Motor Contro	nbination Iler (SCPD)	Ser	vo Amplifiers		Main Circuit Voltage	SCCR	
Model Name	Maximum Heater Designation	Model Name	Input Rating (Vac)	Input Phase	(Vac)	(kA)	
	1.6A	MR-J4-10#					
	2.5A	MR-J4-20#					
	4A	MR-J4-40#					
	6.3A	MR-J4-60#				50	
	6.3A	MR-J4-70#	200 to 240	Three-Phase	240		
	8A	MR-J4-100#					
	18A	MR-J4-200#					
	25A	MR-J4-350#				25 (Noto 1)	
	32A	MR-J4-500#				23 (Note 1)	
	2.5A	MR-J4-60#4	_				
MMP-T32	4A	MR-J4-100#4					
	8A	MR-J4-200#4	380 to 480	Throo Phase	4807077	50	
	13A	MR-J4-350#4	380 10 480	THIEE-FHASE	4001211		
	18A	MR-J4-500#4					
	25A	MR-J4-700#4				25 (Note 1)	
	6.3A	MR-J4W2-22B					
	8A	MR-J4W2-44B					
	13A	MR-J4W2-77B	200 to 240	Three-Phase	240	50	
	18A	MR-J4W2-1010B	200 10 240	11166-1 11036	240	50	
	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 Com Motor Control	bination	Inverte	ers	Main Circuit Voltage	SCCB
			Ormonitu		(kA)
Model Name	Maximum Heater	Model Name	Capacity	(vac)	(10-1)
_	Designation				
	1.6A		0.1		
	4A		0.2		
	6.3A		0.4		50
	10A	FR-E720	0.75		
	13A		1.5		
	18A		2.2		
	25A		3.7		25 (Note 1)
	4A		0.4		
	6.3A		0.75		
	8A		1.5		50
	10A	FR-E740	2.2		
	18A		3.7		
	25A		5.5		25 (Note 1)
MMP-T32	32A		7.5	480Y277	,
	1.6A	FR-D720	0.1		
	4A		0.2		
	6.3A		0.4		50
	8A	FR-D720	0.75		
	13A	(FR-F720P.I)	1.5		
	18A	(1111/2010)	2.2		
	25A		3.7		25 (Note 1)
	2.5A		0.4		
	4A		0.75		
	6.3A	FB-D740	1.5		50
	10A	(FR-F740PJ)	2.2		
	18A	(111174010)	3.7		
	25A		5.5		25 (Note 1)
	32A		7.5		20 (1010 1)
	8A		0.4		
	13A		0.75		50
	18A	FR-A820	1.5		
	25A		2.2		25 (Note 1)
	32A		3.7		23 (Note 1)
	4A		0.4		
	6.3A		0.75		
	8A		1.5		50
	13A	FR-A840	2.2		
	18A		3.7		
	25A		5.5		05 (Nets 1)
	32A		7.5	490\/077	25 (Note 1)
IVIIVIP-132	8A		0.75	4601277	
	13A		1.5		50
	18A	FR-F820	2.2		
	25A		3.7	1	
	32A		5.5		
	4A		0.75	1	
	6.3A		1.5	1	
	8A		2.2	1	50
	13A	FR-F840	3.7	1	
	18A		5.5	1	
	25A		7.5	1	
	32A		11	1	25 (Note 1)

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

			Short-Circuit Current Rating (SCCR)								
Motor		M	ain Circuit Voltag	je: 240 V Maximu	um	Main Circuit Voltage: 480 V Maximum			um		
Breaker	Heater		Low Voltage	Circuit Breaker	(BCP) Rating		Low Voltage	e Circuit Breaker	(BCP) Rating		
Model Name	Designation		Maximum Rated Current	Minimum Breaking Current	Recommended Model Name		Maximum Rated Current	Minimum Breaking Current	Recommended Model Name		
	0.16A										
	0.25A						250 A	50 kA	NF250-HVU NV250-HVU		
	0.4A										
	0.63A					50 kA					
	1A										
	1.6A										
	2.5A	50 kA									
MMP-T32	4A		250 A	50 kA	NV250-HVU						
	6.3A				10220-1100						
	8A										
	10A										
	13A										
	18A										
	25A	25 kA				25 kA					
	32A	20 KA				20 KA					

#### Table 2. Motor Circuit Breaker MMP-T32+S(D)-(2x)T

								Shor	t-Circuit Curr	ent Ratii	ng (SCCR)		
Motor						Main C	Circuit Volt	age: 240 \	/ Maximum	Main (	Circuit Volt	age: 480 \	/ Maximum
Circuit		Heater Combination Designation Connecting Unit/Magnetic Contactor				1	Low Voltage Circuit Breaker (BCP) Ratio				Low Voltage	ow Voltage Circuit Breaker (BCP) Rating	
Model Name	Heater Designation						Maximum Rated Current	Minimum Breaking Current	Recommended Model Name		Maximum Rated Current	Minimum Breaking Current	Recommended Model Name
	0.16A												
	0.25A								NF250-HVU			50 kA	NF250-HVU NV250-HVU
	0.4A												
	0.63A												
	1A	LIT-MT20								50 kA	250 A		
	1.6A	/	/	UT-MT20(D)									
	2.5A	, S-(2x)T10	, S(D)-(2x)T12	/	UT-MT32(D)								
MMP-T32	4A	0 (27)110		S(D)-(2x)T20	/	50 kA	250 A	50 kA					
	6.3A				S(D)-(2x)T32								
	8A												
	10A												
	13A			-									
	18A												
	25A	-	-	_									
	32A												

Note. Some combinations require the mounting base unit (UT-BT 
) and jointing block unit (UT-RT ) for installation.

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(Unit: mm)

**MMP-T32** 

UT-MT20

IEC Rail

35 mm Width 15 mm Height

# 12.10 Outline Drawings

\* Information on the UL standard is for products that bear the UL mark only. (Refer to page 362.)

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MMP-T32 + UT-MT20 + S-T12/S-T20

Model Name

UT-MT20

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#### MMP-T32 + UT-MAX(LL)/UT-MAL(LL)



\* 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.

	Contact Arrangement		
Model Name	Model Name	Terminal No	o. (marked)
UT-MAX	Woder Name	1a	1b
UT-MAXU	UT-MAX	13(23)-14(24)	11(21)-12(22)
	UT-MAXLL	10(20) 11(21)	(=:) .=(==)
UI-MAL	UT-MAL	17/07) 10/00)	15(05) 16(06)
UT-MALLL	UT-MALLL	17(27)-10(20)	15(25)-10(20)

#### MMP-T32 + UT-CV3 + UT-TU (Type E Combination)







#### (Unit: mm) הרא הרא





U



MMP-T32 + UT-MT32 + S-T32



Combination

Contactor

S-2×T10

S-2×T12/T20

SD-2×T12/T20

S-2×T32

SD-2×T32

Combination Connecting

Conductor Unit

UT-MT20

UT-MT20

UT-MT20D

UT-MT32

UT-MT32D

Variable Dimensione	Variable	e Dimensi	on [mm]	Model Nam
variable Dimensio	A	В	С	UT-3B4
UT-3B4	135	125	45	UT-3B5
UT-3B5	159	149	57	

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.

Combination

UT-BT20 (2 Units)

UT-BT20 (2 Units)

UT-BT32D (2 Units)

UT-BT32 (2 Units)

UT-BT32D (2 Units)

Mounting Base Unit Dimensions

Variable Dimension [mm]

A B C

54

98 53 150

98 53 154

116

91 46 116

99

Variable

UT-RT10

UT-RT20

UT-BT32

# MMP-T32 + UT-MT□D + SD-T□ + UT-BT32DMP



Combination	Combination Connecting	Variable	Variable Dimension [mm]						
Contactor	Conductor Unit	Dimensions	Α	В	С	D	E	F	
SD-T12/T20	UT-MT20D		99	164	188	84	90	103	
SD-T32	UT-MT32D	UI-BI32DMP		167	191	89	96	111	

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E

#### Model Name UT-BT32DMP

#### MMP-T32×2 + UT-EP3 + UT-□B□





#### MMP-T32 + UT-MT□D + SD-2×T□ + UT-BT32DMP x 2 + UT-RT32DMP

(Unit: mm) UI-BI32DMP X 2 + UI-RI32DMF





Combination	Combination Connecting	Combination	Variable	Variable	Dimensi	on (mm)
Contactor	Conductor Unit	Mounting Base Unit	Dimensions	Α	В	С
SD-2×T12/T20	UT-MT20D	UT-RT32DMP		190	98	103
SD-T32	UT-MT32D	(2 Units)		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 + UT-MQ12 + SD-Q□



	Connecting	Combination	Varia	ble L	limen	sion	լՠՠյ
	Conductor Unit Contactor		Α	В	С	+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	

(Unit: mm)



Model Name UT-MQ12

# 12.11 How to Order

#### How to Order

Follow the steps below when ordering. (Enter a space in  $\blacktriangle$ .)



#### How to Order Options

Follow the steps below when ordering. (Enter a space in  $\blacktriangle$ .)

	Model Name		Contact Arrangement
Auxiliary Contact Unit	UT-MAX	<b></b>	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.

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# Supplementary Information

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	-

### 13.1 Model Name Changes and Compatibility Between New and Old Products



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. O: 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)	0	MS-T10				
MS-A11(RM)	0	MS-T12				
MS-A12(RM)	х	MS-T12				
MS-A20	0	MS-T21				
MS-A21	0	MS-T21				
MS-A25	0	MS-T35				
MS-A35	0	MS-T35				
MS-A50	х	MS-T50				
MS-A60	0	MS-T65				
MS-A65	х	MS-T65				
MS-A80	х	MS-T80				
MS-A100	0	MS-N125				
MS-A120	0	MS-N125				
MS-A125	x (O)	MS-N125 (MS-N150)				
MS-A150	0	MS-N150				
MS-A220	0	MS-N220				
MS-A300	0	MS-N300				
MS-A401	0	MS-N400				
MS-A400	x	MS-N400				
MS-A600	_	_				

#### (2) Mounting Compatibility of MS-K and MS-T/N

Non-Reversible Type							
Old Model	Compatibility	Current Model					
MS-K10	0	MS-T10					
MS-K11	0	MS-T12					
MS-K12	0	MS-T12					
MS-K20	0	MS-T21					
MS-K21	0	MS-T21					
MS-K25	0	MS-T35					
MS-K35	0	MS-T35					
MS-K50	х	MS-T50					
MS-K65	0	MS-T65					
MS-K80	x	MS-T80					
MS-K95	0	MS-T100					
MS-K100	0	MS-N125					
MS-K125	0	MS-N125					
MS-K150	0	MS-N150					
MS-K180	0	MS-N180					
MS-K220	0	MS-N220					
MS-K300	0	MS-N300					
MS-K400	0	MS-N400					

Reversible Type		
Old Model	Compatibility	Current Model
MS-AR11	х	MS-2xT21
MS-2xA20	0	MS-2xT21
MS-2xA21	0	MS-2xT21
MS-2xA25	x	MS-2xT35
MS-2xA35	0	MS-2xT35
MS-2xA50	х	MS-2xT50
MS-2xA60	0	MS-2xT65
MS-2xA65	х	MS-2xT65
MS-2xA80	х	MS-2xT80
MS-2xA100	0	MS-2xN125
MS-2xA120	0	MS-2xN125
MS-2xA125	x (O)	MS-2xN125 (MS-2xN150)
MS-2xA150	0	MS-2xN150
MS-2xA220	0	MS-2xN220
MS-2xA300	0	MS-2xN300
MS-2xA401	0	MS-2xN400
MS-2xA400	x	MS-2xN400

Reversible Type		
Old Model	Compatibility	Current Model
MS-KR11	х	MS-2xT21
MS-2xK20	0	MS-2xT21
MS-2xK21	0	MS-2xT21
MS-2xK25	0	MS-2xT35
MS-2xK35	0	MS-2xT35
MS-2xK50	х	MS-2xT50
MS-2xK65	0	MS-2xT65
MS-2xK80	х	MS-2xT80
MS-2xK95	0	MS-2xT100
MS-2xK100	0	MS-2xN125
MS-2xK125	0	MS-2xN125
MS-2xK150	0	MS-2xN150
MS-2xK180	0	MS-2xN180
MS-2xK220	0	MS-2xN220
MS-2xK300	0	MS-2xN300
MS-2xK400	0	MS-2xN400

(3) Mounting Compatibility of MS-N and MS-T Type	es
--------------------------------------------------	----

Non-Reversible Type		
Old Model	Compatibility	Current Model
MS-N10	0	MS-T10
MS-N11	0	MS-T12
MS-N12	0	MS-T12
MS-N20	0	MS-T21
MS-N21	0	MS-T21
MS-N25	0	MS-T35
MS-N35	0	MS-T35
MS-N50	x	MS-T50
MS-N65	0	MS-T65
MS-N80	x	MS-T80
MS-N95	0	MS-T100

#### (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)	0	MSO-T12
MSO-A12(RM)	•	MSO-T12
MSO-A20	•	MSO-T20
MSO-A21	0	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

#### (5) Mounting Compatibility of MSO-K and MSO-T/N Types

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-T20           MSO-K25         X           MSO-K25         X           MSO-K50         MSO-T50           MSO-K50         MSO-T50           MSO-K65         MSO-T65           MSO-K95         MSO-T65           MSO-K95         MSO-T100           MSO-K95         MSO-T100           MSO-K100         MSO-T50           MSO-K95         MSO-T50           MSO-K95         MSO-T50           MSO-K95         MSO-T100           MSO-K100         MSO-T125           MSO-K100         MSO-N125           MSO-K100         MSO-N125           MSO-K150         MSO-N130           MSO-K160         MSO-N130           MSO-K160         MSO-N130           MSO-K160         MSO-N300	Non-Reversible Type		
MSO-K10         MSO-T10           MSO-K11         O         MSO-T12           MSO-K12         MSO-T12         MSO-T12           MSO-K18         O         MSO-T20           MSO-K19         MSO-T20         MSO-T20           MSO-K20         MSO-T20         MSO-T20           MSO-K21         O         MSO-T21           MSO-K25         X         MSO-T25           MSO-K26         MSO-T25         MSO-T25           MSO-K25         X         MSO-T25           MSO-K26         MSO-T25         MSO-T35           MSO-K50         MSO-T50         MSO-T50           MSO-K65         O         MSO-T80           MSO-K80         MSO-T80         MSO-T80           MSO-K100         O         MSO-T80           MSO-K100         O         MSO-T80           MSO-K100         O         MSO-T80           MSO-K100         O         MSO-N125           MSO-K100         O         MSO-N125           MSO-K120         O         MSO-N180           MSO-K120         O         MSO-N120           MSO-K200         O         MSO-N300	Old Model	Compatibility	Current Model
MSO-K11         MSO-T12           MSO-K12         MSO-T12           MSO-K18         MSO-T20           MSO-K19         MSO-T20           MSO-K20         MSO-T20           MSO-K21         MSO-T20           MSO-K25         X           MSO-K26         MSO-T20           MSO-K27         MSO-T20           MSO-K20         MSO-T20           MSO-K20         MSO-T20           MSO-K20         MSO-T20           MSO-K21         MSO-T20           MSO-K25         X           MSO-K25         X           MSO-K50         MSO-T35           MSO-K50         MSO-T50           MSO-K65         MSO-T65           MSO-K80         MSO-T80           MSO-K95         MSO-T100           MSO-K100         MSO-N125           MSO-K100         MSO-N125           MSO-K150         MSO-N150           MSO-K150         MSO-N180           MSO-K20         MSO-N180           MSO-K20         MSO-N300           MSO-K300         MSO-N300	MSO-K10	•	MSO-T10
MSO-K12         MSO-T12           MSO-K18         MSO-T20           MSO-K19         MSO-T20           MSO-K20         MSO-T20           MSO-K21         MSO-T20           MSO-K25         X           MSO-K25         X           MSO-K50         MSO-T35           MSO-K65         MSO-T65           MSO-K80         MSO-T80           MSO-K95         MSO-T100           MSO-K100         MSO-T100           MSO-K125         MSO-T100           MSO-K100         MSO-T100           MSO-K100         MSO-T100           MSO-K100         MSO-T80           MSO-K100         MSO-T80           MSO-K100         MSO-T80           MSO-K100         MSO-T80           MSO-K100         MSO-T80           MSO-K100         MSO-T50           MSO-K125         MSO-T50           MSO-K120         MSO-N125           MSO-K120         MSO-N180           MSO-K200         MSO-N180           MSO-K200         MSO-N300           MSO-K400         MSO-N400	MSO-K11	0	MSO-T12
MSO-K18         MSO-T20           MSO-K19         MSO-T20           MSO-K20         MSO-T20           MSO-K21         MSO-T21           MSO-K25         X           MSO-K35         X           MSO-K50         MSO-T50           MSO-K65         MSO-T65           MSO-K80         MSO-T100           MSO-K100         MSO-N125           MSO-K100         MSO-N125           MSO-K125         MSO-N125           MSO-K100         MSO-N130           MSO-K180         MSO-N180           MSO-K200         MSO-N300           MSO-K300         MSO-N400	MSO-K12	•	MSO-T12
MSO-K19         MSO-T20           MSO-K20         MSO-T20           MSO-K21         MSO-T21           MSO-K25         X           MSO-K35         X           MSO-K50         MSO-T50           MSO-K65         MSO-T65           MSO-K95         MSO-T100           MSO-K100         MSO-N125           MSO-K100         MSO-N125           MSO-K125         MSO-N125           MSO-K125         MSO-N125           MSO-K120         MSO-N125           MSO-K120         MSO-N125           MSO-K120         MSO-N125           MSO-K120         MSO-N125           MSO-K120         MSO-N125           MSO-K120         MSO-N120           MSO-K130         MSO-N130           MSO-K200         MSO-N300           MSO-K300         MSO-N300	MSO-K18	0	MSO-T20
MSO-K20         MSO-T20           MSO-K21         MSO-T21           MSO-K25         X           MSO-K35         X           MSO-K50         MSO-T35           MSO-K65         MSO-T65           MSO-K80         MSO-T80           MSO-K95         MSO-T100           MSO-K100         MSO-N125           MSO-K125         MSO-N125           MSO-K125         MSO-N125           MSO-K150         MSO-N130           MSO-K200         MSO-N300           MSO-K300         MSO-N300	MSO-K19	•	MSO-T20
MSO-K21         O         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-N125           MSO-K150         •         MSO-N150           MSO-K150         •         MSO-N150           MSO-K180         •         MSO-N130           MSO-K180         •         MSO-N130           MSO-K200         •         MSO-N220           MSO-K300         •         MSO-N300           MSO-K400         •         MSO-N400	MSO-K20	•	MSO-T20
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-N125           MSO-K150         MSO-N150           MSO-K180         MSO-N150           MSO-K180         MSO-N180           MSO-K200         MSO-N220           MSO-K300         MSO-N300           MSO-K400         MSO-N400	MSO-K21	0	MSO-T21
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-N150           MSO-K150         MSO-N180           MSO-K180         MSO-N180           MSO-K20         MSO-N220           MSO-K300         MSO-N300           MSO-K400         O	MSO-K25	x	MSO-T25
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-N150           MSO-K180         MSO-N180           MSO-K180         MSO-N180           MSO-K20         MSO-N220           MSO-K300         MSO-N300           MSO-K400         MSO-N400	MSO-K35	x	MSO-T35
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-N150           MSO-K180         MSO-N180           MSO-K220         MSO-N220           MSO-K300         MSO-N300           MSO-K400         MSO-N400	MSO-K50	•	MSO-T50
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-K20         MSO-N220           MSO-K300         MSO-N300           MSO-K400         MSO-N400	MSO-K65	0	MSO-T65
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	MSO-K80	•	MSO-T80
MSO-K100         O         MSO-N125           MSO-K125         O         MSO-N125           MSO-K150         O         MSO-N150           MSO-K180         O         MSO-N180           MSO-K220         O         MSO-N220           MSO-K300         O         MSO-N300           MSO-K400         O         MSO-N400	MSO-K95	0	MSO-T100
MSO-K125         O         MSO-N125           MSO-K150         O         MSO-N150           MSO-K180         O         MSO-N180           MSO-K220         O         MSO-N220           MSO-K300         O         MSO-N300           MSO-K400         O         MSO-N400	MSO-K100	0	MSO-N125
MSO-K150         O         MSO-N150           MSO-K180         O         MSO-N180           MSO-K220         O         MSO-N220           MSO-K300         O         MSO-N300           MSO-K400         O         MSO-N400	MSO-K125	0	MSO-N125
MSO-K180         O         MSO-N180           MSO-K220         O         MSO-N220           MSO-K300         O         MSO-N300           MSO-K400         O         MSO-N400	MSO-K150	0	MSO-N150
MSO-K220         O         MSO-N220           MSO-K300         O         MSO-N300           MSO-K400         O         MSO-N400	MSO-K180	0	MSO-N180
MSO-K300         O         MSO-N300           MSO-K400         O         MSO-N400	MSO-K220	0	MSO-N220
MSO-K400 O MSO-N400	MSO-K300	0	MSO-N300
	MSO-K400	0	MSO-N400

Reversible Type		
Old Model	Compatibility	Current Model
MS-2xN20	0	MS-2xT21
MS-2xN21	0	MS-2xT21
MS-2xN25	0	MS-2xT35
MS-2xN35	0	MS-2xT35
MS-2xN50	х	MS-2xT50
MS-2xN65	0	MS-2xT65
MS-2xN80	х	MS-2xT80
MS-2xN95	0	MS-2xT100

Reversible Type		
Old Model	Compatibility	Current Model
	х	MSO-2xT10
NISO-ANTI	x	MSO-2xT12
MSO-2xA20	х	MSO-2xT20
MSO-2xA21	х	MSO-2xT21
MSO-2xA25	х	MSO-2xT25
MSO-2xA35	х	MSO-2xT35
MSO-2xA50	х	MSO-2xT50
MSO-2xA60	х	MSO-2xT65
MSO-2xA65	х	MSO-2xT65
MSO-2xA80	х	MSO-2xT80
MSO-2xA100	х	MSO-2xN125
MSO-2xA120	х	MSO-2xN125
MSO-2xA125	х	MSO-2xN125
MSO-2xA150	х	MSO-2xN150
MSO-2xA220	х	MSO-2xN220
MSO-2xA300	х	MSO-2xN300
MSO-2xA401	х	MSO-2xN400
MSO-2xA400	х	MSO-2xN400
MSO-2xA600	x	S-2xN600 + TH-N600

Reversible Type		
Old Model	Compatibility	Current Model
	х	MSO-2xT10
	х	MSO-2xT12
MSO-2xK18	х	MSO-2xT20
MSO-2xK19	х	MSO-2xT20
MSO-2xK20	х	MSO-2xT20
MSO-2xK21	х	MSO-2xT21
MSO-2xK25	х	MSO-2xT25
MSO-2xK35	0	MSO-2xT35
MSO-2xK50		MSO-2xT50
MSO-2xK65	0	MSO-2xT65
MSO-2xK80		MSO-2xT80
MSO-2xK95	0	MSO-2xT100
MSO-2xK100	0	MSO-2xN125
MSO-2xK125	0	MSO-2xN125
MSO-2xK150	0	MSO-2xN150
MSO-2xK180	0	MSO-2xN180
MSO-2xK220	0	MSO-2xN220
MSO-2xK300	0	MSO-2xN300
MSO-2xK400	0	MSO-2xN400

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#### (6) Mounting Compatibility of MSO-N and MSO-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
MSO-N10	•	MSO-T10
MSO-N11	0	MSO-T12
MSO-N12	•	MSO-T12
MSO-N18	0	MSO-T20
MSO-N20	•	MSO-T20
	0	MSO-T21
MSO-N21	0	MSO-T21
MSO-N25	•	MSO-T25
MSO-N35	0	MSO-T35
MSO-N50	•	MSO-T50
MSO-N65	0	MSO-T65
MSO-N80	•	MSO-T80
MSO-N95	0	MSO-T100

Reversible Type		
Old Model	Compatibility	Current Model
MSO-2×N10	х	MSO-2×T10
MSO-2×N11	х	MSO-2×T12
MSO-2×N18	х	MSO-2×T20
	х	MSO-2×T20
MSO-2×N20	0	MSO-2×T21
MSO-2×N21	0	MSO-2×T21
MSO-2×N25	х	MSO-2×T25
MSO-2×N35	0	MSO-2×T35
MSO-2×N50		MSO-2×T50
MSO-2×N65	0	MSO-2×T65
MSO-2×N80		MSO-2×T80
MSO-2×N95	0	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)*	0	S-T12
S-A12(RM)*	$\triangle$	S-T12
S-A20		S-T20
S-A21	0	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	<b></b>	S-N125
S-A120		S-N125
S-A125	×(▲)	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	0	S-N600
S-A800	0	S-N800

\*(RM) indicates that it can be rail-mounted. S-T10 to T80 are standard products that can be rail-mounted.

#### (2) Mounting Compatibility of S-K and S-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
S-K10	Δ	S-T10
S-K11	0	S-T12
S-K12	$\triangle$	S-T12
S-K18	0	S-T20
S-K19	$\triangle$	S-T20
S-K20	$\triangle$	S-T20
S-K21	0	S-T21
S-K25	x	S-T25
S-K28	x	S-T32
S-K35	x	S-T35
S-K38	х	S-T35
S-K48	х	S-T50
S-K50	$\triangle$	S-T50
S-K65	0	S-T65
S-K80	Δ	S-T80
S-K95	0	S-T100
S-K100	0	S-N125
S-K125	0	S-N125
S-K150	0	S-N150
S-K180	0	S-N180
S-K220	0	S-N220
S-K300	0	S-N300
S-K400	0	S-N400
S-K600	0	S-N600
S-K800	0	S-N800

Reversible Type		
Old Model	Compatibility	Current Model
0 4011	x	S-2×T10
3-ANTI	x	S-2×T12
S-2×A20	х	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	х	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

Reversible Type		
Old Model	Compatibility	Current Model
	x	S-2×T10
S-KR11	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	0	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	0	S-2×T65
S-2×K80		S-2×T80
S-2×K95	0	S-2×T100
S-2×K100	0	S-2×N125
S-2×K125	0	S-2×N125
S-2×K150	0	S-2×N150
S-2×K180	0	S-2×N180
S-2×K220	0	S-2×N220
S-2×K300	0	S-2×N300
S-2×K400	0	S-2×N400
S-2×K600	0	S-2×N600
S-2×K800	0	S-2×N800

#### (3) Mounting Compatibility of S-N and S-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
S-N10	$\triangle$	S-T10
S-N11	0	S-T12
S-N12	$\triangle$	S-T12
S-N18	0	S-T20
S N00	$\triangle$	S-T20
5-IN2U	0	S-T21
S-N21	0	S-T21
S-N25	$\bigtriangleup$	S-T25
S-N28	0	S-T32
S-N35	0	S-T35
S-N50	$\bigtriangleup$	S-T50
S-N65	0	S-T65
S-N80	Δ	S-T80
S-N95	0	S-T100

#### (4) Mounting Compatibility of SD-A and SD-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SD-A11	0	SD-T12
SD-A12	$\triangle$	SD-T12
SD-A21	0	SD-T21
SD-A35	х	SD-T35
SD-A50	х	SD-T50
SD-A60	$\triangle$	SD-T65
SD-A65	х	SD-T65
SD-A80	х	SD-T80
SD-A100	<b>A</b>	SD-N125
SD-A150	<b>A</b>	SD-N150
SD-A220	<b>A</b>	SD-N220
SD-A300	<b>A</b>	SD-N300
SD-A401	<b>A</b>	SD-N400
SD-A400	x	SD-N400
SD-A600	0	SD-N600

#### (5) Mounting Compatibility of SD-K and SD-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SD-K11	0	SD-T12
SD-K12	$\triangle$	SD-T12
SD-K21	0	SD-T21
SD-K35	x	SD-T35
SD-K50	$\triangle$	SD-T50
SD-K65	0	SD-T65
SD-K80	$\triangle$	SD-T80
SD-K95	0	SD-T100
SD-K100	0	SD-N125
SD-K125	0	SD-N125
SD-K150	0	SD-N150
SD-K220	0	SD-N220
SD-K300	0	SD-N300
SD-K400	0	SD-N400
SD-K600	0	SD-N600
SD-K800	0	SD-N800

#### (6) Mounting Compatibility of SD-N and SD-T Types

Old Model Compatibility Current Model		
	Companionity	
SD-N11	0	SD-T12
SD-N12	$\triangle$	SD-T12
SD-N21	0	SD-T21
SD-N35	0	SD-T35
SD-N50	$\triangle$	SD-T50
SD-N65	0	SD-T65
SD-N80	Δ	SD-T80
SD-N95	0	SD-T100

Reversible Type		
Old Model	Compatibility	Current Model
S-2xN10	х	S-2xT10
S-2xN11	х	S-2xT12
S-2xN18	х	S-2xT20
C. 0v/N00	х	S-2xT20
S-ZXINZU	0	S-2xT21
S-2xN21	0	S-2xT21
S-2xN25	х	S-2xT25
S-2xN28	0	S-2xT32
S-2xN35	0	S-2xT35
S-2xN50		S-2xT50
S-2xN65	0	S-2xT65
S-2xN80		S-2xT80
S-2xN95	0	S-2xT100

Reversible Type		
Old Model	Compatibility	Current Model
SD-2xA21	х	SD-2xT21
SD-2xA35	х	SD-2xT35
SD-2xA50	х	SD-2xT50
SD-2xA60	х	SD-2xT65
SD-2xA65	х	SD-2xT65
SD-2xA80	х	SD-2xT80
SD-2xA100	х	SD-2xN125
SD-2xA150	х	SD-2xN150
SD-2xA220	х	SD-2xN220
SD-2xA300	х	SD-2xN300
SD-2xA401	х	SD-2xN400
SD-2xA400	x	SD-2xN400
SD-2xA600	х	SD-2xN600

Reversible Type		
Old Model	Compatibility	Current Model
SD-2xK21	х	SD-2xT21
SD-2xK35	0	SD-2xT35
SD-2xK50		SD-2xT50
SD-2xK65	0	SD-2xT65
SD-2xK80		SD-2xT80
SD-2xK95	0	SD-2xT100
SD-2xK100	0	SD-2xN125
SD-2xK125	0	SD-2xN125
SD-2xK150	0	SD-2xN150
SD-2xK220	0	SD-2xN220
SD-2xK300	0	SD-2xN300
SD-2xK400	0	SD-2xN400
SD-2xK600	0	SD-2xN600
SD-2xK800	0	SD-2xN800

Reversible Type		
Old Model	Compatibility	Current Model
SD-2xN11	х	SD-2xT12
SD-2xN21	0	SD-2xT21
SD-2xN35	0	SD-2xT35
SD-2xN50		SD-2xT50
SD-2xN65	0	SD-2xT65
SD-2xN80		SD-2xT80
SD-2xN95	0	SD-2xT100

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#### (7) Mounting Compatibility of SL(D)-A and SL(D)-T/N Types

Non-Reversible Type		
Compatibility	Current Model	
0	SL(D)-T21	
$\triangle$	SL(D)-T50	
$\triangle$	SL(D)-T65	
$\triangle$	SL(D)-T80	
▲	SL(D)-N125	
<b>A</b>	SL(D)-N125	
<b>A</b>	SL(D)-N150	
<b>A</b>	SL(D)-N220	
<b></b>	SL(D)-N300	
<b>A</b>	SL(D)-N400	
х	SL(D)-N400	
0	SL(D)-N600	
	Non-Heversible ly Compatibility C Compatibility C C C C C C C C C C C C C C C C C C C	

#### (8) Mounting Compatibility of SL(D)-K and SL(D)-T/N Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-K21	0	SL(D)-T21
SL(D)-K35	х	SL(D)-T35
SL(D)-K50	$\triangle$	SL(D)-T50
SL(D)-K65	0	SL(D)-T65
SL(D)-K80	$\triangle$	SL(D)-T80
SL(D)-K95	0	SL(D)-T100
SL(D)-K100	0	SL(D)-N125
SL(D)-K125	0	SL(D)-N125
SL(D)-K150	0	SL(D)-N150
SL(D)-K220	0	SL(D)-N220
SL(D)-K300	0	SL(D)-N300
SL(D)-K400	0	SL(D)-N400
SL(D)-K600	0	SL(D)-N600
SL(D)-K800	0	SL(D)-N800

#### (9) Mounting Compatibility of SL(D)-N and SL(D)-T Types

Non-Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-N21	0	SL(D)-T21
SL(D)-N35	0	SL(D)-T35
SL(D)-N50	$\triangle$	SL(D)-T50
SL(D)-N65	0	SL(D)-T65
SL(D)-N80	$\triangle$	SL(D)-T80
SL(D)-N95	0	SL(D)-T100

Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-2xA21	х	SL(D)-2xT21
SL(D)-2xA50	х	SL(D)-2xT50
SL(D)-2xA60	x	SL(D)-2xT65
SL(D)-2xA80	0	SL(D)-2xT80
SL(D)-2xA100	х	SL(D)-2xN125
SL(D)-2xA120	х	SL(D)-2xN125
SL(D)-2xA150	x	SL(D)-2xN150
SL(D)-2xA220	x	SL(D)-2xN220
SL(D)-2xA300	х	SL(D)-2xN300
SL(D)-2xA401	х	SL(D)-2xN400
SL(D)-2xA400	x	SL(D)-2xN400
SL(D)-2xA600	x	SL(D)-2xN600

Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-2xK21	х	SL(D)-2xT21
SL(D)-2xK35	0	SL(D)-2xT35
SL(D)-2xK50	х	SL(D)-2xT50
SL(D)-2xK65	0	SL(D)-2xT65
SL(D)-2xK80	х	SL(D)-2xT80
SL(D)-2xK95	0	SL(D)-2xT100
SL(D)-2xK100	0	SL(D)-2xN125
SL(D)-2xK125	0	SL(D)-2xN125
SL(D)-2xK150	0	SL(D)-2xN150
SL(D)-2xK220	0	SL(D)-2xN220
SL(D)-2xK300	0	SL(D)-2xN300
SL(D)-2xK400	0	SL(D)-2xN400
SL(D)-2xK600	0	SL(D)-2xN600
SL(D)-2xK800	0	SL(D)-2xN800

Reversible Type		
Old Model	Compatibility	Current Model
SL(D)-2xN21	0	SL(D)-2xT21
SL(D)-2xN35	0	SL(D)-2xT35
SL(D)-2xN50	х	SL(D)-2xT50
SL(D)-2xN65	0	SL(D)-2xT65
SL(D)-2xN80	x	SL(D)-2xT80
SL(D)-2xN95	0	SL(D)-2xT100

#### 3. Contactor Relays

 Mounting Compatibility of SR(RM) Type and current models (SR-K/SR-T)

Old Model	Compatibility	Current Model
SR-40(RM)	0	SR-T5
SR-50(RM)	$\triangle$	SR-T5
SR-80(RM)	0	SR-T9
SR-63,60(RM)	x	SR-T9
SR-100	0	SR-K100

# (3) Mounting Compatibility of SR-N Type and current models (SR-T)

Old Model	Compatibility	Current Model
SR-N4	0	SR-T5
SR-N5	$\triangle$	SR-T5
SR-N8	0	SR-T9

# (5) Mounting Compatibility of SRD-K Type and current models (SRD-T)

Old Model	Compatibility	Current Model
SRD-K4	0	SRD-T5
SRD-K5	$\bigtriangleup$	SRD-T5
SRD-K8	0	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)	0	SRL(D)-T5
SRL(D)-50(SE)	∆(○)	SRL(D)-T5(SRL(D)-K100)
SRL(D)-100(SE)/ SRL(D)-101	0	SRL(D)-K100

#### (9) Mounting Compatibility of SRL(D)-N and SRL(D)-T

Types		
Old Model	Compatibility	Current Model
SRL(D)-N4	0	SRL(D)-T5

# (2) Mounting Compatibility of SR-K Type and current models (SR-K/SR-T)

	,	
Old Model	Compatibility	Current Model
SR-K4	0	SR-T5
SR-K5	$\bigtriangleup$	SR-T5
SR-K8	0	SR-T9
SR-K63,K6	х	SR-T9
SR-K10	0	SR-K100

# (4) Mounting Compatibility of SRD Type and current models (SRD-K/SRD-T)

Old Model	Compatibility	Current Model
SRD-40	0	SRD-T5
SRD-50	Δ	SRD-T5
SRD-80	0	SRD-T9
SRD-100	0	SRD-K100

# (6) Mounting Compatibility of SRD-N Type and current models (SRD-T)

Old Model	Compatibility	Current Model
SRD-N4	0	SRD-T5
SRD-N5	$\triangle$	SRD-T5
SRD-N8	0	SRD-T9

# (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	0	SRL(D)-T5
SRL(D)-K10	0	SRL(D)-K100

# 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)

	Mod	el Name	MS-K10	MS-K11	MS-K12	MS-K20	MS-K21	MS-K25	MS-K35	MS-K50	
	Rated	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)	
	Capacity	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)	
	AC-3	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 Cor	ntact Arrangement	1a	1a	1a1b	1a1b	2a2b	2a2b	2a2b	2a2b	
MS-K Series	Outline (	e Drawings mm)	3	-M4 Screw Mounting Hol	e 1	3-M5 Screw M Depth 110 + 76 + 104	Aounting Hole	4-M5 Screw M Depth 126		4-M5 Screw Mounting Hole	
	Wei	ght (kg)	0.8	0.8	0.9	1.2	1.2	2.0	2.0	3.2	
	Mounting With M	Compatibility S-T Series	0	0	0	0	0	0	0	x	
	Mod	el Name	MS-N10	MS-N11	MS-N12	MS-N20	MS-N21	MS-N25	MS-N35	MS-N50	
	Rated	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)	
	(kW)	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)	
	AC-3	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 Con	tact Arrangement	1a	1a	1a1b	1a1b	2a2b	2a2b	2a2b	2a2b	
MS-N Series	Outline (	Drawings mm)	3	-M4 Screw Mounting Hol	e	3-M5 Screw N	Aourting Hole	4-M5 Screw M		4-MS Screw Mounting Hole	
	Wei	ght (kg)	0.8	0.8	0.8	1.1	1.1	1.8	1.8	2.9	
	Mounting With M	Compatibility S-T Series	0	0	0	0	0	0	0	x	
	Mod	el Name	MS-T10	MS	-T12	MS-	-T21	MS-	T35	MS-T50	
	Rated	220 to 240 V	2.5 (2.2)	3.5	(2.7)	5.5	(4)	11 (	(7.5)	15 (11)	
	(kW)	380 to 440 V	4 (2.7)	5.5	(4)	11 (	(7.5)	18.5	(15)	22 (22)	
	AC-3	500 V	4 (2.7)	5.5	(5.5)	11 (	(7.5)	18.5	(15)	25 (22)	
	Auxiliary Con	tact Arrangement	1a	1a	1b	2a	2b	2a	2b	2a2b	
MS-T Series	Outline (	e Drawings mm)	3	-M4 Screw Mounting Hol Depth 97.5	e	3-M5 Screw N		4	-M5 Screw Mounting Ho Depth 126 9 135	le	
	Wei	ght (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)	
4-M5 Screw Mounting Hole	4-M6 Screw M Depth 163 + 150 + 190	Acunting Hole	4-M6 Screw Mounting Hole		4-M8 Screw Mounting Hole			4-M10 Screw Mounting Hole		
3.2	4.0	4.0	8	3	12.8	16.2	16.2	28	28	
0	х	0	0	0	0	0	0	0	0	
MS-N65	MS-N80	MS-N95	MS-I	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)	
4-M5 Screw Mounting Hole	4-M6 Screw M Depth 163 190	Nounting Hole	4-M6 Screw Mounting Hole		4	-M8 Screw Mounting Hol	e	4-M10 Screw Mounting Hole		
2.9	4.0	4.0	8	8	12.8	16.2	16.2	27.5	28	
0	x	0								
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								
4-M5 Screw M 4-M5 Screw M 0 0 0 0 0 0 0 0 0 0 0 0 0		4-M6 Screw Mounting Hole								
2.9	2.9	4.0								

Note 1. The mounting compatibility symbols have the following indications.  $\bigcirc$  : 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)

	Мо	del Name	MSO-K10	MSO-K11	MSO-K12	MSO-K18	MSO-K20	MSO-K21	MSO-K25	MSO-K35	MSO-K50	
	Rated	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)	
	Capacity (kW)	/ 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)	
	AC-3	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 Co	ontact Arrangement	1a (3a2b)	1a (3a2b)	1a1b	(2a2b)	1a1b	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	
MSO-K Series	Outlin	e Drawings (mm)	2-M4 Screw Depth 35 4150 Allows M 30 x 52, 30 x 4 34 x 52 0.	Auting Hole 4.5 butting of 8 and 38	2-M4 Screw Mounting Hole Depth	2-M4 Screw Mounting Hole	2-M4 Screw M Depth 85 4 71 Allows Mot 54 x (56 to 0.7	tounting Hole	2-M4 Screv Depti 102- 82.5 Allows Mountii of up to (65 to (59 to 65) x 70 0.9	Mounting Hole 21 1 22 1 22 1 22 1 2 1 2 1 2 1	2-M4 Screw Mounting Hole	
	Mounting With M	g Compatibility ISO-T Series	•	0	•	0	•	0	x	x	•	
	Мо	del Name	MSO-N10	MSO-N11	MSO-N12	MSO-N18	MSO-N20	MSO-N21	MSO-N25	MSO-N35	MSO-N50	
	Rated	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)	
	Capacity	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)	
	AC-3	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 Co	ontact Arrangement	1a (3a2b)	1a (3a2b)	1a1b (3a3b)	(2a2b)	1a1b (3a3b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	
MSO-N Series	Outlin	e Drawings (mm)	2-M4 Screw N Depth 79 45 45 Also Allows Mo 30 x 52, 30 x 48 34 x 52	Mounting Hole	2-M4 Screw Mounting Hole Depth 79	2-M4 Screw Mounting Hole	2-M4 Screw M Depth 81 	Adounting Hole	2-M4 Screw N Depth 91 - - - - - - - - - - - - - - - - - - -	Mounting Hole	2-M4 Screw Mounting Hole	
	We	eight (kg)	0.41	0.41	0.43	0.46	0.54	0.56	0.72	0.72	1.1	
	Mounting With N	g Compatibility ISO-T Series	•	0	•	0	•	0	•	0	•	
	Moo	del Name	MSO-T10	MSC	)-T12	MSO	-T20	MSO-T21	MSO-T25	MSO-T35	MSO-T50	
	Rated	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)	
	(kW)	380 to 440 V	4 (2.7)	5.5	(4)	7.5	(7.5)	11 (7.5)	15 (11)	18.5 (15)	22 (22)	
	AC-3	500 V	4 (2.7)	5.5	(5.5)	7.5	(7.5)	11 (7.5)	15 (11)	18.5 (15)	25 (22)	
	Auxiliary Co	ontact Arrangement	1a (3a2b)	1a1b	(3a3b)	1a1b	(3a3b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	2a2b (4a4b)	
MSO-T Series	Outlin	e Drawings (mm)	2-M4 Screw Mounting Hole		2-M4 Screw Depth 79 + 46 Also Allow Mounting and 35 x	Mounting Hole		2-M4 Screw Depth 82- 63 Also Allows N 54 x 56	Mounting Hole	2-M4 Screw 1 Depth 91	Mounting Hole           982:1	
	We	eight (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)
2-M4 Screw Mounting Hole	2-M5 Screw Depth 22-M5 Screw Depth 227 200	Mounting Hole	4-M4 Screw Mounting Hole		4-M4 Screw Mounting Hole	4-M6 Screw Mounting Hole		4-M8 Screw N	
1.4	2.2	2.2	3.	.5	4.6	8	8	12	12
0	•	0	0	0	0	0	0	0	0
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)
2-M4 Screw Mounting Hole	2-M5 Screw	Mounting Hole	4-M4 Screw Mounting Hole		4-M4 Screw Mounting Hole	4-M6 Screw M	ounting Hole	4-M8 Screw Mounting Hole	
1.1	2.2	2.2	3.	.5	4.6	8	8	11.5	12
0	•	0							
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)							
2-M4 Screw M g Depth 4 106	lounting Hole	2-MIS Screw Mounting Hole							
 1.1	1.1	2.2							

Note 1. The mounting compatibility symbols have the following indications.

O: 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)

	e n, e n an		agnotio	ooma		mpano		(Outogo	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	~		
	Model Name	S-K10	S-K11	S-K12	S-K18	S-K20	S-K21	S-K25	—	S-K35	S-K50	
	Rated 200 to 240 V	11 (11)	13 (13)	13 (13)	18 (18)	22 (20)	22 (20)	30 (26)	—	40 (35)	55 (50)	
	Operating Current 380 to 440 V	9 (7)	12 (9)	12 (9)	16 (13)	22 (20)	22 (20)	30 (24)	—	40 (32)	46 (46)	
	(A) AC-3 500 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)	
S-K Series	Outline Drawings (mm)	2-M4 Scre Depth 78 44 Also Allows Mour 30 x 52, 30 x 48 a	w Mounting Hole	2-M4 Screw Mounting Hole Depth 75 40 40 40 40 40 40 40 40 40 40	2-M4 Screw Mounting Hole Depth 87.5 Street 45.45 Also Allows Mounting of 32 x 52 and 34 x 52	2-M4 Screw Mi Depth 88 	unting of up to 60)	2-N	44 Screw Mounting H hepth 02 4 71 80 10 10 10 10 10 10 10 10 10 1	ole	2-M4 Screw Mounting Hole	
	Terminal Screw (Main)	M	3.5	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	$\diamond$	0	$\diamond$	0	$\diamond$	0	х	-	x	$\diamond$	
	Model Name	S-N10	S-N11	S-N12	S-N18	S-N20	S-N21	S-N25	—	S-N35	S-N50	
	Rated 200 to 240 V	11 (11)	13 (13)	13 (13)	18 (18)	22 (20)	22 (20)	30 (26)	_	40 (35)	55 (50)	
	Current 380 to 440 V	9 (7)	12 (9)	12 (9)	16 (13)	22 (20)	22 (20)	30 (25)	_	40 (32)	50 (48)	
	(A) AC-3 500 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)	
S-N Series	Outline Drawings (mm)	Outline Drawings (mm) Also Allows Mounting of 30 x 52, 30 x 48 and 34 x 52		Level development of the second moduling role Depth g R 78 g R 40 s Also Allows Mounting of 40 x 52 and 34 x (48 to 52)	Depth         R           5.5         30           4.3         4.3           Also Allows for         35 × 50, 32 × 52 and 34 × 52           36 × 51, Mounting         Allows Mount           5.4 × 56 to 60		ting of up to	2-1	VIA Screw Mounting F	lole	2-M4 Screw Mounting Hole	
	Terminal Screw (Main)	M	3.5	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	$\diamond$	0	$\diamond$	0	$\diamond$	0	$\diamond$	_	0	$\diamond$	
	Model Name	S-T10	S-	Г12	S-	Г20	S-T21	S-T25	S-T32	S-T35	S-T50	
	Rated 200 to 240 V	11 (11)	13	(13)	18	(18)	25 (20)	30 (26)	32 (32)	40 (35)	55 (50)	
	Current 380 to 440 V	9 (7)	12	(9)	18	(18)	23 (20)	30 (25)	32 (32)	40 (32)	50 (48)	
	(A) AC-3 500 V	7 (6)	9	(9)	17	(17)	17 (17)	24 (20)	24 (20)	32 (26)	38 (38)	
	Conventional Free Air Thermal Current (A)	20	2	0	2	0	32	32	32	60	80	
	Auxiliary Contact Arrangement (Maximum)	1a (3a2b)	1a1b	(3a3b)	1a1b	(3a3b)	2a2b (4a4b)	2a2b (4a4b)	— (2a2b)	2a2b (4a4b)	2a2b (4a4b)	
S-T Series	Outline Drawings (mm)	2-M4 Screw Mounting Hole	4	2-M4 Screw Mou	nting Hole - - Allows Mounting 0 x 60, 35 x 50 to 52		2-M4 Screw Depth 4.5 	rs violanting Hole	2-M4 Screw Mounting Hole	2-M4 Screw Depth 91 5 65 75	Mounting Hole	
	Terminal Screw (Main)	M3.5	M	3.5	M	3.5	M4	M4	M4	N	15	
	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 1	4-5, 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)
 2420(4440)	2420(4440)	2420(4440)	2820(	-44-0)	2820(4840)	2820(4840)	2420(4440)	2820(4840)	2420(4440)	2820(4840)	2020(4040)
2-M4 Screw Mounting Hole	2-M5 Screw N	Aounting Hole	4-M4 Screw Mounting Hole		4-M5 Screw Mounting Hole	4-M6 Screw Mounting Hole		4-M8 Screw Mounting Hole		4-M10 Screw Mou 250 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	nting Hole Jlows Mounting of 263, Lower 80)
M6	M6	M6	N	18	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 t	o 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
11	18	1.8	2	7	32	55	5.5	95	9.5	24	24
0	\$	0	0	0	0	0	0	0	0	0	0
S N65		S N05	S N	105	S N150	S N180	S N220	S N300	S N/100	S N600	S N800
65 (65)	85 (90)	105 (100)	105	(125)	150 (150)	190 /100	250 (220)	300 (200)	400 (400)	630 (630)	800 (200)
 05 (05)	00) 00	105 (100)	120	(125)	150 (150)	160 (160)	250 (220)	300 (300)	400 (400)	030 (030)	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	15	50	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)
2-M4 Screw Mounting Hole	2-M5 Screw M Depth 127 0 100	Nounting Hole	4-M4 Screw Mounting Hole		4-M5 Screw Mounting Hole	4-M6 Screw M Depth 175	Nounting Hole	4-M8 Screw M Depth 195 195 163	Mounting Hole	4-M10 Screw 250 Depth 235 290 Also Allows Mo (Upper 263, Lo	Mounting Hole
M6	M6	M6	N	18	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	55.8+	0 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	1.23-0 10 00-0	1.23-0 10 00-0	0.0-01	7	2 2 2	5 5	5 F	0.0	0.5	00-1010323-10	00-10 10 323-10
0.75	\$	0	2.		5.5	5.5	5.5	3.0	9.5	24	
S Tee	S 100	S T100									
65 (65)	85 (90)	105 (100)									
00 (00) 65 (65)	00 (00) 05 (00)	105 (100)									
 (50) (0)	00 (0U)	100 (93)									
60 (45)	75 (75)	85 (75)									
100	120	150									
2a2b(4a4b)	2a2b(4a4b)	2a2b(4a4b)									
2-M4 Screw Depth 106 	founting Hole	2-MS Screw Mounting Hole									
N	16	M6									
1.25-6 to 22-6	, 38-S6, 60-S6	1.25-6 to 60-6									
0.75	0.75	1.7									
INOTE 1. The	mounting c	ompatibility	symbols ha	ave the follo	wing indica	uons.					

- O: Compatible
- •: S-N $\square$ 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).

# 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		Vaa	Can be combined using the K Series connecting conductors and mounting brackets.
SD-K125,K150	111-11120(1A)(RF)	165	(Note 1)
S-K180/K220		Vaa	Lies the service that some with the thermal everland relay
SD-K220	TH-IN220RH(KF)	res	
S-K300/K400		Vaa	Lies the service that some with the thermal everland relay
SD-K300/K400		res	l ose the screws that come with the mermai 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		Vaa	Can be combined using the K Series connecting conductors and mounting brackets.
SD-N125,N150		Tes	(Note 1)
S-N180/N220		Vaa	Lies the service fixing the surrently attached thermal everland relay
SD-N220		Tes	
S-N300/N400		Vee	Lies the service fixing the surrently attached thermal everland relay
SD-N300/N400		Tes	

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.

	MS-T Series				MS-N Series			
Product Name		Ap	plication to MS-N Ser	ies		A	pplication to MS-T Ser	ies
	Unit Model Name	AC Operated	DC Operated	Mechanically Latched Type	Unit Model Name	AC Operated	DC Operated	Mechanically Latched Type
	UT-AX2.AX4	x	×	x	UN-AX2.AX4	S-T65, T80	SD-T65, T80	x
Auxiliary Contacts	UT-AX11	x	x	x	UN-AX11	S-T65, T80	SD-T65, T80	SL(D)-T65, T80
						S-T100	SD-T100	SL(D)-T100
					LIN-MI 11	Y Y	×	x
Mechanical Interlocks	LIT-MI 20	×	×	v	LIN-ML21	S-T21 to T80	SD-T21 to T80	SI (D)-T21 to T80
Wicenanioar interiooks	OT MILLO	^	~	~		S-T100	SD-T100	SL(D)-T100
		~				0 1100	001100	02(D) 1100
		^	SRD-N4,N5,N8			×	×	~
	UT-SA21		SD-N11 to N35	CDL (D) N/4 Classing Coil		*	*	X
	UT-5A22	SR-N4,N5,N8 S-N10 to N35		SL(D)-N21 Closing Coll	UN-SA22	X	X	X
	01-3A23	S-N38,N48			UN-SA23	X	X	×
Surge Absorbers	UT-SA25		SD-N11 to N35		UN-SA25	x	x	x
for Operation Coils					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
	UT-SA3320	х	x	x	UN-SA3310	x	x	x
Surge Absorbers for Main Circuits	UT-SA3332	х	x	x	UN-SA3320	x	x	x
Main Oround				ĺ	UN-SA33	S-T10 to T100	SD-T12 to T100	SL(D)-T21 to T100
					UN-SY11	S-T10 to T100	x	x
					UN-SY12	S-T10 to T100	x	x
DC/AC Interfaces for Operation Coil	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	×
					UN-SY32	S-T65, T80	x	x
Live Dert	UT-CW800	S-N50 N65	SD-N50 N65	×				
Protection Covers	LIT-CW655	0 1100,100	TH-N60	~		S-T65 to T100	SD-T65 to T100	SI (D)-T65 to T100
Manual Operation Prevention Covers	UT-CV107	×		×				0E(D) 100 to 1100
Manual Operation Prevention Covers	UT-SD10	×	×	× ×		×	×	× ×
		~	×	× ×		×	×	~
Main Circuit	01-0020	^	^	^		^ С 2ут22		~
Conductor Kits		~				0-2X132	SD-2X132	
(For Reversing)	01-3025	X	X	×		S-2X135, 150	SD-2X135, 150	SL(D)-2X135, 150
						S-2X105, 160	SD-2X103, 160	SL(D)=2X103, 180
	117.0010					5-2X1100	3D-2X1100	SL(D)-2X1100
	UI-SG10	X	x	X	UN-SGIUCX	X	X	X
Main Circuit	01-SG20	X	x	x	UN-SG21CX	X	X	X
Conductor Kits					UN-SG18CX	S-2x132	SD-2x132	X
(For Crossover)	UI-SG25	x	x	x	UN-SG25CX	S-2x135, 150	SD-2x135, 150	SL(D)-2x135, 150
					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
	UT-YY20	x	x	x	UN-YY21	S-T21	SD-T21	SL(D)-T21
3-Pole Array					UN-YY35	S-T35, T50	SD-T35, T50	SL(D)-T35, T50
Units					UN-YY50	S-T65, T80	SD-T65, T80	SL(D)-T65, T80
					UN-YY80	S-T100	SD-T100	SL(D)-T100
Thermal Overload Relay					UN-CV203		TH-T25, T50	·
Misoperation Prevention Covers			•		UN-CV603	TH-T65, T100		
	UT-RR204 to RR704		x		UN-RR205 to RR705	x		
Thermal Overload Relays Reset					UN-RR200 to BB700	TH-T25, T50		
Releases					UN-RR206 to BB706		TH-T65, T100	
						+	TU. T10	
Thermal Overload							TH TOS TSO	
Display Lamps							TH TES T100	
I hermal Overload Relays With Independent Mounting			X				X	
With Independent Mounting	1	1			UN-RIVIZU	1	IH-125	

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.

	MS-N Series				MS-K Series			
Product Name	Linit Madel Neme	Aŗ	plication to MS-K Ser	ies	Linit Madel Name	Application to MS-N Series		
	Unit Model Name	AC Operated	DC Operated	Mechanically Latched Type	Unit Woder Name	AC Operated	DC Operated	Mechanically Latched Type
	UN-AX80	S-K125	SD-K125	SL(D)-K125	UA-AX80	S-N125	SD-N125	SL(D)-N125
Auxiliary Contacts	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
	UN-ML80	S-K125	SD-K125	SL(D)-K125	UA-ML80	S-N125	SD-N125	SL(D)-N125
Mechanical Interlocks	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	UN-CV203		x	·	UA-CV203	TH-N120 to N600		
Misoperation Prevention Covers	UN-CV603		TH-K120 to K600					
Thermal Overload Relays Reset Releases	UN-RR200 to RR700		x			TH-N120 to N600		
	UN-RR206 to RR706		TH-K120 to K600					
Thermal Overload Relays	UN-TL20		x		UA-TL20		TH-N120 to N600	
Fluorescent Display Lamps	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) Te	I) 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 S-T21 to T35, SD-T21 to T35	Make Contacts: 13NO-14NO Break Contacts: 21NC-22NC Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC- 32NC	Make Contacts: 13NO-14NO Break Contacts: 21NC-22NC Make Contacts: 13NO-14NO 43NO-44NO Break Contacts: 21NC-22NC 31NC-32NC	NO (Normally Open): Make Contact NC (Normally				
		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	Closed): Break Contact				
	Auxiliary Terminal Number (Contactor Relay)	SR-T5 SRD-T5	<ul> <li>Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2</li> <li>Tens Place of the Number Changes to 1 to 5</li> <li>E.g.: SR-T5 3a2b</li> <li>A2 A1 11NC 23NO 33NO 43NO 51NC</li> <li>A2 A1 11NC 24NO 34NO 44NO 52NC</li> </ul>	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 A2 A1 01NC 13N0 23N0 33N0 41NC O2NC 14N0 24N0 34N0 42NC	Complies With the International Standards IEC				
		SR-T9 SRD-T9	<ul> <li>Ones Place of the Number for Make Contacts: 3-4, Break Contacts: 1-2</li> <li>Tens Place of the Number Changes to 1 to 9</li> <li>Example: SR-T9 5a4b</li> <li>63NO 71NC 81NC 93NO</li> <li></li></ul>	• 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 53N0 61NC 73N0 83N0 $-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1-\frac{1}{\sqrt{1}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}$					
	Coil Terminal Number	S-T10 to T35 SD-T12 to T35 S-T50 to T100	A1, A2 (Embossed Characters) A1, A2	A1, A2 (Simultaneous Printing With Rated Coil Display) A1, A2					
		SD-T50 to T100	(Embossed Characters)	(Embossed Characters)					

# Supplementary Information

	Item	MS-T Target Model Names (Typical Model)	MS-T Series	MS-N Series	Remarks
	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) 63NO 71NC -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -      -	• 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) $53N0 \ 61NC$ $-\frac{1}{7} - \frac{1}{7} - \frac{1}{7}$ $54N0 \ 62NC$	
Display Content		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 63N0 71NC 	<ul> <li>Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2</li> <li>Tens Place of the Number Changes to 5 to 6</li> <li>E.g.: UN-AX2 1a1b</li> <li>53NO 61NC         <ul> <li></li></ul></li></ul>	
		UT-AX4	<ul> <li>Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2</li> <li>Tens Place of the Number Changes to 6 to 9</li> <li>E.g.: UT-AX4 2a2b</li> <li>63NO 71NC 81NC 93NO</li> <li></li></ul>	<ul> <li>Ones Place of the Number for Make Contacts: 3-4 Break Contacts: 1-2</li> <li>Tens Place of the Number Changes to 5 to 8</li> <li>E.g.: UN-AX4 2a2b</li> <li>53N0 61NC 71NC 83N0</li> <li></li></ul>	
Display Position	Terminal Number	S-T10 to T20 SD-T12 to T20 SR-T5/T9 SRD-T5/T9 UT-AX2, AX4 UT-AX11 S-T21 to T35 SD-T21 to T35 SD-T21 to T35 SD-T50 SD-T50 SD-T50 SD-T65 to T100	<ul> <li>Laser printed on the product front for both the body and auxiliary contact unit</li> <li>The terminal number is printed on a paper name plate on the product front</li> <li>Laser printed on the front of the product</li> <li>Laser printed on the front of the product</li> <li>Printed on the name plate on the product front in grav</li> </ul>	<ul> <li>For the body (lower part of SR-N8), printed on the product front in blue</li> <li>For the upper part of SR-N8 (auxiliary contact unit), the terminal number is printed on the paper name plate in blue</li> <li>The terminal number is printed on the paper name plate in blue</li> <li>Printed on the front of the product in blue</li> <li>Printed on the name plate on the product front in blue</li> <li>Printed on the name plate on the product front in blue</li> </ul>	

#### (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	<ul> <li>The Ith rating (A) is printed on the front bottom left</li> <li>Other ratings are displayed on a name plate on the side</li> </ul>	
		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)	<ul> <li>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</li> <li>Other ratings have all rated ranges printed on a name plate in white</li> <li>SD and SRD are printed in black on blue</li> </ul>	
		S-T50 SD-T50	All laser printed (No color-coding)	The designation AC100V/200V is printed in black on color-coded nameplates	
		S-T65 to T100 SD-T-65 to T100	All printed in black on white nameplates	<ul> <li>Other ratings are printed in black on white nameplates</li> <li>SD is printed in black on blue</li> </ul>	
	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
pou	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	
ay Met		S-T50 SD-T50	Laser printed on the product front left	Printed on the name plate on the product front in blue	
Displ		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

Item	MS-T Target Model Names (Typical Model)	MS-T Series		MS-N Series		Remarks
	S-T10 to T35 SD-T12 to T35 SR-T5, SRD-T5	Make Contact ▽	Break Contact $\triangle$	Make Contact $\stackrel{\perp}{\top}$	Break Contact	
Contact Mark Display of Auxiliary Terminal	SR-T9, SRD-T9	Upper Part (Body Side)	Lower Part (Additional Auxiliary Contact Unit Side)	Upper Part (Body Side)	Lower Part (Additional Auxiliary Contact Unit Side)	
Displayed with engraved marks on contact and terminal, etc.		Make Contact ▽	Make Contact	Make Contact $\stackrel{\perp}{\top}$	Make Contact ▽	
		Break Contact	Break Contact	Break Contact	Break Contact $\triangle$	

#### (2) Rail Mounting

Item	MS-T Target Model Names (Typical Model)	MS-T Series	MS-N Series	Remarks
DIN Rail Mounting	S-T10 to T50 SD-T12 to T50	<ul> <li>Mounting</li> <li>↓</li> <li>↓</li> <li>Click3</li> <li>↓</li> <li>7.5mm</li> <li>∠</li> </ul>	Mounting	
		Screwdriver Not Required	Operated by Screwdriver	
	S-T65	Same Operation as N Series		
	S-T80		Not Available	

#### (3) Other

Item	MS-T Target Model Names (Typical Model)	MS-T Series	MS-N Series	Remarks
Coil Surge	S-T10SA to T50SA SD-T12SA to T50SA	Surge Absorber Mounted Type Operation Coil Surge Absorber Unit UT-SA21 (Varistor Element) Mounted on Main Body	Surge Absorber Integrated Type Operation Coil Surge Absorber (Varistor Element) Integrated in Main Body	
Coil Surge Absorber Function	S-T65 to T100	Integrated Surge Absorber Function Through AC Operated DC Excitation Type Electromagnet · S-T65 to T100	Integrated Surge Absorber Function Through AC Operated DC Excitation Type Electromagnet · S-N50 to N400	
**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

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### Product Marking

### (1) Terminal Number

	Item MS-N Model Na (Typical Mode		MS-N Series	MS-K Series	Remarks
	Main Terminal	S-N, TH-N	Power Supply Side: 1/L1, 3/L2, 5/L3	Power Supply Side: R/1/L1, S/3/L2, T/5/L3	Change in accordance
t t	Number	All Models	Load Side: 2/T1, 4/T2, 6/T3	Load Side: U/2/T1, V/4/T2, W/6/T3	with JEM1038 and JIS
Conte	Auxiliary Ter	minal 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	04551
Display (	(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):
	Coil Terminal Number	S-N125 to N800	A1/a, A2/b (Mold Embossed Characters)	A1/a, A2/b (Mold Embossed Characters)	Break Contact
ay	Auxiliarv	S-N125		Embossed on the base barrier	
spl	Terminal	S-N150 to N400	the arc box (arc cover) in black	Embossed on the base side	
۵ä	Number	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 S-N600/N800	<ul> <li>The Ith rating (A) is printed on the name plate on the front bottom left</li> <li>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)))</li> </ul>	<ul> <li>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)]</li> <li>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)]</li> </ul>	

### (3) Model Names and Standards

	ltem	MS-N Model Names (Typical Model)	MS-N Series	MS-K Series	Remarks
	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)	
pod		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	JEM 1038 NK Certification Number IEC 947-4-1 DIN VDE 0660 BS EN 60947 UR and CE Marks	
Display Meth	Compliance and Certification Standards	S-N600	JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN cURus and CE Marks	JEM 1038 NK Certification Number IEC 947-4-1 DIN VDE 0660 BS EN 60947-4-1 UR and CE Marks	The cUL mark is equivalent to the CSA mark
		S-N800	JIS C8201-4-1 JEM 1038 NK Certification Number IEC 60947-4-1 DIN VDE 0660 BS EN CE Mark	JEM 1038 NK Certification Number IEC 947-4-1 VDE 0660 BS EN 60947-4-1 CE Mark	

### 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	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	
MS-A Series	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	MSOL(D)/SL(D) -N125 to N220	Built-in Surge Absorbing Function (Closing/Tripping)	No Surge Absorbing Function (Closing/Tripping)	
Absorbing Function	MSOL(D)/SL(D) -N300, N400	(Excluding AC/DC24 V and 48 V)	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.



\*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.

## **13.8 Model Names of Discontinued Former Models and Replacements**

Old Model Name	Model Name	Alternative Model	Comp	atibility	Bemarks
		Name	Mounting	Rating	nemarks
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	x	0	Model Name End 1: OFF Delay, 2: ON Delay
B-□	NC Main Contact Contactor	B-T/N□	At Right	0	Only B-A20 and B-N20 have compatibility.
BD-□	NC Main Contact Contactor	BD-T/N□	At Right	0	Only BD-A20 and BD-N20 have compatibility.
C-831	Commercial Magnetic Contactor	S-T□	x	0	
DM-□	Time Limit Relay	Schneider LADT □, LADR □ (Pneumatic Timer Unit)	x	0	Model Name End 1: OFF Delay, 2: ON Delay
DU-□	Magnetic Contactor For DC	DU-N□	At Right	0	Only DU-K180, K260 and DU-N180, N260 have compatibility.
DUD-	Magnetic Contactor For DC	DUD-N□	At Right	0	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□	0	0	
MRD-□	Contactor Relay	SRD-T/K□	At Right	At Right	Partly compatible.
MRL-□	Mechanically Latched Contactor Relay	SRL-T/K□	0	0	
MRDL-	Mechanically Latched Contactor Relay	SRLD-T/K□	0	0	
ML-□	Mechanically Latched Contactor	SL-T/N□	At Right	0	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.
<b>N</b> -□	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	0	
RP-□P	Control Relay	Omron MK⊡P-2	0	0	SR(D)-T is functionally usable.
RP-⊡SP	Control Relay With Twin Contact	Omron MK⊡ZP-2	0	0	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	0	Model Name End 1: OFF Delay, 2: ON Delay
SMD- □, SRTD- □	Pneumatic Timer	Schneider LADT  , LADR (Pneumatic Timer Unit)	x	0	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.



		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
	Motor rating	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
	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 MS	D- T10,T12	T12	T20	T20	T21	T35	T35	T50	KP										
	associated thermal overload relay T	I- T18	T18	T18	T25	T50	T50	T65	KP											
220V	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
50/60Hz	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	IF 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	А
	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	mm <sup>2</sup>
	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	А
	type designation of Magnetic Starter MS	D- T10,T12	T12	T12	T20	T20	T21	T35	KP											
	associated thermal overload relay T	I- T18	T18	T18	T18	T18	T25	T50	KP											
380V 3-phase	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	А
50/60Hz	Fuse (VDE0660 gT time-delay)	*2	*2	2	2	4	4	6	6	10	16	16	20	25	25	35	50	50	80	А
	MCCB	IF –	-	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	mm <sup>2</sup>
	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 MS	D- T10,T12	T12	T12	T20	T20	T21	T35	KP											
	associated thermal overload relay T	I- T18	T18	T18	T18	T18	T25	T50	KP											
415V 3-phase	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
50Hz	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	IF –	-	-	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	А
	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	mm <sup>2</sup>

	Motor rating		18.5	22	30	37	45	55	75	90	110	132	160	200	250	315	355	400	450	kW
	Motor fating		25	30	40	50	60	75	100	125	150	180	220	270	340	420	480	540	600	HP
	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
220V	heater designation		54	82	95	125	125	180	210	250	330	500	500	660	-	-	-	-	-	A
50/60Hz	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
	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
380V	heater designation		35	42	54	67	82	95	125	150	180	210	250	330	500	500	660	660	660	A
50/60Hz	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
	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
415V	heater designation		35	42	54	67	82	95	125	150	180	210	250	330	500	500	660	660	660	A
50Hz	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)	mm <sup>2</sup>

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.

### 13.9.2 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  $1/\sqrt{3}\times f.l.c$ 



	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
	Wotor fating	3	4	5	5 1/2	7 1/2	10	15	20	25	30	40	50	60	75	100	125	150	HP
	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	А
	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	А
220V	type designation of Contactor MCD S-	T12	T12	T12	T12	T12	T20	T25	T35	T35	T50	T65	T80	T80	N125	N150	N180	N220	
3-phase	type designation of Contactor MCS S-	T10	T10	T12	T20	T21	T25	T35	T35	T50	T65	T80							
50/60Hz	Fuse (VDE0660 gT time-delay)	16	20	32	32	32	40	63	80	100	100	125	160	200	220	315	400	400	А
	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	А
	wire size recommended(*)	1.5	1.5	1.5	4	6	10	16	25	25	35	50	50	70	95	150	150	150	mm <sup>2</sup>
	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 <sup>2</sup>
	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	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	А
380V	type designation of Contactor MCD S-	T12	T12	T12	T12	T12	T20	T20	T20	T21	T25	T35	T50	T50	T65	T80	T100	N125	
3-phase	type designation of Contactor MCS S-	T10	T10	T12	T12	T20	T20	T20	T21	T25	T35	T50							
50/60Hz	Fuse (VDE0660 gT time-delay)	12	16	16	16	20	32	32	40	40	63	63	100	100	125	160	200	250	А
	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	А
	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 <sup>2</sup>
	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 <sup>2</sup>
	motor full load current	5.0	6.3	7.5	8	11	15	21	28	35	40	54	67	79	98	130	160	190	А
	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	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
415V	type designation of Contactor MCD S-	T12	T12	T12	T12	T12	T12	T20	T20	T21	T25	T35	T50	T50	T65	T80	T100	N125	
3-phase	type designation of Contactor MCS S-	T10	T10	T10	T12	T20	T20	T20	T21	T25	T35	T50							
50Hz	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	mm²
	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 <sup>2</sup>

	1							· · · · ·	r		
	Motor rating		132	160	200	250	315	355	400	450	kW
			180	220	270	340	420	480	540	600	HP
	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
220V	type designation of Contactor MCD	S-	N300	N300	N400	N600	N600	N600	N800	N800	
3-phase	type designation of Contactor MCS	S-	T100	T100	N125	N150	N220	N220	N220	N300	
50/60Hz	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	А
	wire size recommended(*)		185	240	185(2wires)	240(2wires)	60x5(2bars)	80x5(2bars)	80x5(2bars)	100x5(3bars)	mm²
	wire size recommended(*)		120	185	240	150(2wires)	185(2wires)	240(2wires)	240(2wires)	240(2wires)	mm²
	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
3801/	type designation of Contactor MCD	S-	N150	N180	N220	N300	N400	N400	N600	N600	
3-phase	type designation of Contactor MCS	S-	T50	T65	T80	T100	N125	N150	N150	N180	
50/60Hz	Fuse (VDE0660 gT time-delay)		250	310	400	630	630	800	800	1000	A
	МССВ	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)	mm²
	wire size recommended		50	70	95	150	185	240	150(2wires)	150(2wires)	mm <sup>2</sup>
	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
415V	type designation of Contactor MCD	S-	N150	N180	N220	N300	N400	N400	N400	N600	
3-phase	type designation of Contactor MCS	S-	T50	T65	T65	T80	T100	N125	N150	N150	
50Hz	Fuse (VDE0660 gT time-delay)		250	315	400	630	630	800	800	1000	A
	МССВ	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 <sup>2</sup>
	wire size recommended		50	70	95	150	185	185	240	150(2wires)	mm <sup>2</sup>

- 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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# Mitsubishi Electric Magnetic Starters



- 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.



Mitsubishi Electric Corporation Nagoya Works holds environmental management system ISO14001 and quality system ISO9001 certification.



### MITSUBISHI ELECTRIC CORPORATION

This publication has been issued in June 2021. In addition, as the contents of this publication may change without prior notice, please contact us in advance when adopting products.

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