MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

INVERTER OPTION CATALOG

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

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

Changes for the Better

"Changes for the Better" represents the Mitsubishi Electric Group’s attitude to “always strive to achieve something better”, as we continue to change and grow. Each one of us shares a strong will and passion to continuously aim for change, reinforcing our commitment to creating “an even better tomorrow”.

Our advances in AI and IoT are adding new value to society in diverse areas from automation to information systems. The creation of game-changing solutions is helping to transform the world, which is why we are honored to be recognized in the 2019 "Forbes Digital 100" as one of world's most influential digital corporations.

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 entertainment 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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A Wide Variety of Options Which Improve Such as Installation Attachments, Are

Purpose	Option type					
Control function expansion	Plug-in option / Control terminal option	Plug-in option / control terminal option: Orientation control, Machine end orientation (P11, 24)	Encoder feedback control (P11, 24)	Vector control (P11, 24)	Position control (P11, 24)	Encoder pulse division output (P11, 24)
Additional input/output	Plug-in option / Control terminal option	Plug-in option: 16-bit digital input (P.14)	High-resolution analog input (P.15)	Digital output (P.14)	Relay output (P.14)	Analog output, Coded analog output (P.14, 15)
Communication support	Plug-in option / Control terminal option	Plug-in option: CC-Link IE TSN (P.20)	CC-Link IE Field Network (P.21)	CC-Link (P.21)	SSCNETIII(/H) (P.22)	DeviceNet™ (P.22)
Improved operability	Operation option	LCD operation panel, Parameter unit, Parameter unit with battery pack (P.30)	Enclosure surface Operation panel, Connectors (P.31)	Parameter unit connection cable (P.31)	Software	FR Configurator2, FR Configurator Mobile (P.32)
Power factor improvement	Reactor	AC reactor (P.34)	DC reactor (P.35)	Filterpack (P.54)	High power factor converter (P.16, 43)	Multifunction regeneration converter (P.46)
Improved regeneration performance	Braking option	Brake resistor (P.36)	Brake unit (P.38)	Power regeneration converter (P.41)		Multifunction regeneration converter (P.46)
Noise reduction	Noise filter	Radio noise filter (P.52)	Line noise filter (P.51)	EMC Directive compliant noise filter (P.52)	Filterpack (P.54)	
Operation panel mounting attachment	Structure option	Panel through attachment (P.59)	Totally enclosed structure specification attachment (P.60)	Intercompatibility attachment (P.60)	EMC filter installation attachment (P.61)	DIN rail installation attachment (P.64)
	Other options	Pilot generator (P.65)	Deviation sensor (P.65)	Digital frequency meter (P.65)	Analog frequency meter (P.66)	Calibration resistor (P.66)

Function and Performance, Available for the FR Series Lineup.

Plug-in option
- Motor thermistor interface → P.15
- Changeover between inverter and high power factor converter → P.16
- Phase-synchronized bypass switching function → P.19

Dedicated cable option
- Encoder cable → P.28

Plug-in option
- 24VDC input → P.15

Control terminal option
- Power supply output for encoder → P.24, 26

Plug-in option
- PROFIBUS-DP → P.22
- LonWorks® → P.23
- FL remote → P.23
- EtherCAT
EtherNet/IP
PROFINET
PROFIBUS-DP(DP-V1) → P.23

Control terminal option
- RS-485 → P.27

Dedicated cable option
- SSCNETIII cable → P.29

USB cable → P.33

800 series inverters

700 series inverters

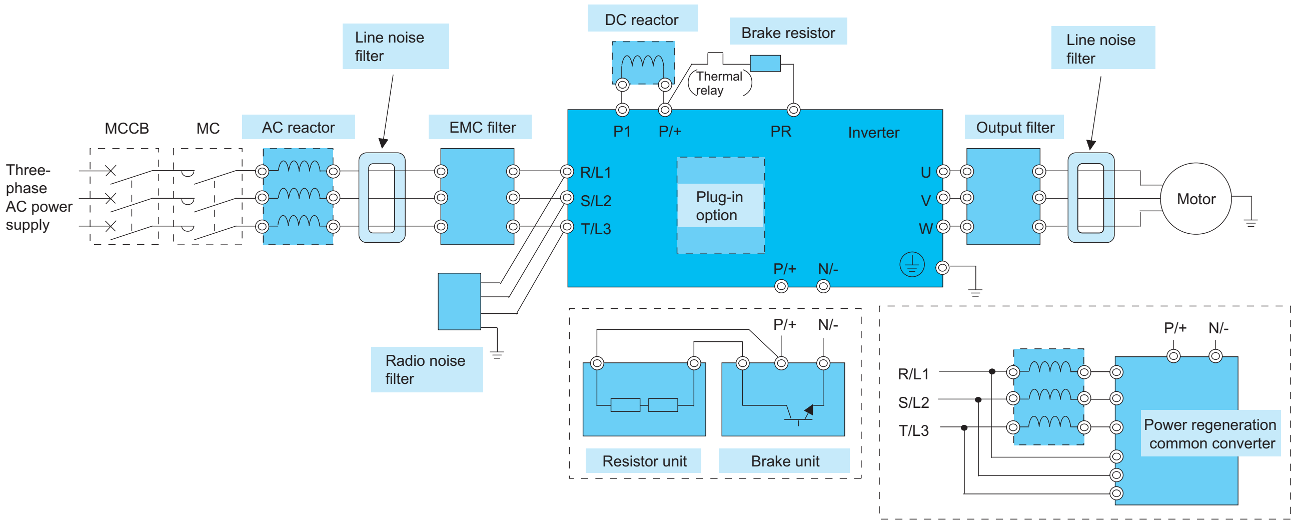
Output filter
- Surge voltage suppression filter → P.56
- Sine wave filter → P.57

Attachments for installation inside the enclosure for FR-A872 → P.58

Frequency setting potentiometer
Pointer scale
Knob → P.66

Connection example

This diagram shows the connection of main optional devices with the inverter. All devices in the connection diagram below are not necessarily connected.
Select necessary options referring to the table below and descriptions.



Reactor	Noise filter		Braking unit			Output filter	Plug-in option
AC reactor DC reactor	Line noise filter Radio noise filter	EMC filter	Brake resistor	Brake unit Resistor unit	Power regeneration common converter High power factor converter		
Use when power harmonic measures are required, the power factor is to be improved or the inverter is installed under a large power supply system.	Use to reduce the electromagnetic noise generated from the inverter.	Use this EMC filter to comply with the EU EMC Directive.	Increases the braking capability of the inverter which has a built-in brake transistor.	Increases the braking capability more than the brake resistor. The inverter without a built-in brake transistor can be connected.	Returns regeneration energy to the power supply, enabling continuous regeneration operation. A high power factor converter whose power factor is 1 is available.	Limits surge voltage supplied to the motor terminal.	Mounts to the inverter to expand functions and make communication.

Option list

● 800 series

○: Compatible ×: Incompatible

Name	Type	Applicable inverter				Refer to Page
		FR-A800	FR-A800 Plus	FR-F800	FR-E800	
Plug-in option (control function expansion, additional input/output)						
Orientation control Encoder feedback control Vector control	FR-A8AP	○	○	×	○ (E kit type)	11
	FR-A8APR	○	○	×	×	12
	FR-A8APS	○	○	×	×	13
Orientation control Encoder feedback control Vector control Position control Encoder pulse division output	FR-A8AL	○	○	×	×	11
Orientation control, Encoder feedback control, Vector control	FR-A8APA	○	○ *1	×	×	13
Encoder pulse divider	FR-A8APD *3	○	○ *1	×	×	12
16-bit digital input	FR-A8AX	○	○	○	○ (E kit type)	14
Analog output (2 terminals) Digital output (7 terminals)	FR-A8AY	○	○	○	○ (E kit type)	14
Relay output (3 terminals)	FR-A8AR	○	○	○	○ (E kit type)	14
Coded analog output High-resolution analog input Motor thermistor interface	FR-A8AZ	○	○	×	×	15
24 VDC input	FR-E8DS E kit	Equipped as standard	Equipped as standard	Equipped as standard	○	15
Changeover between inverter and high power factor converter	FR-A8AVP	○ *4	○ *1*4	×	×	16
Phase-synchronized bypass switching	FR-A8AVP	○	○*1	○	×	19
Plug-in option (for communication)						
RS-485	PU connector (inverter)	Equipped as standard	Equipped as standard	Equipped as standard	Equipped as standard *5	—
	Dedicated terminal (inverter)	Equipped as standard *5	Equipped as standard *5	Equipped as standard *5	×	—
USB — USB host	A connector	Equipped as standard	Equipped as standard	Equipped as standard	×	—
USB — USB device	Mini B connector	Equipped as standard	Equipped as standard	Equipped as standard	Equipped as standard	—
CC-Link IE TSN	FR-A8NCG	○	○*1	○	×	20
	Built-in	FR-A800-GN	×	×	FR-E800-E (EPA/EPB)*6	20
CC-Link IE Field Network	FR-A8NCE	○ *7	○	○	×	21
	Built-in	FR-A800-GF	×	×	×	21
CC-Link	FR-A8NC	○ *7	○	○	○ (E kit type)	21
SSCNETIII(/H)	FR-A8NS	○ *7	○*1	×	×	22
DeviceNet™	FR-A8ND	○ *7	○	○	○ (E kit type)	22
PROFIBUS-DP	FR-A8NP	○ *7	○	○	○ (E kit type)	22
LONWORKS®	FR-A8NL	×	×	○	×	23
FL remote	FR-A8NF	○ *7	○*2	○	×	23
EtherCAT	A8NECT_2P (HMS Industrial Networks AB) *8	○	○	○	×	23
	Built-in	×	×	×	FR-E800-E(EPC)*6	—
EtherNet/IP	A8NEIP_2P (HMS Industrial Networks AB) *8	○	○	○	×	23
	Built-in	×	×	×	FR-E800-E(EPA)*6	—
PROFINET	A8NPRT_2P (HMS Industrial Networks AB) *8	○	○	○	×	23
	Built-in	×	×	×	FR-E800-E(EPB)*6	—
PROFIBUS-DP(DP-V1)	A8NDPV1 (HMS Industrial Networks AB) *8	○	○	○	×	23
Control terminal option						
Vector control terminal block	FR-A8TP	○	○	×	×	24
Screw terminal block	FR-A8TR	○ *5	○ *5	○ *5	×	25
Dedicated cable option						
Encoder cable	FR-V7CBL[][]	○	○	×	○	28
	FR-JCBL[][]	○	○	×	○	28
SSCNET III cable	MR-J3BUS[]M-[]	○	○	×	×	29
Operation option						
LCD operation panel	FR-LU08	○	○	○	○*5	30
Parameter unit	FR-PU07	○	○	○	○*5	30
	FR-PU07BB	○	○	○	○*5	30
Enclosure surface operation panel	FR-PA07	×	×	×	○*5	31
Parameter unit connection cable	FR-CB20[]	○	○	○	○*5	31
Operation panel connection connector	FR-ADP	○	○	○	×	31

Option list

○: Compatible ×: Incompatible

Name			Type	Applicable inverter				Refer to Page
				FR-A800	FR-A800 Plus	FR-F800	FR-E800	
Software								
FR Configurator2			SW1DND-FRC2	○	○	○	○	32
FR Configurator Mobile			—	FR-A800-E	FR-A800-E	FR-F800-E	FR-E800-E/SCE	33
USB cable			MR-J3USBCBL3M	○	○	○	○	33
Reactor								
AC reactor			FR-HAL	○	○	○	○	34
DC reactor			FR-HEL	○	○	○	○	35
Braking option								
Brake resistor			MRS, MYS	×	×	×	○ *9	36
High-duty brake resistor			FR-ABR	○ *9	○ *9	×	○ *9	36
Brake unit			FR-BU2	○ *10	○ *10	○ *10	○ *10	38
	Resistor		GRZG	○	○	○	○	38
	Resistor unit		FR-BR	○	○	○	○	38
			MT-BR5	○	○	○	×	38
Power regeneration converter			MT-RC	○	○	○	×	41
High power factor converter			FR-HC2	○	○	○	○	43
Multifunction regeneration converter			FR-XC	○	○	○	○	46
Noise filter								
Line noise filter			FR-BSF01	○ *11	○ *11	○ *11	○	51
			FR-BLF	○ *11	○ *11	○ *11	○	51
Radio noise filter			FR-BIF	Corresponding filter is built-in	Corresponding filter is built-in	Corresponding filter is built-in	○	52
EMC Directive compliant EMC filter			Built-in filter	Standard equipped (2nd Environment) *12			×	—
			SF[][]	×	×	×	○	52
			FR-E5NF	×	×	×	○	52
			FR-S5NFSA	×	×	×	○	52
Filterpack (DC reactor/noise filter)			FR-BFP2	×	×	×	○	54
Output filter								
Surge voltage suppression filter			FR-ASF	○ *13	○ *13	○ *13	○ *13	56
			FR-BMF	○ *13	○ *13	○ *13	○ *13	56
Sine wave filter	Reactor		MT-BSL(-HC)	○ *14	○ *14	○ *14	×	57
	Capacitor		MT-BSC	○ *14	○ *14	○ *14	×	57
Structure option								
Attachments for installation inside the enclosure for FR-A872			FR-A8CW	○ *15	×	×	×	58
			FR-A8SR	○ *15	×	×	×	58
			FR-A8CU	○ *15	×	×	×	58
Panel through attachment			FR-A8CN	○	○	○	×	59
			FR-E8CN	×	×	×	○	59
Control circuit terminal block intercompatibility attachment			FR-A8TAT	○	○	○	×	60
Intercompatibility attachment			FR-AAT	○	○	○	○	61
			FR-A5AT	○	○	○	○	61
			FR-E7AT	×	×	×	○	61
			FR-F8AT	×	×	○	×	61
			FR-E8AT	×	×	×	○	61
EMC filter installation attachment			FR-E5T	×	×	×	○	61
DIN rail installation attachment			FR-UDA	×	×	×	○ *16	64
Other options								
Pilot generator			QVAH-10	○	○	○	○	65
Deviation sensor			YVGC-500W-NS	○	○	○	○	65
Analog frequency meter			YM-206NRI 1 mA	○	○	○	○ *5	66
Calibration resistor			RV24YN 10 kΩ	○	○	○	○	66

*1 The option is not compatible with the FR-A800-R2R and FR-A800-AWH.
*2 The option is not compatible with the FR-A800-R2R.
*3 This product cannot be used on its own. Use it with the FR-A8AP or the FR-A8APA.
*4 The option is compatible with the FR-A842-315K to 500K.
*5 The option is not compatible with the FR-A800-E, FR-F800-E, FR-E800-E, and FR-E800-SCE.
*6 The network is supported by the inverter alone.
*7 The option is not compatible with the FR-A800-GF.
*8 For further details on supported models, contact your sales representative.
*9 Only models with a built-in brake transistor can be used.
*10 For the 200 V class 0.2K or lower, 400 V class 1.5K or lower, they cannot be used in combination with a brake unit.
*11 For the 55K or lower, a corresponding appliance is built-in on the input side.
*12 The applicable standard depends on the built-in EMC filter.
*13 The filter can be used under V/F control or Advanced magnetic flux vector control.
*14 The filter can be used under V/F control.
*15 The option is compatible with the FR-A872-05690 to 07150 and the FR-CC2-N-450K to 630K.
*16 The option is compatible with the models with the 3.7kW or lower capacity.

● 700 series

○: Compatible ×: Incompatible

Name	Type	Applicable inverter FR-E700	FR-F700PJ	FR-D700	FR-A701	Refer to Page
Plug-in option (control function expansion, additional input/output)						
Orientation control Encoder feedback control Vector control	FR-A7AP	×	×	×	○	11
Orientation control Encoder feedback control Vector control Position control Encoder pulse division output	FR-A7AL	×	×	×	○	11
16-bit digital input	FR-A7AX	○ (E kit type)	×	×	○	14
Analog output (2 terminals) Digital output (7 terminals)	FR-A7AY	○ (E kit type)	×	×	○	14
Relay output (3 terminals)	FR-A7AR	○ (E kit type)	×	×	○	14
Coded analog output High-resolution analog input Motor thermistor interface	FR-A7AZ	×	×	×	○	15
24 VDC input	FR-E7DS	○ (for the FR-E700-SC only)	×	×	×	15
Plug-in option (for communication)						
RS-485	PU connector (inverter)	Equipped as standard *1	Equipped as standard	Equipped as standard	Equipped as standard	—
RS-485	Dedicated terminal (inverter)	FR-E7TR	×	×	Equipped as standard	—
USB - USB device	B connector	×	×	×	Equipped as standard	—
USB - USB device	Mini B connector	Equipped as standard	×	×	×	—
CC-Link IE Field Network	FR-A7NCE	×	×	×	○	21
CC-Link	FR-A7NC	○ (E kit type)	×	×	○	21
CC-Link	Built-in	FR-E700-NC	×	×	×	21
SSCNETIII	FR-A7NS	×	×	×	○	22
DeviceNet™	FR-A7ND	○ (E kit type)	×	×	○	22
PROFIBUS-DP	FR-A7NP	○ (E kit type)	×	×	○	22
LONWORKS®	FR-A7NL	○ (E kit type)	×	×	○	23
FL remote	FR-A7NF	×	×	×	○	23
FL remote	Built-in	FR-E700-NF	×	×	×	23
EtherCAT	E7NECT_2P (HMS Industrial Networks AB) *2	FR-E700-TM only	×	×	×	23
Control terminal option						
12 V control circuit terminal block with encoder power supply	FR-A7PS	×	×	×	○	26
RS-485 2-port terminal block	FR-E7TR	○ (for models with the standard control circuit terminal specification only)	×	×	×	27
Dedicated cable option						
Encoder cable	FR-V7CBL[][]	×	×	×	○	28
Encoder cable	FR-JCBL[][]	×	×	×	○	28
SSCNET III cable	MR-J3BUS[]M-[]	×	×	×	○	29
Operation option						
Parameter unit	FR-PU07	○ *1	○	○	○	30
Parameter unit	FR-PU07BB	○ *1	×	×	×	30
Enclosure surface operation panel	FR-PA07	○	○	○	×	31
Parameter unit connection cable	FR-CB20[]	○	○	○	○	31
Operation panel connection connector	FR-ADP	×	×	×	○	31
Software						
FR Configurator2	SW1DND-FRC2	○	×	×	×	32
FR Configurator2	FR-SW3-SETUP-WE	○ *3	○	○	○	33
USB cable	MR-J3USBCBL3M	○	×	×	×	33
Reactor						
AC reactor	FR-HAL	○	○	○	×	34
DC reactor	FR-HEL	○	○	○	×	35

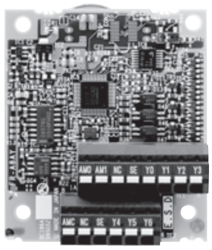
Option list

○: Compatible ×: Incompatible

Name		Type	Applicable inverter				Refer to Page
			FR-E700	FR-F700PJ	FR-D700	FR-A701	
Braking option							
Brake resistor		MRS, MYS	○ *4	○ *4	○ *4	×	36
High-duty brake resistor		FR-ABR	○ *4	○ *4	○ *4	×	36
Brake unit		FR-BU2	○ *5	○ *5	○ *5	×	38
	Resistor	GRZG	○	○	○	×	38
	Resistor unit	FR-BR	○	○	○	×	38
High power factor converter		FR-HC2	○	○	○	×	43
Multifunction regeneration converter		FR-XC	○	○	○	×	46
Noise filter							
Line noise filter		FR-BSF01	○	○	○	○	51
		FR-BLF	○	○	○	○	51
Radio noise filter		FR-BIF	○	○	○	○	52
EMC Directive compliant EMC filter		SF[][]	○	×	○	○	52
		FR-E5NF	○	○	○	×	52
		FR-S5NFSA	○	×	○	×	52
Filterpack (DC reactor/noise filter)		FR-BFP2	○	○ *6	○	×	54
Output filter							
Surge voltage suppression filter		FR-ASF	○	○ *8	○	○ *7	56
		FR-BMF	○	○ *8	○	○ *7	56
Structure option							
Panel through attachment		FR-E7CN	○	○	○	×	59
Totally-enclosed structure attachment		FR-E7CV	○ *9	×	×	×	60
Intercompatibility attachment		FR-AAT	○	○	○	×	61
		FR-A5AT	○	○	○	×	61
		FR-E7AT	○	×	×	×	61
EMC filter installation attachment		FR-E5T	○	○	○	×	61
DIN rail installation attachment		FR-UDA	○ *10	○ *10	○ *10	×	64
Other options							
Pilot generator		QVAH-10	○	○	○	○	65
Deviation sensor		YVGC-500W-NS	○	○	○	○	65
Analog frequency meter		YM-206NRI 1 mA	○	○	○	○	66
Calibration resistor		RV24YN 10 kΩ	○	○	○	○	66

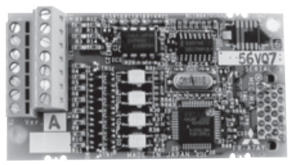
*1 PU connector is disabled for the FL remote communication model and the CC-Link communication model.
*2 For further details on supported models, contact your sales representative.
*3 FR Configurator is not compatible with FL remote communication models.
*4 Only models with a built-in brake transistor can be used.
*5 For the 200 V class 0.2K or lower, 400 V class 1.5K or lower, they cannot be used in combination with a brake unit.
*6 Filterpack (FR-BFP2) is enclosed for the FR-F7[]0PJ-[]KF inverters.
*7 The filter can be used under V/F control or Advanced magnetic flux vector control.
*8 The filter cannot be used during IPM motor control.
*9 The option is compatible with the FR-E720-0.1K to 7.5K only.
*10 The option is compatible with the models with the 3.7kW or lower capacity.

Plug-in option (control function expansion/additional I/O)



800 series plug-in option example: FR-A8AY

**This option can be mounted in the 800 series inverter.
Up to three options can be connected.
(Max. number of connectable options depends on the model of inverter.)**



700 series plug-in option example: FR-A7AY

**This option can be mounted in the 700 series inverter.
FR-A701: 3 options max. FR-E700: 1 option max.
The FR-E700 has "E kit" in the end of the name and sold as a package set with a dedicated front cover, etc. (standard control circuit terminal model)**

If two of the same plug-in option are connected, only one will function.

Orientation control/encoder feedback control/vector control

FR-A8AP, FR-A8APR, FR-A8APA (A800) (A800 Plus)
FR-A8AP E kit (E800)
FR-A7AP (A701)

Orientation control/encoder feedback control/vector control/position control/encoder pulse division output/machine end orientation control

FR-A8AL (A800) (A800 Plus)
FR-A7AL (A701)

Orientation control/encoder feedback control/vector control/position control

FR-A8APS (A800) (A800 Plus)

Encoder pulse divider

FR-A8APD (A800) (A800 Plus)

Option		Compatible encoder	Compatible motor/encoder	Encoder power supply	Pulse train input	Encoder divider output
Plug-in option *1	FR-A8AP	Encoder (differential line driver/complementary)	Motor with encoder (SF-PR-SC)	External	Pulse train + rotation direction sign	Option (FR-A8APD)*2
	FR-A7AP					Not supported
	FR-A8AL	Encoder (differential line driver/complementary)	Motor with encoder (SF-PR-SC)	Internal (5 V/12 V/24 V)	Forward pulse train + reverse pulse train Pulse train + rotation direction sign A phase pulse train + B phase pulse train	Supported
	FR-A7AL			External		
	FR-A8APR	Resolver	Recommended encoder: TS2640N321E64 manufactured by Tamagawa Seiki Co., Ltd.	Not required	Pulse train + rotation direction sign	Not supported
	FR-A8APS	EnDat	Recommended encoder: ECN 1313/ECN 1325/EQN 1325 manufactured by HEIDENHAIN	Internal (5 V)	Pulse train + rotation direction sign	Not supported
	FR-A8APA	SinCos	Compatible encoder: ERN 1387 manufactured by HEIDENHAIN	Internal (5 V)	Pulse train + rotation direction sign	Option (FR-A8APD)
Control terminal option	FR-A8TP (refer to **page 24**)	Encoder (differential line driver/complementary)	Motor with encoder (SF-PR-SC)	Internal (24 V)	Pulse train + rotation direction sign	Supported

*1 Only one of the above options can be used at a time.
When multiple options are connected to the same inverter, the following options are given priority in descending order: FR-A8AL (FR-A7AL) > FR-A8APS > FR-A8APA > FR-A8APR > FR-A8AP (FR-A7AP).
*2 The option is not compatible with the FR-E800 series.

Orientation control : **The inverter can adjust the stop position (Orientation control) using an encoder attached to a place such as the main shaft of the machine.**

Encoder feedback control : **Under V/F control or Advanced magnetic flux vector control, the inverter output frequency is controlled so that the motor speed is constant to the load variation by detecting the motor speed with the encoder to perform feedback to the inverter.**

Vector control : **Closed loop vector control is possible when using a motor with an encoder.**

Position control : **Position control can be performed by pulse train input.**

Encoder pulse division output : **Pulse input of encoder connected to the inverter is divided and output from the option terminal.**

Plug-in option (control function expansion/additional I/O)

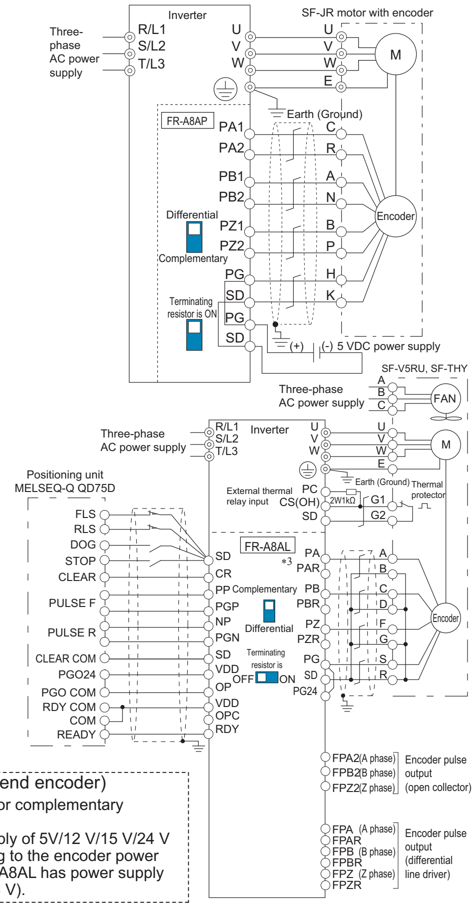
<<FR-A8AP, FR-A8AL, FR-A7AP, FR-A7AL, FR-A8APD>>

●Specifications

Function		Description	
Orientation control		Repeated positioning accuracy	±1.5°
		Permissible speed	Encoder-mounted shaft speed (6000 r/min with 1024 pulse encoder) The motor and encoder-mounted shaft should be coupled with a speed ratio of 1 to 1.
Encoder feedback control		Speed variation ratio	±0.1% (to the speed 3600 r/min)
Vector control	Speed control	Speed control range	1:1500 (both driving/regeneration *1)
		Speed variation ratio	±0.01% (to the speed 3000 r/min)
		Speed response	130 Hz (30 Hz for FR-E800)
	Torque control	Torque control range	1:50
		Absolute torque accuracy	±10% *2
		Repeated torque accuracy	±5% *2
	Position control (available for FR-A8AL, FR-A7AL)	Pulse input type	Forward rotation pulse train + reverse rotation pulse train Pulse train + sign A phase pulse train + B phase pulse train
		Repeated positioning accuracy	±1.5° (motor shaft end)
		Power supply	24 V power supply output for interface driver is provided
		Maximum input pulse frequency	Differential line receiver: 500k pulses/s Open collector: 200k pulses/s
		Electronic gear setting	1/50 to 20
Encoder pulse division output (available for FR-A8AL, FR-A7AL, FR-A8APD)		Output circuit method	Open collector and differential line driver
		Permissible load	Open collector output: 24 VDC, max 50 mA Differential line driver output: 40 mA
Machine end orientation control (available for FR-A8AL, FR-A7AL)		Repeated positioning accuracy	±1.5°
		Permissible speed	Encoder-mounted shaft speed (6000 r/min)

*1 Regeneration unit (option) is necessary for regeneration.
*2 With online auto tuning (adaptive magnetic flux observer), dedicated motor, rated load
*3 FR-A7AL uses two option connectors of an inverter. When using FR-A7AL, only one more built-in option can be used.

●Connection diagram (Sink logic)



(Applicable machine end encoder)
- Differential line driver or complementary
- 1000P/R to 4096P/R
- A separate power supply of 5V/12 V/15 V/24 V is necessary according to the encoder power specification. The FR-A8AL has power supply terminals (5 V/12 V/24 V).

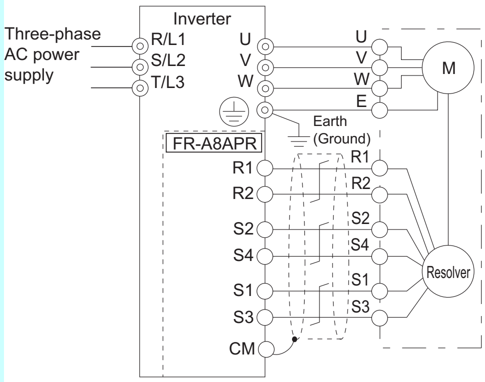
<<FR-A8APR>>

●Specifications

Function		Description	
Orientation control		Repeated positioning accuracy	±1.5° Depends on the load torque, moment of inertia of the load or orientation, creep speed, position loop switching position, etc.
		Permissible speed	Resolver-mounted shaft speed (6000 r/min). The drive shaft and resolver-mounted shaft must be coupled directly or via a belt without any slip. Gear changing shafts cannot be applied.
Resolver (encoder) feedback control		Speed variation ratio	±0.1% (100% means 3600 r/min)
Vector control	Speed control	Speed control range	1:1500 (both driving/regeneration *1)
		Speed variation ratio	±0.01% (100% means 3000 r/min)
		Speed response	20 Hz (40 Hz during fast-response operation)
		Maximum speed	400 Hz
	Torque control	Torque control range	1: 50
		Absolute torque accuracy	±10% *2
		Repeated torque accuracy	±5% *2
	Position control	Repeated positioning accuracy	±1.5° (at motor shaft end)
		Maximum input pulse frequency	100k pulses/s (Terminal JOG)
		Positioning feedback pulse	4096 pulses/rev
		Electronic gear setting	1/50 to 20
		In-position width	0 to 32767 pulses
		Error excess	0 to 400k pulses

*1 Regeneration unit (option) is necessary for regeneration
*2 With online auto tuning (adaptive magnetic flux observer), dedicated motor, rated load

●Connection diagram



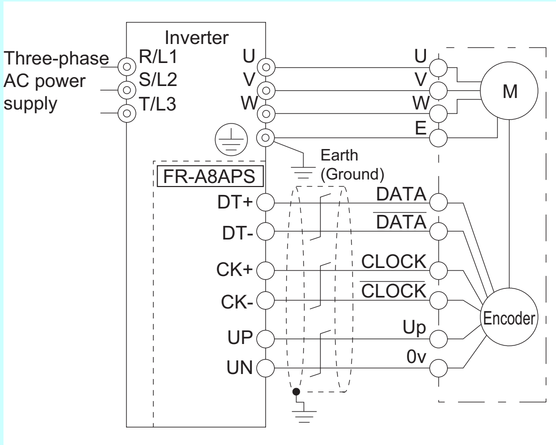
<<FR-A8APS>>

●Specifications

Function			Description
Orientation control		Repeated positioning accuracy	±1.5° Depends on the load torque, moment of inertia of the load or orientation, creep speed, position loop switching position, etc.
		Permissible speed	Rotation speed of the EnDat interface encoder-mounted shaft The drive shaft and encoder-mounted shaft must be coupled directly or via a belt (with the speed ratio of 1:1) without any mechanical looseness or slip. Gear changing shafts cannot be applied.
Encoder feedback control		Speed variation ratio	±0.1% (100% means 3600 r/min)
Vector control	Speed control	Speed control range	1:1500 (both driving/regeneration *1)
		Speed variation ratio	±0.01% (100% means 3000 r/min)
		Speed response	300 rad/s (analog command input) Note that the internal response is 600 rad/s (with model adaptive speed control)
		Maximum speed	400 Hz
	Torque control	Torque control range	1: 50
		Absolute torque accuracy	±10% *2
		Repeated torque accuracy	±5% *2
	Position control	Repeated positioning accuracy	±1.5° (at motor shaft end)
		Maximum input pulse frequency	100k pulses/s (Terminal JOG)
		Positioning feedback pulse	Different depending on the encoder resolution
		Electronic gear setting	1/50 to 20
		In-position width	0 to 32767 pulses
		Error excess	0 to 400k pulses

*1 Regeneration unit (option) is necessary for regeneration.
*2 With online auto tuning (adaptive magnetic flux observer), dedicated motor, rated load

●Connection diagram



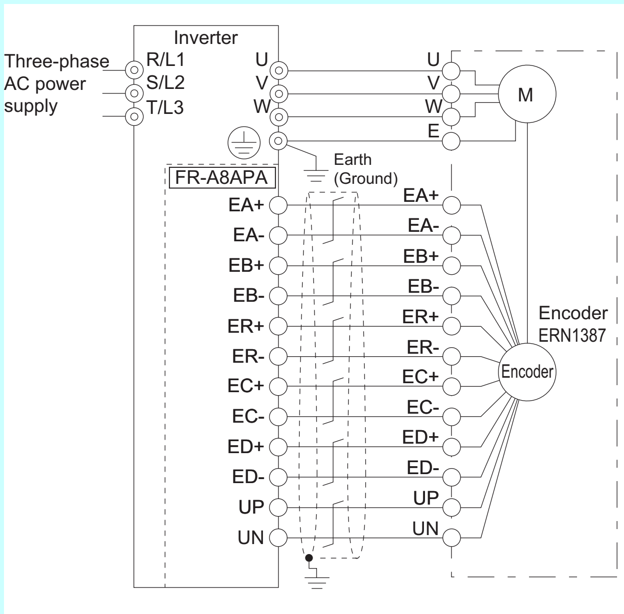
<<FR-A8APA>>

●Specifications

Function			Description
Orientation control		Repeated positioning accuracy	±1.5° Depends on the load torque, moment of inertia of the load or orientation, creep speed, position loop switching position, etc.
Encoder feedback control		Speed variation ratio	±0.1% (100% means 3600 r/min)
Vector control	Speed control	Speed control range	1:1500 (both driving/regeneration *1)
		Speed variation ratio	±0.01% (100% means 3000 r/min)
		Speed response	300 rad/s (analog command input) Note that the internal response is 600 rad/s (with model adaptive speed control)
	Torque control	Torque control range	1: 50
		Absolute torque accuracy	±10% *2
		Repeated torque accuracy	±5% *2
	Position control	Repeated positioning accuracy	±1.5° (at motor shaft end)
		Maximum input pulse frequency	100k pulses/s (Terminal JOG)
		Positioning feedback pulse	Different depending on the encoder resolution
		Electronic gear setting	1/50 to 20
		In-position width	0 to 32767 pulses
		Error excess	0 to 400k pulses

*1 Regeneration unit (option) is necessary for regeneration.
*2 With online auto tuning (adaptive magnetic flux observer), dedicated motor, rated load

●Connection diagram



16-bit digital input

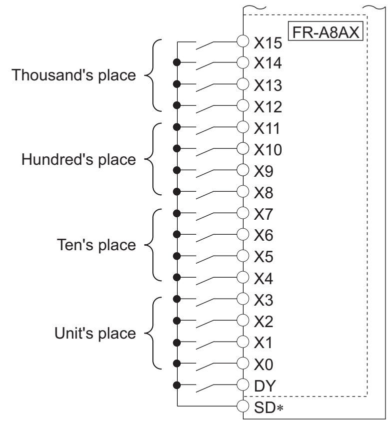
FR-A8AX (A800) (A800 Plus) (F800) FR-A8AX E kit (E800)
FR-A7AX (A701) FR-A7AX E kit (E700)

Digital input **Frequency setting of the inverter can be performed using a digital signal such as BCD code or binary code from controller.**

●Specifications

Function	Description	
Digital input	Digital input signal type	BCD code 3 digits or 4 digits Binary 12 bits or binary 16 bits
	Input specifications	Contact signal or open collector input

●Connection diagram



* Use terminal SD on the inverter.

Analog output/digital output

FR-A8AY (A800) (A800 Plus) (F800) FR-A8AY E kit (E800)
FR-A7AY (A701) FR-A7AY E kit (E700)

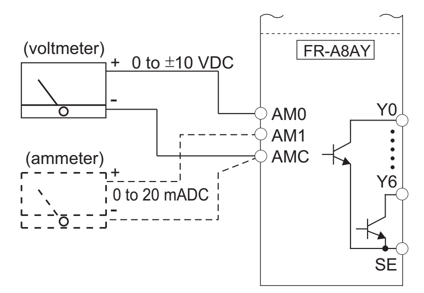
Digital output **Output signal (RUN, SU, etc.) provided with the inverter as standard can be output from the open collector terminal.**

Analog output **Analog signals such as the output frequency and output current can be output from the voltage output terminal (AM0) and current output terminal (AM1).**

●Specifications

Function	Description	
Digital output	Open collector output specifications	Permissible load 24 VDC 0.1 A
	Circuit logic	Same as the inverter (sink when shipped from factory)
Analog output	Output signal	Voltage output (across terminals AM0-AMC) FR-A8AY: 0 to ±10 VDCMAX FR-A7AY: 0 to 10 VDCMAX Current output (across terminals AM1-AMC) 0 to 20 mADC
	Wiring length	Maximum 10 m

●Connection diagram



Relay output

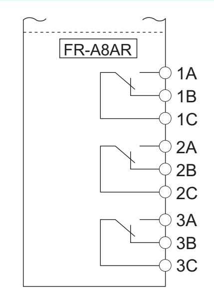
FR-A8AR (A800) (A800 Plus) (F800) FR-A8AR E kit (E800)
FR-A7AR (A701) FR-A7AR E kit (E700)

Relay output **You can select any three output signals (RUN, SU, IPF, etc.) available with an inverter as standard, and output them as relay contact (1C) signals.**

●Specifications

Function	Description	
Relay output	Contact capacity	AC230 V... 0.3 A DC30 V ... 0.3 A

●Connection diagram



Coded analog output/high-resolution analog input/ motor thermistor interface

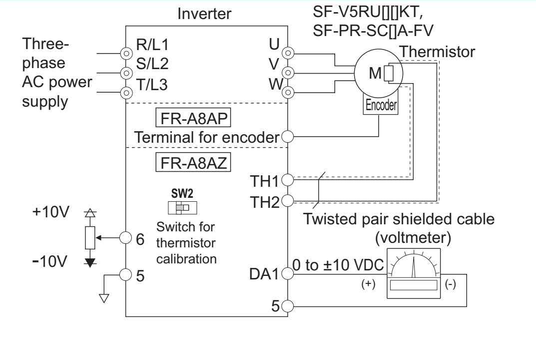
FR-A8AZ (A800) (A800 Plus)
FR-A7AZ (A701)

Coded analog output	**Outputting 0 to ±10 VDC enables output frequency, output voltage, etc. to be monitored with a DC voltage meter.**
High-resolution analog input	**Inputting 0 to ±10 VDC voltage enables speed command, torque limit command, torque command, etc.**
Motor thermistor interface	**When using the vector inverter motor equipped with a thermistor (SF-V5RU[][]KT) or the high-performance energy-saving three-phase motor with encoder (SF-PR-SC[]A-FV), the inverter can receive feedback (detected temperature) from the motor-side thermistor. The feedback is used to reduce the fluctuation of output torque.**

●Specifications

Function	Description	
Coded analog output	Output signal	Voltage output (between terminal DA1 to 5): -10 V to +10 VDC
High resolution analog input	Resolution	-10V to +10 V/16 bits
	Input resistance	10 kW
	Maximum input voltage	±20 VDC
Motor thermistor interface	Detectable motor temperature	-50 °C to 200 °C
	Torque accuracy	±3%

●Connection diagram



24 VDC input

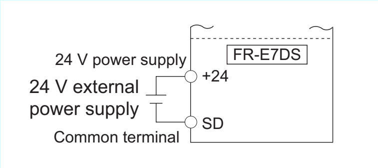
FR-E8DS E kit (E800)
FR-E7DS (E700)
Supports FR-E700-SC only.

Instead of the main circuit power supply, external power can be supplied to an inverter.
Connect the 24 V external power supply across terminals +24 and SD. The 24 V external power supply enables I/O terminal operation, operation panel displays, and control functions even while the inverter's main circuit power supply is OFF. When the main circuit power supply is turned ON, the power supply changes from the 24 V external power supply to the main circuit power supply.

●Specifications

Function	Description	
24 VDC input	Input voltage	23.5 V to 26.5 VDC
	Input current	0.7 A or lower

●Connection diagram



Changeover between inverter and high power factor converter

FR-A8AVP A800 A800 Plus

Certain inverters can be changed to high power factor converters by installing the FR-A8AVP and configuring its parameters. The following options are needed to use the converter: phase detection transformer box, dedicated filter reactor, dedicated reactor for PWM control, dedicated filter capacitor, inrush current limit resistor. The converter can be changed back to an inverter.

●Option lineup for the converter

Peripheral device	Component model	Name
FR-A8VPB-H	FR-A8VPB-H	Phase detection transformer box
FR-A8BL1-H[]	FR-A8BL1-H[]	Dedicated filter reactor
FR-A8BL2-H[]	FR-A8BL2-H[]	Dedicated reactor for PWM control
FR-A8BC-H[]	FR-A8BC-H[]	Dedicated filter capacitor

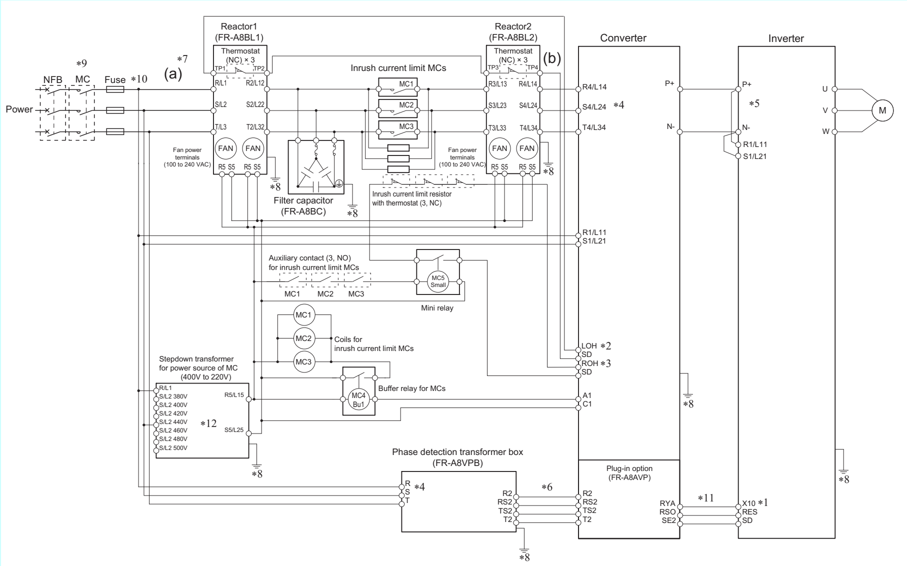
Peripheral device	Component model	Name
FR-A8MC-H[]		Dedicated circuit parts for inrush current protection
	BKO-CA2573H01	Inrush current limit resistor (without thermostat)
	BKO-CA2573H11	Inrush current limit resistor (with thermostat)
	BKO-CA2571H01	Stepdown transformer for power source of magnetic contactor (400 to 220 V)
	S-N400 AC200V 2A2B	Inrush current limit magnetic contactor
	SR-T5 AC200V 5A	Buffer relay
	MYQ4Z AC200/220	Mini relay
	PYF14T	Mini relay terminal block
	PYC-A1	Mini relay clip

●Converter rated specifications

Model FR-A842-[]	07700	08660	09620	10940	12120
	315K	355K	400K	450K	500K
Applicable inverter capacity (kW)	315	355	400	450	500
Rated output capacity *1	375	423	476	536	595
Rated voltage (V) *2*3	Three-phase 380 to 500 V 50 Hz/60 Hz *6*7				
Rated current (A)	564	636	716	806	895
Overload current rating*4	150% 60s				
Permissible power supply voltage fluctuation	323 to 506 V 50 Hz/60 Hz				
Permissible power supply frequency fluctuation	±5%				
Input power factor	0.99 or more (when load ratio is 100%)				
Power supply capacity (kVA)	456	515	580	652	724
Protective structure of the converter *5	Open type (IP00)				
Cooling system	Forced air				
Approx. mass (kg)	163	163	243	243	243

*1 DC output capacity when the input voltage is 400 VAC. Multiple ratings are not supported.
*2 Change the stepdown transformer tap according to the input voltage.
*3 The output voltage is approx. 594 VDC at an input voltage of 400 VAC, approx. 653 VDC at 440 VAC, and approx. 742 VDC at 500 VAC.
*4 The percentage of the overload current rating is the ratio of the overload current to the converter's rated input current. For repeated duty, allow time for the temperatures of the converter and the inverter to return to or below the temperatures under 100% load.
*5 FR-DU08: IP40 (except for the PU connector)
*6 The permissible voltage imbalance ratio is 3% or less. (Imbalance ratio = (highest voltage between lines - average voltage between three lines)/ average voltage between three lines × 100)
*7 The rated voltage when connecting a motor to the FR-A840-02160(75K) and FR-F840-02160(90K) or higher. If connecting a motor to inverters other than those mentioned above, the rated voltage is 380 to 480 V.

●Connection diagram



∗1 Use the Input terminal function selection to assign the X10 signal to a terminal. The signal is assigned to terminal MRS in the initial status.

∗2 The LOH signal function is assigned to terminal RT in the initial status. Set "33" in any of Pr.178 to Pr.189 (Input terminal function selection) to assign the LOH signal to another terminal.

∗3 The ROH signal function is assigned to terminal AU in the initial status. Set "34" in any of Pr.178 to Pr.189 (input terminal function selection) to assign the ROH signal to another terminal.

∗4 Confirm the correct voltage phase sequence between the converter (terminals R4/L14, S4/L24, and T4/L34) and the phase detection transformer box (terminals R, S, and T).

∗5 Do not install any MCCB between the inverter and the converter (P to P and N to N). Connecting opposite polarity of terminals P and N will damage the converter and the inverter.

∗6 Always connect terminals R2, RS2, TS2, and T2 of the FR-A8AVP installed on the converter and the identically-named terminals of the phase detection transformer box. If the inverter is operated without connecting between the terminals, the converter will be damaged.

∗7 Do not install an MCCB or MC between the reactor 1 input terminals (R/L1, S/L2, and T/L3) (a) and the converter input terminals (R4/L14, S4/L24, and T4/L34) (b) except for those specified in the connection diagram. Doing so disrupts proper operation.

∗8 Securely perform grounding (earthing) by using the grounding (earthing) terminal.

∗9 Install an MC for each phase.

∗10 Install the UL listed fuse (specified in the Instruction Manual of the FR-A8AVP) on the input side of the FR-A842 converter to meet the UL/cUL standards.

∗11 Always connect terminal RYA on the FR-A8AVP (installed on the converter) and the inverter terminal to which the X10 signal is assigned, and connect terminal SE2 on the FR-A8AVP and the inverter terminal SD (terminal PC in the source logic). Failure to do so may lead to damage of the converter.

∗12 Select a terminal S/L2 according to the input voltage.

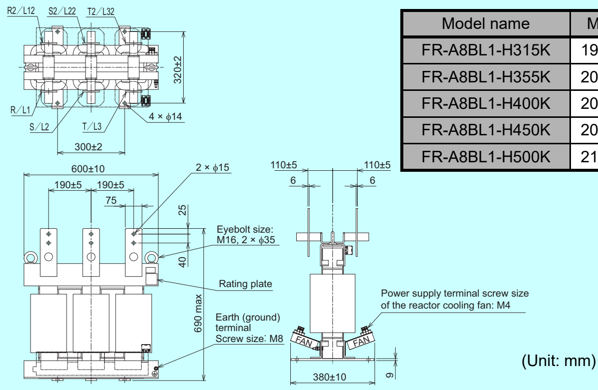
Plug-in option (control function expansion/additional I/O)

●Outline dimension drawings

<<FR-A8BL1-H315K to H500K>>

This is an example of the outer appearance, which differs depending on the model.

Model name	Mass
FR-A8BL1-H315K	198 kg
FR-A8BL1-H355K	209 kg
FR-A8BL1-H400K	209 kg
FR-A8BL1-H450K	209 kg
FR-A8BL1-H500K	215 kg



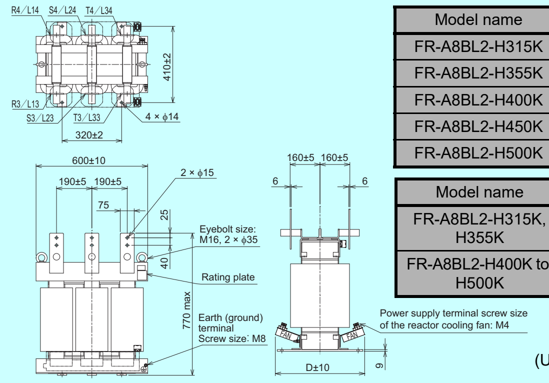
(Unit: mm)

<<FR-A8BL2-H315K to H500K>>

This is an example of the outer appearance, which differs depending on the model.

Model name	Mass
FR-A8BL2-H315K	380 kg
FR-A8BL2-H355K	385 kg
FR-A8BL2-H400K	429 kg
FR-A8BL2-H450K	457 kg
FR-A8BL2-H500K	457 kg

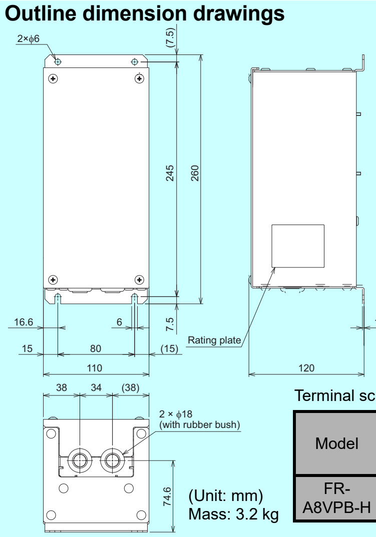
Model name	D
FR-A8BL2-H315K, H355K	460
FR-A8BL2-H400K to H500K	480



(Unit: mm)

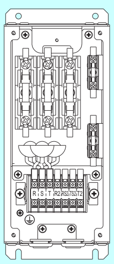
<<FR-A8VPB-H>>

Outline dimension drawings



(Unit: mm)
Mass: 3.2 kg

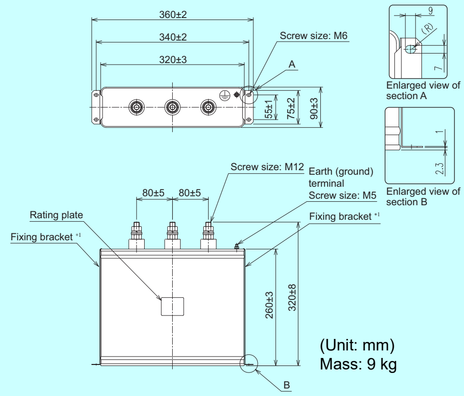
Terminal block



Terminal screw size

Model	Terminals R, S, T, R2, RS2, TS2, and T2	Earth (ground) terminal
FR-A8VPB-H	M3.5	M3.5

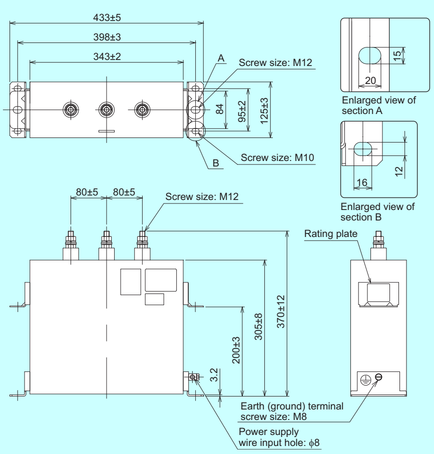
<<FR-A8BC-H400K>>



(Unit: mm)
Mass: 9 kg

*1 Attach the fixing brackets to the capacitor.

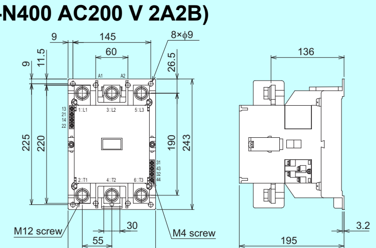
<<FR-A8BC-H500K>>



(Unit: mm)
Mass: 20 kg

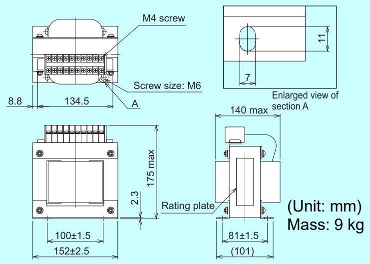
<<FR-A8MC-H355K, H500K>>

Inrush current limit MC (S-N400 AC200 V 2A2B)



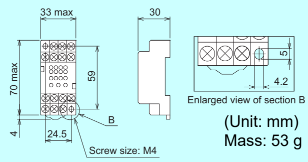
(Unit: mm)
Mass: 9.5 kg

MC power supply stepdown transformer (BKO-CA2571H01)



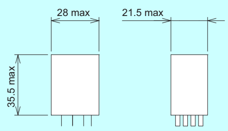
(Unit: mm)
Mass: 9 kg

Mini relay terminal block



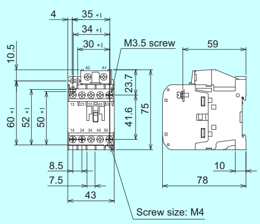
(Unit: mm)
Mass: 53 g

Mini relay (MYQ4Z AC200/220)



(Unit: mm)
Mass: 35 g

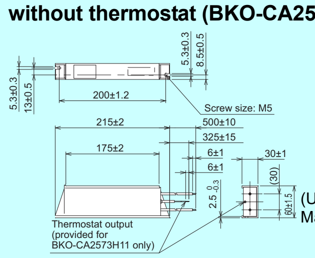
Buffer relay (SR-T5 AC200 V 5 A)



(Unit: mm)
Mass: 0.27 kg

*1 The position of the upper-left mounting hole is selectable. Combinations of the horizontal and vertical dimensions are as follows: 35 and 60, 30 and 60, 34 and 52, 35 and 50-52.

Inrush current limit resistor with thermostat (BKO-CA2573H11) without thermostat (BKO-CA2573H01)



(Unit: mm)
Mass: 0.8 kg

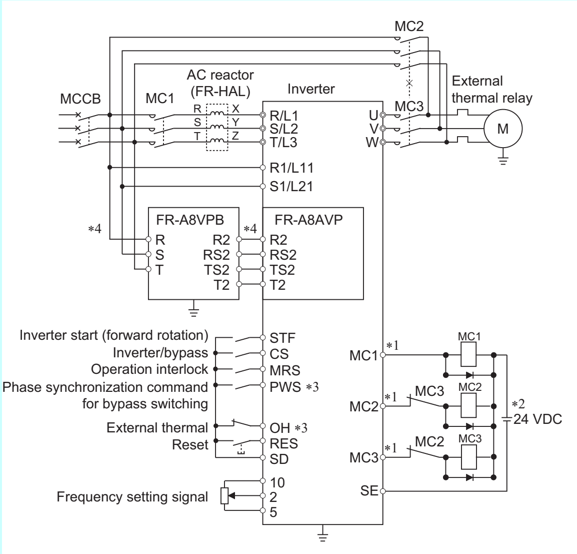
Phase-synchronized bypass switching

FR-A8AVP (A800) (A800 Plus) (F800)

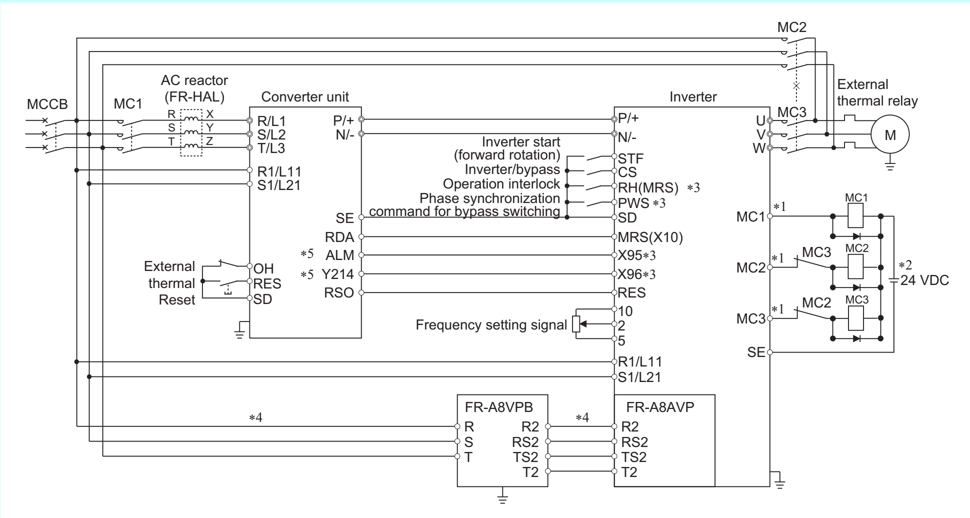
The phase-synchronized bypass switching function permits smooth switching of the motor power supply from the inverter output power to the commercial power. The shock caused by the switch is suppressed because the inverter output voltage phase is synchronized with the commercial power voltage phase. Use with a phase detection transformer box (FR-A8VPB-H).

●Connection diagram

<<Example for the standard model or IP55 compatible model of the FR-A800 series inverter>>



<<Example for the separated converter type of the FR-A800 series inverter>>



*1 Be careful of the capacity of the sequence output terminals. The applied terminals differ depending on the settings of Pr.190 to Pr.196 (Output terminal function selection).

Output terminal capacity	Output terminal permissible load
Open collector output of inverter (RUN, SU, IPF, OL, FU)	24 VDC 0.1 A
Inverter relay output (A1-C1, B1-C1, A2-B2, B2-C2) Relay output option (FR-A8AR)	230 VAC 0.3 A 30 VDC 0.3 A

*2 When connecting a DC power supply, insert a protective diode. When connecting an AC power supply, use the relay output option (FR-A8AR), and use contact outputs.

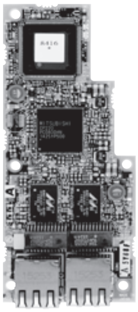
*3 The applied terminals differ depending on the settings of Pr.180 to Pr.189 (Input terminal function selection).

*4 Use the wires satisfying the following requirements for each wiring location.

Wiring location	Wire gauge (mm^2)	Total wiring length
Wiring between the power supply and the phase detection transformer box	2	10 m or less
Wiring between the phase detection transformer box and the inverter	0.75 to 1.25	5 m or less

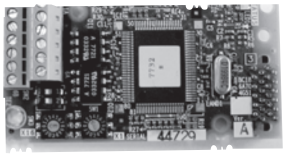
*5 To use the signal, assign the function to the output terminal using Pr.190 to Pr.195 (Output terminal function selection) in the converter unit. Always set the negative logic for the ALM signal.

Plug-in option (for communication)



800 series plug-in option example: FR-A8NCE

**This option can be mounted in the 800 series inverter.
The FR-A800 series has an inverter with communication function.**



700 series plug-in option example: FR-A7NP

**This option can be mounted in the 700 series inverter.
Some of the plug-in options of the FR-E700 series have "E-kit" attached to their names. This denotes that the option is sold as a kit and comes with a dedicated front cover (standard control circuit terminal model).
The FR-E700 series also has an inverter with communication function.**

For the communication option, only one option is connectable.

CC-Link IE TSN communication

FR-A8NCG (A800) (A800 Plus) (F800)
Built-in FR-A800-GN (A800)

**Data can be transmitted to IT systems while performing real-time cyclic communication control.
Real-time monitoring using time synchronization enables trouble analysis right after an error has occurred.**

●Specifications

Item		Description
Transmission speed		1 Gbps/100 Mbps
Minimum synchronization cycle		125.00 μs
CC-Link IE TSN authentication class		B
Communication method		Time sharing method
Synchronization function		Compliant with IEEE 802.1AS and IEEE 1588v2
Maximum number of connected units		121 units (sum of master and remote stations)
Topology		Line, star*1, ring*2, or a combination of line and star
Connection cable		Ethernet cable (IEEE 802.3 1000BASE-T compliant cable or ANSI/TIA/EIA-568-B (Category 5e) compliant shielded 4-pair branched cable)
Connector		Shielded RJ-45
Node type		Remote station
Maximum distance between nodes		100 m
Maximum number of branches		No upper limit within the same Ethernet system
Maximum cyclic size (of one node)	RX	64 bits
	RY	64 bits
	RWr	128 words
	RWw	128 words

*1 To connect only the authentication class B devices in star topology when the communication speed of the master station is 1 Gbps, use a CC-Link IE TSN compatible switching hub (TSN switching hub).
*2 Ring topology will be supported later.

CC-Link IE Field Network communication

FR-A8NCE (A800) (A800 Plus) (F800)
Built-in FR-A800-GF (A800)
FR-A7NCE (A701)

Gigabit transmission (1 Gbps) enables super-high speed communication.
Network configuration is flexible with different types of topologies.
CC-Link IE Field Network uses widely available Ethernet components, such as Ethernet cables and connectors.

●Specifications

Item	Description			
Type	Inverter plug-in option type, RJ-45 connector connection method			
Power supply	Supplied from the inverter			
Transmission speed	1 Gbps			
Communication method	Token passing			
Number of units connected	120 units at max. (64 units when all stations are inverters handling 128-word transmissions.) Different devices can be connected together.			
Maximum distance between nodes	100 m			
Maximum number of branches	No upper limit within the same Ethernet system			
Topology	Line, star, ring, or a combination of line and star			
Connection cable	Ethernet cable (IEEE 802.3 1000BASE-T compliant cable or ANSI/TIA/EIA-568-B (Category 5e) compliant shielded 4-pair branched cable)			
Connector	Shielded RJ-45			
Node type	Intelligent device station	Maximum cyclic size (of one node)	RX	64 bits
			RY	64 bits
			RWr	128 words
			RWw	128 words

CC-Link communication

FR-A8NC (A800) (A800 Plus) (F800) FR-A8NC E kit (E800)
FR-A7NC (A701) FR-A7NC E kit (E700)
Built-in FR-E700-NC (E700)

Has a maximum communication speed of 10 Mbps. Because the system employs the bus connection method, even if a module system fails due to power off, it will not affect the communication with other normal modules.

●Specifications

Item	Description
Network topology	Bus
Station type	Remote device station
Number of connectable devices	42 units maximum (occupy 1 station/unit), can be shared with other models
Supported version	Ver. 2.00 supported
Communication speed	Selectable from among 156 kbps/625 kbps/2.5 Mbps/5 Mbps/10 Mbps
Overall extension	1200 m/600 m/200 m/150 m/100 m (corresponding to the above communication speed)
Connection cable	Twisted pair cable

SSCNET III(/H) communication

FR-A8NS A800 A800 Plus
FR-A7NS A701

By communication with the Mitsubishi Electric motion controller, inverter operation and monitoring from the program on the motion controller are enabled. (SSCNET III/H communication is supported by the FR-A8NS only.)
SSCNET III(/H), which is optical network, realizes reduction in wiring length, reliability improvement, synchronous control performance improvement, and multi-axis batch control using a motion controller.
To use vector control with FR-A800 series inverters, one of the following options is required: FR-A8AP, FR-A8AL, FR-A8APR, FR-A8APS, FR-A8APA, FR-A8TP. To use vector control with FR-A700 series inverters, one of the following options is required: FR-A7AP or FR-A7AL.

●Specifications

Item	SSCNET III	SSCNET III/H
Compatible options	FR-A8NS, FR-A7NS	FR-A8NS
Communication speed	50 Mbps for two-way	150 Mbps for two-way
Wiring distance between stations	Up to 50 m	Up to 100 m
Overall length	Up to 800 m	Up to 1600 m
Selectable calculation cycle	0.444 ms, 0.888 ms or more	0.222 ms, 0.444 ms, 0.888 ms or more
Number of connectable devices	16 axis maximum	
Connection cable	SSCNET III cable (refer to **page 29**) MR-J3BUS[]M (0.15 m, 0.3 m, 0.5 m, 1 m, 3 m): standard code for enclosure MR-J3BUS[]M-A (5 m, 10 m, 20 m): standard cable for outside enclosure MR-J3BUS[]M-B (30 m, 40 m, 50 m): long-distance cable	

There are some restrictions on the SSCNET III communication according to the setting of calculation cycle.

Calculation cycle	Restrictions for the SSCNET III communication
0.222 ms	Not applicable.
0.444 ms	Up to 8 axes controlled in a system.*1 Set the axis number between 0 to 7 using the axis number switch on the FR-A8NS/FR-A7NS. An inverter set as the axis number between 8 to F cannot be recognized.
0.888ms or more	No restriction.

*1 If this calculation cycle is set for the system requiring 9 axes or more, the calculation cycle of 0.888 ms is applied.

DeviceNet™ communication

FR-A8ND A800 A800 Plus F800 FR-A8ND E kit E800
FR-A7ND A701 FR-A7ND E kit E700

DeviceNet employs CAN (Controller Area Network) and is widely used in the automotive industry.

●Specifications

Item	Description
Network topology	Bus (trunk line · branch line)
Number of connectable devices	64 inverters (including master)
Communication speed	Selectable from among 125 kbps/250 kbps/500 kbps
Overall extension	500 m/250 m/100 m (corresponding to the above communication speed)
Connection cable	DeviceNet standard thick cable or thin cable (5 wire twisted pair cable)

PROFIBUS-DP communication

FR-A8NP A800 A800 Plus F800 FR-A8NP E kit E800
FR-A7NP A701 FR-A7NP E kit E700

Has a maximum communication speed of 12 Mbps. Widely used in FA operations of the automotive and transportation industries.

●Specifications

Item	Description
Network topology	Bus
Number of connectable devices	126 inverters (including master and repeater)
Communication speed	9.6 kbps, 19.2 kbps, 93.75 kbps/187.5 kbps/500 kbps, 1.5 Mbps/3.0 Mbps, 6.0 Mbps, 12.0 Mbps
Overall extension	1200 m/600 m/200 m/100 m (corresponding to the above communication speed)
Connection cable	Profibus communication cable

LONWORKS® communication

FR-A8NL (F800)
FR-A7NL (A701) **FR-A7NL Ekit** (E700)

Decentralized control without master assures that the whole system will not stop even if any of the station fails. In addition, communication traffic can be restricted.

●Specifications

Item	Description
Network topology	Bus, free topology
Number of nodes occupied	One inverter occupies one node.
Number of connectable devices	64 units maximum including inverters in the same segment
Communication speed	78 kbps
Overall extension	Free topology: 500 m maximum, bus topology: 2700 m maximum
Connection cable	Twisted pair cable

FL remote communication

FR-A8NF (A800) (A800 Plus) (F800)
FR-A7NF (A701)
Built-in FR-E700-NF (E700)

A high speed communication of 100Mbps is obtained with an Ethernet-based network.

●Specifications

Item	Description
Network topology	Star (connection with a hub in the center), Star bus (connection with multiple hubs)
Number of connectable devices	64 units
Communication speed	10 Mbps/100 Mbps (auto detection)
Overall extension	2000 m (Between node-hub: 100 m maximum, between hubs: 100 m maximum)
Connection cable	FL-net dedicated cable

Other communication options

Communication is also possible using the following options manufactured by HMS Industrial Networks AB. Please contact your sales representative for information on supported models.

●EtherCAT® communication
A8NECT_2P
E7NECT_2P: FR-E700-TM only.

●EtherNet/IP communication
A8NEIP_2P

●PROFINET communication
A8NPRT_2P

●PROFIBUS-DP communication (DP-V1)
A8NDPV1

Control terminal option

Vector control terminal block

FR-A8TP (A800) (A800 Plus)

Use the option in exchange with standard control circuit terminals. The 24 VDC power supply can be used for the encoder of the SF-V5RU.

●Control terminal specifications

<<Input signal>>

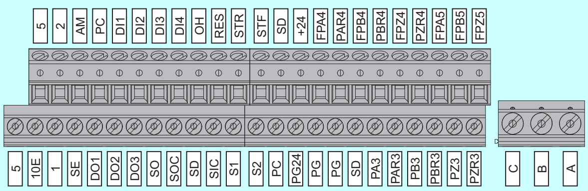
Function	Terminal symbol	Terminal name	Rated specification
Contact input	DI1 to DI4	Digital input terminal 1 to 4	Input resistance: 4.7 kΩ Voltage when contacts are open: 21 to 27 VDC Current when contacts are short-circuited: 4 to 6 mADC When terminal DI4 is used as a pulse train input terminal: Input resistance: 2 kΩ When contacts are short-circuited: 8 to 13 mADC
	OH	Thermal protector input	Input resistance: 940 Ω Voltage when contacts are open: 21 to 27 VDC Current when contacts are short-circuited: 140 to 180 mADC
Encoder signal	PA3	Control terminal option / A-phase signal input terminal	Differential line driver/ Complementary
	PAR3	Control terminal option / A-phase inverse signal input terminal	Differential line driver
	PB3	Control terminal option / B-phase signal input terminal	Differential line driver/ Complementary
	PBR3	Control terminal option / B-phase inverse signal input terminal	Differential line driver
	PZ3	Control terminal option / Z-phase signal input terminal	Differential line driver/ Complementary
	PZR3	Control terminal option / Z-phase inverse signal input terminal	Differential line driver
	PG	Encoder power supply terminal (positive side)	—

Specifications are the same as those of the standard control circuit terminals for the input signals (STF, STR, RES, SD, PC, 10E, 2, 1, 5, and +24) and the output signals (A, B, C, AM, S1, S2, SIC, So (SO), and SOC).

<<Output signal>>

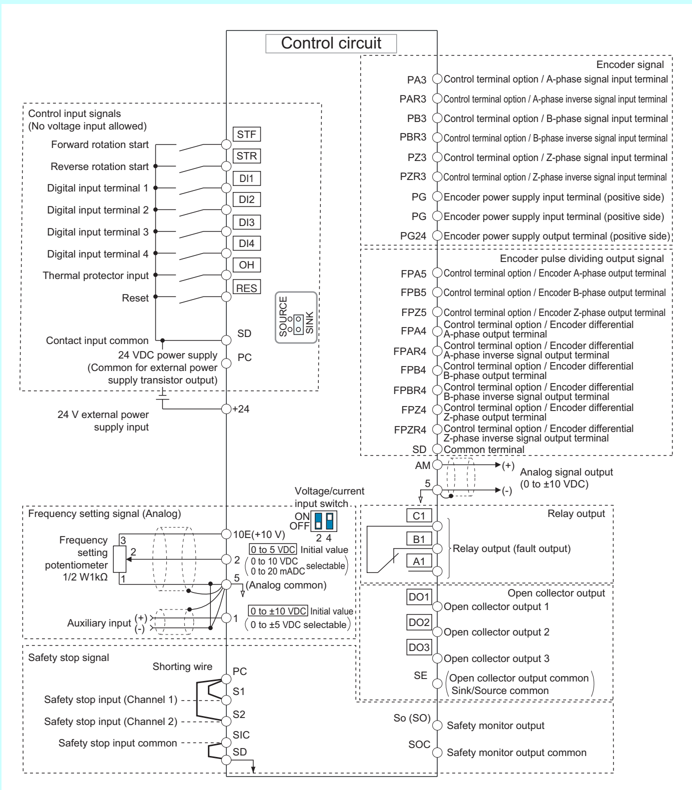
Function	Terminal symbol	Terminal name	Rated specification
Open collector	DO1 to DO3	Digital output terminal 1 to 3	Open collector output Permissible load: 24 to 27 VDC, 0.1 A
	SE	Open collector output common	—
Encoder pulse dividing output	FPA5	Control terminal option / Encoder A-phase output terminal	Open collector output Permissible load: 24 to 27 VDC, maximum 50 mA
	FPB5	Control terminal option / Encoder B-phase output terminal	
	FPZ5	Control terminal option / Encoder Z-phase output terminal	
	FPA4	Control terminal option / Encoder differential A-phase output terminal	Differential line driver output Permissible load: 40 mA
	FPAR4	Control terminal option / Encoder differential A-phase inverse signal output terminal	
	FPB4	Control terminal option / Encoder differential B-phase output terminal	
	FPBR4	Control terminal option / Encoder differential B-phase inverse signal output terminal	
	FPZ4	Control terminal option / Encoder differential Z-phase output terminal	
	FPZR4	Control terminal option / Encoder differential Z-phase inverse signal output terminal	
Power supply output for encoder	PG24	Encoder power supply terminal (positive side)	24 to 26.4 VDC 80 mA

●Terminal layout



Tightening torque: 0.5 N·m to 0.6 N·m (terminals A, B, and C)
0.22 N·m to 0.25 N·m (terminals other than described above)
Small flat-blade screwdriver (Tip thickness: 0.4 mm / tip width: 2.5 mm)

●Terminal connection diagram (sink logic)

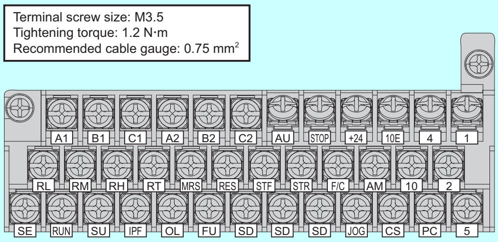


Screw terminal block

FR-A8TR A800 A800 Plus F800

The option replaces the standard control circuit terminal block.

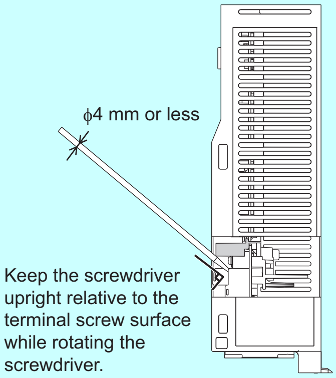
●Terminal layout

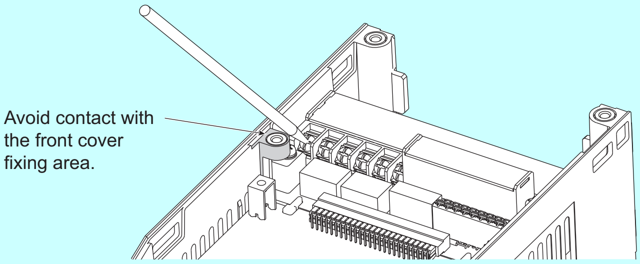


●Restrictions for the FR-A8TR

As compared with the standard control circuit terminal block, the FR-A8TR has the following restrictions.

- Terminals +24, 10E, 4, STOP, and AU cannot be used when using the plug-in option FR-A8NS.
- Because the height is restricted, two wires cannot be wired to upper-row terminals (except for terminals A1, B1, C1, A2, B2, and C2) and middle-row terminals on the terminal block.
- The safety stop function is not available.
- For the connection to terminal 1, use a screwdriver with a diameter of 4 mm or less. To avoid contact with the front cover fixing area, put the screwdriver upright relative to the terminal screw surface.
- Not compatible with the FR-A800-E or FR-F800-E.





Control circuit terminal block with 12V encoder power supply FR-A7PS A701

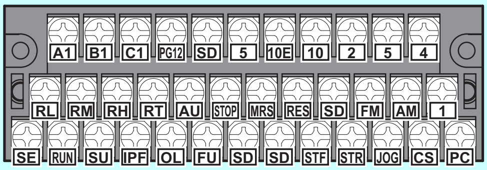
Use the option in exchange with standard control terminals. This option enables the inverter to supply the 12 V power source for the encoder.

●Specifications

Terminal Symbol	Terminal Name	Rated Specifications
PG12	Encoder power supply terminal (Positive side)	12 VDC±10% Permissible maximum load current 150 mA
SD	Contact input common (sink), Power supply ground terminal	Power supply common

The control circuit terminal specifications not shown above are the same as the specifications of the standard terminal block.

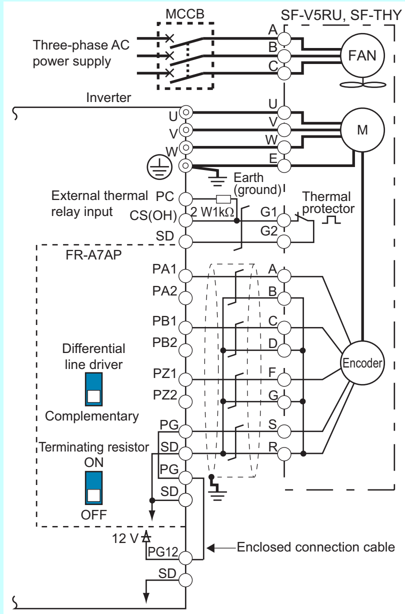
●Terminal layout



●Main differences and compatibilities with the standard terminal block

Standard Terminal Block	FR-A7PS
Without 12 VDC power supply for encoder	With 12 VDC power supply for encoder
Two relay contact terminals (terminal A1, B1, C1, A2, B2, C2)	One relay contact terminal (terminal A1, B1, C1)
Pr. 196 ABC2 terminal function selection	The *Pr. 196* setting is invalid.
One terminal 5	Two terminal 5

●Wiring example of FR-A7AP (Sink logic)



RS-485 2-port terminal block

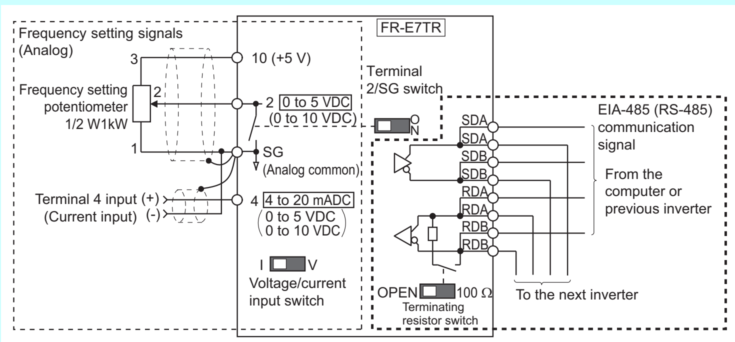
FR-E7TR (E700)

Use the option in exchange with standard control circuit terminals. (This option cannot be used simultaneously with the operation panel (FR-PA07) or parameter unit (FR-PU07).) This terminal block enables RS-485 communication. Multi-drop connection can be easily performed with separate input and output terminals.

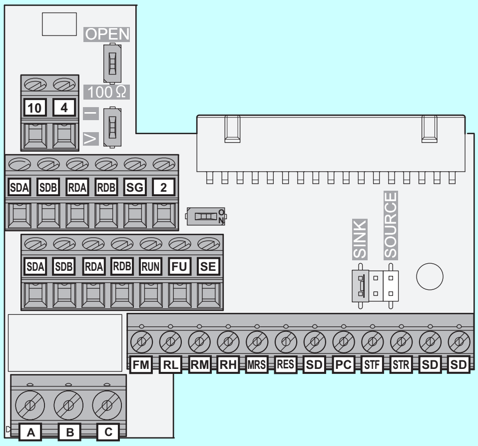
●Control terminal specifications

<table>
<tr><th colspan="2">Terminal Symbol</th><th>Terminal Name</th><th>Rated Specifications</th></tr>
<tr><td rowspan="4">RS-485 communication</td><td>SDA (2 terminals)</td><td>Inverter send+</td><td rowspan="4">
<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Communication protocol</td><td>Mitsubishi inverter protocol (computer link communication), MODBUS®RTU protocol</td></tr>
<tr><td>Conforming standard</td><td>EIA-485 (RS-485)</td></tr>
<tr><td>Number of connectable devices</td><td>32 units maximum</td></tr>
<tr><td>Communication speed</td><td>4800/9600/19200/38400 bps</td></tr>
<tr><td>Communication method</td><td>Half-duplex system</td></tr>
<tr><td>Terminating resistor</td><td>100 Ω (valid/invalid can be changed with a terminating resistor switch)</td></tr>
</table>
</td></tr>
<tr><td>SDB (2 terminals)</td><td>Inverter send-</td></tr>
<tr><td>RDA (2 terminals)</td><td>Inverter receive+</td></tr>
<tr><td>RDB (2 terminals)</td><td>Inverter receive-</td></tr>
<tr><td rowspan="3">Frequency setting</td><td>10</td><td>Frequency setting power supply</td><td>5.2 VDC±0.2 V
Permissible load current 10 mA</td></tr>
<tr><td>2</td><td>Frequency setting (voltage)/Common terminal</td><td>When voltage is input: input resistance 10 kΩ±1 kΩ
Permissible maximum load voltage 20 VDC
When selected with SG: common terminal</td></tr>
<tr><td>4</td><td>Frequency setting (current)</td><td>When current is input: input resistance 233 Ω±5 Ω
Permissible load current 30 mA
When voltage is input: input resistance 10 kΩ±1 kΩ
Permissible maximum load voltage 20 VDC</td></tr>
<tr><td colspan="2">SG</td><td>RS-485 communication common, Analog common</td><td>Common terminal</td></tr>
</table>

●Terminal connection diagram



●Terminal layout



Dedicated cable option

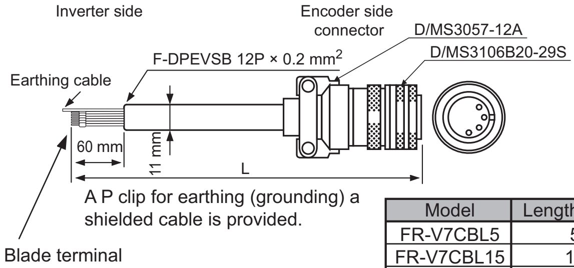
Encoder cable

FR-V7CBL[][] A800 A800 Plus E800 A701
FR-JCBL[][] A800 A800 Plus E800 A701

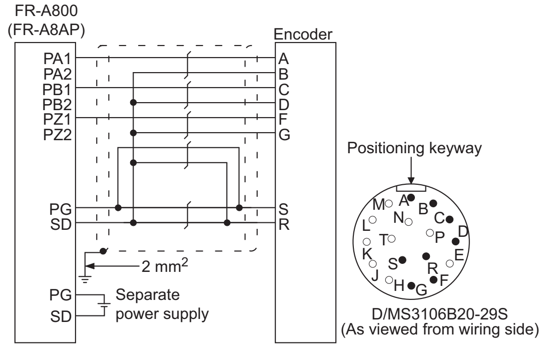
Dedicated cable for connecting encoder signal from the motor to the inverter.

●Outline dimension drawings, connection diagram

<<FR-V7CBL[][]>>
Motor: SF-PR-SC*1/SF-V5RU
Option: FR-A8AP/FR-A8AL/FR-A8TP/FR-A7AP/FR-A7AL

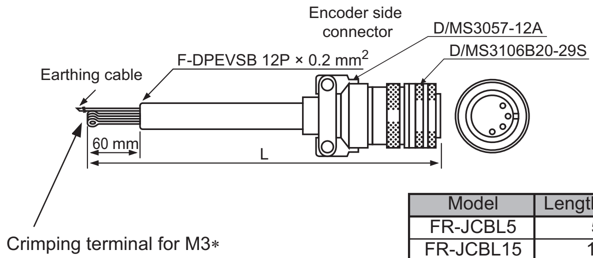


Model	Length L (m)
FR-V7CBL5	5
FR-V7CBL15	15
FR-V7CBL30	30



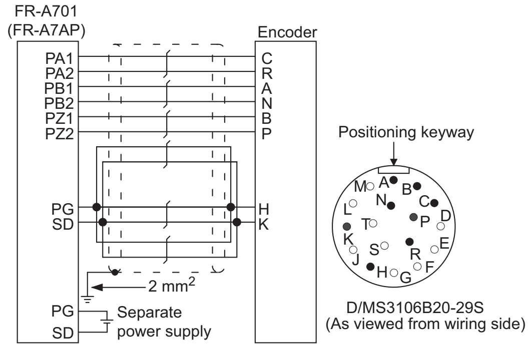
*1 When using an outdoor type or dustproof/waterproof type motor, use the FR-B4CBL instead.

<<FR-JCBL[][]>>
Motor: SF-JR with encoder
Option: FR-A8AP/FR-A8AL/FR-A8TP/FR-A7AP/FR-A7AL



Model	Length L (m)
FR-JCBL5	5
FR-JCBL15	15
FR-JCBL30	30

* Change to blade terminal when used with the FR-A8AP/FR-A8AL/FR-A8TP/FR-A7AP/FR-A7AL.

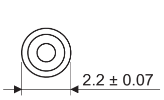
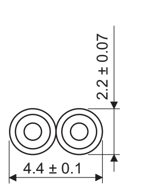
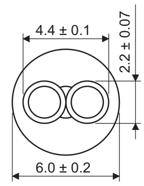
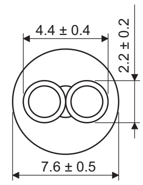


SSCNET III cable

MR-J3BUS[]M(-A, -B) (A800) (A800 Plus) (A701)

Dedicated cables are available for SSCNET III(/H) connection. The cables can be used for the inverter with the following plug-in options.
800 series: FR-A8NS
700 series: FR-A7NS

●Specifications

Model*1		MR-J3BUS[]M		MR-J3BUS[]M-A	MR-J3BUS[]M-B
Applications		Standard code for enclosure		Standard cable for outside enclosure	Long distance cable
Flexing life		Standard		Standard	High flexion
Length (m)		0.15	0.3 to 3	5 to 20	30 to 50
Optical cable (code)	Minimum bending radius (mm)*2	25		Reinforced sheath portion of cable: 50 Code section: 25	Reinforced sheath portion of cable: 50 Code section: 30
	Tension strength	70 N	140 N	420 N (Reinforced sheath portion of cable)	980 N (Reinforced sheath portion of cable)
	Operating temperature range*3	-40 to 80 °C			-20 to 70 °C
	Atmosphere	Indoor (avoid direct sunlight) No medium nor oil should be attached			
	Appearance (mm)				

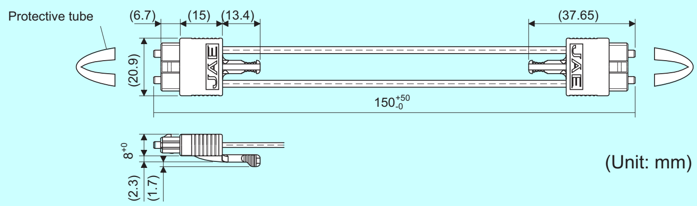
*1 [] of model indicates the cable length.

Symbol	015	03	05	1	3	5	10	20	30	40	50
Length (m)	0.15	0.3	0.5	1	3	5	10	20	30	40	50

*2 Make sure to lay the cable with greater radius than the minimum bend radius. Do not press the cable to edges of equipment or others.
*3 This operating temperature range is the value for optical cable (code) only. The temperature conditions of the connector section is the same as the inverter.

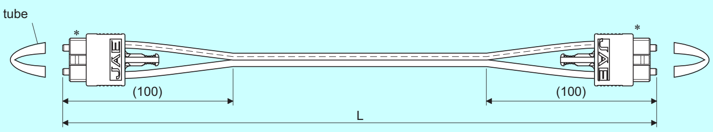
●Outline dimension drawings

<<MR-J3BUS015M>>



(Unit: mm)

<<MR-J3BUS03M to MR-J3BUS3M>>

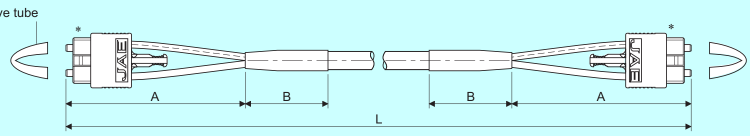


(Unit: mm)

* The size of the connector section is the same as the MR-J3BUS015M.

Cable Model	MR-J3BUS03M	MR-J3BUS05M	MR-J3BUS1M	MR-J3BUS3M
Length L (m)	0.3	0.5	1	3

<<MR-J3BUS5M-A to MR-J3BUS20M-A, MR-J3BUS30M-B to MR-J3BUS50M-B>>



* The size of the connector section is the same as the MR-J3BUS015M.

Cable Model	MR-J3BUS5M-A	MR-J3BUS10M-A	MR-J3BUS20M-A	MR-J3BUS30M-B	MR-J3BUS40M-B	MR-J3BUS50M-B
Length A (mm)	100			150		
Length B (mm)	30			50		
Length L (m)	5	10	20	30	40	50

Operation panel option

LCD operation panel

FR-LU08(-01) A800 A800 Plus F800 E800

The option is not compatible with the FR-E800-E and FR-E800-SCE.

The LCD operation panel is capable of displaying text and menus.

●Features

- Replacement with the operation panel (FR-DU08) and installation on the enclosure surface using a connection cable (FR-CB2) are possible. (To connect the FR-LU08, an optional operation panel connection connector (FR-ADP) is required.)
- Parameter settings for up to three inverters can be stored.
  (For the FR-E800 series, parameter settings of one inverter can be stored.)
- When the FR-LU08 is connected to the inverter, the internal clock of the inverter can be synchronized with the clock of FR-LU08. (Real time clock function)
  With a battery (CR1216), the FR-LU08 time count continues even if the main power of the inverter is turned OFF. (The time count of the inverter internal clock does not continue when the inverter power is turned OFF.)
- The FR-LU08-01 meets the IP55 rating (except for the PU connector).

FR-LU08

Parameter unit

FR-PU07 ALL

The option is not compatible with the FR-E800-E and FR-E800-SCE.

Interactive parameter unit with LCD display.

●Features

- Remove an operation panel to connect a parameter unit.
- Setting functionality such as direct input method with a numeric keypad, operation status indication, and help function are usable.
- Eight languages can be displayed.
- The FR-PU07 can store parameter settings of up to three inverters.
  (For the FR-A800, FR-A800 Plus, FR-F800, and FR-E800 series, parameter settings of one inverter can be stored.)

FR-PU07

Parameter unit with battery pack

FR-PU07BB(-L) A800 A800 Plus F800 E800 A701 E700

The option is not compatible with the FR-E800-E and FR-E800-SCE.

This parameter unit enables parameter setting without connecting the inverter to power supply.
Uses 4 × AA batteries. Can also be powered by an external 100 VAC power supply.

●Specifications

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td rowspan="3">Power supply</td><td>• When driven by batteries</td><td>AA batteries four
(nickel hydride(NiMH)/alkali)</td></tr>
<tr><td>• When driven by external power supply (100 VAC)</td><td>AC adaptor *1</td></tr>
<tr><td>• When power is applied to the inverter</td><td>Power is supplied from the PU connector of the inverter.</td></tr>
<tr><td>Battery life *2</td><td colspan="2">
<table>
<tr><th rowspan="2"></th><th colspan="4">Alkaline battery</th><th colspan="4">Nickel metal hydride battery</th></tr>
<tr><th>A800/
F800</th><th>E800</th><th>A701</th><th>E700</th><th>A800/
F800</th><th>E800</th><th>A701</th><th>E700</th></tr>
<tr><td>Battery life</td><td>Approx. 90 min</td><td>Approx. 260 min</td><td>Approx. 90 min</td><td>Approx. 260 min</td><td>Approx. 120 min</td><td>Approx. 340 min</td><td>Approx. 120 min</td><td>Approx. 340 min</td></tr>
<tr><td>Battery exhaustion warning lamp color changing start time From green to orange (at lowering of battery power)</td><td colspan="4">Approx. 10 min before</td><td colspan="4">Approx. 10 min before</td></tr>
</table>
</td></tr>
<tr><td>Switch / connector</td><td colspan="2">Battery ON/OFF switch
Modular connector for inverter connection and connector for AC adaptor connection</td></tr>
<tr><td>Display functions</td><td colspan="2">Alarm LED for battery exhaustion, Other display is the same as the FR-PU07.</td></tr>
<tr><td>Provided appliances</td><td colspan="2">AA alkali battery (for operation check) four *3
Connection cable (FR-CB203) one</td></tr>
</table>

*1 Use an AC adapter with the following specifications.

Output specifications	Rated voltage	5.0 VDC±5% or less
	Rated current	2 A or more
	Polarity	Plus polarity in the center.
	Plug	JEITA RC-5320A compliant

*2 The battery life is a reference value. It differs depending on the battery and the usage.
*3 Batteries are not included in FR-PU07BB-L.

FR-PU07BB(-L)

Operation panel connection connector Enclosure surface operation panel

FR-ADP A800 A800 Plus F800 A701

FR-PA07 E800 E700 F700PJ D700

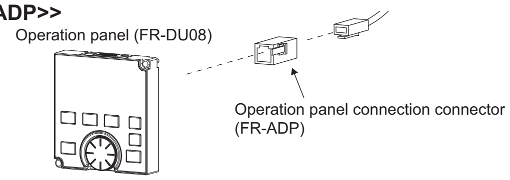
The option is not compatible with the FR-E800-E and FR-E800-SCE.

FR-ADP Use this connector to mount an operation panel, which is detached from a 800 series or FR-A701 series inverter, to an enclosure surface.

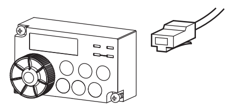
FR-PA07 This operation panel can be mounted to an enclosure surface to enable inverter operation and monitoring of frequency, etc. (This product does not have the parameter copy function.)

●Appearance diagram

<<FR-ADP>>



<<FR-PA07>>



Parameter unit connection cable

FR-CB20[] ALL

The option is not compatible with the FR-E800-E and FR-E800-SCE.

This cable is for connection of operation panel or parameter unit.

●Specifications

Model	Length
FR-CB201	1 m
FR-CB203	3 m
FR-CB205	5 m

Software

FR Configurator2

SW1DND-FRC2 A800 A800 Plus F800 E800 E700

This product contains FR-SW3-SETUP-WE and FR-SW1-SETUP-WE software.

From inverter startup to maintenance, this versatile software allows the user to specify settings easily at the computer.

<<SW1DND-FRC2>>

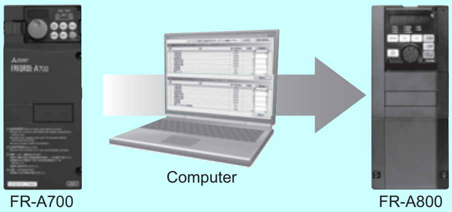
The connection with a personal computer can be easily established with a USB cable.
By loading trace data and parameter settings copied to a USB memory device into FR Configurator2, analysis and adjustments can be carried out with ease away from the equipment.
Connected inverters are displayed in tree view format. Windows for each function can be accessed by changing the tab for maximum efficiency.
The Developer function is used for creating sequence programs and writing them to the inverter to enable the use of the PLC function of the inverter.

●Specifications (compatible operating systems)

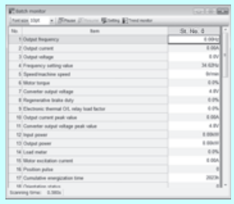
Windows® 10 (Home, Pro, Enterprise, IoT Enterprise (64-bit)), Windows® 8.1, Windows® 7 SP1 or later (Professional, Enterprise)

●Function

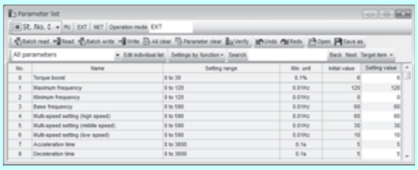
- System settings (available in the free trial version)
- Test operation (available in the free trial version)
- Conversion function (available in the free trial version)
- Ethernet parameter setting (available in the free trial version)
- Parameter list (available in the free trial version)
- USB memory parameter copy file edit
- Batch monitor function
- Offline auto tuning
- Diagnosis (fault history) (available in the free trial version)
- AI fault diagnosis
- Help (available in the free trial version)
- Graph function
- Service life check (available in the free trial version)
- Developer function
- Firmware Update Tool (available in the free trial version)



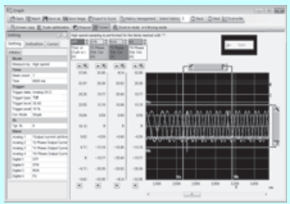
Conversion function



Batch monitor function



Parameter list



Graph function

The free trial version with limited functions can be downloaded at Mitsubishi Electric FA Global Website.

Function	Free trial version
Parameter list	○
Diagnosis	○
AI fault diagnosis	×
Graph	×
Batch monitor	×
Test operation	○
Convert	○
Developer	×

Function	Free trial version
USB memory parameter copy file edit	×
Ethernet parameter setting	○
iQSS backup file conversion	○
Firmware Update Tool	○
Help	○

A full functional trial version, which has the same functionality as the release version, is also offered for a limited period of 30 days.

<<FR-SW3-SETUP-WE>>

It is connected to the inverter through RS-485 communication. The FR-A701 and E700 series inverters can be easily connected to the personal computer with USB cable.
Use FR-SW3-SETUP-WE (CC-Link seamless) to facilitate setups via CC-Link communication.

●Specifications

Type	FR-SW3-SETUP-WJ	FR-SW3-SETUP-WJ (CC-Link seamless)
Supported inverters	FR-A701, FR-E700 *1, FR-F700PJ, FR-D700	FR-A701, FR-E700 *1
Supported OS	Windows® 10, Windows® 8.1, Windows® 8.1 (Pro, Enterprise), Windows® 8, Windows® 7 (32-bit, 64-bit), Windows Vista® SP1 or more (32-bit)	

*1 Excluding the FR-E700-NF and FR-E700-NE.

●Function

- Parameter read, write
- Inverter operating status monitor
- Test operation
- High speed graph function with minimum of 1 ms sampling (only in case of USB cable connection *2)
- Easy setup function
- Convert function which automatically converts parameters of the conventional series inverters to the 700 series inverters *2
- I/O terminal function assignment function *2
- Life check function

*2 Not supported by FR-SW3-SETUP-WE (CC-Link seamless).

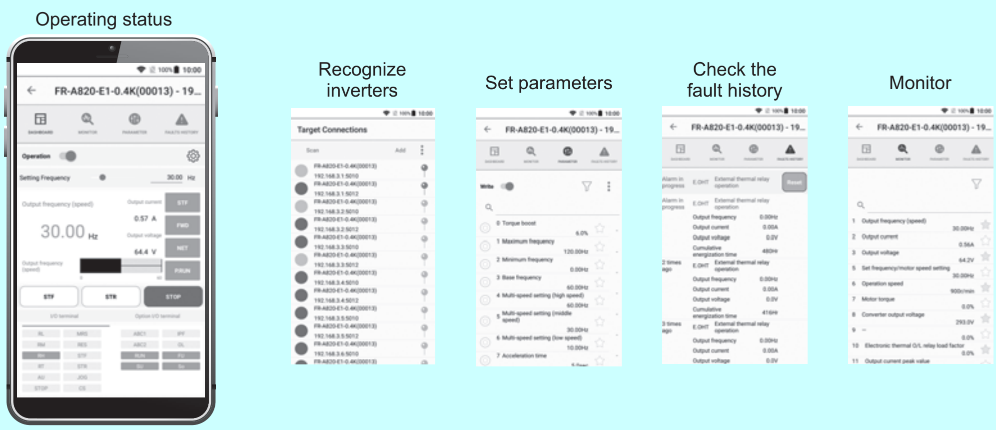
FR Configurator Mobile

A800 A800 Plus F800 E800

Wireless access with inverters from a remote location enables setting or changing of parameters, starting and stopping, and monitoring on the screen of mobile devices.
Users can easily monitor the inverter operation by checking data such as the running frequency and status of input and output terminals at a glance in one screen.
Wireless communication equipment must be prepared in the system that includes the inverter.

●Compatible inverters

FR-A800-E, FR-F800-E, FR-E800-E, FR-E800-SCE



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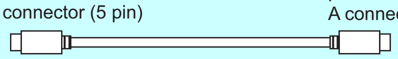
USB cable

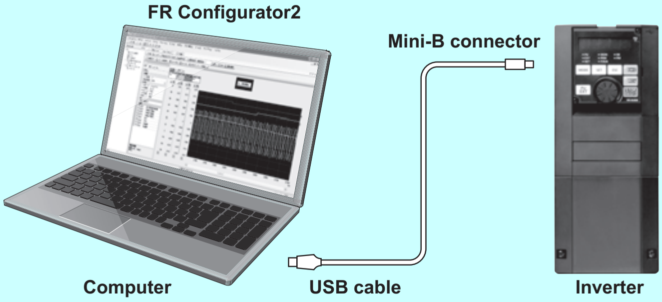
MR-J3USBCBL3M A800 A800 Plus F800 E800 E700

USB cable for communication with the inverter using the USB port of the PC.
(Since a USB connector for the FR-A701 series inverter is B connector, this cable cannot be used.)

●Appearance diagram

<<MR-J3USBCBL3M>>





Reactor

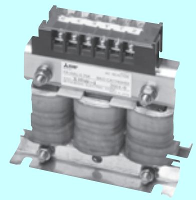
AC reactor

FR-HAL (A800) (A800 Plus) (F800) (E800) (E700) (F700PJ) (D700)

An AC reactor connected on the input side of the inverter improves power factor and reduces harmonic currents on the input side.

●Specifications

Model FR-HAL-[][]	200 V	400 V
	0.4K to 110K*1	H0.4K to H560K*1
Power factor improvement effect*2	Power factor at power supply: About 88% (92.3%*3) with 100% load	
Vibration	5.9 m/s^2 or less 10 to 55 Hz (directions of X, Y, Z axes)	H110K or lower: 5.9 m/s^2 or less H185K or higher: 2.9 m/s^2 or less 10 to 55 Hz (directions of X, Y, Z axes)
Installation procedure	(H)55K or lower: horizontal plane installation or vertical plane installation (H)75K or higher: horizontal plane installation	



FR-HAL

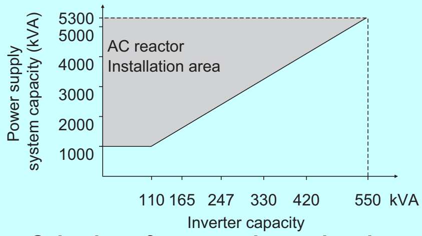
*1 Refer to the model in the table of outline dimension drawing for details of capacity.

*2 Power factor stated above is the value when considering the power supply impedance is 1%. The value changes according to the power supply capacity and power supply impedance.
The load is considered as 100% when the fundamental current value specified in JEM-TR201 is 100%. The power factor improving effect is slightly lower when the motor below 0.4 kW is used.

*3 Improved power factor is about 88%. (It is 92.3% when calculated by applying 1 power factor to the reference waveform according to the Architectural Standard Specifications (Electrical Installation) (2013 revisions) supervised by the Ministry of Land, Infrastructure, Transport and Tourism of Japan.)

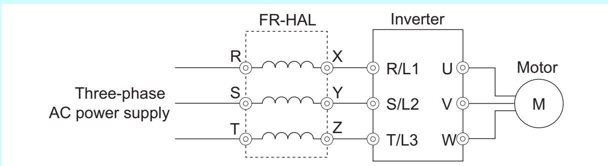
●Selection

- Make selection according to the applicable motor capacity. (When the inverter capacity is larger than the motor capacity, make selection according to the motor capacity.)
- When the inverter is connected under a large-capacity power transformer (1000 kVA or more transformer) or when a power capacitor is to be switched over, an excessive peak current may flow in the power input circuit, damaging the inverter. Be sure to install an AC reactor in such a case.



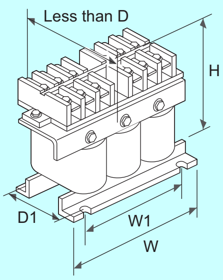
<Selection of reactor when using the large-capacity power transformer>

●Connection diagram



●Outline dimension drawings

- The appearance of a typical model. The shape differs according to each model.
- W1 and D1 indicate distances between installation holes. The installation hole size is indicated by d.
- Keep enough clearance around the reactor because it heats up.
(Keep a clearance of minimum 10cm each on top and bottom and minimum 5cm each on right and left regardless of the installation orientation.)



(Unit: mm)

	Model	W	W1	H	D	D1	d	Mass (kg)
200 V	0.4K	104	84	99	72	40	M5	0.6
	0.75K	104	84	99	74	44	M5	0.8
	1.5K	104	84	99	77	50	M5	1.1
	2.2K	115	40	115	77	57	M6	1.5
	3.7K	115	40	115	83	67	M6	2.2
	5.5K	115	40	115	83	67	M6	2.3
	7.5K	130	50	135	100	86	M6	4.2
	11K	160	75	164	111	92	M6	5.2
	15K	160	75	167	126	107	M6	7.0
	18.5K	160	75	128	175	107	M6	7.1
	22K	185	75	150	158	87	M6	9.0
	30K	185	75	150	168	87	M6	9.7
	37K	210	75	175	174	82	M6	12.9
	45K	210	75	175	191	97	M6	16.4
	55K	210	75	175	201	97	M6	17.4
	75K	240	150	210	213	109	M8	23
	110K	330	170	325	258	127	M10	40

	Model	W	W1	H	D	D1	d	Mass (kg)
400 V	H0.4K	135	120	115	59.6	45	M4	1.5
	H0.75K	135	120	115	59.6	45	M4	1.5
	H1.5K	135	120	115	59.6	45	M4	1.5
	H2.2K	135	120	115	59.6	45	M4	1.5
	H3.7K	135	120	115	70.6	57	M4	2.5
	H5.5K	160	145	142	72	55	M4	3.5
	H7.5K	160	145	142	91	75	M4	5.0
	H11K	160	145	146	91	75	M4	6.0
	H15K	220	200	195	105	70	M5	9.0
	H18.5K	220	200	215	170	70	M5	9.0
	H22K	220	200	215	170	70	M5	9.5
	H30K	220	200	215	170	75	M5	11
	H37K	220	200	214	170	100	M5	12.5
	H45K	280	255	245	165	80	M6	15
	H55K	280	255	245	170	90	M6	18
	H75K	205	75	170	208	105	M6	20
	H110K	240	150	225	220	99	M8	28
	H185K	330	170	325	270	142	M10	55
	H280K	330	170	325	320	192	M10	80
	H355K	330	170	325	340	192	M10	80
	H560K	450	300	540	635	345	M12	190

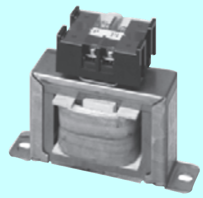
DC reactor

FR-HEL (A800) (A800 Plus) (F800) (E800) (E700) (F700PJ) (D700)

A DC reactor connected on the DC side of the inverter improves power factor and reduces harmonic currents on the input side.

●Specifications

Type FR-HEL-[][]	200 V	400 V
	0.4K to 110K*1	H0.4K to H355K*1
Power factor improvement effect*2	Power factor at power supply: About 93% (94.4%*3)	
Vibration	5.9 m/s^2 or less, 10 to 55 Hz (directions of X, Y, Z axes)	
Installation procedure	(H) 55K or lower: Horizontal installation or vertical installation (H) 75K or higher: Horizontal installation	



FR-HEL

*1 Refer to the type in the table of outline dimension drawing for details of capacity.

*2 Power factor stated above is the value when considering the power supply impedance is 1%. The value changes according to the power supply capacity and power supply impedance.
The load is considered as 100% when the fundamental current value specified in JEM-TR201 is 100%. The power factor improving effect is slightly lower when the motor below 0.4kW is used.

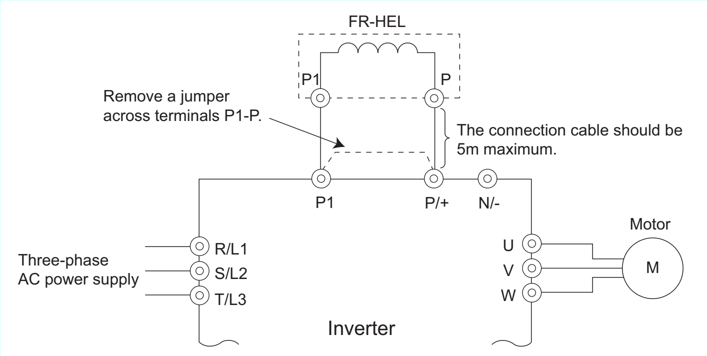
*3 Improved power factor is about 93%. (It is 94.4% when calculated by applying 1 power factor to the reference waveform according to the Architectural Standard Specifications (Electrical Installation) (2013 revisions) supervised by the Ministry

●Selection

- Make selection according to the applicable motor capacity. (When the inverter capacity is larger than the motor capacity, make selection according to the motor capacity.)
- For the 75K or higher inverters, or whenever a 75kW or higher motor is used, always connect a DC reactor.

●Connection diagram

- Connect the reactor to terminal P1 and P of the inverter. Make sure to remove a jumper across terminal P1-P before connecting. (A failure to do so will produce no power factor improving effect.)
- The wiring length between the reactor and inverter should be 5m maximum and minimized.



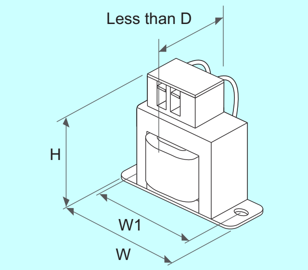
●Outline dimension drawings

- The appearance of a typical model. The shape differs according to each model.
- W1 and D1 indicate distances between installation holes. The installation hole size is indicated by d.
- Keep enough clearance around the reactor because it heats up.
(Keep a clearance of minimum 10cm each on top and bottom and minimum 5 cm each on right and left regardless of the installation orientation.)

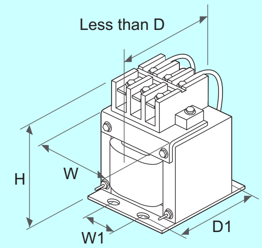
(Unit: mm)

	Model	W	W1	H	D	D1	d	Mass (kg)
200 V	0.4K	70	60	71	61	—	M4	0.4
	0.75K	85	74	81	61	—	M4	0.5
	1.5K	85	74	81	70	—	M4	0.8
	2.2K	85	74	81	70	—	M4	0.9
	3.7K	77	55	92	82	57	M4	1.5
	5.5K	77	55	92	92	67	M4	1.9
	7.5K	86	60	113	98	72	M4	2.5
	11K	105	64	133	112	79	M6	3.3
	15K	105	64	133	115	84	M6	4.1
	18.5K	105	64	93	165	94	M6	4.7
	22K	105	64	93	175	104	M6	5.6
	30K	114	72	100	200	101	M6	7.8
	37K	133	86	117	195	98	M6	10
	45K	133	86	117	205	108	M6	11
	55K	153	126	132	209	122	M6	12.6
	75K	150	130	190	340	310	M6	17
	90K	150	130	200	340	310	M6	19
	110K	175	150	200	400	365	M8	20

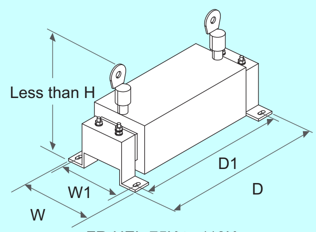
	Model	W	W1	H	D	D1	d	Mass (kg)
400 V	H0.4K	90	75	78	60	—	M5	0.6
	H0.75K	66	50	100	70	48	M4	0.8
	H1.5K	66	50	100	80	54	M4	1
	H2.2K	76	50	110	80	54	M4	1.3
	H3.7K	86	55	120	95	69	M4	2.3
	H5.5K	96	60	128	100	75	M5	3
	H7.5K	96	60	128	105	80	M5	3.5
	H11K	105	75	137	110	85	M5	4.5
	H15K	105	75	152	125	95	M5	5
	H18.5K	114	75	162	120	80	M5	5
	H22K	133	90	178	120	75	M5	6
	H30K	133	90	178	120	80	M5	6.5
	H37K	133	90	187	155	100	M5	8.5
	H45K	133	90	187	170	110	M5	10
	H55K	152	105	206	170	106	M6	11.5
	H75K	140	120	185	320	295	M6	16
	H90K	150	130	190	340	310	M6	20
	H110K	150	130	195	340	310	M6	22
	H132K	175	150	200	405	370	M8	26
	H160K	175	150	205	405	370	M8	28
	H185K	175	150	240	405	370	M8	29
	H220K	175	150	240	405	370	M8	30
	H250K	190	165	250	440	400	M8	35
	H280K	190	165	255	440	400	M8	38
	H315K	210	185	250	495	450	M10	42
	H355K	210	185	250	495	450	M10	46



FR-HEL-0.4K to 2.2K
FR-HEL-H0.4K



FR-HEL-3.7K to 55K
FR-HEL-H0.75K to H55K



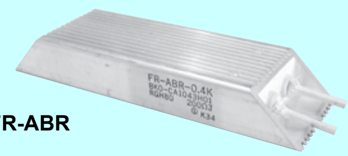
FR-HEL-75K to 110K
FR-HEL-H75K to H355K

Braking option

Brake resistor
High-duty brake resistor

MRS, MYS (E800) (E700) (F700PJ) (D700)
FR-ABR (A800) (A800 Plus) (E800) (E700) (F700PJ) (D700)
Only models with a built-in brake transistor can be used.

Larger value of the regenerative brake duty can be set by connecting this high-duty brake resistor to the inverter.



FR-ABR

●Specifications

Model MRS Type, MYS Type	200 V				
	MRS120W200	MRS120W100	MRS120W60	MRS120W40	MYS220W50 *2
Applicable inverter capacity (kW)	0.4	0.75	1.5, 2.2	2.2, 3.7	3.7
Permissible duty *1	3%ED				6%ED
Resistance value (Ω)	200	100	60	40	50 (×1/2)

Model FR-ABR-[][]	200 V								
	0.4K	0.75K	2.2K	3.7K	5.5K	7.5K	11K	15K *2	22K *2
Applicable inverter capacity (kW)	0.4	0.75	1.5, 2.2	3.7	5.5	7.5	11	15	18.5, 22
Braking torque	150% 5 s		100% 5 s						
Permissible duty *1	10%ED						6%ED		
Resistance value (Ω)	200	100	60	40	25	20	13	18 (×1/2)	13 (×1/2)
Approximate mass (kg)	0.2	0.4	0.5	0.8	1.3	2.2	3.5	2.4 (×2)	3.3 (×2)

Model FR-ABR-[][]	400 V									
	H0.4K	H0.75K	H1.5K	H2.2K	H3.7K	H5.5K	H7.5K	H11K	H15K *3	H22K *2
Applicable inverter capacity (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5, 22
Braking torque	100% 5 s									
Permissible duty *1	10%ED							6%ED		
Resistance value (Ω)	1200	700	350	250	150	110	75	52	18 (×2)	52 (×1/2)
Approximate mass (kg)	0.2	0.2	0.4	0.5	0.8	1.3	2.2	3.2	2.4 (×2)	3.3 (×2)

*1 The permissible duty indicates braking capability including the motor loss, and thereby the actual duty of the resistor is slightly smaller.
*2 Use two units in parallel.
*3 Use two units in series. FR-ABR-15K is indicated on the resistor (same resistor as the 200 V class 15K).

●Selection

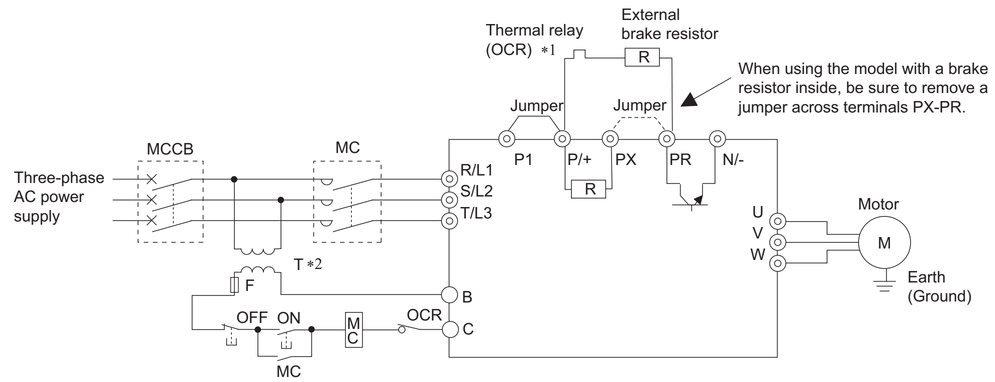
- Make selection according to the applicable motor capacity of the above specifications.
- The model with built-in brake resistor and external brake resistor.

Inverter		Built-in Brake Resistor	External Brake Resistor (built-in brake transistor)
FR-A800, FR-A800 Plus	0.4K to 7.5K	○	○
	11K to 22K	×	○
FR-E800, FR-E700	0.1K, 0.2K	×	×
	0.4K or higher	×	○
FR-F700PJ	All capacities	×	○
FR-D700	0.1K, 0.2K	×	×
	0.4K or higher	×	○

○: Available ×: Not available

●Connection diagram

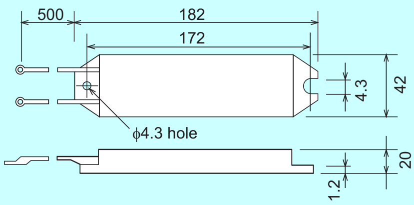
- Connect across terminals P and PR of the inverter.
- When using the model with a brake resistor inside, be sure to remove a jumper across terminals PX and PR. (Note that a jumper across terminals P1 and P should not be removed by mistake.)
- The temperature of the MRS type and MYS type brake resistor becomes 200 °C or more and the FR-ABR becomes 300 °C or more, care must be taken for installation and heat dissipation.
- The following sequence is recommended to prevent overheat and burnout of the brake resistor in case the brake transistor is damaged.



∗1 Always install a thermal relay when using the FR-ABR-11K, 15K, 22K, H11K, H15K, and H22K.
∗2 When the power supply is 400 V class, install a step-down transformer.

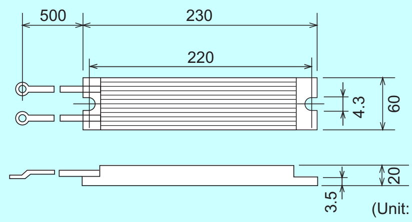
●Outline dimension drawings

<<MRS type>>



(Unit: mm)

<<MYS type>> ∗

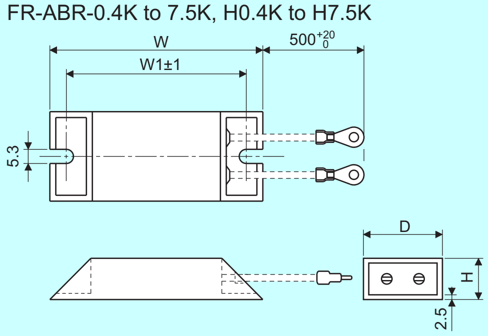


(Unit: mm)

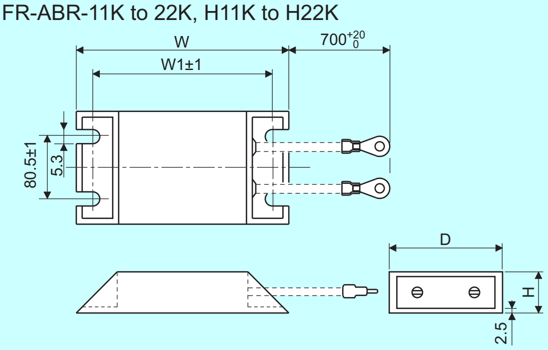
∗ Outline dimension drawing of one resistor.

<<FR-ABR>>

FR-ABR-0.4K to 7.5K, H0.4K to H7.5K



FR-ABR-11K to 22K, H11K to H22K



(Unit: mm)

Brake Resistor Model		Outline Dimension W	W1	H	D	Brake Resistor Model		Outline Dimension W	W1	H	D
200 V	FR-ABR-0.4K	140	125	21	40	400 V	FR-ABR-H0.4K	115	100	21	40
	FR-ABR-0.75K	215	200	21	40		FR-ABR-H0.75K	140	125	21	40
	FR-ABR-2.2K	240	225	26	50		FR-ABR-H1.5K	215	200	21	40
							FR-ABR-H2.2K	240	225	26	50
	FR-ABR-3.7K	215	200	33	61		FR-ABR-H3.7K	215	200	33	61
	FR-ABR-5.5K	335	320	33	61		FR-ABR-H5.5K	335	320	33	61
	FR-ABR-7.5K	400	385	40	80		FR-ABR-H7.5K	400	385	40	80
	FR-ABR-11K	400	385	50	100		FR-ABR-H11K	400	385	50	100
	FR-ABR-15K∗	300	285	50	100		FR-ABR-H15K∗	300	285	50	100
	FR-ABR-22K∗	400	385	50	100		FR-ABR-H22K∗	450	435	50	100

∗ Outline dimension drawing of one resistor.

Braking option

Brake unit Discharging resistor or resistor unit

FR-BU2 (A800) (A800 Plus) (F800) (E800) (E700) (F700PJ) (D700)
GRZG (A800) (A800 Plus) (F800) (E800) (E700) (F700PJ) (D700)
FR-BR (A800) (A800 Plus) (F800) (E800) (E700) (F700PJ) (D700)
MT-BR5 (A800) (A800 Plus) (F800)

Braking options have larger braking capability than the external brake resistor. These options can be connected to the inverter with or without a built-in brake transistor. Select from three discharging resistors according to the required braking torque.

●Specifications

FR-BU2

<<Brake unit>>

Model FR-BU2-[]	200V						400V						
	1.5K	3.7K	7.5K	15K	30K	55K	H7.5K	H15K	H30K	H55K	H75K	H220K	H280K
Applicable motor capacity	Capacity of the motor to be used with differs according to the braking torque and duty (%ED)												
Connected brake resistor	GRZG type, FR-BR, MT-BR5 (Refer to the table below for combination.)											MT-BR5 *1	
Multiple (parallel) operation	Up to 10 units (Note that torque generated is not more than the tolerable overcurrent amount of connected inverter.)												
Approximate mass (kg)	0.9	0.9	0.9	0.9	1.4	2.0	0.9	0.9	1.4	2.0	2.0	13	13

*1 Please contact your sales representative to use a brake resistor other than MT-BR5.

<<Discharging Resistor>>

Model GRZG type *2	200 V				400 V		
	GZG300W-50Ω (1 unit)	GRZG200-10Ω (3 units)	GRZG300-5Ω (4 units)	GRZG400-2Ω (6 units)	GRZG200-10Ω (3 units)	GRZG300-5Ω (4 units)	GRZG400-2Ω (6 units)
Number of resistors	1	3 in series (1 set)	4 in series (1 set)	6 in series (1 set)	6 in series (2 sets)	8 in series (2 sets)	12 in series (2 sets)
Resistance value (Ω)	50	30	20	12	60	40	24
Continuous permissible power (W)	100	300	600	1200	600	1200	2400

<<Resistor unit>>

Model FR-BR-[]	200 V			400 V		
	15K	30K	55K	H15K	H30K	H55K
Resistance value (Ω)	8	4	2	32	16	8
Continuous permissible power (W)	990	1990	3910	990	1990	3910
Approximate mass (kg)	15	30	70	15	30	70

Model MT-BR5-[]	200 V	400 V
	55K	H75K
Resistance value (Ω)	2	6.5
Continuous permissible power (W)	5500	7500
Approximate mass (kg)	70	65

*2 The 1 set contains the number of units in the parentheses. For the 400V class, 2 sets are required.

●Table of combination of the brake unit and resistor unit

Brake Unit Model		Discharging Resistor or Resistor Unit Model			
		GRZG type		FR-BR	MT-BR5
		Model *1	Number of connectable units		
200 V class	FR-BU2-1.5K	GZG 300W-50 Ω (1 unit)	1 unit	—	—
	FR-BU2-3.7K	GRZG 200-10 Ω (3 units)	3 in series (1 set)	—	—
	FR-BU2-7.5K	GRZG 300-5 Ω (4 units)	4 in series (1 set)	—	—
	FR-BU2-15K	GRZG 400-2 Ω (6 units)	6 in series (1 set)	FR-BR-15K	—
	FR-BU2-30K	—	—	FR-BR-30K	—
	FR-BU2-55K	—	—	FR-BR-55K	MT-BR5-55K
400 V class	FR-BU2-H7.5K	GRZG 200-10 Ω (3 units)	6 in series (2 sets)	—	—
	FR-BU2-H15K	GRZG 300-5 Ω (4 units)	8 in series (2 sets)	FR-BR-H15K	—
	FR-BU2-H30K	GRZG 400-2 Ω (6 units)	12 in series (2 sets)	FR-BR-H30K	—
	FR-BU2-H55K	—	—	FR-BR-H55K	—
	FR-BU2-H75K	—	—	—	MT-BR5-H75K
	FR-BU2-H220K	—	—	—	3×MT-BR5-H75K *2
	FR-BU2-H280K	—	—	—	4×MT-BR5-H75K *2

*1 The 1 set contains the number of units in the parentheses. For the 400V class, 2 sets are required.
*2 The number before the model name explains the number of connectable units in parallel.

●Selection

<<When GRZG type is connected>>

Power Supply Voltage	Motor(kW) / Braking Torque	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
200 V class	50% 30s	FR-BU2-1.5K			FR-BU2-3.7K		FR-BU2-7.5K		FR-BU2-15K		2×FR-BU2-15K *1			3×FR-BU2-15K *1		4×FR-BU2-15K *1
	100% 30s	FR-BU2-1.5K		FR-BU2-3.7K	FR-BU2-7.5K		FR-BU2-15K		2×FR-BU2-15K *1		3×FR-BU2-15K *1		4×FR-BU2-15K *1	5×FR-BU2-15K *1	6×FR-BU2-15K *1	7×FR-BU2-15K *1
400 V class	50% 30s	— *2			FR-BU2-H7.5K				FR-BU2-H15K		FR-BU2-H30K			2×FR-BU2-H30K *1		
	100% 30s	— *2			FR-BU2-H7.5K		FR-BU2-H15K		FR-BU2-H30K		2×FR-BU2-H30K *1			3×FR-BU2-H30K *1		4×FR-BU2-H30K *1

*1 The number before the model name explains the number of connectable units in parallel.
*2 The inverter of 1.5K or lower in the 400V class cannot be used in combination with a brake unit. To use in combination with a brake unit, use the inverter of 2.2K or higher.

<<When the FR-BR is connected>>

%ED at short-time rating when braking torque is 100%

Motor Capacity			5.5kW	7.5kW	11kW	15kW	18.5kW	22kW	30kW	37kW	45kW	55kW
200 V	FR-BU2-15K	%ED	80	40	15	30	—	—	—	—	—	—
	FR-BU2-30K		—	—	65	30	25	15	10	—	—	—
	FR-BU2-55K		—	—	—	—	90	60	30	20	15	10
400 V	FR-BU2-H15K	%ED	80	40	15	10	—	—	—	—	—	—
	FR-BU2-H30K		—	—	65	30	25	15	10	—	—	—
	FR-BU2-H55K		—	—	—	—	90	60	30	20	15	10

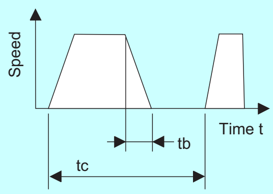
FR-BR

Braking torque (%) at 10%ED in 15s

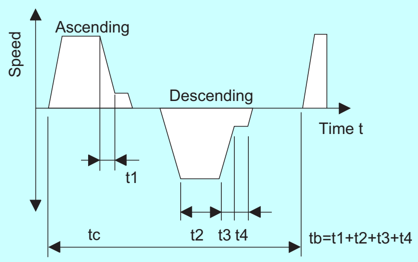
Motor Capacity			5.5kW	7.5kW	11kW	15kW	18.5kW	22kW	30kW	37kW	45kW	55kW
200 V	FR-BU2-15K	Braking torque (%)	280	200	120	100	80	70	—	—	—	—
	FR-BU2-30K		—	—	260	180	160	130	100	80	70	—
	FR-BU2-55K		—	—	—	—	300	250	180	150	120	100
400 V	FR-BU2-H15K	Braking torque (%)	280	200	120	100	80	70	—	—	—	—
	FR-BU2-H30K		—	—	260	180	160	130	100	80	70	—
	FR-BU2-H55K		—	—	—	—	300	250	180	150	120	100

Regeneration load time factor (operating duty) $\%ED = \frac{tb}{tc} \times 100$ tb<15 s (continuous operating time)

Example 1 Travel operation



Example 2 Lift operation



<<When the MT-BR5 is connected>>

%ED at short-time rating when braking torque is 100%

Motor Capacity / Number of connectable units *1		75kW	90kW	110kW	132kW	160kW	185kW	220kW	250kW	280kW	315kW	355kW	375kW	400kW	450kW	500kW	560kW
200V class FR-BU2-55K	1	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2	20	15	10	—	—	—	—	—	—	—	—	—	—	—	—	—
400V class FR-BU2-H75K	1	10	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2	40	25	20	10	5	5	—	—	—	—	—	—	—	—	—	—
400V class FR-BU2-H220K	1	80	60	40	25	15	10	10	5	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	20	20	15	15	15	10	10	10	5	—
400V class FR-BU2-H280K	1	—	80	65	40	30	20	15	10	10	10	5	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	20	20	15	15	15	10	10

Braking torque (%) at short-time rating in 15s

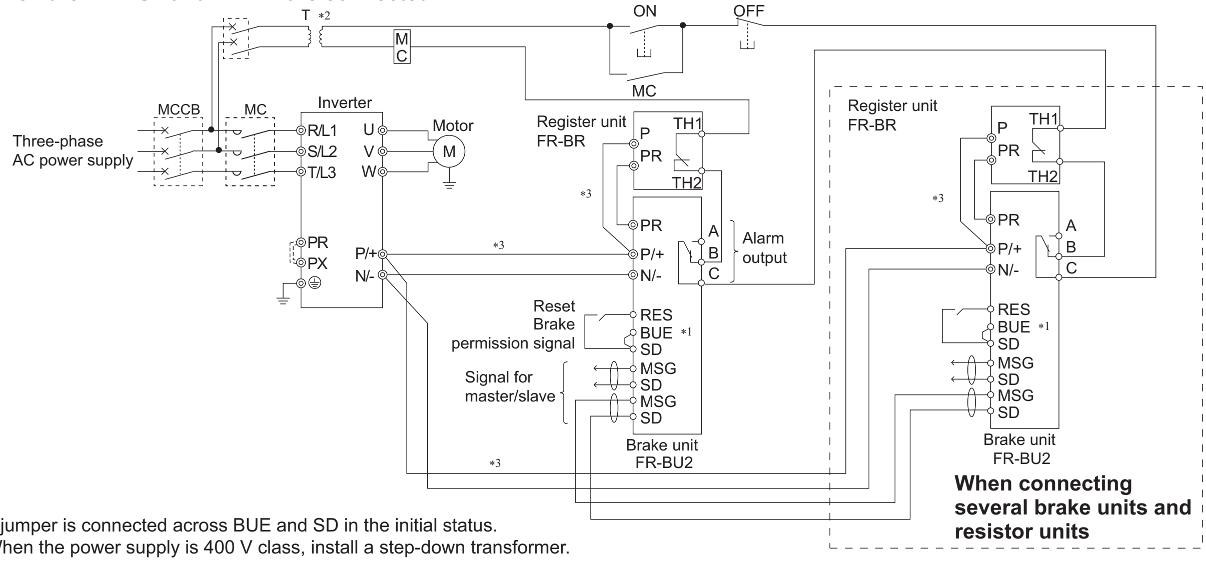
Motor Capacity / Number of connectable units *1		75kW	90kW	110kW	132kW	160kW	185kW	220kW	250kW	280kW	315kW	355kW	375kW	400kW	450kW	500kW	560kW
200V class FR-BU2-55K	1	70	60	50	—	—	—	—	—	—	—	—	—	—	—	—	—
	2	150	120	100	—	—	—	—	—	—	—	—	—	—	—	—	—
400V class FR-BU2-H75K	1	100	80	70	55	45	40	35	30	25	20	20	20	—	—	—	—
	2	150	150	135	110	90	80	70	60	50	45	40	40	—	—	—	—
400V class FR-BU2-H220K	1	200	200	150	150	135	115	100	80	55	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	190	170	150	150	140	120	110	100	90	80
400V class FR-BU2-H280K	1	—	—	200	200	150	150	150	125	100	70	60	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	180	160	150	150	130	115	100

*1 The number explains the number of connectable units in parallel.
*2 To obtain a large braking torque, the motor has to have a torque characteristic that meets the braking torque.
Check the torque characteristic of the motor.

Braking option

●Connection diagram (Sink logic)

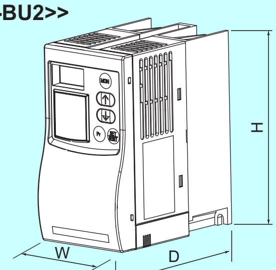
<<When the FR-BU2 and FR-BR are connected>>



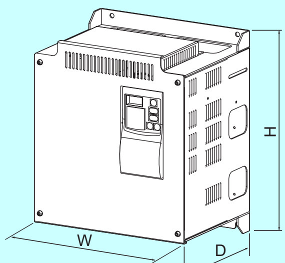
*1 A jumper is connected across BUE and SD in the initial status.
*2 When the power supply is 400 V class, install a step-down transformer.
*3 The wiring distance between the inverter, brake unit (FR-BU2) and resistor unit (FR-BR) should be within 5 m.
If twisted wires are used, the distance should be within 10 m.
When connecting several FR-BU2 to one inverter, connect P/+ of each FR-BU2 and of the inverter and N/- respectively. Do not pass wires from terminal P/+ and N/- of the FR-BU2 to terminals of other FR-BU2.

●Outline dimension drawings

<<FR-BU2>>



FR-BU2-1.5K to 55K
FR-BU2-H7.5K to H75K

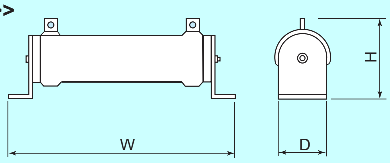


FR-BU2-H220K, H280K

(Unit: mm)

Model	W	H	D
FR-BU2-1.5K to 15K	68	128	132.5
FR-BU2-30K	108	128	129.5
FR-BU2-55K	170	128	142.5
FR-BU2-H7.5K, H15K	68	128	132.5
FR-BU2-H30K	108	128	129.5
FR-BU2-H55K, H75K	170	128	142.5
FR-BU2-H220K, H280K	250	300	200

<<GRZG type>>



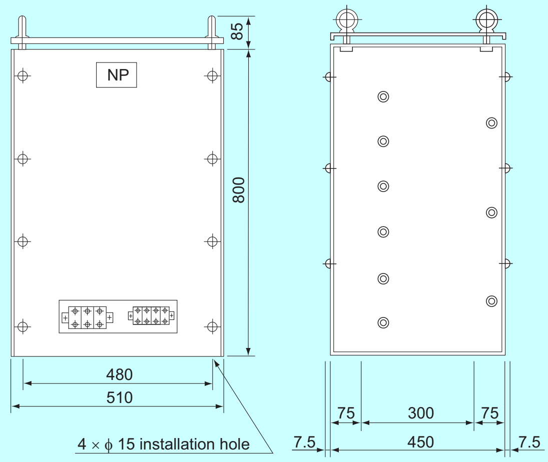
(Unit: mm)

Model	W	H	D
GZG300W	335	78	40
GRZG200	306	55	26
GRZG300	334	79	40
GRZG400	411	79	40

- The maximum temperature rise of the discharging resistors is approximately 100 °C. Use heat-resistant wires to perform wiring and make sure that they will not make contact with resistors.
- Do not touch the discharging resistor while the power is ON or for about 10 minutes after the power supply turns OFF. Otherwise, electric shock may result.

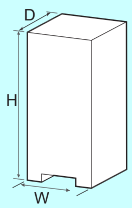
<<MT-BR5>>

(Unit: mm)



- Be sure to select the well-ventilated place for installation of the resistor unit. Ventilation is necessary when installing the resistor in a place, e.g. enclosure, where heat is not well diffused.
- The temperature rise of the resistor unit is about a maximum of 150 °C. Therefore, wire the cable so as not to touch the resistor. Also, separate a component, which is low in heat-resistant property, at least 40 to 50 cm from the resistors.
- The temperature of the resistor unit abnormally increases if the brake unit is operated exceeding the specified duty. Since the resistor unit may result in overheat if the temperature of the brake unit is left unchanged, switch off the inverter.

<<FR-BR>>



(Unit: mm)

Resistor Unit			
Model	W	H	D
FR-BR-15K	170	450	220
FR-BR-30K	340	600	220
FR-BR-55K	480	700	450
FR-BR-H15K	170	450	220
FR-BR-H30K	340	600	220
FR-BR-H55K	480	700	450

- The temperature rise of the resistor unit is about a maximum of 100 °C. Therefore, use heat-resistant wires (such as glass wires).

Power regeneration converter

MT-RC (A800) (A800 Plus) (F800)

A power regeneration converter allows energy generated at braking operation of the inverter to be regenerated to the power supply. Using a brake unit negates the need for a discharge resistor, saving space and energy as well as raising the peak brake torque.

●Specifications

Model MT-RC-[]	400V			
	H75K	H160K	H220K	H280K
Rated current (A) *1	102	218	300	382
Rated input AC power supply	Three-phase 380 to 460 V 50/60 Hz			
Permissible AC voltage fluctuation	Three-phase 323 to 506 V 50/60 Hz			
Approximate mass (kg)	65	98	155	235
AC reactor type MT-RCL-[] (standard accessory)	H75K	H160K	H220K	H280K
Approximate mass (kg)	130	240	410	580

*1 The rated current indicates the current flow in the main circuit DC bus (terminal P/+, N/-).

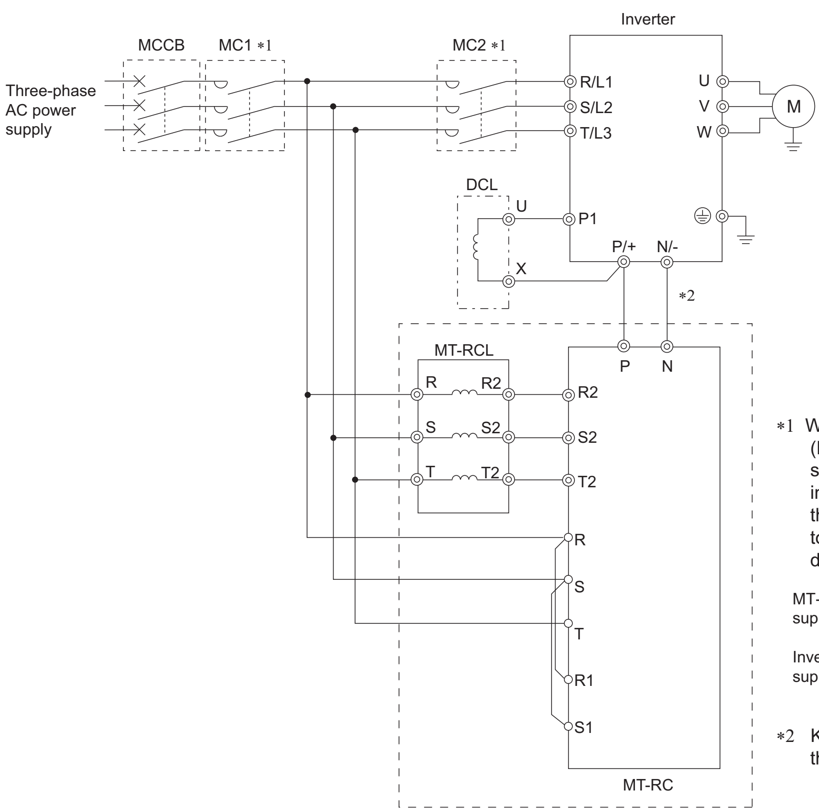
●Selection

1) Select the unit according to the motor capacity and magnitude of the braking torque referring to the table below.
2) Do not use the MT-RC whose capacity is larger than the stated combination in the table below.
(Even if the MT-RC larger in capacity is selected, continuous braking torque will not exceed 100% of the rated motor.)

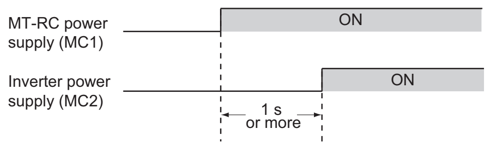
Braking torque (%) at continuous rating (% value on the assumption that the rated motor torque is 100%.)

Motor Capacity (kW)	75	90	110	132	150	160	185	200	220	250	280
Inverter model	75K	110K	110K	160K	160K	160K	220K	220K	220K	280K	280K
MT-RC-H75K	100	80	65	55	50	45	40	35	30	30	25
MT-RC-H160K	—	100	100	100	100	100	85	80	70	60	55
MT-RC-H220K	—	—	—	—	—	—	100	100	100	85	75
MT-RC-H280K	—	—	—	—	—	—	—	—	—	100	100

●Connection diagram



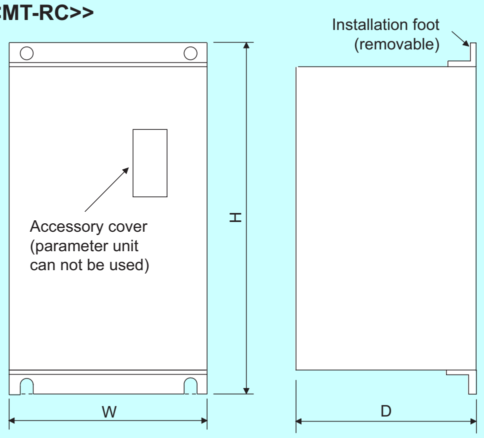
*1 When connecting a power regeneration converter (MT-RC), install a magnetic contactor (MC) at the input side of the inverter so that power is supplied to the inverter after 1s or more has elapsed after powering ON the MT-RC. When power is supplied to the inverter prior to the MT-RC, the inverter and the MT-RC may be damaged or the MCCB may trip or be damaged.



*2 Keep the total wiring distance between the inverter and the power regenerative converter (MT-RC) within 5 m.

●Outline dimension drawings

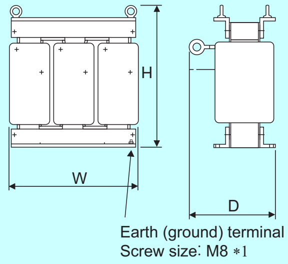
<<MT-RC>>



(Unit: mm)

	Model	W	H	D
400V	MT-RC-H75K	480	740	360
	MT-RC-H160K	498	1010	380
	MT-RC-H220K	680	1010	380
	MT-RC-H280K	790	1330	440

<<MT-RCL>>



(Unit: mm)

	Model	W	H	D
400V	MT-RCL-H75K	390	385	358
	MT-RCL-H160K	515	465	380
	MT-RCL-H220K	630	655	565
	MT-RCL-H280K	690	690	620

*1 The terminal position differs according to the reactor capacity.

High power factor converter

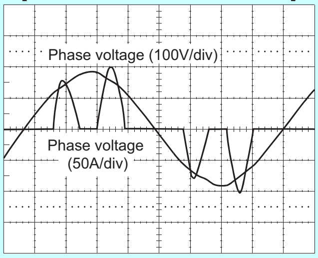
FR-HC2 ALL

A high power factor converter substantially suppresses power harmonics to realize the equivalent capacity conversion coefficient K5 = 0 in "the Harmonic Suppression Guidelines for Consumers Who Receive High Voltage or Special High Voltage" in Japan. Power regeneration function featured as standard enables common converter system operation with multiple inverters connected.

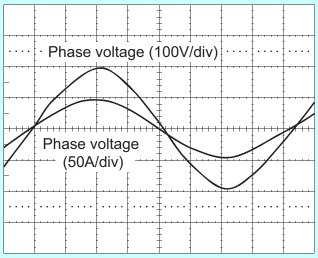
●Suppressions of power-supply harmonics

(Example) FR-HC2-7.5K
(Environment) Load; 100% Power factor; 1

[When FR-HC2 is not connected]



[When FR-HC2 is connected]



(FR-HCL21) (FR-HCB2) (FR-HCL22) FR-HC2

Provided appliances

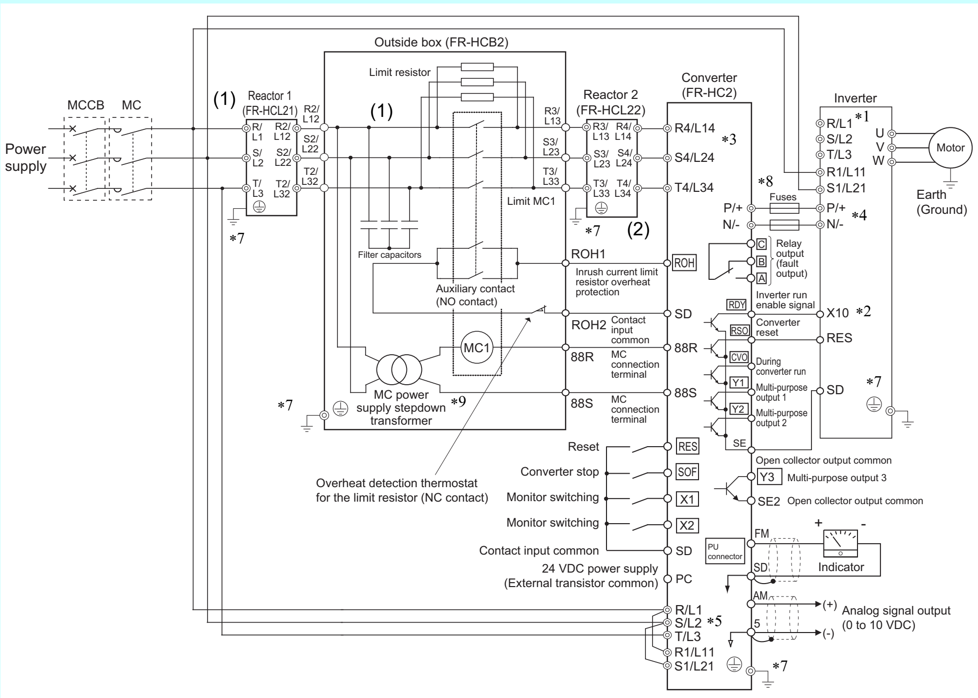
●Specifications

Model FR-HC2-[] *2		7.5K	15K	30K	55K	75K	H7.5K	H15K	H30K	H55K	H75K	H110K	H160K	H220K	H280K	H400K	H560K
		200 V					400 V										
Applicable inverter capacity (kW) *1		3.7 to 7.5	7.5 to 15	15 to 30	30 to 55	37 to 75	3.7 to 7.5	7.5 to 15	15 to 30	30 to 55	37 to 75	55 to 110	90 to 160	110 to 220	160 to 280	200 to 400	280 to 560
Rated input current (A)		33	61	115	215	278	17	31	57	110	139	203	290	397	506	716	993
Input power factor		0.99 or more (when load factor is 100%)															
Rated voltage		Three-phase 200 to 220 V 50 Hz/ three phase 200 to 230 V 60 Hz					Three-phase 380 to 460V 50 Hz/60 Hz										
Permissible power supply voltage fluctuation		Three-phase 170 to 242 V 50 Hz/ three phase 170 to 253 V 60 Hz				Three-phase 170 to 230 V 50 Hz/60 Hz	Three-phase 323 to 506 V 50 Hz/60 Hz				Three-phase 323 to 460 V 50 Hz/60 Hz						
Approximate mass (kg)	Unit	7	12	24	39	53	9	9	26	43	37	56	120	120	160	250	250
	Provided appliances	21.0	33.0	57.7	95.4	148.0	21.8	33.0	53.0	99.0	156.0	240.0	349.0	462.0	—	—	—

*1 Up to ten inverters may be connected to one high power factor converter. The capacity of the high power factor converter should always be higher than the sum of those of the inverters connected. Note that if the sum of the inverter capacities is less than half of the high power factor converter capacity, the high power factor converter may be used as a common converter or regenerative converter, but its capability to suppress power harmonics will decrease.
*2 In the order of the FR-HC2-[], FR-HCL21, FR-HCL22, and FR-HCB2 (FR-HCL21, FR-HCL22, FR-HCC2, FR-HCR2, and FR-HCM2 for H280K or higher) are included as accompanying appliances.

●Connection diagram

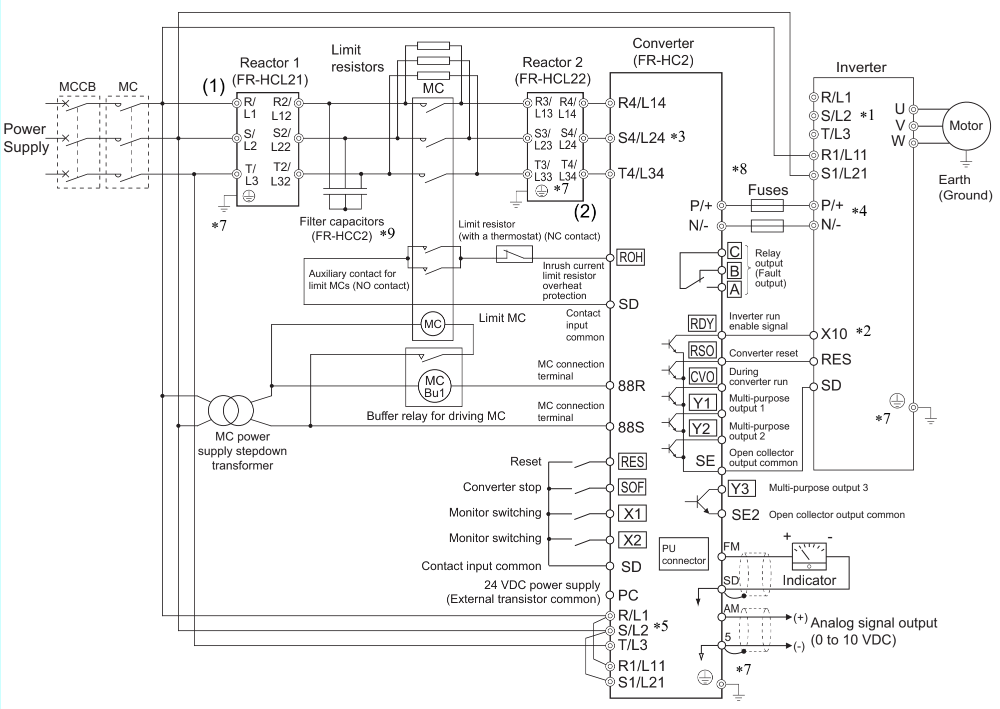
<<FR-HC2-7.5K to 75K, FR-HC2-H7.5K to H220K>>



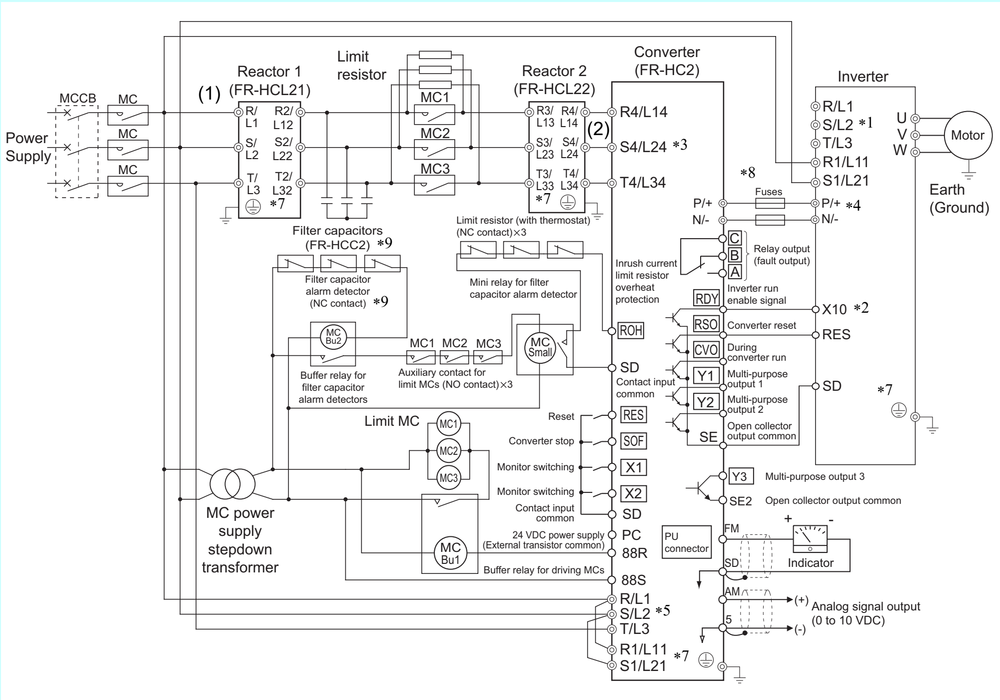
*1 Do not connect anything to the inverter power input terminals R/L1, S/L2 and T/L3. Incorrect connection will damage the inverter. Connecting opposite polarity of terminals P/+ and N/- will damage the converter and the inverter.
*2 Use input terminal function selection to assign the terminal used for the X10 signal.
*3 The power phases of terminals R4/L14, S4/L24, and T4/L34 and terminals R/L1, S/L2, and T/L3 must be matched.
*4 Do not insert MCCB between terminals P/+ and N/- (P and P, N and N).
*5 Always connect terminal R/L1, S/L2, T/L3 of the converter to the power supply. If the inverter is operated without connecting the terminals to the power supply, the converter will be damaged.
*6 Do not insert MCCB or MC between (1) (terminal R/L1, S/L2, and T/L3 input of the Reactor 1) and (2) (terminal R4/L14, S4/L24, and T4/L34 input of the converter) of the above diagram. It will not operate properly.
*7 Securely perform grounding (earthing).
*8 Installation of a fuse is recommended.
*9 The MC power supply stepdown transformer is only equipped in the 400 V class models.

Braking option

<<FR-HC2-H280K>>



<<FR-HC2-H400K, H560K>>



*1 Do not connect anything to the inverter power input terminals R/L1, S/L2 and T/L3. Incorrect connection will damage the inverter. Connecting opposite polarity of terminals P/+ and N/- will damage the converter and the inverter.
*2 Use input terminal function selection to assign the terminal used for the X10 signal.
*3 The power phases of terminals R4/L14, S4/L24, and T4/L34 and terminals R/L1, S/L2, and T/L3 must be matched.
*4 Do not insert MCCB between terminals P/+ and N/- (P and P, N and N).
*5 Always connect terminal R/L1, S/L2, T/L3 of the converter to the power supply. If the inverter is operated without connecting the terminals to the power supply, the converter will be damaged.
*6 Do not insert MCCB or MC between (1) (terminal R/L1, S/L2, and T/L3 input of the Reactor 1) and (2) (terminal R4/L14, S4/L24, and T4/L34 input of the converter) of the above diagram. It will not operate properly.
*7 Securely perform grounding (earthing).
*8 Installation of a fuse is recommended. (Not required for the FR-A802 or FR-F802 inverters.)
*9 The quantity of the filter capacitor and the filter capacitor alarm detector depends on the inverter capacity.

Device	Quantity		
	280K	400K	560K
Filter capacitors	1	2	3
Filter capacitor alarm detector	—	2	3

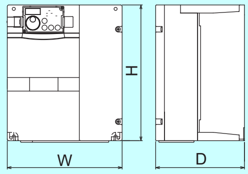
●Outline dimension drawings

(Unit: mm)

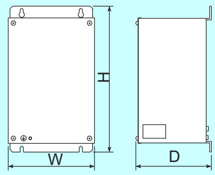
Voltage	Capacity	High Power Factor Converter FR-HC2			Reactor 1 FR-HCL21			Reactor 2 FR-HCL22			Outside Box FR-HCB2		
		W	H	D	W *1	H *1	D *1	W *1	H *1	D *1	W	H	D
200V	7.5K	220	260	170	132	150	100	237.5	230	140	190	320	165
	15K	250	400	190	162	172	126	257.5	260	165			
	30K	325	550	195	195	210	150	342.5	305	180	270	450	203
	55K	370	620	250	210	180	200.5	432.5	380	280			
	75K	465	620	300	240	215	215.5	474	460	280	400	450	250
400V	H7.5K	220	300	190	132	140	100	237.5	220	140	190	320	165
	H15K	220	300	190	162	170	126	257.5	260	165			
	H30K	325	550	195	182	195	101	342.5	300	180			
	H55K	370	670	250	282.5	245	165	392.5	365	200	270	450	203
	H75K	325	620	250	210	175	210.5	430	395	280	300	350	250
	H110K	465	620	300	240	230	220	500	440	370	350	450	380
	H160K	498	1010	380	280	295	274.5	560	520	430	400	450	440
	H220K	498	1010	380	330	335	289.5	620	620	480			
	H280K*2	680	1010	380	330	335	321	690	700	560	—	—	—
	H400K*2	790	1330	440	402	460	550	632	675	705	—	—	—
	H560K*2	790	1330	440	452	545	645	632	720	745	—	—	—

*1 The sizes indicated by W, H, and D are not the sizes of legs. These indicate sizes of whole reactors only.
*2 FR-HCB2 is not provided for H280K or higher. A filter capacitor and inrush current limit resistors are provided instead.
*3 Install reactors (FR-HCL21 and 22) on a horizontal surface.

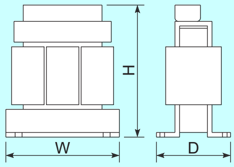
High power factor converter



Outside box



Reactor 1, reactor 2 *3



●Fuse

For safety, installation of a fuse is recommended between a high power factor converter and an inverter. Select a fuse according to the capacity of the connected motor.
Select a fuse from the table below, and install it to the P side and the N side between the high power factor converter and the inverter.

<<Fuse selection table>>

Manufacturer: Mersen Japan K.K.
Contact: Sun-Wa Technos Corporation

*1 Use the CUS102 (without fuse light melting indicator) or CUS102I (with fuse light melting indicator) fuse holders (2-pole type).
*2 When installing several fuses in parallel, leave 12mm or more between the fuses.

<<200 V class>>

Motor capacity (kW)	Rating (A)	Model
0.1	5	6.900 CP GR 10.38 0005 (FR10GR69V5) *1
0.2	10	6.900 CP GR 10.38 0010 (FR10GR69V10) *1
0.4	16	6.900 CP GR 10.38 0016 (FR10GR69V16) *1
0.75	20	6.900 CP GR 10.38 0020 (FR10GR69V20) *1
1.5	25	6.900 CP GR 10.38 0025 (FR10GR69V25) *1
2.2	50	6.9 URD 30 TTF 0050
3.7	63	6.9 URD 30 TTF 0063
5.5	100	6.9 URD 30 TTF 0100
7.5	125	6.9 URD 30 TTF 0125
11	160	6.9 URD 30 TTF 0160
15	200	6.9 URD 30 TTF 0200
18.5	250	6.9 URD 30 TTF 0250
22	315	6.9 URD 30 TTF 0315
30	400	6.9 URD 30 TTF 0400
37	500	6.9 URD 30 TTF 0500
45	630	6.9 URD 31 TTF 0630
55	700	6.9 URD 31 TTF 0700
75	800	6.9 URD 31 TTF 0800

<<400 V class>>

Motor capacity (kW)	Rating (A)	Model
0.4	12.5	6.900 CP GR 10.38 0012.5 (FR10GR69V12.5) *1
0.75	16	6.900 CP GR 10.38 0016 (FR10GR69V16) *1
1.5	16	6.900 CP GR 10.38 0016 (FR10GR69V16) *1
2.2	20	6.900 CP GR 10.38 0020 (FR10GR69V20) *1
3.7	30	6.900 CP GR 10.38 0030 (FR10GR69V30) *1
5.5	50	6.9 URD 30 TTF 0050
7.5	50	6.9 URD 30 TTF 0050
11	80	6.9 URD 30 TTF 0080
15	125	6.9 URD 30 TTF 0125
18.5	125	6.9 URD 30 TTF 0125
22	160	6.9 URD 30 TTF 0160
30	200	6.9 URD 30 TTF 0200
37	250	6.9 URD 30 TTF 0250
45	315	6.9 URD 30 TTF 0315
55	350	6.9 URD 30 TTF 0350
75	450	6.9 URD 30 TTF 0450
90	500	6.9 URD 30 TTF 0500
110	550	6.9 URD 31 TTF 0550

Motor capacity (kW)	Rating (A)	Model
132	630	6.9 URD 31 TTF 0630
160	800	6.9 URD 31 TTF 0800
185	900	6.9 URD 32 TTF 0900
220	1000	6.9 URD 32 TTF 1000 or 6.9 URD 31 TTF 0630 × 2 in parallel *2
250	1250	6.9 URD 33 TTF 1250 or 6.9 URD 31 TTF 0700 × 2 in parallel *2
280	1400	6.9 URD 33 TTF 1400 or 6.9 URD 31 TTF 0800 × 2 in parallel *2
315	1600	6.9 URD 232 TTF 1600 or 6.9 URD 31 TTF 0800 × 2 in parallel *2
355	1800	6.9 URD 232 TTF 1800 or 6.9 URD 32 TTF 0900 × 2 in parallel *2
400	1800	6.9 URD 232 TTF 1800 or 6.9 URD 32 TTF 0900 × 2 in parallel *2
450	2500	6.9 URD 33 TTF 1250 × 2 in parallel *2
500	2700	6.9 URD 32 TTF 0900 × 3 in parallel *2
560	2700	6.9 URD 32 TTF 0900 × 3 in parallel *2

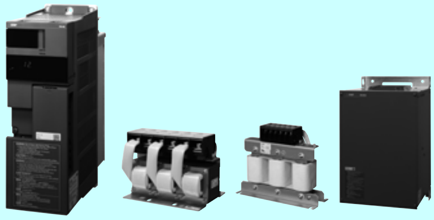
Multifunction regeneration converter
Dedicated stand-alone reactor
Dedicated box-type reactor

FR-XC ALL
FR-XCL, FR-XCG ALL
FR-XCB ALL

One inverter can handle harmonic suppression and power regeneration.
Functions that match the application can be selected by combining the inverter/converter with the dedicated reactor FR-XCB (box-type) or FR-XCL/FR-XCG.

Compact design offering a solution to harmonic problems

The FR-XC series converter in use with the dedicated box-type reactor FR-XCB is classified as a self-excitation three-phase bridge circuit under the "Harmonic Suppression Guidelines for Specific Consumers" and achieves K5 = 0 (conversion factor for equivalent capacity).



FR-XC FR-XCL FR-XCG FR-XCB

Up to 10 inverters connectable in common bus regeneration mode

Up to 10 inverters can be connected to a common converter. The power returned from an inverter during regenerative drive can be supplied to another inverter, which in turn saves energy.

Selectable regenerative power in power regeneration mode

In power driving mode, the inverter supplies power. During regenerative driving, the FR-XC converter returns power to the power supply. The capacity of the FR-XC converter is selectable according to the desired regenerative power. Thus, the compact converter is applicable when the regenerative power is smaller than the inverter capacity, which allows cost reduction.

●Combination

<<Combination matrix of FR-XCL/FR-XCG and FR-XC(-PWM)>>

Dedicated stand-alone reactor	Multifunction regeneration converter	
FR-XCL-[ ] FR-XCG-[ ]	FR-XC-[ ]	FR-XC-[ ]-PWM *1
7.5K	7.5K	—
11K	11K	—
15K	15K	—
22K	22K	18.5K
30K	30K	22K
37K	37K	37K
55K	55K	55K
H7.5K	H7.5K	—
H11K	H11K	—
H15K	H15K	—
H22K	H22K	H18.5K
H30K	H30K	H22K
H37K	H37K	H37K
H55K	H55K	H55K
H75K	50°C rating H75K	50°C rating H75K
H90K	40°C rating H75K	40°C rating H75K

*1 The harmonic suppression function is pre-enabled in this model. To use the converter with the FR-XCL, change the "9999" setting of Pr.416 Control method selection to "0" (harmonic suppression disabled).

<<Combination matrix of FR-XCB and FR-XC(-PWM)>>

Dedicated box-type reactor	Multifunction regeneration converter	
FR-XCB-[ ]	FR-XC-[ ] *2	FR-XC-[ ]-PWM
18.5K	22K	18.5K
22K	30K	22K
37K	37K	37K
55K	55K	55K
H18.5K	H22K	H18.5K
H22K	H30K	H22K
H37K	H37K	H37K
H55K	H55K	H55K
H75K	H75K	H75K

*2 The harmonic suppression function is not pre-enabled in this model. To use the converter with the FR-XCB, change the "9999" setting of Pr.416 Control method selection to "1" (harmonic suppression enabled).

<<Combination matrix of FR-MCB and FR-XC>>

Dedicated contactor box	Multifunction regeneration converter
FR-MCB-H[ ]	FR-XC-[ ] (-PWM)
150	H75K

*3 A dedicated contactor box used for coordination with the charging circuit.

<<Combination matrix of FR-XCCP and FR-XC(-PWM)>>

Converter installation attachment for enclosure	Multifunction regeneration converter
FR-XCCP[ ]	FR-XC-[ ]
01	(H) 7.5K
	(H) 11K
02	(H) 15K
03	(H) 22K
	(H) 30K
	(H) 18.5K-PWM
	(H) 22K-PWM

<<Combination matrix of FR-XCCU and FR-XC(-PWM)>>

IP20 compatible attachment	Multifunction regeneration converter
FR-XCCU[ ]	FR-XC-[ ] (-PWM)
01	37K
	H55K
02	55K
03	H37K

●Specifications

<<200V class>>

Model *1			FR-XC-[ ]K							FR-XC-[ ]K-PWM			
		Harmonic suppression	7.5	11	15	22	30	37	55	18.5	22	37	55
Common bus regeneration mode	Applicable inverter capacity (kW)	Disabled	7.5	11	15	22	30	37	55	22	30	37	55
		Enabled	—	—	—	18.5	22	37	55	18.5	22	37	55
	Overload current rating		100% continuous /150% 60 s							100% continuous /150% 60 s			
Power regeneration mode *2	Potential regenerative capacity (kW)		5.5	7.5	11	18.5	22	30	45	18.5	22	30	45
	Overload current rating		100% continuous /150% 60 s							100% continuous /150% 60 s			
Power source	Rated input AC voltage/frequency	Disabled	Three-phase 200 to 240 V 50 Hz/60 Hz							Three-phase 200 to 240 V 50 Hz/60 Hz			
		Enabled	—	—	—	Three-phase 200 to 230 V 50 Hz/60 Hz *3				Three-phase 200 to 230 V 50 Hz/60 Hz *4			
	Permissible AC voltage fluctuation	Disabled	Three-phase 70 to 264 V 50 Hz/60 Hz							Three-phase 170 to 264 V 50 Hz/60 Hz			
		Enabled	—	—	—	Three-phase 170 to 253 V 50 Hz/60 Hz				Three-phase 170 to 253 V 50 Hz/60 Hz			
	Permissible frequency fluctuation	Disabled	±5%							±5%			
		Enabled	—	—	—	±5%				±5%			
Input power factor		Enabled	—	—	—	0.99 or more (when load ratio is 100%)				0.99 or more (when load ratio is 100%)			
Approx. mass (kg) *5			5	5	6	10.5	10.5	28	38	10.5	10.5	28	38

<<400V class>>

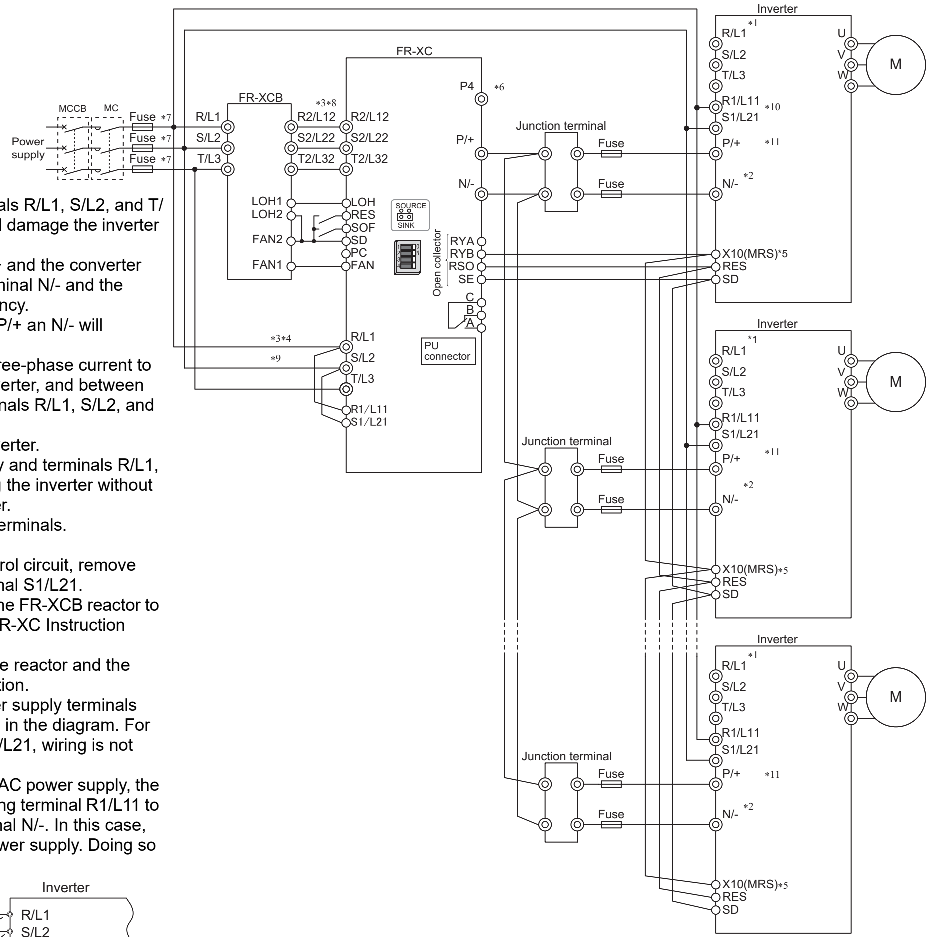
Model *1			FR-XC-[ ]K								FR-XC-[ ]K-PWM				
		Harmonic suppression	7.5	11	15	22	30	37	55	75	18.5	22	37	55	75
Common bus regeneration mode	Applicable inverter capacity (kW)	Disabled	7.5	11	15	22	30	37	55	75 *6	22	30	37	55	75 *6
		Enabled	—	—	—	18.5	22	37	55	75 *6	18.5	22	37	55	75 *6
	Overload current rating		100% continuous /150% 60 s								100% continuous /150% 60 s				
Power regeneration mode *2	Potential regenerative capacity (kW)		5.5	7.5	11	18.5	22	30	45	75 *6	18.5	22	30	45	75 *6
	Overload current rating		100% continuous /150% 60 s								100% continuous /150% 60s				
Power source	Rated input AC voltage/frequency	Disabled	Three-phase 380 to 500 V 50 Hz/60 Hz								Three-phase 380 to 500 V 50 Hz/60 Hz				
		Enabled	—	—	—	Three-phase 380 to 480 V 50 Hz/60 Hz*3					Three-phase 380 to 480 V 50 Hz/60 Hz*4				
	Permissible AC voltage fluctuation	Disabled	Three-phase 323 to 550 V 50 Hz/60 Hz								Three-phase 323 to 550 V 50 Hz/60 Hz				
		Enabled	—	—	—	Three-phase 323 to 506 V 50 Hz/60 Hz					Three-phase 323 to 506 V 50 Hz/60 Hz				
	Permissible frequency fluctuation	Disabled	±5%								±5%				
		Enabled	—	—	—	±5%					±5%				
Input power factor		Enabled	—	—	—	0.99 or more (when load ratio is 100%)					0.99 or more (when load ratio is 100%)				
Approx. mass (kg) *5			5	5	6	10.5	10.5	28	28	45	10.5	10.5	28	28	45

*1 The harmonic suppression function is not pre-enabled in this model.
*2 The power regeneration mode is selectable when the harmonic suppression function is disabled.
*3 The DC bus voltage is approx. 297 VDC at an input voltage of 200 VAC, approx. 327 VDC at 220 VAC, and approx. 342 VDC at 230 VAC.
*4 The DC bus voltage is approx. 594 VDC at an input voltage of 400 VAC, approx. 653 VDC at 440 VAC, and approx. 713 VDC at 480 VAC.
*5 Mass of the FR-XC alone.
*6 90 kW for the 40°C rating

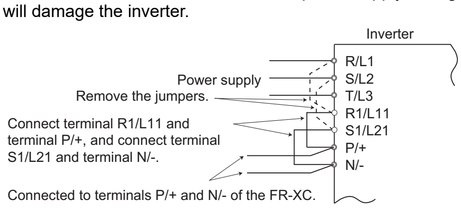
Braking option

●Connection diagram

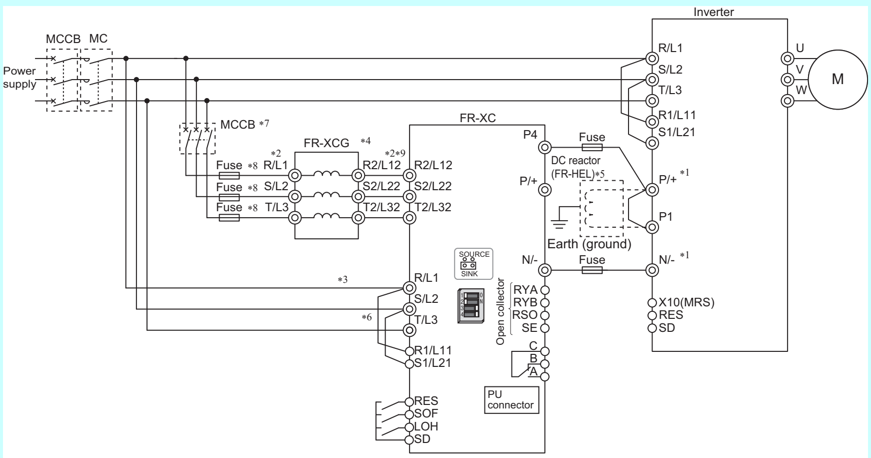
<<Common bus regeneration mode with harmonic suppression enabled (for the FR-XC-(H)55K or lower)>>



*1 Never connect the power supply to terminals R/L1, S/L2, and T/L3 on the inverter. Incorrect connection will damage the inverter and the converter.
*2 Connect between the inverter terminal P/+ and the converter terminal P/+ and between the inverter terminal N/- and the converter terminal N/- for polarity consistency.
Connecting opposite polarity of terminals P/+ an N/- will damage the converter and the inverter.
*3 Confirm the correct phase sequence of three-phase current to connect between the reactor and the converter, and between the power supply and the converter (terminals R/L1, S/L2, and T/L3).
Incorrect connection will damage the converter.
*4 Always connect between the power supply and terminals R/L1, S/L2, and T/L3 of the converter. Operating the inverter without connecting them will damage the converter.
*5 Assign the X10 signal to any of the input terminals.
*6 Do not connect anything to terminal P4.
*7 To use separate power supply for the control circuit, remove each jumper at terminal R1/L11 and terminal S1/L21.
*8 Install UL listed fuses on the input side of the FR-XCB reactor to meet the UL/cUL standards (refer to the FR-XC Instruction Manual for information about the fuse).
*9 Do not install an MCCB or MC between the reactor and the converter. Doing so disrupts proper operation.
*10 When the inverter has control circuit power supply terminals (R1/L11 and S1/L21), wire them as shown in the diagram. For inverters without terminals R1/L11 and S1/L21, wiring is not required.
*11 Instead of connecting the terminals to the AC power supply, the control circuit can be powered by connecting terminal R1/L11 to terminal P/+ and terminal S1/L21 to terminal N/-. In this case, do not connect the terminals to the AC power supply. Doing so will damage the inverter.



<<Power regeneration mode 2 (for the FR-XC-(H)55K or lower)>>

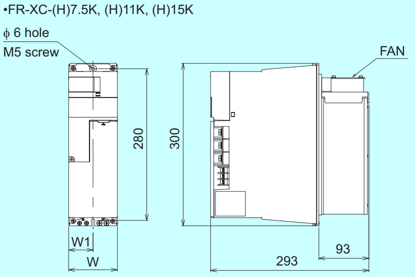


*1 Connect between the inverter terminal P/+ and the converter terminal P4 and between the inverter terminal N/- and the converter terminal N/- for polarity consistency. Connecting the opposite polarity of terminals P/+ and N/- will damage the converter and the inverter.
*2 Confirm the correct phase sequence of three-phase current to connect between the reactor and the converter, and between the power supply and the reactor. Incorrect connection will damage the converter.
*3 Always connect between the power supply and terminals R/L1, S/L2, and T/L3 of the converter. Operating the inverter without connecting them will damage the converter. A branch point to each of these terminals must be placed between the power supply and the FR-HAL reactor.
*4 Install the FR-XCG reactor between the power supply and the converter as shown in the figure. To select an appropriate model, refer to the FR-XC Instruction Manual.
*5 To connect a DC reactor, remove a jumper installed across terminals P1 and P/+ before installing the DC reactor.
*6 To use separate power supply for the control circuit, remove each jumper at terminal R1/L11 and terminal S1/L21.
*7 To select an appropriate MCCB, refer to the FR-XC Instruction Manual.
*8 Install UL listed fuses on the input side of the reactor to meet the UL/cUL standards (refer to the FR-XC Instruction Manual for information about the fuse).
*9 Do not install an MCCB or MC between the reactors and the converter. Doing so disrupts proper operation.

●Outline dimension drawings

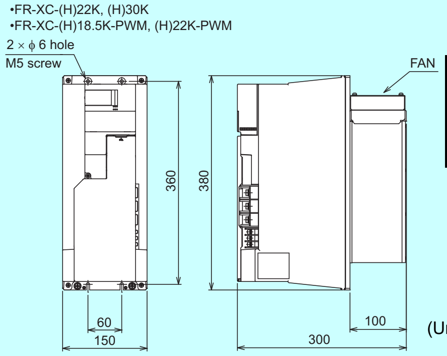
This is an example of the outer appearance, which differs depending on the model.

<<Multifunction regeneration converter FR-XC (-PWM)>>

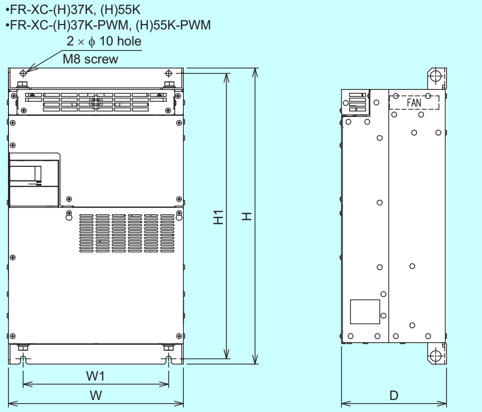


(Unit: mm)

Model	W	W1
FR-XC-(H)7.5K, (H)11K	90	45
FR-XC-(H)15K	120	60

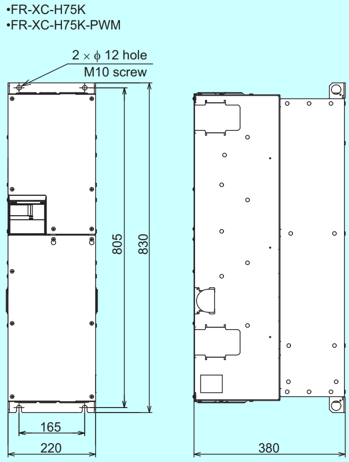


(Unit: mm)



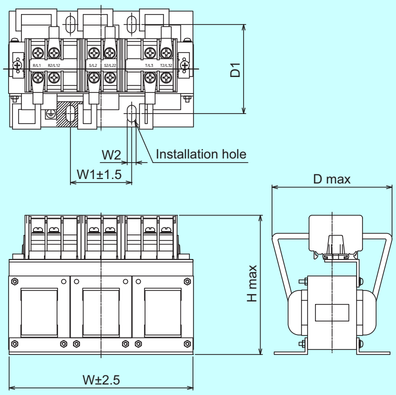
(Unit: mm)

Model	W	W1	H	H1	D
FR-XC-(H)37K, H55K FR-XC-(H)37K-PWM, H55K-PWM	325	270	550	530	195
FR-XC-55K FR-XC-55K-PWM	370	300	620	600	250



(Unit: mm)

<<Dedicated stand-alone reactor FR-XCL>>



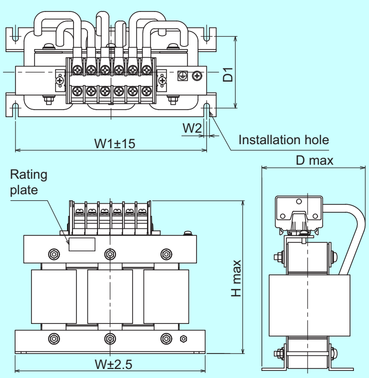
200 V class (Unit: mm)

Model	W	W1	W2	H	D	D1	Mounting screw size	Terminal screw size	Mass
FR-XCL-7.5K	165	55	8	125	120	80±2	M6	M5	3.9 kg
FR-XCL-11K						73±2			3.6 kg
FR-XCL-15K	192			130	130	100±2		M6	5.5 kg
FR-XCL-22K					140	110±2			6.3 kg
FR-XCL-30K	240	70		150	160	119±2			10.0 kg
FR-XCL-37K	248	200	10	190	240	120±5	M8	M10	12.0 kg
FR-XCL-55K	250	225			260	135±5			15.5 kg

400 V class (Unit: mm)

Model	W	W1	W2	H	D	D1	Mounting screw size	Terminal screw size	Mass
FR-XCL-H7.5K	165	55	8	125	120	73±2	M6	M5	3.7 kg
FR-XCL-H11K						80±2			4.2 kg
FR-XCL-H15K					135	110±2			6.0 kg
FR-XCL-H22K	240	70		150	150	109±2		M6	9.0 kg
FR-XCL-H30K					170	129±2			12.0 kg
FR-XCL-H37K	220	200	10	190	230	120±5	M8	M8	12.0 kg
FR-XCL-H55K	250	225				135±5			16.0 kg
FR-XCL-H75K	300	270	10	335	200	140±2	M8	M8	50.0 kg
FR-XCL-H90K	300	270	10	360	210	150±2	M8	M8	60.0 kg

<<Dedicated stand-alone reactor FR-XCG>>



200 V class (Unit: mm)

Model	W	W1	W2	H	D	D1	Mounting screw size	Terminal screw size	Mass
FR-XCG-7.5K	220	200	6	185	115	60±1.5	M5	M5	5 kg
FR-XCG-11K					120	75±1.5			8 kg
FR-XCG-15K				190	130	90±1.5		M6	11 kg
FR-XCG-22K	255	225	8	240	140	85±1.5	M6		16 kg
FR-XCG-30K					155	100±1.5			20 kg
FR-XCG-37K	300	270	10	285	180		M8	M10	25 kg
FR-XCG-55K					190	130±1.5			40 kg

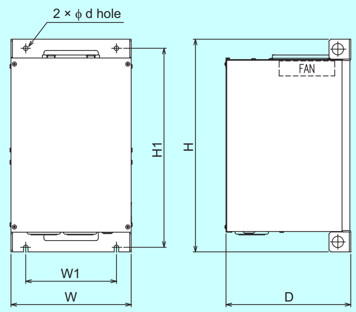
400 V class (Unit: mm)

Model	W	W1	W2	H	D	D1	Mounting screw size	Terminal screw size	Mass
FR-XCG-H7.5K	220	200	6	185	115	60±1.5	M5	M5	5 kg
FR-XCG-H11K					120	75±1.5			8 kg
FR-XCG-H15K					130	90±1.5			11 kg
FR-XCG-H22K	255	225	8	240		85±1.5	M6	M6	16 kg
FR-XCG-H30K					140	100±1.5			20 kg
FR-XCG-H37K	300	270	10	285	180		M8	M8	25 kg
FR-XCG-H55K					190	130±1.5			40 kg
FR-XCG-H75K	300	270	10	335	200	140±2	M8	M8	50 kg
FR-XCG-H90K	300	270	10	360	210	150±2	M8	M8	60 kg

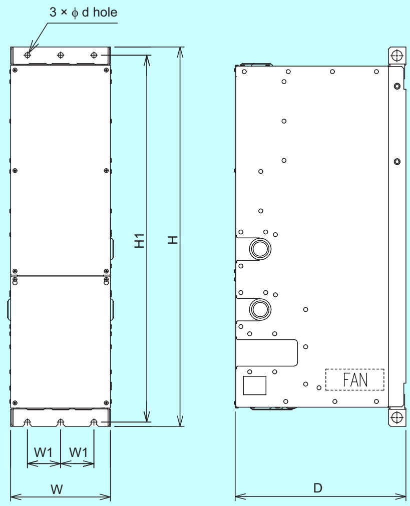
Braking option

<<Dedicated box-type reactor FR-XCB>>

FR-XCB-(H)55K or less



FR-XCB-H75K



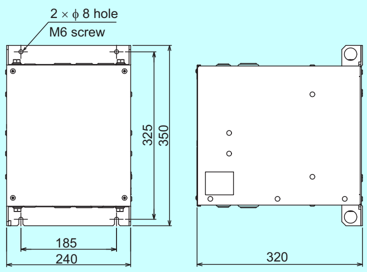
200 V class (Unit: mm)

Model	W	W1	H	H1	D	d	Screw size	Mass
FR-XCB-18.5K	265	200	470	440	275	10	M8	26.0 kg
FR-XCB-22K								
FR-XCB-37K	350	270	600	575	330	12	M10	56.9 kg
FR-XCB-55K								68.5 kg

400 V class (Unit: mm)

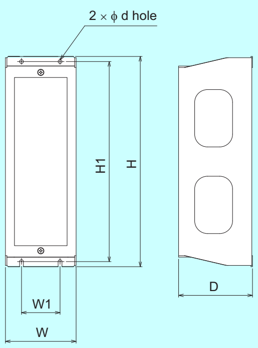
Model	W	W1	H	H1	D	d	Screw size	Mass
FR-XCB-H18.5K	265	200	470	440	275	10	M8	26.9 kg
FR-XCB-H22K								
FR-XCB-H37K	350	270	600	575	330	12	M10	63.0 kg
FR-XCB-H55K								73.0 kg
FR-XCB-H75K	240	80	915	885	410	12	M10	120.0 kg

<<Dedicated contactor box FR-MCB>>



Model	Mass
FR-MCB-H150	17.0 kg

<<Converter installation enclosure attachment FR-XCCP>>



(Unit: mm)

Model	W	W1	H	H1	D	d	Screw size
FR-XCCP01	110	60	330	314	115	6	M5
FR-XCCP02	130	90			120		
FR-XCCP03	160	120	410	396	116	7	M6

Noise filter

Line noise filter

FR-BSF01 (ALL) FR-BLF (ALL)
RC5128ZZ (introduced product) (A800) (A800 Plus) (F800) (A701)

A filter is used to suppress radio noise and line noise emitted from the inverter power supply side or output side.

Introduced product: RC5128ZZ Manufacturer: Soshin Electric Co., Ltd.

●Specifications

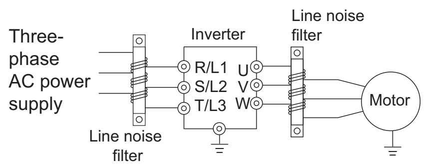
Model	FR-BSF01				FR-BLF				RC5128ZZ (introduced product)		
Applicable inverter capacity	For small capacity inverter *1				For general inverter *1				For large capacity inverter *1		
Compatible wire size (mm²)	2, 3.5	5.5	8, 14	22	2 to 22	30 to 60	80	100 to 150	100 to 125	150 to 200	250
Number of times of wire to be passed through (T)	4	3	2	1	4	3	2	1	3	2	1
Improvement effect	Greater effect between 0.5 to 5MHz The greater the number of turns, the more effective result is obtained.										
Rated input AC power supply	Three phase 200 V 50 Hz/three phase 200/220 V 60 Hz										
	Three phase 400 V 50 Hz/three phase 400/440 V 60 Hz										
Approximate mass (kg)	0.2				1.2				1.1		

FR-BLF

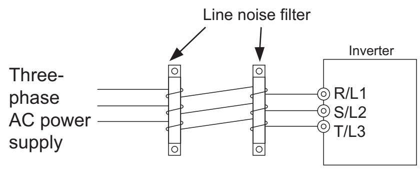
*1 Used up to the cable thickness (applicable wire size) less than the size of wire passing hole.
*2 For the 55K or lower models of the FR-A800, FR-A800 Plus, and FR-F800 series inverters, a corresponding appliance (common mode choke) is built-in on the input side.

●Connection diagram

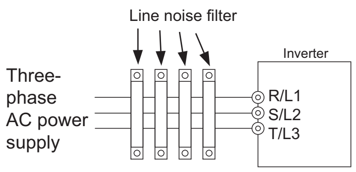
- Ensure that each phase is wounded one time in the same direction.
- When connecting to the input side, it is recommended that the wire should be turned three times or more (4T, 4 turns). The greater the number of turns, the more effective result is obtained.
- When using several line noise filters to make 4T or more, wind the phases (cables) together. Do not use different line noise filter for different phases.
- When using filters at the output side, do not wind the cable more than 4 turns (4T) for each filter as the filter may overheat.
- Do not wind earthing cable.
- When the wire size is too thick to wind, use more than four filters in series.



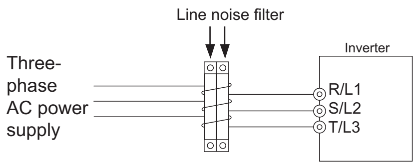
Connection example to input side and output side



When using several line noise filters separately



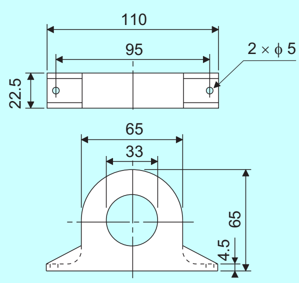
When using line noise filters in series



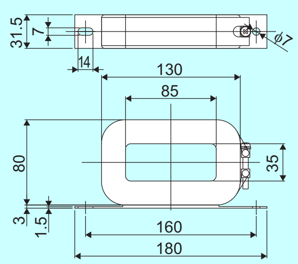
When using several line noise filters together

●Outline dimension drawings

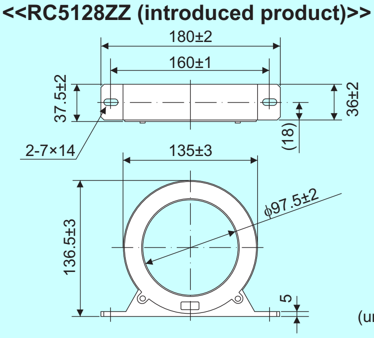
<<FR-BSF01>>



<<FR-BLF>>



<<RC5128ZZ (introduced product)>>



(unit: mm)

Noise filter

Radio noise filter FR-BIF (E800) (E700) (F700PJ) (D700)

A filter is used to suppress radio noise emitted from the inverter power supply side.

●Specifications

Type	200 V	400 V
	FR-BIF	FR-BIF-H
Applicable inverter capacity	Usable regardless of the inverter capacity ∗	
Improvement effect	Greater effect at 10 MHz or less (note that the effect differs according to region.)	
Rated input AC power supply	Three phase 200 V 50 Hz/ three phase 200/220 V 60 Hz	Three-phase 400 V 50 Hz/ three phase 400/440 V 60 Hz
Approximate mass (kg)	0.1	0.1

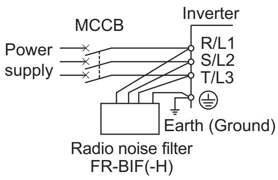
FR-BIF-H

∗ For the FR-A800, FR-A800 Plus, or FR-F800 series inverter, a corresponding filter (capacitive filter) is built-in.

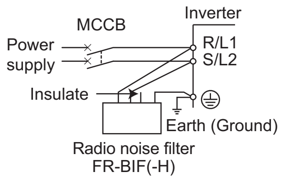
●Connection diagram

- Connect to the inverter input side. Connect the filter directly to the inverter input terminal.
- Since long connection wire reduces effect, the wire length should be minimized. Make sure to perform earthing with resistance of 100 Ω or less.
- When the filter is used in the inverter with the single-phase power input specification, cut the T-phase wire as short as possible and insulate the cut end securely.
- The maximum leakage current is about 4 mA (8 mA for the 400 V class). (The leakage current is equivalent to the current for one phase of the three-phase three-wire star-connection power supply.)

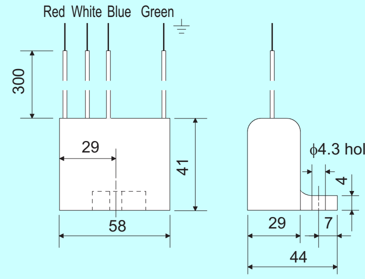
<<Three-phase power supply>>



<<Single-phase power supply>>



●Outline dimension drawings



(unit: mm)

EMC Directive compliant EMC filter

SF□□ (E800) (E700) (F700PJ) (D700)
FR-E5NF (E800) (E700) (F700PJ) (D700) FR-S5NFSA (E800) (E700) (D700)

This EMC filter complies with the EU EMC Directive.

●Selection

- Select the appropriate noise filter based on the inverter and noise filter combinations shown below.

FR-E800 Series Inverter Model		EMC Filter Model
Single phase 200 V class	FR-E820S-0.1K to 0.4K	SF1320
	FR-E820S-0.75K	SF1321
	FR-E820S-1.5K	FR-S5NFSA-1.5K
	FR-E820S-2.2K	SF1309
200 V class	FR-E820-0.1K to 1.5K	SF1306
	FR-E820-2.2K, 3.7K	SF1309
	FR-E820-5.5K to 11K	SF1260
	FR-E820-15K	SF1261
	FR-E820-18.5K, 22K	SF1262
400 V class	FR-E840-0.4K, 0.75K	FR-E5NF-H0.75K
	FR-E840-1.5K to 3.7K	FR-E5NF-H3.7K
	FR-E840-5.5K, 7.5K	FR-E5NF-H7.5K
	FR-E840-11K, 15K	SF1175
	FR-E840-18.5K, 22K	SF1176

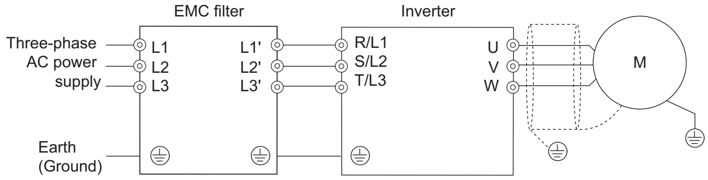
FR-E700 Series Inverter Model		EMC Filter Model
Single phase 100 V class	FR-E710W-0.1K to 0.4K	FR-S5NFSA-0.75K
	FR-E710W-0.75K	FR-S5NFSA-1.5K
Single phase 200 V class	FR-E720S-0.1K to 0.4K	SF1320
	FR-E720S-0.75K	SF1321
	FR-E720S-1.5K	FR-S5NFSA-1.5K
	FR-E720S-2.2K	SF1309
200 V class	FR-E720-0.1K to 1.5K	SF1306
	FR-E720-2.2K, 3.7K	SF1309
	FR-E720-5.5K to 11K	SF1260
	FR-E720-15K	SF1261
400 V class	FR-E740-0.4K, 0.75K	FR-E5NF-H0.75K
	FR-E740-1.5K to 3.7K	FR-E5NF-H3.7K
	FR-E740-5.5K, 7.5K	FR-E5NF-H7.5K
	FR-E740-11K, 15K	SF1175

FR-F700PJ Series Inverter Model		EMC Filter Model
200 V class	FR-F720PJ-0.4K to 1.5K	SF1306
	FR-F720PJ-2.2K, 3.7K	SF1309
	FR-F720PJ-5.5K to 11K	SF1260
	FR-F720PJ-15K	SF1261
400 V class	FR-F740PJ-0.4K, 0.75K	FR-E5NF-H0.75K
	FR-F740PJ-1.5K to 3.7K	FR-E5NF-H3.7K
	FR-F740PJ-5.5K, 7.5K	FR-E5NF-H7.5K
	FR-F740PJ-11K, 15K	SF1175

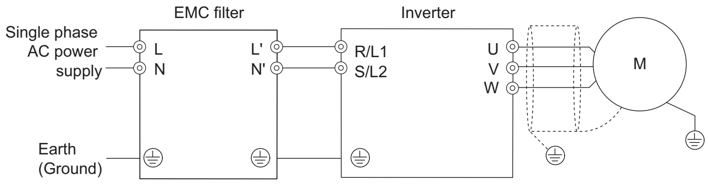
FR-D700 Series Inverter Model		EMC Filter Model
Single phase 100 V class	FR-D710W-0.1K to 0.4K	FR-S5NFSA-0.75K
	FR-D710W-0.75K	FR-S5NFSA-1.5K
Single phase 200 V class	FR-D720S-0.1K to 0.75K	FR-S5NFSA-0.75K
	FR-D720S-1.5K	FR-S5NFSA-1.5K
	FR-D720S-2.2K	SF1309
200 V class	FR-D720-0.1K to 1.5K	SF1306
	FR-D720-2.2K, 3.7K	SF1309
	FR-D720-5.5K to 11K	SF1260
	FR-D720-15K	SF1261
400 V class	FR-D740-0.4K, 0.75K	FR-E5NF-H0.75K
	FR-D740-1.5K to 3.7K	FR-E5NF-H3.7K
	FR-D740-5.5K, 7.5K	FR-E5NF-H7.5K
	FR-D740-11K, 15K	SF1175

●Connection diagram

· Connect to the inverter input side. Refer to EMC Installation Guidelines (BCN-A21041-202/204) for details of wiring method.



Connection diagram of three-phase power supply



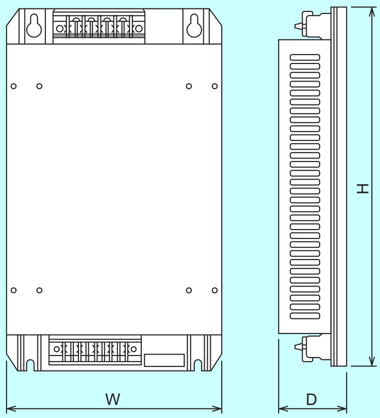
Connection diagram of single-phase power supply

*** Take the following measures to prevent a peripheral device malfunction or electric shock accident from occurring due to a leakage current.**

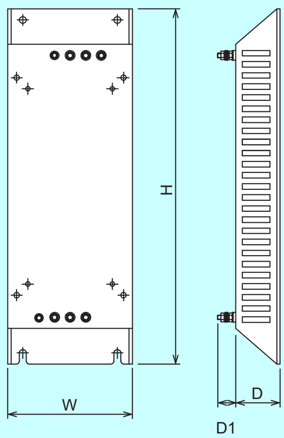
1) **Ground (earth) the EMC filter before connecting the power supply. In that case, make certain that grounding (earthing) is securely performed via the grounding (earthing) part of the panel.**
2) **Select the earth leakage circuit breaker or earth leakage relay in consideration of the EMC filter's leakage current. A leakage current breaker may not be used when leakage current of EMC filter become large. When using an earth leakage relay which has great sensitivity current or when not using a leakage circuit breaker and earth leakage relay, connect the equipment to the earth securely as shown in 1).**

●Outline dimension drawings

EMC Filter Model		Outline Dimension (mm) W	H	D	Approximate Mass (kg)	Leakage Current Reference Value (mA)
Single phase 100 V Single phase 200 V	FR-S5NFSA-0.75K	70	168	35	0.7	4.5
	FR-S5NFSA-1.5K	110	168	35	1.1	9.5
Single phase 200 V	SF1320	70	168	30.5	0.4	10
	SF1321	110	168	36.5	0.6	10
Three phase 200 V	SF1306	110	200	36.5	0.7	10
	SF1309	200	282	57	2.1	15
Three phase 400 V	FR-E5NF-H0.75K	140	210	46	1.1	22.6
	FR-E5NF-H3.7K	140	210	46	1.2	44.5
	FR-E5NF-H7.5K	220	210	47	2	68.4



EMC Filter Model		Outline Dimension (mm) W	H	D	D1	Approximate Mass (kg)	Leakage Current Reference Value (mA)
Three phase 200 V	SF1260	222	468	80	39	5	440
	SF1261	253	600	86	38	9.3	71
	SF1262	303	650	86	47	11	71
Three phase 400 V	SF1175	253	530	60	35	4.7	76
	SF1176	303	600	60	38	5.9	108



*1 The indicated leakage current is equivalent to the current for one phase of the three-phase three-wire star-connection power supply. For the three-phase three-wire delta-connection power supply, the value becomes approximately three times larger than the listed value.
*2 An installation intercompatibility attachment and an EMC filter installation attachment may be necessary to install the inverter. In such a case, note that the width equivalent to the intercompatibility attachment length increases.

Filterpack

FR-BFP2 E800 E700 F700PJ D700

Filterpack is enclosed for the FR-F7[]0PJ-[]KF inverters.

Power factor improving AC reactor, common mode choke, and capacitor type filter are combined into one as Filterpack.
Using the option, the inverter may conform to the Japanese guideline for reduction of harmonic emission.
The option is available for three-phase 200V/400V class inverters with 0.4K to 15K capacity.
Filterpack can be installed on the side or on the rear. (Rear panel installation is not available for FR-E720-5.5K, 7.5K, and FR-E740-0.4K to 3.7K.)

●Specifications

<<For three-phase 200 V class>>

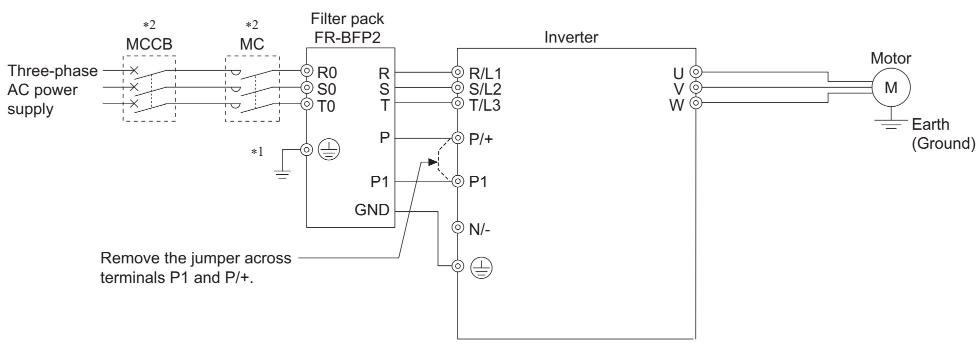
Model FR-BFP2-[]K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Permissible inverter output current (A) *1		2.5	4.2	7	10	16.5	23.8	31.8	45	58
Approximate mass (kg)		1.3	1.4	2.0	2.2	2.8	3.8	4.5	6.7	7.0
Power factor improving reactor		Install a DC reactor on the DC side. (93% to 95% of power supply power factor under 100% load (94.4% *2))								
Noise filter	Common mode choke	Install a ferrite core on the input side.								
	Capacitive filter	About 4 mA of capacitor leakage current *3								
Protective structure (JEM1030)		Open type (IP00)								

<<For three-phase 400V class>>

Model FR-BFP2-H[]K		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Permissible inverter output current (A) *1		1.2	2.2	3.7	5	8.1	12	16.3	23	29.5
Approximate mass (kg)		1.6	1.7	1.9	2.3	2.6	4.5	5.0	7.0	8.2
Power factor improving reactor		Install a DC reactor on the DC side. (93% to 95% of power supply power factor under 100% load (94.4% *2))								
Noise filter	Common mode choke	Install a ferrite core on the input side.								
	Capacitive filter	About 8 mA of capacitor leakage current *3								
Protective structure (JEM1030)		Open type (IP00)								

*1 To use with an FR-E700 series inverter, select a capacity that makes the load (inverter output) current to be the same with the permissible inverter output current or lower.
*2 The values in parentheses are calculated by applying 1 power factor to the reference waveform in accordance with the Architectural Standard Specifications (Electrical Installation) (2013 revisions) supervised by the Ministry of Land, Infrastructure, Transport and Tourism of Japan.)
*3 The indicated leakage current is equivalent to the current for one phase of the three-phase three-wire star-connection power supply.

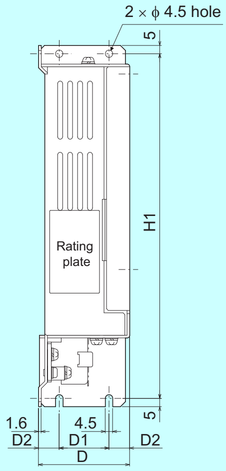
●Connection diagram

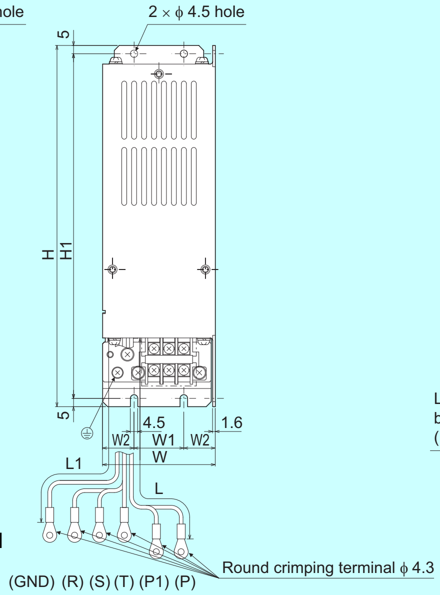


*1 Connect the GND cable of the filter pack to the earth (ground) terminal of the inverter. Use the earth (ground) terminal of the filter pack to earth (ground). The inverter is earthed (grounded) through the filter pack.
*2 For cable size for MCCB, MC and filter pack, refer to the inverter Instruction Manuals.
MCCB and MC should be selected with reactor connection.

●Outline dimension drawings

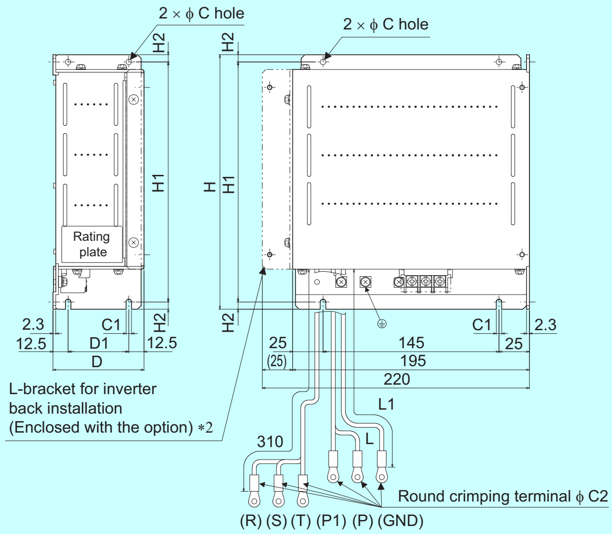
● FR-BFP2-0.4K to 3.7K
● FR-BFP2-H0.4K to H3.7K





The appearance of a typical model. The shape differs according to each model.

● FR-BFP2-5.5K to 15K
● FR-BFP2-H5.5K to H15K



(Unit: mm)

	Capacity	W	W1	W2	H	H1	D	D1	D2	L	L1
200 V	0.4K, 0.75K	68	30	19	218	208	60	30	15	240	220
	1.5K, 2.2K	108	55	26.5	188	178	80	55	12.5	200	220
	3.7K	170	120	25	188	178	65	40	12.5	220	240
400 V	H0.4K, H0.75K *1	108	55	26.5	188	178	55	30	12.5	200	220
	H1.5K to H3.7K	108	55	26.5	188	178	80	55	12.5	200	220

	Capacity	W	W1	W2	H	H1	D	D1	D2	L	L1
200 V	5.5K, 7.5K	210	198	6	75	50	4.5	4.5	5.3	270	400
	11K	320	305	7.5	85	60	6	6	5.3	280	280
	15K	320	305	7.5	85	60	6	6	6.4	260	260
400 V	H5.5K, H7.5K	210	198	6	75	50	4.5	4.5	4.3	270	400
	H11K	320	305	7.5	85	60	6	6	4.3	280	280
	H15K	320	305	7.5	85	60	6	6	6.4	260	260

*1 The 400V class H0.4K and H0.75K have no slit.
*2 L-bracket is required to install the option to the back of inverter.
L-bracket is not attached when shipped from the factory but is enclosed with the option.

Output filter

Surge voltage suppression filter

FR-ASF, FR-BMF

A800 | A800 Plus | F800 | E800 | E700 | F700PJ | D700

A surge voltage suppression filter limits surge voltage applied to motor terminals when driving the 400V class motor by the inverter. This filter cannot be used under vector control, Real sensorless vector control, and IPM motor control.

●Specifications

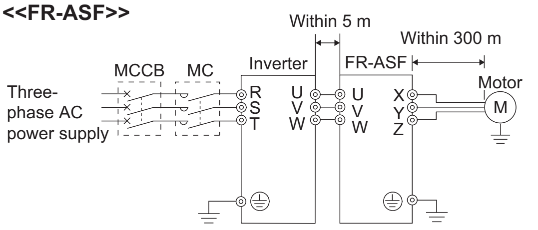
Model FR-ASF-[]	400V						
	H1.5K	H3.7K	H7.5K	H15K	H22K	H37K	H55K
Applicable motor capacity (kW)	0.4 to 1.5	2.2 to 3.7	5.5 to 7.5	11 to 15	18.5 to 22	30 to 37	45 to 55
Rated input current (A)	4.0	9.0	17.0	31.0	43.0	71.0	110.0
Rated input AC voltage	Three-phase 380 V to 460 V 50/60 Hz						
Maximum AC voltage fluctuation	Three-phase 506V 50 Hz/60 Hz						
Maximum frequency	400 Hz						
PWM frequency permissible range	0.5 kHz to 14.5 kHz						
Maximum wiring length between the filter-motor	300 m						
Approximate mass (kg)	8.0	11.0	20.0	28.0	38.0	59.0	78.0

Model FR-BMF-[]	400V			
	H7.5K	H15K	H22K	H37K
Applicable motor capacity (kW)	5.5 to 7.5	11 to 15	18.5 to 22	30 to 37
Rated input current (A)	17.0	31.0	43.0	71.0
Rated input AC voltage	Three-phase 380 to 480 V 50 Hz/60 Hz			
Maximum AC voltage fluctuation	Three-phase 323 to 528V 50 Hz/60 Hz			
Maximum AC voltage fluctuation	120 Hz			
PWM frequency permissible range	2 kHz or less *			
Maximum wiring length between the filter-motor	100 m			
Approximate mass (kg)	5.5	9.5	11.5	19

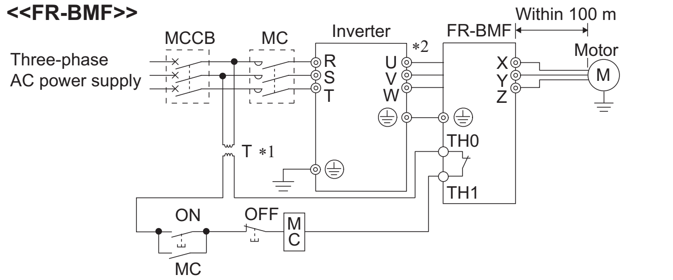
* Always set the inverter PWM frequency to 2 kHz or less.

●Connection diagram

<<FR-ASF>>

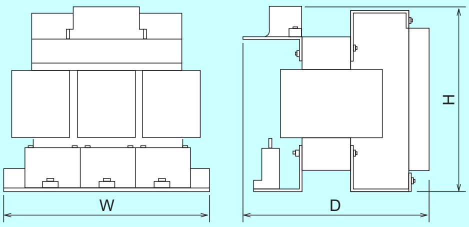


<<FR-BMF>>



*1 Install a step-down transformer.
*2 Connect the FR-BMF wire to output terminal (U, V, W) of the inverter. Do not increase the wiring length.

<<FR-ASF>>



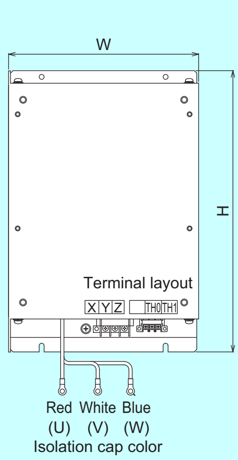
(Unit: mm)

Surge Voltage Suppression Filter Model	W *1	H *1	D *1
FR-ASF-H1.5K	221	193	160
FR-ASF-H3.7K	221	200	180
FR-ASF-H7.5K	281	250	215
FR-ASF-H15K *2	336	265	290
FR-ASF-H22K *2	336	345	354
FR-ASF-H37K *2	376	464	429
FR-ASF-H55K *2	396	464	594

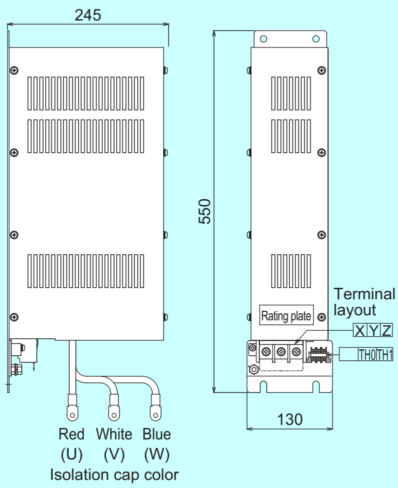
*1 Maximum size
*2 For the H15K or higher, the shape is partially different.

<<FR-BMF>>

● FR-BMF-H7.5K to H22K



● FR-BMF-H37K



(Unit: mm)

Surge Voltage Suppression Filter Model	W	H	D
FR-BMF-H7.5K	230	340	75
FR-BMF-H15K, H22K	260	500	100

Sine wave filter

MT-BSL, MT-BSC (A800) (A800 Plus) (F800) (A701)

Installing the sine wave filter on the inverter output side converts the motor voltage/current into a nearly sine wave. Effects such as 1) acoustic noise reduction, 2) surgeless, and 3) reduction of the motor loss (use of standard motor) could be expected.
Always use this filter under V/F control.

●Specifications

Model	200V		400V				
MT-BSL-[][]	75K	90K	H75K	H110K	H150K	H220K	H280K
MT-BSC-[][]	75K	90K	H75K	H110K	—	—	—
Maximum frequency	60 Hz						
PWM frequency permissible range	2.5 kHz *1						
Vibration	5.9 m/s^2 or less, 10 to 55 Hz (directions of X, Y, Z axes)						
Approximate mass (kg)	Refer to the outline dimension drawing.						

*1 Always set the inverter PWM frequency to 2.5 kHz.

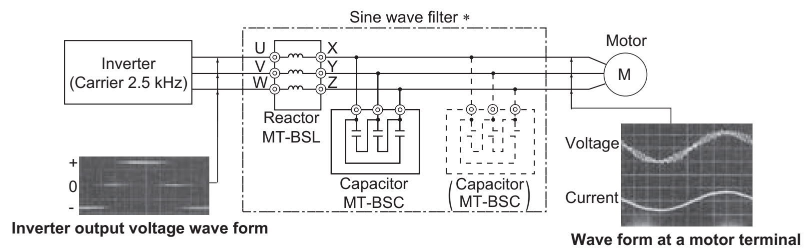
●Selection

- Select an inverter with a rating one step above the capacity of the motor to be used. Note that an inverter with same kW with a motor can be used if the rated motor current × 1.1 is less than 90% of the inverter rated current.
- Use the MT-BSL-HC when using a sine wave filter with the FR-HC2.

Motor Capacity (kW) *1		Model		
		Reactor for filter		Capacitor for filter *2
			Rated current (A)	
200V class	75	MT-BSL-75K	288	1 × MT-BSC-75K
	90	MT-BSL-90K	346	1 × MT-BSC-90K
400V class	75	MT-BSL-H75K(-HC)	144	1 × MT-BSC-H75K
	90	MT-BSL-H110K(-HC)	216	1 × MT-BSC-H110K
	110	MT-BSL-H110K(-HC)	216	1 × MT-BSC-H110K
	132	MT-BSL-H150K(-HC)	288	2 × MT-BSC-H75K
	160	MT-BSL-H220K(-HC)	432	2 × MT-BSC-H110K
	185	MT-BSL-H220K(-HC)	432	2 × MT-BSC-H110K
	220	MT-BSL-H220K(-HC)	432	2 × MT-BSC-H110K
	250	MT-BSL-H280K(-HC)	576	3 × MT-BSC-H110K
	280	MT-BSL-H280K(-HC)	576	3 × MT-BSC-H110K

*1 Assumes the use of a standard 4-pole motor.
*2 When using several capacitors for filter, connect them in parallel as in the connection diagram.

●Connection diagram

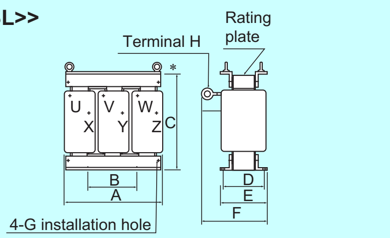


* Install the filter near the inverter.
For a capacitor cable, use a cable with A size larger than indicated in the table below "recommended cable size".

●Outline dimension drawings

- The appearance of a typical model. The shape differs according to each model.

<<MT-BSL>>

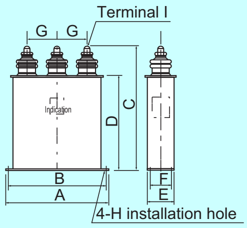


* Remove the eye nut after installation of the product.

(Unit: mm)

Model		A	B	C	D	E	F	G	H	Mass (kg)
200V class	MT-BSL-75K	330	150	285	185	216	328	M10	M12	80
	MT-BSL-90K	390	150	320	180	220	330	M12	M12	120
400V class	MT-BSL-H75K	330	150	285	185	216	318	M10	M10	80
	MT-BSL-H110K	390	150	340	195	235	368	M12	M12	140
	MT-BSL-H150K	455	200	397	200	240	380	M12	M12	190
	MT-BSL-H220K	495	200	405	250	300	420	M12	M12	240
	MT-BSL-H280K	575	200	470	310	370	485	M12	M12	340
	MT-BSL-H75K-HC	385	150	345	185	216	315	M10	M10	110
	MT-BSL-H110K-HC	420	170	400	195	235	370	M12	M12	180
	MT-BSL-H150K-HC	450	300	455	390	430	500	M12	M12	250
	MT-BSL-H220K-HC	510	350	540	430	485	555	M12	M12	310
	MT-BSL-H280K-HC	570	400	590	475	535	620	M12	M12	480

<<MT-BSC>>



(Unit: mm)

Model		A	B	C	D	E	F	G	H	I	Mass (kg)
200V class	MT-BSC-75K	207	191	285	233	72	41	45	ϕ7	M8	3.9
	MT-BSC-90K	282	266	240	183	92	56	85	ϕ7	M12	5.5
400V class	MT-BSC-H75K	207	191	220	173	72	41	55	ϕ7	M6	3.0
	MT-BSC-H110K	207	191	280	233	72	41	55	ϕ7	M6	4.0

* Leave more than 25 mm space between capacitors.

Recommended cable size

The cable sizes between the Inverter and MT-BSL and between the MT-BSL and Motor should be the same as the U, V, W wiring size. The cable size to the MT-BSC is as table below.

MT-BSC-75K	MT-BSC-90K	MT-BSC-H75K	MT-BSC-H110K
38 mm^2	38 mm^2	22 mm^2	22 mm^2

Structure option

Attachments for installation inside the enclosure for FR-A872

FR-A8CW (A800)
FR-A8SR (A800)
FR-A8CU (A800)

The attachments are used with the FR-A872-05690 to 07150 and the FR-CC2-N-450K to 630K.

Attachment for cable connection in the enclosure (FR-A8CW)

This attachment is used for cable connection for the inverter and the converter unit.
Bus bar connection is also available for 12-phase rectification.
This option provides IP20 protection for cable connection.

It is recommended to use the FR-A8SR slide rail with this option.

Option model	Applicable model			
	FR-A872	FR-A872-P	FR-CC2-N	FR-CC2-N-P
FR-A8CW29-N	-		450K, 500K, 560K, 630K	450K, 500K, 560K
FR-A8CW39-N				
FR-A8CW59-N	05690, 06470, 07150		-	

-: Cannot be used.

Enclosure slide rail (FR-A8SR)

This attachment is used to facilitate the installation of the inverter and the converter unit in the enclosure, maintenance, and unit replacement when a fault occurs.

Option model	Applicable model			
	FR-A872	FR-A872-P	FR-CC2-N	FR-CC2-N-P
FR-A8SR39	-		450K, 500K, 560K, 630K	450K, 500K, 560K
FR-A8SR59	05690, 06470, 07150		-	

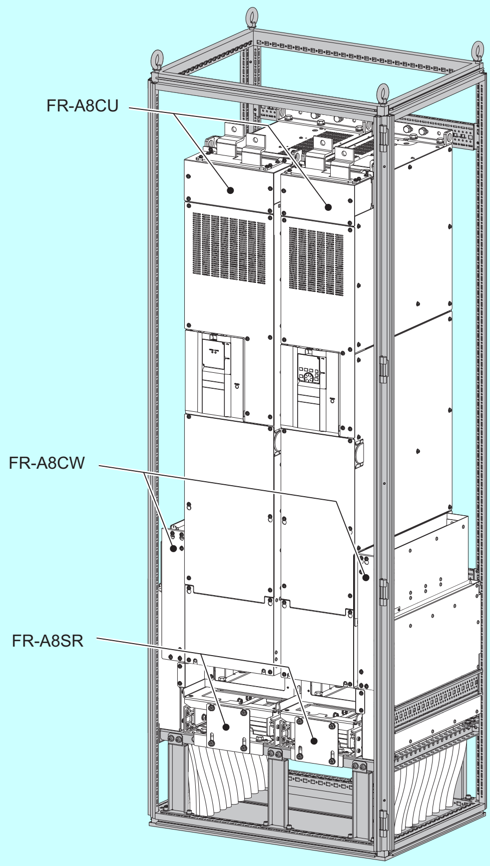
-: Cannot be used.

IP20 compliant attachment (FR-A8CU)

This attachment is used to provide IP20 protection for the inverter and the converter unit when they are connected with bus bars.
The FR-A8CU79 provides IP20 protection for the main circuit terminals when the inverter and the converter unit are installed side by side.

Option model	Applicable model			
	FR-A872	FR-A872-P	FR-CC2-N	FR-CC2-N-P
FR-A8CU39-N	-		450K, 500K, 560K, 630K	450K, 500K, 560K
FR-A8CU59-N	05690, 06470, 07150		-	
FR-A8CU79-N	05690, 06470, 07150	-	450K, 500K, 560K, 630K	-

-: Cannot be used.



Panel through attachment

FR-A8CN A800 A800 Plus F800
FR-E8CN E800
FR-E7CN E700 F700PJ D700

With this attachment, the heat sink, which is the exothermic section of the inverter, can be placed outside of the enclosure. Since the heat generated in the inverter can be radiated to the rear of the enclosure, the enclosure can be downsized.

●Selection

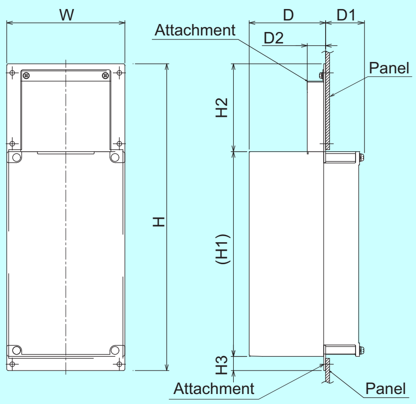
Attachment Model	Applicable Inverter			
	FR-A820	FR-A840	FR-F820	FR-F840
FR-A8CN01	00105(1.5K), 00167(2.2K), 00250(3.7K)	00023(0.4K), 00038(0.75K), 00052(1.5K), 00083(2.2K), 00126(3.7K)	00105(2.2K), 00167(3.7K), 00250(5.5K)	00023(0.75K), 00038(1.5K), 00052(2.2K), 00083(3.7K), 00126(5.5K)
FR-A8CN02	00340(5.5K), 00490(7.5K)	00170(5.5K), 00250(7.5K)	00340(7.5K), 00490(11K)	00170(7.5K), 00250(11K)
FR-A8CN03	00630(11K)	00310(11K), 00380(15K)	00630(15K)	00310(15K), 00380(18.5K)
FR-A8CN04	00770(15K), 00930(18.5K), 01250(22K)	00470(18.5K), 00620(22K)	00770(18.5K), 00930(22K), 01250(30K)	00470(22K), 00620(30K)
FR-A8CN05	01540(30K)	00770(30K)	01540(37K)	00770(37K)
FR-A8CN06	01870(37K), 02330(45K)	00930(37K), 01160(45K), 01800(55K)	01870(45K), 02330(55K)	00930(45K), 01160(55K), 01800(75K)
FR-A8CN07	03160(55K)	—	03160(75K)	—
FR-A8CN08	03800(75K), 04750(90K)	03250(110K), 03610(132K)	03800(90K), 04750(110K)	03250(132K), 03610(160K)
FR-A8CN09	—	02160(75K), 02600(90K)	—	02160(90K), 02600(110K)

Attachment Model	Applicable Inverter									
	Three-phase 200 V class			Single-phase 200 V class		Three-phase 400 V class			Three-phase 575 V class	
	FR-E820	FR-E820	FR-E820	FR-E820S	FR-E820S	FR-E840	FR-E840	FR-E840	FR-E860	FR-E860
FR-E8CN01	1.5K(0080), 2.2K(0110)	—	—	1.5K(0080)	—	—	—	—	—	—
FR-E8CN02	—	3.7K(0175)	—	—	2.2K(0110)	—	—	—	—	—
FR-E8CN03	—	—	5.5K(0240), 7.5K(0330)	—	—	—	—	—	—	—
FR-E8CN04	—	—	—	—	—	1.5K(0040)	—	—	—	—
FR-E8CN05	—	—	—	—	—	—	2.2K(0060), 3.7K(0095)	—	0027, 0040	—
FR-E8CN06	—	—	—	—	—	—	—	5.5K(0120), 7.5K(0170)	—	0061 to 0120

Attachment Model	Applicable Inverter					
	FR-E700		FR-F700PJ		FR-D700	
	200 V class	400 V class	200 V class	400 V class	200 V class	400 V class
FR-E7CN01	FR-E720-1.5K, 2.2K FR-E720S-0.75K, 1.5K	—	FR-F720PJ-1.5K, 2.2K	FR-F740PJ-1.5K to 3.7K	FR-D720-1.5K, 2.2K FR-D720S-1.5K	FR-D740-1.5K to 3.7K
FR-E7CN02	FR-E720-3.7K	—	FR-F720PJ-3.7K	—	FR-D720-3.7K	—
FR-E7CN03	FR-E720-5.5K, 7.5K	—	—	—	—	—
FR-E7CN04	FR-E720S-2.2K	FR-E740-1.5K to 3.7K	—	—	FR-D720S-2.2K	—
FR-E7CN05	—	FR-E740-5.5K, 7.5K	FR-F720PJ-5.5K, 7.5K	FR-F740PJ-5.5K, 7.5K	FR-D720-5.5K, 7.5K	FR-D740-5.5K, 7.5K
FR-E7CN06	FR-E720-11K, 15K	FR-E740-11K, 15K	FR-F720PJ-11K, 15K	FR-F740PJ-11K, 15K	FR-D720-11K, 15K	FR-D740-11K, 15K

●Outline dimension drawings

- This attachment requires larger area for attachment.



(Unit: mm)

Type	W	H	H1	H2	H3	D	D1	D2
FR-A8CN01	150	389.5	260	111.5	18	97	48.4	24.3
FR-A8CN02	245	408.5	260	116.5	32	86	89.4	21.3
FR-A8CN03	245	448.5	300	116.5	32	89	106.4	21.3
FR-A8CN04	280	554	400	113.5	32	96.7	102.4	40.6
FR-A8CN05	357	654	480	130	44	130.8	64.2	105
FR-A8CN06	478.2	650	465	145	40	96	154	55
FR-A8CN07	510.2	805	610	150	45	130	120	105
FR-A8CN08	510.2	845	650	150	45	176.5	183.5	40
FR-A8CN09	510.2	725	530	150	45	152.3	147.7	65

Totally-enclosed structure attachment

FR-E7CV E700

Installing the attachment to the inverter changes the protective structure (JEM1030) of the inverter to the totally enclosed structure (IP40 equivalent).

●Specifications

Item	Description
Surrounding air temperature	-10 °C to +40 °C
Ambient humidity	90% RH or less (non-condensing)
Atmosphere	Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)
Altitude	Maximum 1,000 m
Vibration	5.9 m/s^2 or less at 10 to 55 Hz (directions of X, Y, Z axes)

●Selection

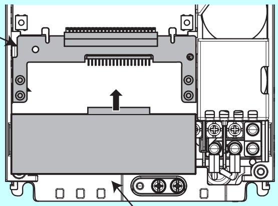
Attachment Model	Applicable Inverter
	FR-E700
FR-E7CV01	FR-E720-0.1K to 0.75K
FR-E7CV02	FR-E720-1.5K, 2.2K
FR-E7CV03	FR-E720-3.7K
FR-E7CV04	FR-E720-5.5K, 7.5K

Control circuit terminal block intercompatibility attachment

FR-A8TAT A800 A800 Plus F800

This attachment allows the conventional 700/500 series control circuit terminal blocks to be installed without removing any cables.
This attachment is useful for replacing a conventional inverter with the 800 series inverter.

●Installation procedure



●Restrictions

- For using the control circuit terminal block of the 500 series, open or remove the cover of the control circuit terminal block. Otherwise, the front cover of the inverter may not close properly.
- Since the specifications of the control circuit terminals of the 700/500 series are different from those of the 800 series, certain functions of the inverter are restricted (refer to the table below).

	Relay output 2 terminals	24 V external power supply input terminal	Safety stop signal terminals
FR-A500/F500 series	×	×	×
FR-A700/F700(P) series	○	×	×

○...Available, ×...Not available

- The FR-A8NC, FR-A8NCE, or FR-A8NS plug-in option cannot be installed.
- When using a plug-in option, connect the plug-in option using a cable that can be routed through the space between the front cover and the control circuit terminal block (700 series: 7 mm, 500 series: 0.8 mm).

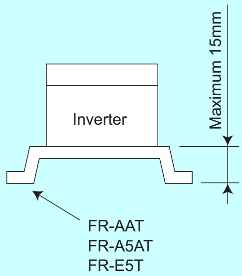
Intercompatibility attachment
EMC filter installation attachment

FR-AAT, FR-A5AT (A800) (A800 Plus) (F800) (E800)
FR-E8AT (E800)
FR-E7AT (E800) (E700)
FR-E5T (E800) (E700) (F700PJ) (D700)
FR-F8AT (F800) (For FR-F820-75K)

When replacing with a new inverter, the attachment make the new inverter to be installed using holes of conventional model.

●Specifications

Attachment Model	Installation Size of Mountable Model (W×H unit mm)	Installation Size of Compatible Conventional Model (W×H unit mm)
FR-AAT01	1) 95 × 245 2) 125 × 245 3) 95 × 285 4) 125 × 285	200 × 280
FR-AAT02	1) 125 × 245 2) 195 × 245 3) 125 × 285 4) 195 × 285	230 × 380
FR-AAT03	1) 195 × 285 2) 230 × 380	230 × 510
FR-AAT04	1) 195 × 285 2) 230 × 380 3) 280 × 430	290 × 570
FR-AAT05	1) 230 × 380 2) 280 × 430 3) 270 × 530	290 × 670
FR-AAT06	1) 270 × 530 2) 380 × 525	420 × 720
FR-AAT07	1) 380 × 525 2) 410 × 675	420 × 860
FR-AAT08	1) 380 × 525	420 × 860
FR-AAT09	1) 270 × 530	380 × 525
FR-AAT21	1) 95 × 245	125 × 245
FR-AAT22	1) 125 × 245	195 × 245
FR-AAT23	1) 270 × 530	380 × 525
FR-AAT24	1) 195 × 285	230 × 380
FR-AAT27	1) 230 × 380	270 × 530
FR-A5AT01	1) 95 × 245	95 × 285
FR-A5AT02	1) 95 × 245 2) 125 × 245	125 × 285
FR-A5AT03	1) 125 × 245 2) 195 × 245	195 × 285
FR-A5AT04	1) 195 × 285 2) 230 × 380	280 × 430
FR-A5AT05	1) 380 × 525	410 × 675
FR-E5T *	1) 96 × 118 2) 158 × 118	188 × 138
FR-E5T-02 *	1) 164 × 244	195 × 285



The depth increases after installation of the inverter when the attachment is used.

*1 This is sold as the FR-E700 series, F700PJ series and D700 series attachment with EMC filter.

●Selection

<<Replacement with FR-A820>>

Model name and capacity of conventional model		FR-A820 0.4K/0.75K	1.5K to 3.7K	5.5K/7.5K	11K	15K to 22K	30K	37K/45K	55K
FR-A220E	0.4K/0.75K	FR-A5AT01	—	—	—	—	—	—	—
	1.5K to 3.7K	FR-A5AT02	FR-A5AT02	—	—	—	—	—	—
	5.5K to 11K	—	FR-A5AT03	FR-A5AT03	○	—	—	—	—
	15K	—	—	FR-AAT02	FR-AAT24	○	—	—	—
	18.5K/22K	—	—	—	FR-A5AT04	FR-A5AT04	—	—	—
	30K	—	—	—	—	FR-AAT27	○	—	—
	37K/45K	—	—	—	—	—	FR-AAT23	○	—
	55K	—	—	—	—	—	—	FR-A5AT05	○
FR-A520/A720	0.4K/0.75K	○	—	—	—	—	—	—	—
	1.5K to 3.7K	FR-AAT21	○	—	—	—	—	—	—
	5.5K/7.5K	—	FR-AAT22	○	—	—	—	—	—
	11K	—	—	FR-A5AT03	○	—	—	—	—
	15K to 22K	—	—	—	FR-AAT24	○	—	—	—
	30K	—	—	—	—	FR-AAT27	○	—	—
	37K/45K	—	—	—	—	—	FR-AAT23	○	—
	55K	—	—	—	—	—	—	FR-A5AT05	○

○: Mountable without an intercompatibility attachment
FR-A5AT[][], FR-AAT[][]: Easily replaceable with a stated intercompatibility attachment.

Structure option

<<Replacement with FR-A840>>

Model name and capacity of conventional model		FR-A840 0.4K to 3.7K	5.5K/7.5K	11K/15K	18.5K/22K	30K	37K to 55K
FR-A240E	0.4K to 3.7K	FR-A5AT02	—	—	—	—	—
	5.5K/7.5K	FR-A5AT03	FR-A5AT03	—	—	—	—
	11K/15K	—	FR-AAT02	FR-AAT24	—	—	—
	18.5K/22K	—	—	FR-A5AT04	FR-A5AT04	—	—
	30K	—	—	—	FR-AAT27	○	—
	37K/45K	—	—	—	—	FR-AAT23	○
	55K	—	—	—	—	—	FR-A5AT05
FR-A540	0.4K to 3.7K	○	—	—	—	—	—
	5.5K/7.5K	FR-AAT22	○	—	—	—	—
	11K to 22K	—	FR-AAT02	FR-AAT24	○	—	—
	30K	—	—	—	FR-AAT27	○	—
	37K to 55K	—	—	—	—	FR-AAT23	○
FR-A740	0.4K to 3.7K	○	—	—	—	—	—
	5.5K/7.5K	FR-AAT22	○	—	—	—	—
	11K/15K	—	FR-A5AT03	○	—	—	—
	18.5K/22K	—	—	FR-AAT24	○	—	—
	30K	—	—	—	FR-AAT27	○	—
	37K to 55K	—	—	—	—	FR-AAT23	○

○: Mountable without an intercompatibility attachment
FR-A5AT[][], FR-AAT[][]: Easily replaceable with a stated intercompatibility attachment.

<<Replacement with FR-F820>>

Model name and capacity of conventional model		FR-F820 0.75K/1.5K	2.2K to 5.5K	7.5K/11K	15K	18.5K to 30K	37K	45K/55K
FR-A120E	0.75K	FR-A5AT01	—	—	—	—	—	—
	1.5K to 3.7K	FR-A5AT02	FR-A5AT02	—	—	—	—	—
	5.5K to 11K	—	FR-A5AT03	FR-A5AT03	—	—	—	—
	15K/18.5K	—	—	FR-AAT02	FR-AAT24	○	—	—
	22K/30K	—	—	—	FR-A5AT04	FR-A5AT04	—	—
	37K	—	—	—	—	FR-AAT27	○	—
	45K	—	—	—	—	—	FR-AAT23	○
	55K	—	—	—	—	—	—	FR-A5AT05
FR-F520	0.75K	○	—	—	—	—	—	—
	1.5K to 3.7K	FR-AAT21	○	—	—	—	—	—
	5.5K/7.5K	—	FR-AAT22	○	—	—	—	—
	11K	—	FR-A5AT03	FR-A5AT03	—	—	—	—
	15K to 22K	—	—	FR-AAT02	FR-AAT24	○	—	—
	30K	—	—	—	FR-A5AT04	FR-A5AT04	—	—
	37K	—	—	—	—	FR-AAT27	○	—
	45K	—	—	—	—	—	FR-AAT23	○
	55K	—	—	—	—	—	—	FR-A5AT05
FR-F720(P)	0.75K/1.5K	○	—	—	—	—	—	—
	2.2K to 5.5K	FR-AAT21	○	—	—	—	—	—
	7.5K/11K	—	FR-AAT22	○	—	—	—	—
	15K	—	FR-A5AT03	FR-A5AT03	○	—	—	—
	18.5K to 30K	—	—	—	FR-AAT24	○	—	—
	37K	—	—	—	—	FR-AAT27	○	—
	45K/55K	—	—	—	—	—	FR-AAT23	○

○: Mountable without an intercompatibility attachment
FR-A5AT[][], FR-AAT[][]: Easily replaceable with a stated intercompatibility attachment.

<<Replacement with FR-F840>>

Model name and capacity of conventional model		FR-F840 0.75K to 5.5K	FR-F840 7.5K/11K	FR-F840 15K/18.5K	FR-F840 22K/30K	FR-F840 37K	FR-F840 45K/55K
FR-A140E	0.75K to 3.7K	FR-A5AT02	—	—	—	—	—
	5.5K to 11K	FR-A5AT03	FR-A5AT03	—	—	—	—
	15K/18.5K	—	FR-AAT02	FR-AAT24	—	—	—
	22K	—	—	FR-A5AT04	FR-A5AT04	—	—
	30K	—	—	—	FR-AAT27	—	—
	37K/45K	—	—	—	—	FR-AAT23	○
	55K	—	—	—	—	—	FR-A5AT05
FR-F540	0.75K to 3.7K	○	—	—	—	—	—
	5.5K to 11K	FR-AAT22	○	—	—	—	—
	15K to 22K	—	FR-AAT02	FR-AAT24	○	—	—
	30K/37K	—	—	—	FR-AAT27	○	—
	45K/55K	—	—	—	—	FR-AAT23	○
FR-F740(P)	0.75K to 5.5K	○	—	—	—	—	—
	7.5K/11K	—	○	—	—	—	—
	15K/18.5K	FR-A5AT03	FR-A5AT03	○	—	—	—
	22K/30K	—	—	FR-AAT24	○	—	—
	37K	—	—	—	FR-AAT27	○	—
	45K/55K	—	—	—	—	FR-AAT23	○

○: Mountable without an intercompatibility attachment
FR-A5AT[][], FR-AAT[][]: Easily replaceable with a stated intercompatibility attachment.

<<FR-F8AT>>
The FR-F8AT01 can be used for replacing FR-F520L-75K and FR-F720-75K with FR-F820-03160(75K).

<<Replacement of FR-E720 with FR-E820>>

Model name and capacity of conventional model		FR-E820 0.1K to 2.2K	FR-E820 3.7K	FR-E820S 0.1K to 1.5K	FR-E820S 2.2K
FR-E720	0.1K to 2.2K	○	—	—	—
	3.7K	—	FR-E8AT03	—	—
FR-E720S	0.1K to 1.5K	—	—	○	—
	2.2K	—	—	—	FR-E8AT04

○: Mountable without an intercompatibility attachment

<<Replacement of FR-E740 with FR-E840>>

Model name and capacity of conventional model		FR-E840 0.4K to 1.5K	FR-E840 2.2K/3.7K
FR-E740	0.4K to 1.5K	FR-E7AT02	—
	2.2K/3.7K	—	○

○: Mountable without an intercompatibility attachment

<<Replacement with FR-E720/FR-E820>>

Model name and capacity of conventional model		FR-E720/FR-E820 0.1K to 0.75K	FR-E720/FR-E820 1.5K	FR-E720/FR-E820 2.2K/3.7K
FR-A024	0.1K to 0.75K	FR-E7AT01	—	—
	1.5K	—	FR-E7AT02	—
	2.2K/3.7K	—	—	FR-E7AT03

<<Replacement with FR-E740/FR-E840>>

Model name and capacity of conventional model		FR-E740/FR-E840 0.4K/0.75K		FR-E740/FR-E840 1.5K to 3.7K
FR-A044	0.4K/0.75K	E740	—	—
		E840	FR-E7AT02	
	1.5K to 3.7K	—		FR-E7AT03

FR-E7AT[][]: Easily replaceable with a stated intercompatibility attachment.

DIN rail installation attachment

FR-UDA E800 E700 F700PJ D700

Use of attachment enables the inverter to be installed on DIN rail.

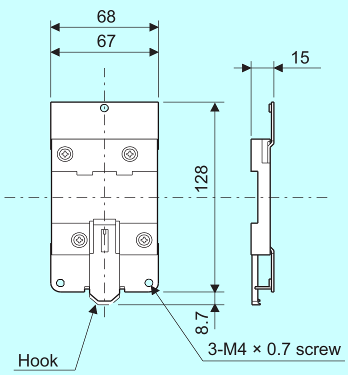
●Selection

• Select the model according to the applicable inverter capacity as shown in the following table.

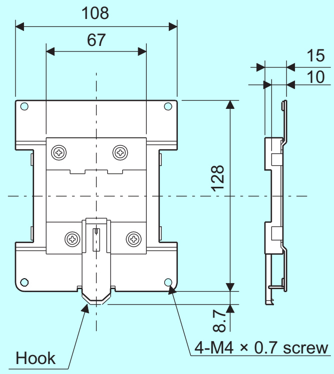
Inverter		Applicable Inverter Capacity		
		FR-UDA01	FR-UDA02	FR-UDA03
FR-E800	Single phase 200 V class	FR-E820-0.1K to 0.75K	FR-E820-1.5K, 2.2K	FR-E820-3.7K
	200 V class	FR-E820S-0.1K to 0.4K	FR-E820S-0.75K, 1.5K	FR-E820S-2.2K
FR-E700	Single phase 100 V class	FR-E710W-0.1K to 0.4K	FR-E710W-0.75K	—
	Single phase 200 V class	FR-E720S-0.1K to 0.4K	FR-E720S-0.75K, 1.5K	—
	200 V class	FR-E720-0.1K to 0.75K	FR-E720-1.5K, 2.2K	FR-E720-3.7K
FR-F700PJ	200 V class	FR-F720PJ-0.4K, 0.75K	FR-F720PJ-1.5K, 2.2K	FR-F720PJ-3.7K
	400 V class	—	FR-F740PJ-0.4K to 3.7K	—
FR-D700	Single phase 100 V class	FR-D710W-0.1K to 0.4K	FR-D710W-0.75K	—
	Single phase 200 V class	FR-D720S-0.1K to 0.75K	FR-D720S-1.5K	—
	200 V class	FR-D720-0.1K to 0.75K	FR-D720-1.5K, 2.2K	FR-D720-3.7K
	400 V class	—	FR-D740-0.4K to 3.7K	—

●Approximate dimension

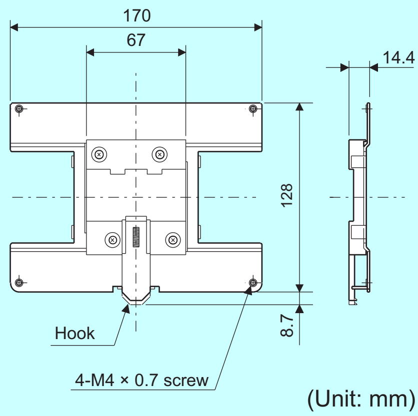
<<FR-UDA01>>



<<FR-UDA02>>



<<FR-UDA03>>



(Unit: mm)

Other options

Pilot generator

QVAH-10 ALL

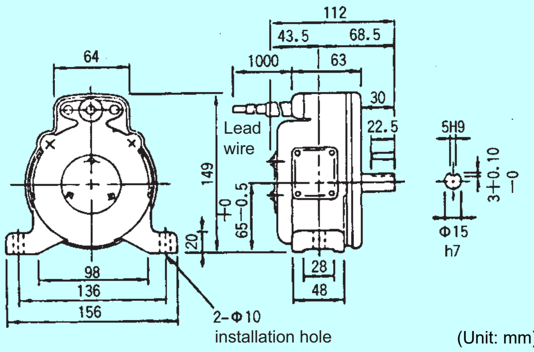
AC voltage is output depending on the speed of the motor.

●Specifications

Item	Description
Output voltage	70 V/35 VAC at 2500 r/min
Output	10 W/5 W *1
Linearity	1% or less
Maximum speed	5000 r/min *2
Number of poles	Single phase 24 poles
Rotation torque	At starting 0.14 N·m During running 0.05 N·m

*1 When outputting 10W between terminal U-V, output 1W or less between terminal U-0 (or 0-V).
*2 Operating at 2500 r/min or more degrades linearity.

●Outline dimension drawings



(Unit: mm)

Deviation sensor

YVGC-500W-NS ALL

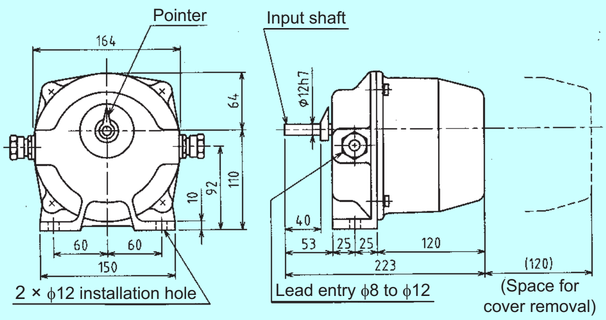
This detector detects the angular displacement of motor shaft and output as AC voltage. It has a built-in limit switch for both end detection.

●Specifications

Item	Description
Power supply voltage	200 V/220 VAC 50 Hz/60 Hz
Contact capacity	250 VAC 6 A
Used angular displacement *1	±60°
Maximum angular displacement *2	±140° ±10°
Maximum output voltage	At 200 VAC input ... 82 VAC/90° At 200 VAC input ... 90 VAC/90°
Rotation torque	0.02 N·m or less

*1 Used angular displacement indicates the rotation angle until the limit switch operates.
*2 Maximum displacement angle indicates the maximum rotation angle of the machine (to the stopper) of the deviation sensor.

●Outline dimension drawings



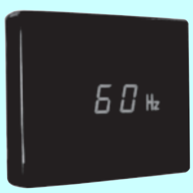
(Unit: mm)

Digital frequency meter

HZ-1N (introduced product) ALL

Connect the frequency meter between terminal FM-SD of the inverter to indicate the inverter output frequency by FM output (pulse).

Introduced product: HZ-1N *
* Please contact your sales representative or the nearest Mitsubishi FA Center.

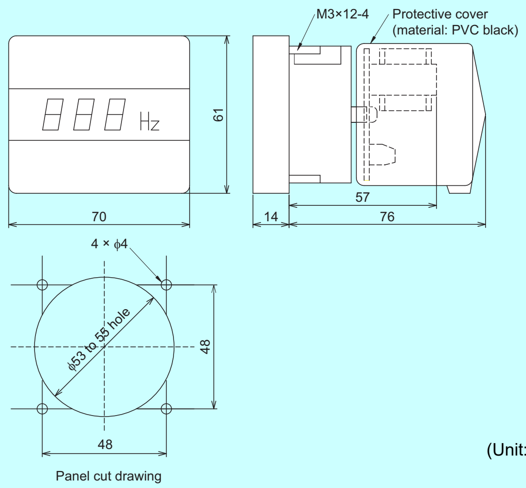


HZ-1N (introduced product)

●Specifications

Item	Description
Display digit	3 digits
Minimum resolution	1 Hz
Sampling period	Approx. 166 ms
Frequency display switching	0 to 60 Hz, 0 to 120 Hz, 0 to 240 Hz switching function
Power supply voltage	100/200 VAC ±10% 50/60 Hz

●Outline dimension drawings



(Unit: mm)

Analog frequency meter

YM-206NRI 1 mA ALL
KY-452 (introduced product) ALL

Connect a full-scale 1 mA ammeter to the inverter terminal FM-SD to display the inverter output frequency.

Introduced product: KY-452 ∗
∗ Please contact your sales representative or the nearest Mitsubishi FA center.

●Specifications

<<YM-206NRI 1 mA>>

Item	Description
Principle of operation	Moving-coil type
Scale specifications	0 to 65 Hz, 130 Hz double scale

<<KY-452 (introduced product)>>

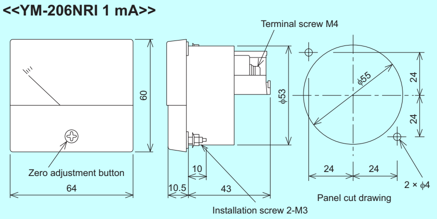
Item	Description
Principle of operation	Moving-coil type
Scale specifications	0 to 60 Hz, 0 to 120 Hz double scale

YM-206NRI 1 mA

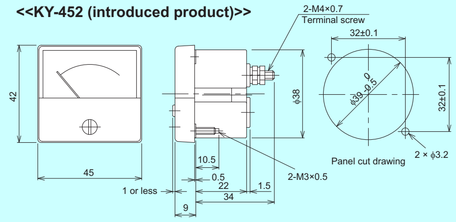
KY-452 (introduced product)

●Outline dimension drawings

<<YM-206NRI 1 mA>>



<<KY-452 (introduced product)>>



(Unit: mm)

Calibration resistor

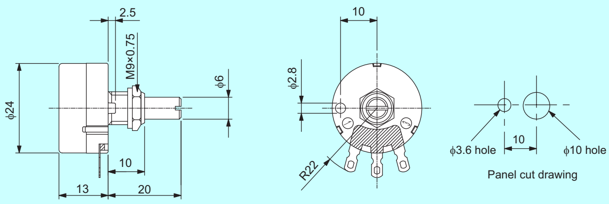
RV24YN 10 kΩ ALL

Calibrate analog frequency meter with this variable resistor. Connect this resistor between the inverter and frequency meter to change the value of current flow. (It is not necessary when calibrating the meter from the operation panel/parameter unit.)

●Specifications

Item	Description
Characteristic	Carbon film variable resistor 1/3 W 10 kΩ B characteristic
Shaft rotation angle	300° ±5°

●Outline dimension drawings



(Unit: mm)

Frequency setting potentiometer
Pointer scale
Knob

WA2W 1 kΩ (introduced product) ALL
MEM-40 (introduced product) ALL
K-3 (introduced product) ALL
WA2W-40SET-S (introduced product) ALL

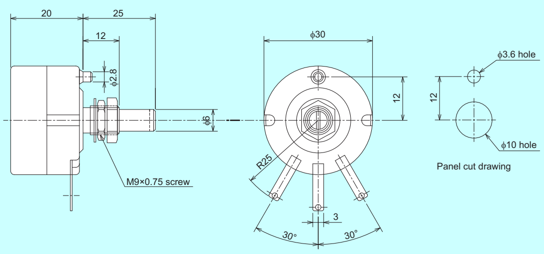
Connect the variable resistor between terminal 10-2-5 of the inverter to set the inverter running frequency.

Introduced product: WA2W, MEM-40, K-3, WA2W-40SET-S ∗
∗ Please contact your sales representative or the nearest Mitsubishi FA center.

●Specifications

Item	Description
Characteristic	Wire wound variable resistor 2 W 1 kΩ B characteristic
Shaft rotation angle	300° ±5°

●Outline dimension drawings



(Unit: mm)

WA2W 1 kΩ (introduced product)

MEM-40 (introduced product)

K-3 (introduced product)

WA2W-40SET-S includes WA2W, MEM-40, and K-3.

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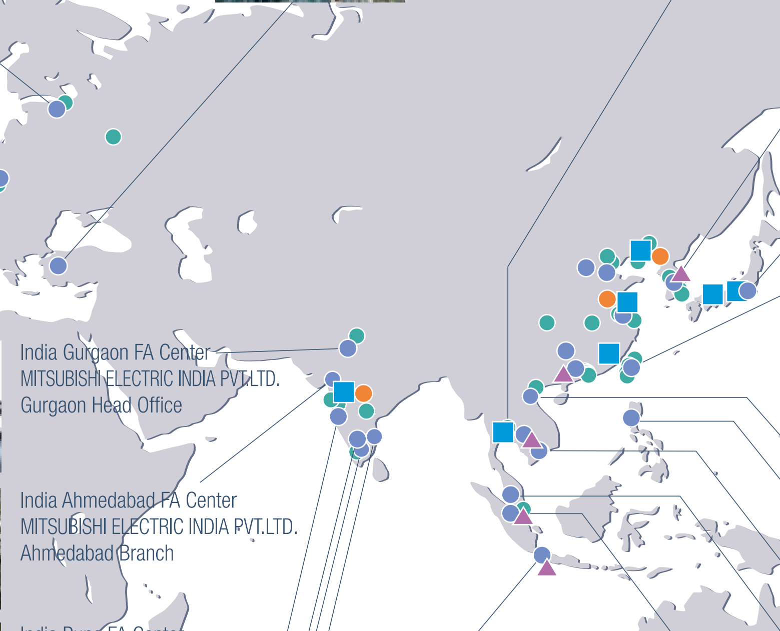

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Russian Branch St.Petersburg office

Germany FA Center
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Germany Branch

UK FA Center
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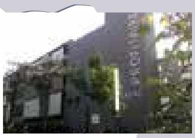
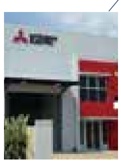


India Ahmedabad FA Center
MITSUBISHI ELECTRIC INDIA PVT.LTD.
Ahmedabad Branch

India Pune FA Center
MITSUBISHI ELECTRIC INDIA PVT.LTD.
Pune Branch



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Coimbatore Branch

India Chennai FA Center
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Production bases

Under the lead of Nagoya Works, we form a powerful network to optimize our manufacturing processes.

Domestic bases

Nagoya Works

Shinshiro Factory

Kani Factory

Production bases overseas

MDI Mitsubishi Electric Dalian Industrial Products Co., Ltd.

MEI Mitsubishi Electric India Pvt.

MEAMC Mitsubishi Electric Automation Manufacturing (Changshu) Co., Ltd.

MEATH Mitsubishi Electric Automation (Thailand) Co., Ltd.

Service bases are established around the world to provide the same services as in Japan globally. Overseas bases are opening one after another to support our customers' business expansion.

Area	Our overseas	FA centers
EMEA	39	7
China	25	4
Asia	49	16
Americas	19	6
Total	132	33

·As of March 2021

Thailand FA Center
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO.,LTD

Korea FA Center
MITSUBISHI ELECTRIC AUTOMATION KOREA CO.,LTD.

MITSUBISHI ELECTRIC CORPORATION
Factory Automation Systems Group

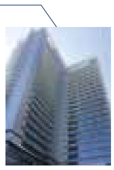
Taichung FA Center
MITSUBISHI ELECTRIC TAIWAN CO.,LTD

Taipei FA Center
SETSUYO ENTERPRISE CO.,LTD

Philippines FA Center
MELCO FACTORY AUTOMATION PHILIPPINES INC.

Hanoi FA center
Mitsubishi Electric Vietnam Company Limited Hanoi Branch

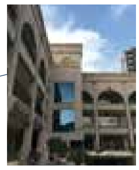
Malaysia FA Center



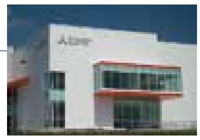
Ho Chi Minh FA Center
MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED

ASEAN FA Center
MITSUBISHI ELECTRIC ASIA PTE.LTD.

North America FA Center
MITSUBISHI ELECTRIC AUTOMATION,INC.

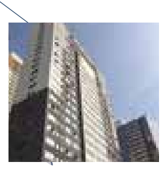


Mexico Monterrey FA Center
Monterrey Office, Mitsubishi Electric Automation, Inc.



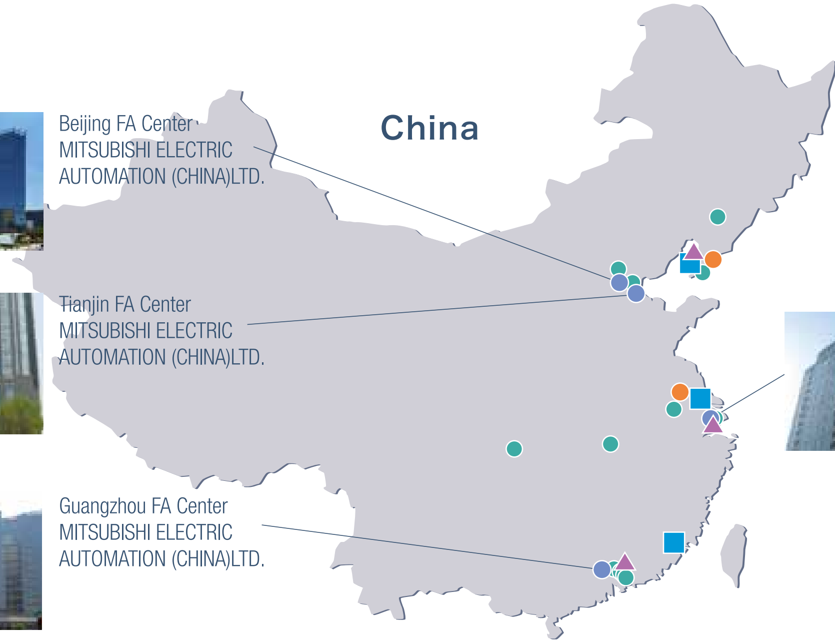
Mexico FA Center
Querétaro Office, Mitsubishi Electric Automation, Inc.

Mexico City FA Center
Mexico FA Center
Mexico Branch, Mitsubishi Electric Automation, Inc.

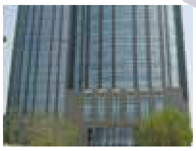


Brazil FA Center
Mitsubishi Electric do Brasil Comércio e Serviços Ltda.

Brazil Votorantim FA Center
MELCO CNC do Brasil Comércio e Serviços S.A.



Beijing FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA)LTD.



Tianjin FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA)LTD.

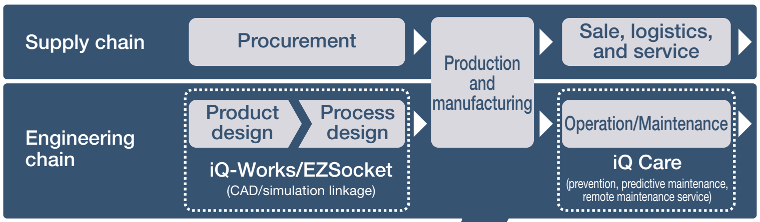
Guangzhou FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA)LTD.

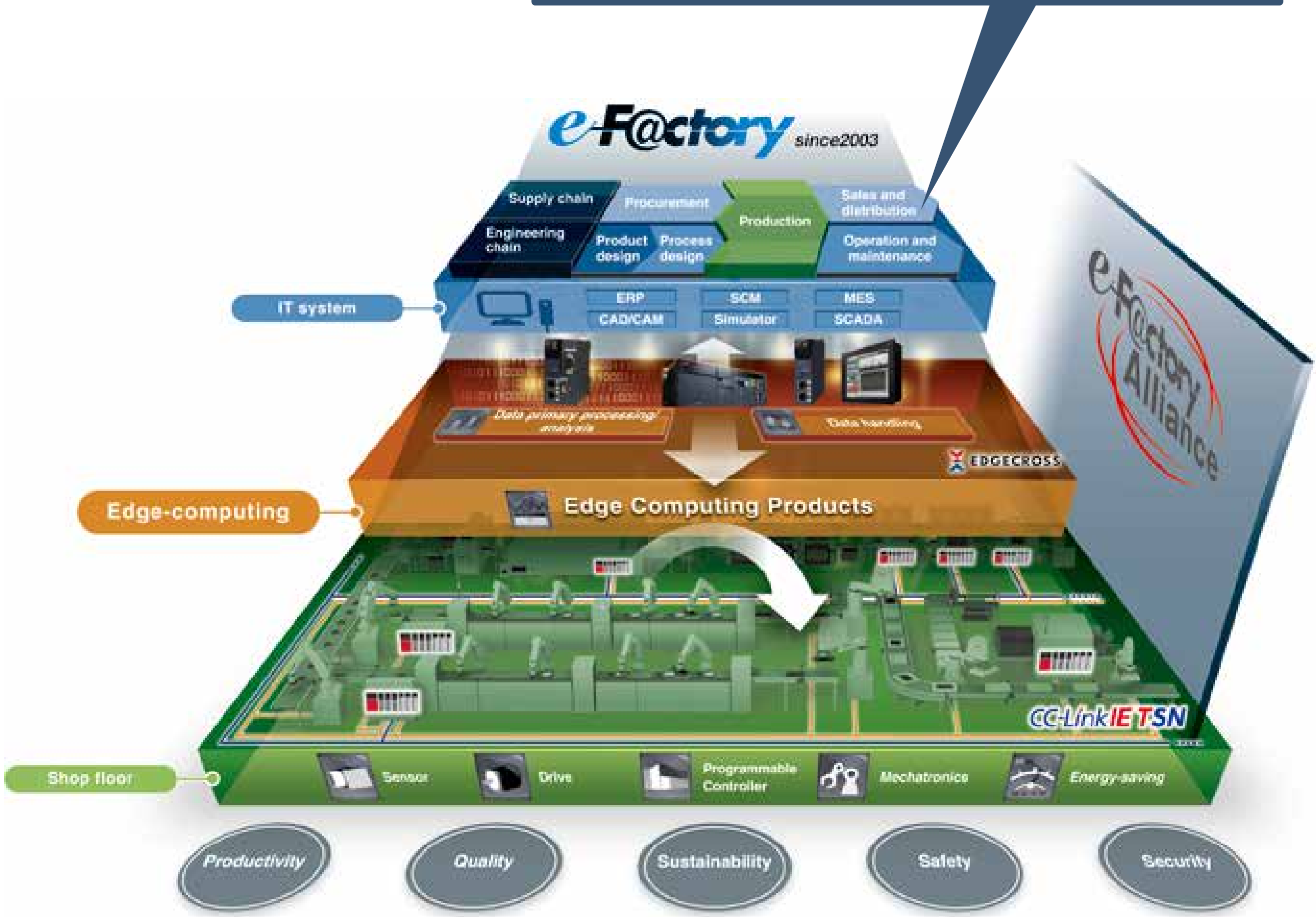
Shanghai FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.

This solution solves customers' issues and concerns by enabling visualization and analysis that lead to improvements and increase availability at production sites.

Utilizing our FA and IT technologies and collaborating with e-F@ctory Alliance partners, we reduce the total cost across the entire supply chain and engineeringchain, and support the improvement initiatives and one-step-ahead manufacturing of our customers.

FA integrated solutions reduce total cost



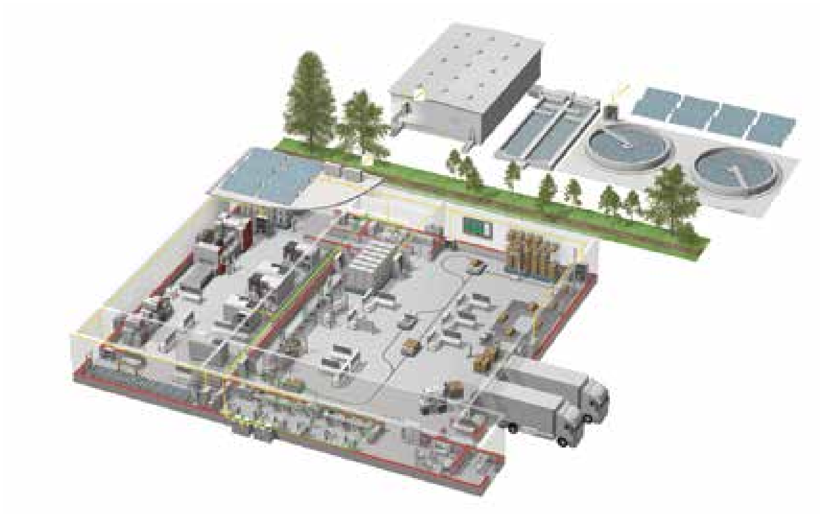


Overall production information is captured in addition to energy information, enabling the realization of efficient production and energy use (energy savings).

⚠ Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

YOUR SOLUTION PARTNER



Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

A NAME TO TRUST

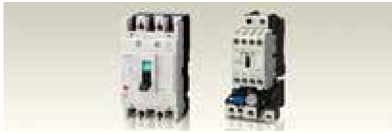
Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation, established in 1921, is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 183 factories, laboratories and offices worldwide in over 140 countries.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 146,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.



Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

Compact and Modular Controllers

Inverters, Servos and Motors

Visualization: HMIs

Numerical Control (NC)

Industrial / Collaborative Robots

Processing machines: EDM, Lasers, IDS

Transformers, Air conditioning, Photovoltaic systems

* Not all products are available in all countries.

MITSUBISHI ELECTRIC CORPORATION

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