

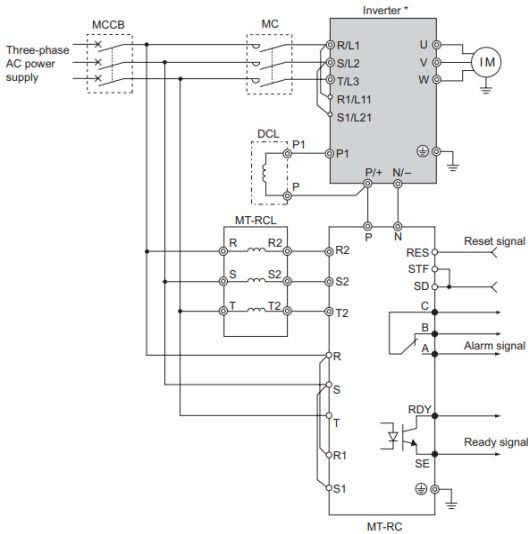
Information for Replacement of MT-RC Series with FR-XC Series

Size, connection, and parameters concerning replacement are stated on the following pages.

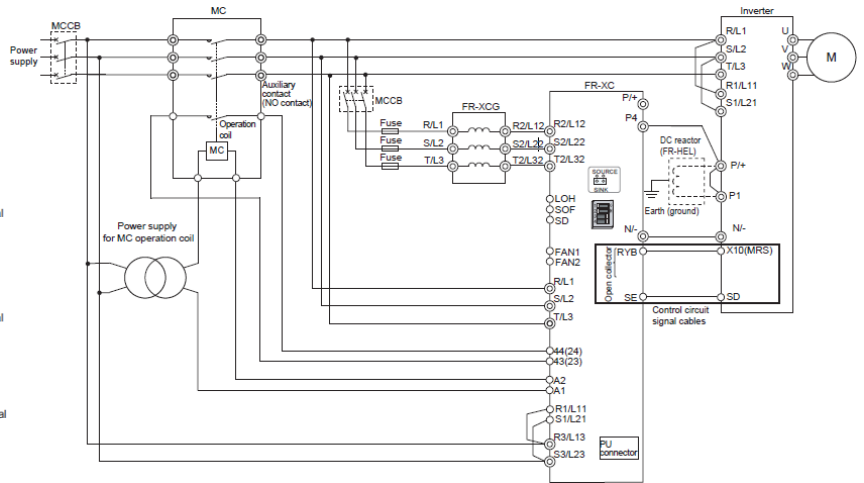
1. DIFFERENCES FROM MT-RC

1.1. Wiring Method

When replacing the MT-RC with the FR-XC, use either of the following control modes according to the inverter capacity: common bus regeneration mode or power regeneration mode 2. The following diagrams show wiring examples. For details on wiring, refer to the Instruction Manual.

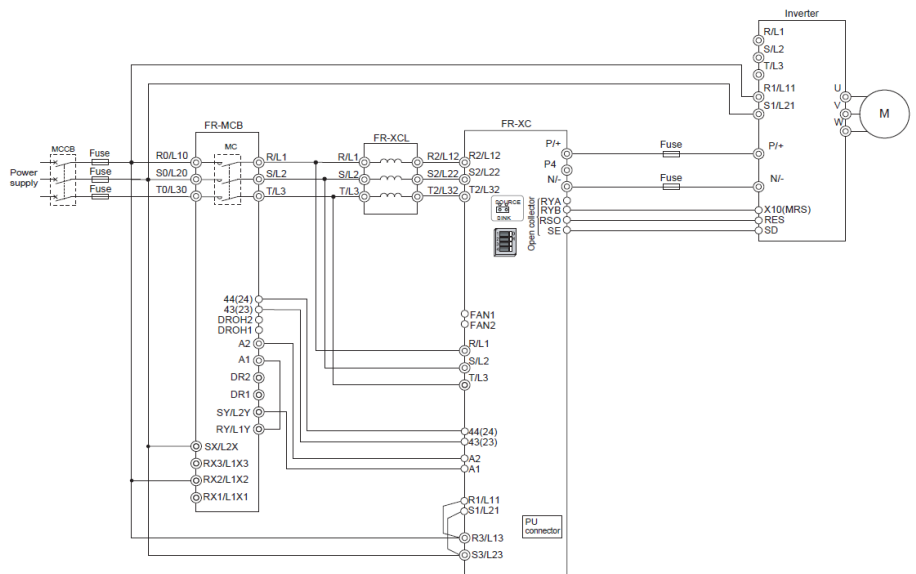


MT-RC



FR-XC

Example) Power regeneration mode 2



FR-XC

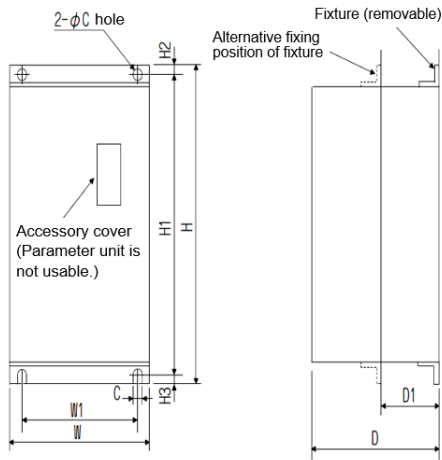
Example) Common bus regeneration mode

1.2. Outline Dimensions

This section describes the differences in width (W), height (H), and depth (D) compared to the MT-RC. For details on the outline dimensions, refer to Chapter 2 "REPLACEMENT SELECTION AND INSTALLATION SIZE" (page 4).

[Power regeneration converter]

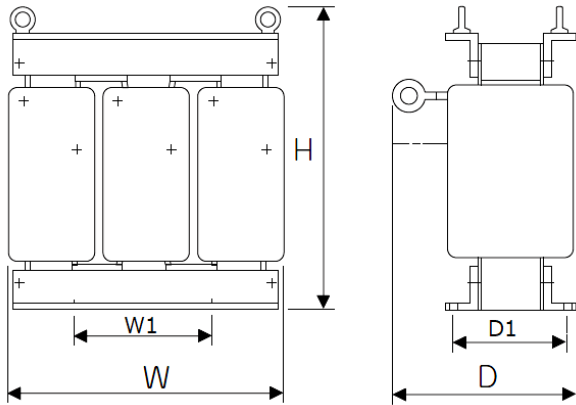
MT-RC



Capacity	Model	W	H	D
75K	MT-RC-H75K	480	740	360
	FR-XC-H75K	220	830	380
160K	MT-RC-H160K	498	1010	380
	FR-XC-H160K	240	1325	443.4
220K	MT-RC-H220K	680	1010	380
	FR-XC-H220K	240	1325	443.4

[Reactor]

MT-RCL



Capacity	Model	W	H	D
75K	MT-RCL-H75K	390	385	358
	FR-XCL-H75K/XCG-H75K	300 ±2.5	335	200
90K	FR-XCL-H90K/XCG-H90K	300 ±2.5	360	210
132K	FR-XCG-H132K	430 ±4	560 ±10	195
160K	MT-RCL-H160K	515	465	380
	FR-XCL-H160K	430 ±4	600 ±10	190
185K	FR-XCG-H185K/XCG-H185K	430 ±4	600 ±10	210
220K	MT-RCL-H220K	630	655	565
	FR-XCL-H220K	500 ±4	640 ±10	210
	FR-XCG-H220K	500 ±4	650 ±10	210

2. REPLACEMENT SELECTION AND INSTALLATION SIZE

The following table shows the replacement selection and installation size required when replacing the MT-RC series with the FR-XC series.

For details on the sizes, refer to the outline dimension drawings on the following pages.

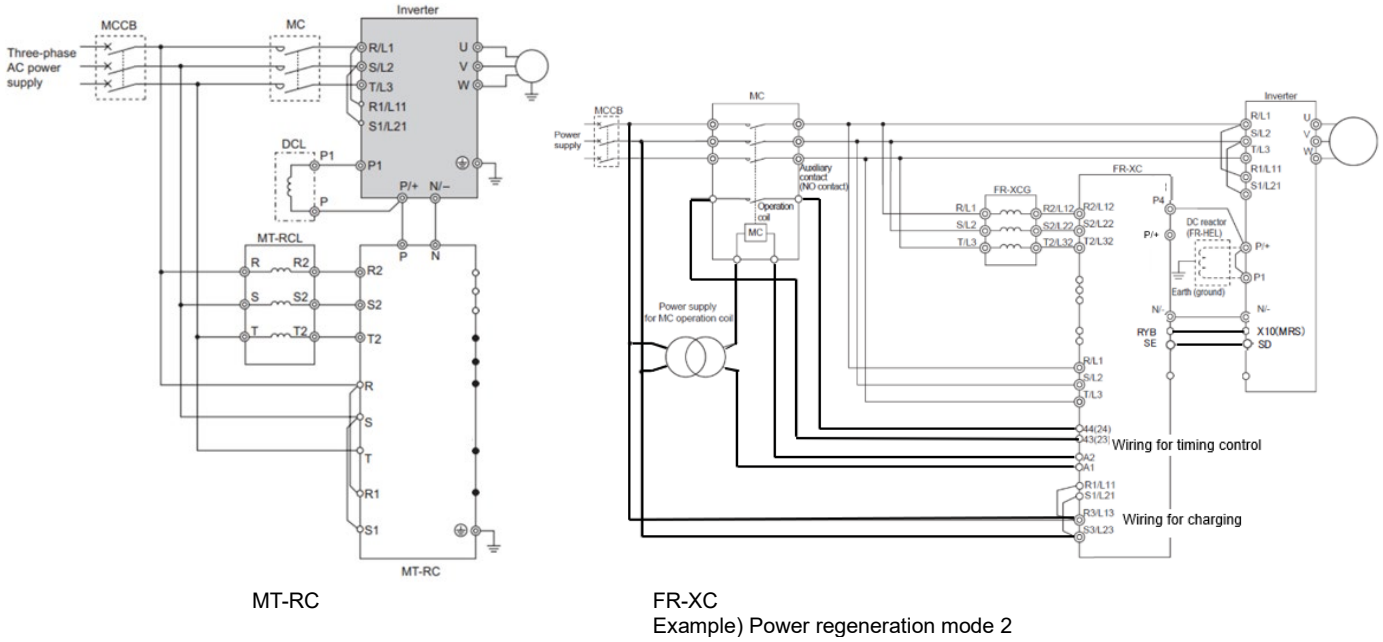
Existing			Replacement selection				Installation size
Power regeneration converter	AC reactor (option)	Inverter capacity (ND rating)	Multifunction regeneration converter*1	Control mode	Dedicated stand-alone reactor (option)	Magnetic contactor (MC) / Dedicated contactor box (option)*2	Multifunction regeneration converter, Stand-alone reactor, Enclosure cut dimensions
MT-RC-H75K	MT-RCL-H75K	75K	FR-XC-H75K	Common bus regeneration mode (50°C rating)	FR-XCL-H75K	FR-MCB-H150 or MC*3	Different size
		90K to 280K	FR-XC-H75K	Power regeneration mode 2 (50°C rating)	FR-XCG-H75K	Magnetic contactor (MC) with auxiliary contact (NO contact) recommended for the inverter, 400/200 V power transformer for MC operation coil*4	
MT-RC-H160K	MT-RCL-H160K	160K	FR-XC-H160K	Common bus regeneration mode (50°C rating)	FR-XCL-H160K	FR-MCB-H400 or MC*3	
		185K to 280K	FR-XC-H160K	Power regeneration mode 2 (50°C rating)*5	FR-XCG-H132K	Magnetic contactor (MC) with auxiliary contact (NO contact) recommended for the inverter, 400/200 V power transformer for MC operation coil*4	
MT-RC-H220K	MT-RCL-H220K	220K	FR-XC-H220K	Common bus regeneration mode (50°C rating)	FR-XCL-H220K	FR-MCB-H400 or MC*3	
		250K to 280K	FR-XC-H220K	Power regeneration mode 2 (50°C rating)*5	FR-XCG-H185K	Magnetic contactor (MC) with auxiliary contact (NO contact) recommended for the inverter, 400/200 V power transformer for MC operation coil*4	

*1 The shape is different.

When installing the heat sink outside the enclosure, change the mount point of the upper and lower installation frames from the rear to the front.

For details, refer to the Instruction Manual.

*2 Used for coordination with the charging circuit, because the main circuit charging part is different between the MT-RC and the FR-XC.
 The following diagram indicates that the positions of the magnetic contactor (MC) for the main circuit power supply are different and the bold lines show the wiring to control the power-on timing.

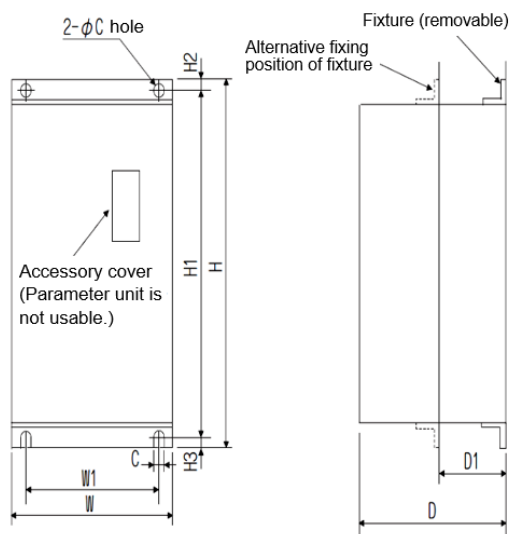


MT-RC

FR-XC
 Example) Power regeneration mode 2

- *3 Select an MC whose operation coil section has a surge absorbing function. To use the MC to shut off the power supply in case of emergency, set Pr.460 Operation selection after MC external shutoff. For details, refer to the Instruction Manual of each inverter.
- *4 Check the model of the purchased multifunction regeneration converter. Appropriate peripheral devices must be selected according to the capacity. To use the converter in power regeneration mode 2, select a circuit breaker and a magnetic contactor (MC) for the inverter according to the inverter capacity. For details, refer to the Instruction Manual of each inverter.
- *5 Selected based on the rated regenerative current
 Always wire the control signal cable (RYB). Failure to do so may shorten the life of the converter or damage the converter.
 When power regeneration mode 2 is selected, the time from power-on of the inverter until the operation is ready becomes longer (maximum 4 seconds).

■ MT-RC-H75K to H220K

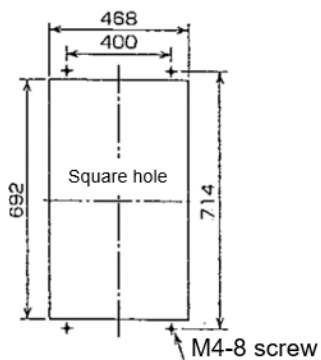


Model	W	W1	H	H1
MT-RC-H75K	480	400	740	714
MT-RC-H160K	498	200×2	1010	984
MT-RC-H220K	680	300×2	1010	984

Model	H2	H3	D	D1	C
MT-RC-H75K	13	13	360	196	10
MT-RC-H160K	13	13	380	196	10
MT-RC-H220K	13	13	380	196	10

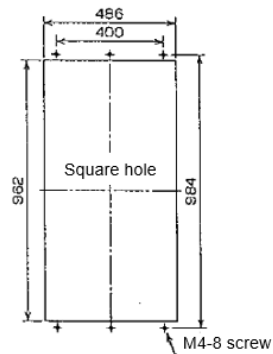
H75K

When cooling fin is positioned outside the panel

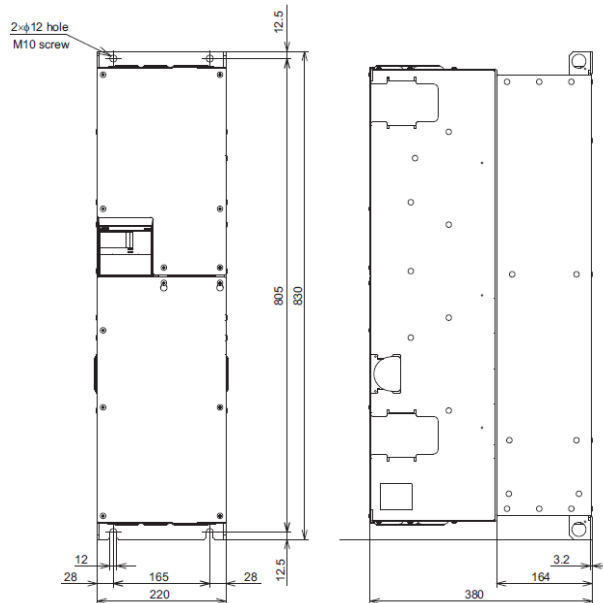


H160K

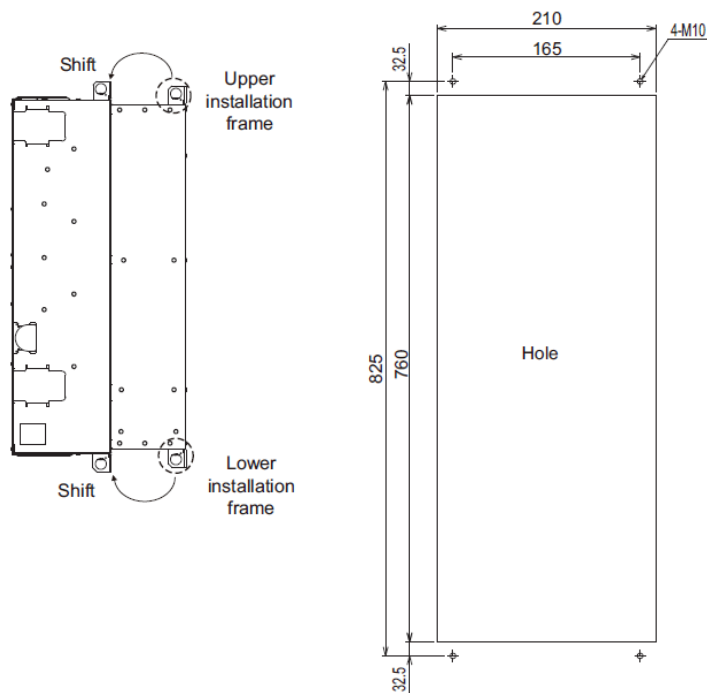
When cooling fin is positioned outside the panel



■ FR-XC-H75K

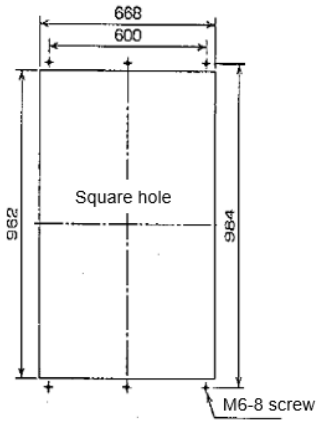


Enclosure cutting

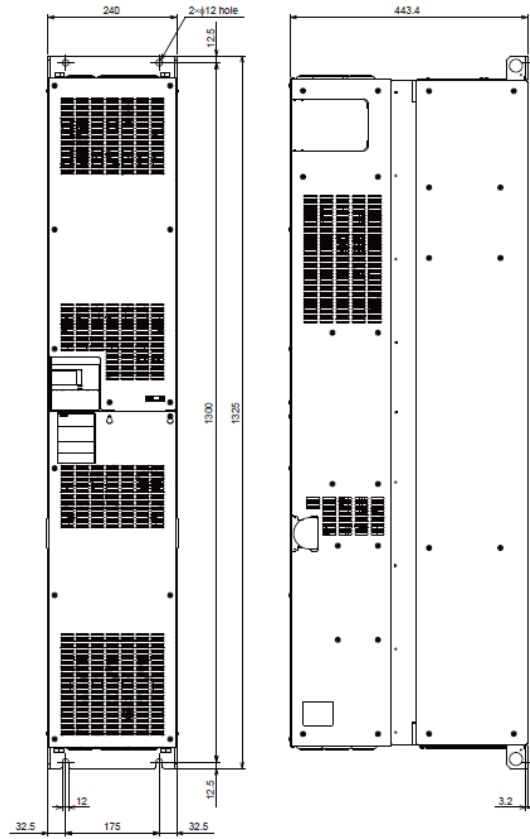


H220K

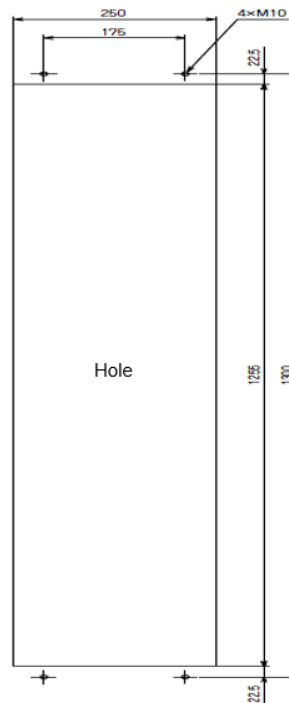
When cooling fin is positioned outside the panel



■ FR-XC-H160K, H220K

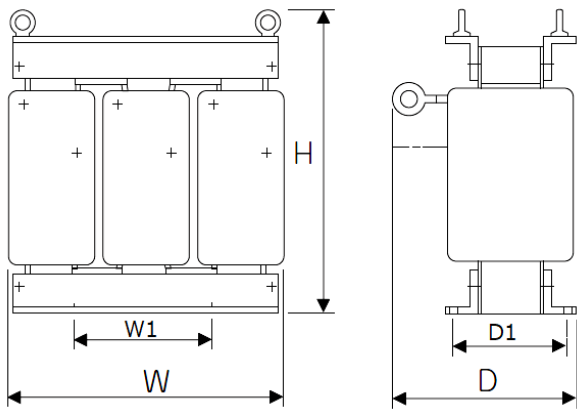


Enclosure cutting



[Reactor]

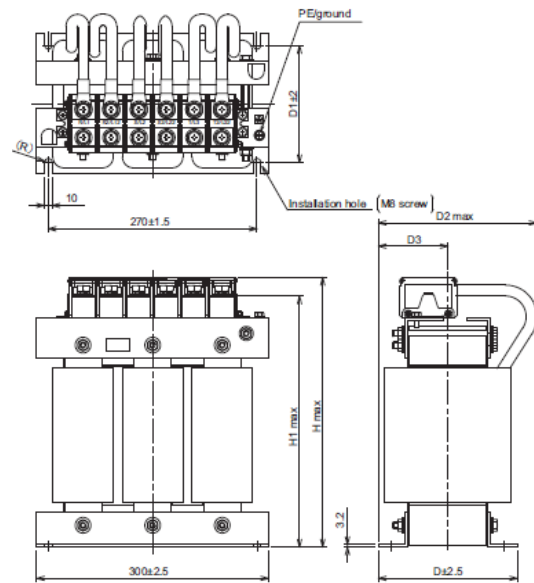
■ MT-RCL-H75K



M12 installation bolt

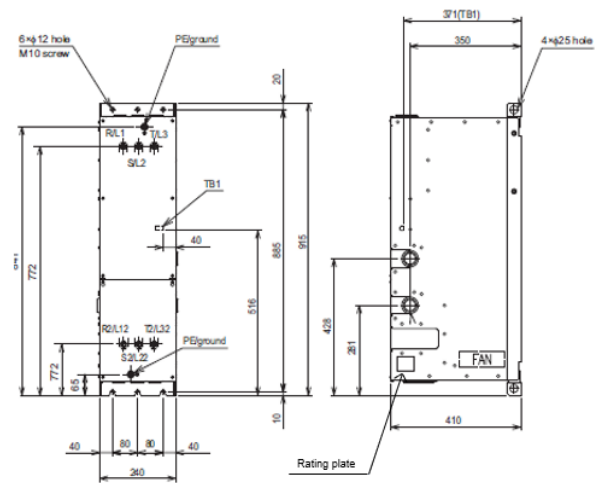
Model	W	W1	H	D	D1
MT-RCL-H75K	390	150	385	358	195
MT-RCL-H160K	515	200	465	380	250
MT-RCL-H220K	630	400	655	565	445

■ FR-XCL/XCG-H75K

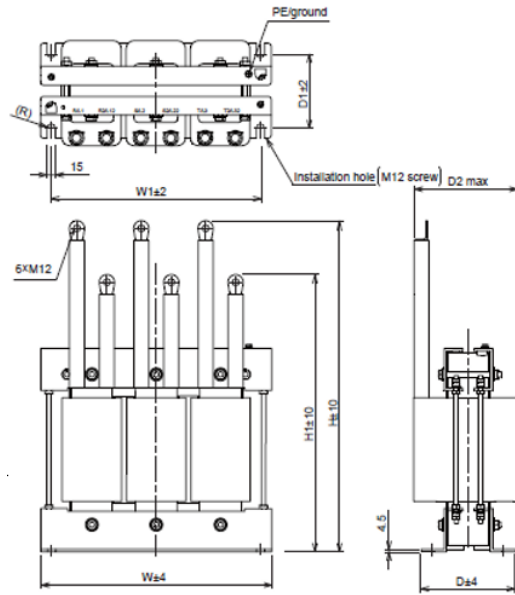


Model	D	D1	D2	D3	H	H1
FR-XCL/XCG-H75K	170	140	200	90	335	311

■ FR-XCB-H75K

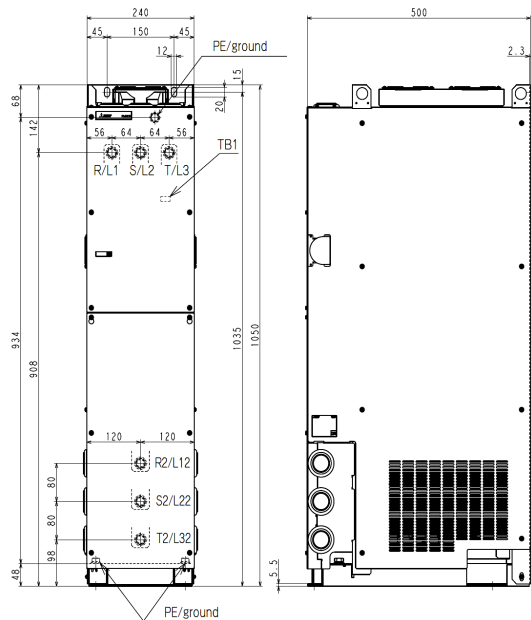


■ FR-XCL-H160K, H220K, FR-XCG-H132K, H185K

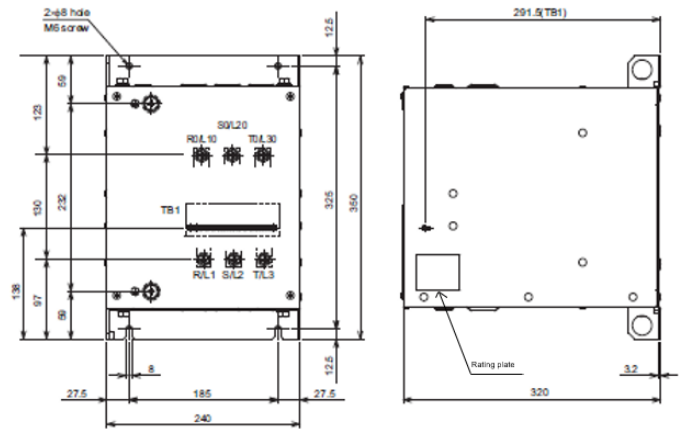


Model	W	W1	D	D1	D2	H	H1
FR-XCL-H160K	430	390	176	140	190	600	500
FR-XCL-H220K	500	460	196	160	210	640	540
FR-XCG-H132K	430	390	176	140	195	560	460
FR-XCG-H185K	430	390	196	160	210	600	500

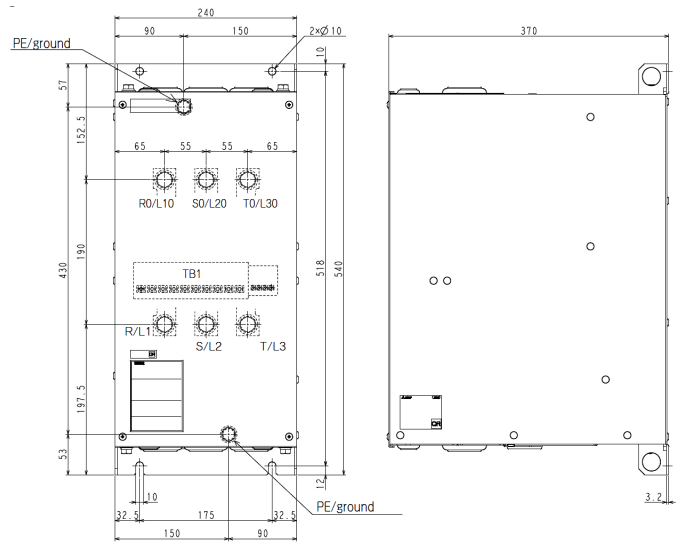
■ FR-XCB-H160K, H220K



■ FR-MCB-H150










■ FR-MCB-H400



3. CONNECTION

The wiring of the new products can follow the one of the existing products as the terminal names between them are almost the same.

Common bus regeneration mode

Power regeneration converter	Type	MT-RC terminal name	FR-XC compatible terminal name*1	Remarks													
	Main circuit	R2, S2, T2	R2/L12, S2/L22, T2/L32	Connect these terminals to terminals R2/L12, S2/L22, and T2/L32 on the FR-XCL or FR-XCB.													
		P, N	P/+, N/- *2	Do not use terminal P4 in the common bus regeneration mode.													
		R1, S1	R1/L11, S1/L21 *3	Power terminals for the control circuit.													
		-	R3/L13, S3/L23 *1	Terminals for the charging circuit. Connect these terminals to the power supply.													
		R, S, T	R/L1, S/L2, T/L3	Used to detect the phase and voltage of the power supply.													
	Control circuit / input signal	Contact	RES	RES													
			STF	-													
			SD	SD													
			-	43 (23), 44 (24)	Auxiliary contact (NO contact) input terminals for the magnetic contactor (FR-MCB).												
				LOH	Used to monitor the speed of the cooling fan in the FR-XCB.												
	Control circuit / output signal	Contact	A, B, C	A, B, C													
			-	A1, A2	Contact output terminals for the operation command for the magnetic contactor (FR-MCB).												
		Open collector	RDY	-													
			-	RYB	Always connect terminal RYB to the inverter terminal to which the X10 signal or the MRS signal is assigned. Always connect terminal SE to the inverter terminal SD.												
SE			SE														
Power supply for fan	-	FAN1, FAN2	Power supply terminals for the fan on the FR-XCB.														
LED indicator	7-segment LED in four digits for fault indication	7-segment LED in two digits for operating status display	<p>FR-XC</p> <table border="1"> <tr> <td>LED display indication</td> <td> *1 Input power value is displayed as a percent. *2</td> <td> Input power value *2 Regenerative drive indication</td> </tr> <tr> <td>Converter status</td> <td>During power driving.</td> <td>During regenerative driving. The regenerative drive indication (a decimal point LED) is ON during operation.</td> </tr> </table> <p>* An example of the indications of power value.</p> <p>Display increment for the rate of input power compared against the rated capacity: 10%</p>	LED display indication	 *1 Input power value is displayed as a percent. *2	 Input power value *2 Regenerative drive indication	Converter status	During power driving.	During regenerative driving. The regenerative drive indication (a decimal point LED) is ON during operation.								
LED display indication	 *1 Input power value is displayed as a percent. *2	 Input power value *2 Regenerative drive indication															
Converter status	During power driving.	During regenerative driving. The regenerative drive indication (a decimal point LED) is ON during operation.															
Function selection switch		SW2	<p>Do not change the switch settings from the initial state when selecting the common bus regeneration mode.</p>  <table border="1"> <thead> <tr> <th colspan="2">Switch</th> <th rowspan="2">Function</th> </tr> <tr> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>ON or OFF</td> <td>Common bus regeneration mode</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>Not used.</td> </tr> <tr> <td></td> <td>OFF</td> <td>Power regeneration mode 2</td> </tr> </tbody> </table>	Switch		Function	1	2	ON	ON or OFF	Common bus regeneration mode	OFF	ON	Not used.		OFF	Power regeneration mode 2
Switch		Function															
1	2																
ON	ON or OFF	Common bus regeneration mode															
OFF	ON	Not used.															
	OFF	Power regeneration mode 2															

Dedicated stand-alone reactor	Type	FR-RCL terminal name	FR-XCL terminal name Common bus regeneration mode	Remarks
	Main circuit	R, S, T	R/L1, S/L2, T/L3	Connect these terminals to terminals R/L1, S/L2, and T/L3 on the FR-MCB.
		R2, S2, T2	R2/L12, S2/L22, T2/L32	Connect these terminals to terminals R2/L12, S2/L22, and T2/L32 on the FR-XC.
		⊥	⊥	
Control circuit (FR-XCB)	-	LOH1, LOH2	In the initial setting, connect these terminals to terminals LOH and SD on the FR-XC. Terminal to be connected depends on the control logic (sink/source). Refer to the Instruction Manual.	
		FAN1, FAN2	Connect these terminals to terminals FAN1 and FAN2 on the FR-XC.	







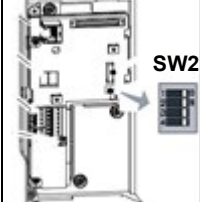


Contactor box	Type	-	FR-MCB*1 terminal name	Remarks
	Main circuit	-	R0/L10, S0/L20, T0/L30	Connect these terminals to the power supply.
			R/L1, S/L2, T/L3	Connect these terminals to terminals R/L1, S/L2, and T/L3 on the FR-XCL (or FR-XCB).
			RX1/L1X1, RX2/L1X2, RX3/L1X3, SX/L2X	Connect these terminals to the power supply.
			RY/L1Y, SY/L2Y	Connect terminal RY/L1Y to terminal A1 on the FR-MCB, and terminal SY/L2Y to terminal A1 on the FR-XC.
	Control circuit	-	43 (23), 44 (24)	Connect these terminals to terminals 43 (23) and 44 (24) on the FR-XC.
		A1, A2	Connect terminal A1 to terminal RY/L1Y on the FR-MCB, and terminal A2 to terminal A2 on the FR-XC.	

*1 FR-MCB is required for coordination with the charging circuit because the main circuit charging part is different between the MT-RC and the FR-XC. For wiring or other information, refer to the Instruction Manual.

*2 Connect the inverter terminal P/+ with the converter terminal P/+, and the inverter terminal N/- with the converter terminal N/- for polarity consistency.

*3 When a power supply for the control circuit is separate from the one for main circuit power, the warning indication "LG" is displayed while only the control circuit power is turned ON. However, it is not a fault.
For the 75K or higher FR-XC, the terminals are initially connected to terminals R3/L13 and S3/L23. For details, refer to the Instruction Manual.

Power regeneration mode 2

Power regeneration converter	Type	MT-RC terminal name	FR-XC*1 compatible terminal name	Remarks														
	Main circuit	R2, S2, T2	R2/L12, S2/L22, T2/L32	Connect these terminals to terminals R2/L12, S2/L22, and T2/L32 on the FR-XCG reactor.														
		P, N	P4, N/- *2	Do not use terminal P/+ in the power regeneration mode.														
		R1, S1	R1/L11, S1/L21 *3	Power terminals for the control circuit.														
		-	R3/L13, S3/L23 *1	Terminals for the charging circuit. Connect these terminals to the power supply.														
		R, S, T	R/L1, S/L2, T/L3	Used to detect the phase and voltage of the power supply.														
	Control circuit / input signal	Contact	RES	RES														
			STF	-														
			SD	SD														
	-	43 (23), 44 (24)	Auxiliary contact (NO contact) input terminals for the magnetic contactor.															
Control circuit / output signal	Contact	A, B, C	A, B, C															
		-	A1, A2	Contact output terminals for the operation command for the magnetic contactor.														
	Open collector	RDY	RYA (RDY)															
SE		SE	Always connect terminal RYB to the inverter terminal to which the X10 signal or the MRS signal is assigned. Always connect terminal SE to the inverter terminal SD.															
LED indicator	7-segment LED in four digits for fault indication	7-segment LED in two digits for operating status display	<p>FR-XC</p> <table border="1"> <tr> <td>LED display indication</td> <td> *1 Input power value is displayed as a percent. *2</td> <td> Input power value *2 Regenerative drive indication</td> </tr> <tr> <td>Converter status</td> <td>During power driving.</td> <td>During regenerative driving. The regenerative drive indication (a decimal point LED) is ON during operation.</td> </tr> </table> <p>* An example of the indications of power value. Display increment for the rate of input power compared against the rated capacity: 10%</p>	LED display indication	 *1 Input power value is displayed as a percent. *2	 Input power value *2 Regenerative drive indication	Converter status	During power driving.	During regenerative driving. The regenerative drive indication (a decimal point LED) is ON during operation.									
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Converter status	During power driving.	During regenerative driving. The regenerative drive indication (a decimal point LED) is ON during operation.																
Function selection switch		SW2	<p>Set switches 1 and 2 in SW2 to the OFF position to select the power regeneration mode 2.</p>  <table border="1"> <thead> <tr> <th colspan="2">Switch</th> <th>Function</th> </tr> <tr> <th>1</th> <th>2</th> <th></th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>ON or OFF</td> <td>Common bus regeneration mode</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>Not used.</td> </tr> <tr> <td>OFF</td> <td>OFF</td> <td>Power regeneration mode 2</td> </tr> </tbody> </table>	Switch		Function	1	2		ON	ON or OFF	Common bus regeneration mode	OFF	ON	Not used.	OFF	OFF	Power regeneration mode 2
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1	2																	
ON	ON or OFF	Common bus regeneration mode																
OFF	ON	Not used.																
OFF	OFF	Power regeneration mode 2																
Dedicated stand-alone reactor	Type	MT-RCL terminal name	FR-XCG terminal name	Remarks														
	Main circuit	R, S, T	R/L1, S/L2, T/L3	Connect these terminals to the output side of the magnetic contactor.														
		R2, S2, T2	R2/L12, S2/L22, T2/L32	Connect these terminals to terminals R2/L12, S2/L22, and T2/L32 on the FR-XC.														
																		
Contactor / power transformer for coil	Type	-	Magnetic contactor*1	Remarks														
	Main circuit	-	Input side / output side	Connect the power supply to the input side and terminals R/L1, S/L2, and T/L3 of the FR-XCG to the output side.														
	Contact / coil	-	Auxiliary contact (NO contact) Operation coil	Connect the auxiliary contact (NO contact) to terminals 43 (23) and 44 (24) on the FR-XC. Connect the operation coil between the output side of the power transformer for coil and terminal A2 on the FR-XC.														
		Type	-	Power transformer for MC operation coil*1	Remarks													
	Main circuit	-	Input side / output side	Connect the power supply to the input side, and the MC operation coil and terminal A1 of the FR-XC to the output side.														

*1 The magnetic contactor (MC) with auxiliary contact (NO contact) recommended for the inverter and the 400/200 V power transformer for MC operation coil are required for coordination with the charging circuit because the main circuit charging part is different between the MT-RC and the FR-XC. For information on selection, wiring or others, refer to the Instruction Manual.

*2 Always connect the inverter terminal P/+ with the converter terminal P4, and the inverter terminal N/- with the converter terminal N/- for polarity consistency.

*3 When a power supply for the control circuit is separate from the one for main circuit power, the warning indication "LG" is displayed while only the control circuit power is turned ON. However, it is not a fault.

For the 75K or higher FR-XC, the terminals are initially connected to terminals R3/L13 and S3/L23. For details, refer to the Instruction Manual.

Main circuit terminal layout

The following shows the main circuit terminal layouts of the MT-RC series and the FR-XC series.

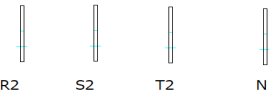
The main circuit terminal layout and the position of the earth (ground) terminal differ. Check the terminal names and positions before performing wiring.

When cables used for the MT-RC series are not long enough for wiring of the FR-XC series, prepare longer ones.

[Power regeneration converter]

■ MT-RC-H75K to H220K

AC reactor connection terminals



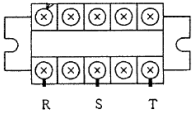
R2 S2 T2 N

Converter input terminals



P

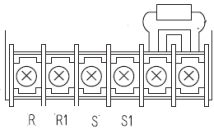
Power supply phase detection terminals



M3.5 screw

R S T

Control circuit power terminals



M4 screw

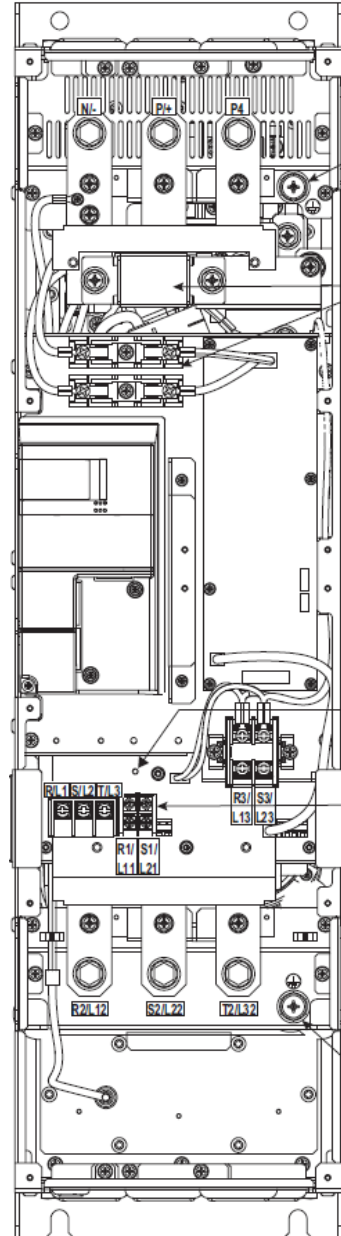
R R1 S S1



Earth (ground) terminal

M10 screw

■ FR-XC-H75K



Screw size for terminals N/-, P/+, and P4: M10

Earth (ground) terminal

Earthing (grounding) screw size: M10

Fuse

Charge lamp

Screw size for terminals R3/L13 and S3/L23: M5

Jumper

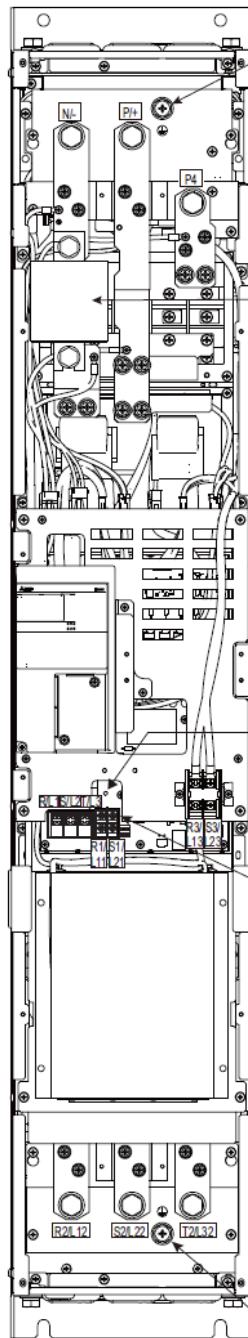
Screw size for terminals R/L1, S/L2, T/L3, R1/L11, and S1/L21: M4

Screw size for terminals R2/L12, S2/L22, and T2/L32: M10

Earth (ground) terminal

Earthing (grounding) screw size: M10

■ FR-XC-H160K, 220K



Earth (ground) terminal

Earthing (grounding) screw size:
M10

Screw size for terminals
N/-, P/+, and P4:
M12

Fuse

Charge lamp

Screw size for terminals
R3/L13 and S3/L23:
M5

Jumper

Screw size for terminals R/L1,
S/L2, T/L3, R1/L11, and S1/L21:
M4

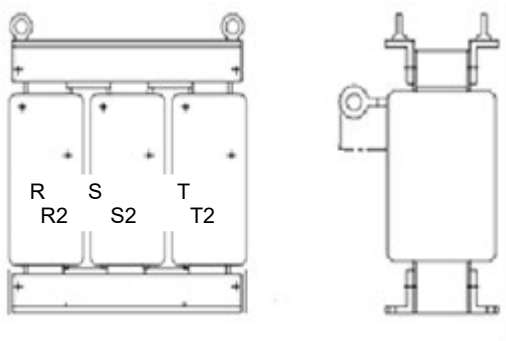
Screw size for terminals
R2/L12, S2/L22, and T2/L32:
M12

Earth (ground) terminal

Earthing (grounding) screw size:
M10

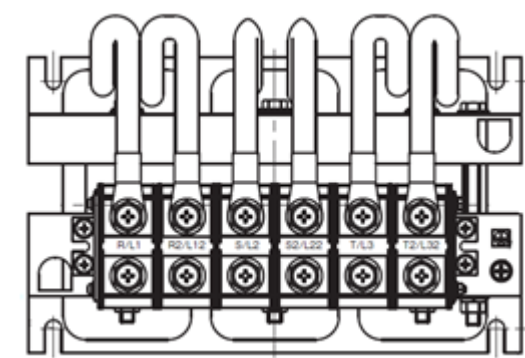
[Reactor]

■ MT-RCL-H75K to H220K



H75K: M8 bolt
H160K, H220K: M12 bolt

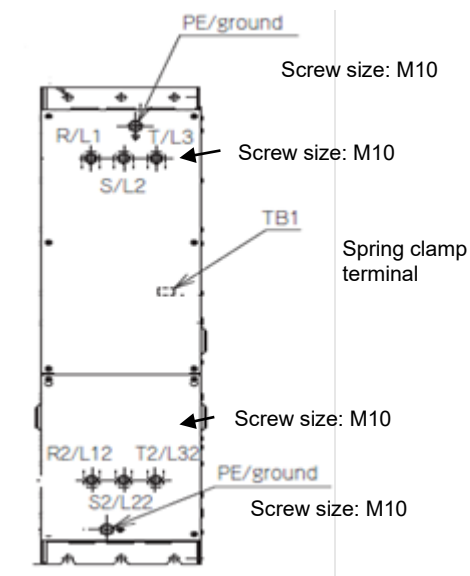
■ FR-XCL/XCG-H75K



Earthing
(grounding)
screw size:
M6

Screw size: M10

■ FR-XCB-H75K



Screw size: M10

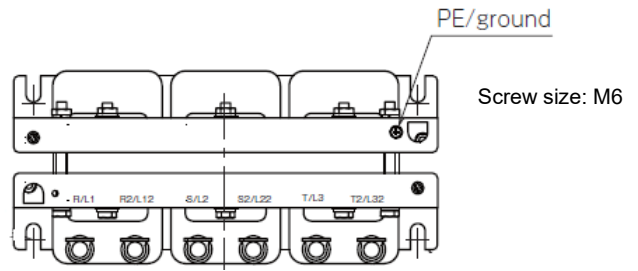
Screw size: M10

Spring clamp
terminal

Screw size: M10

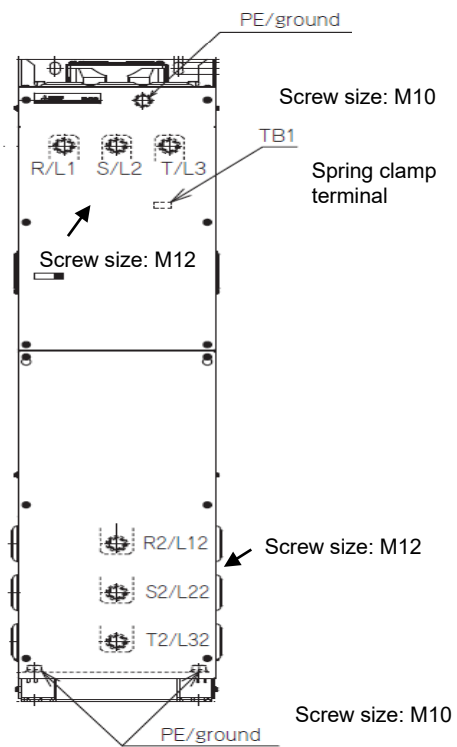
Screw size: M10

■ FR-XCL-H160K, H220K, FR-XCG-H132K, H185K

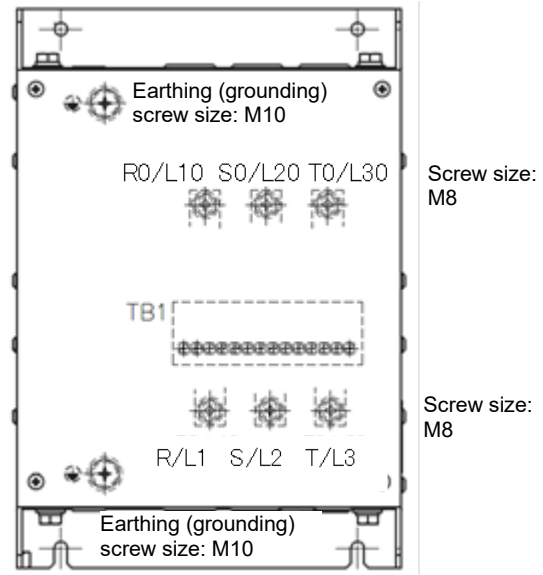


FR-XCL-H160K, H220K
Screw size: M12
FR-XCG-H132K, H185K
Screw size: M12

■ FR-XCB-H160K, H220K



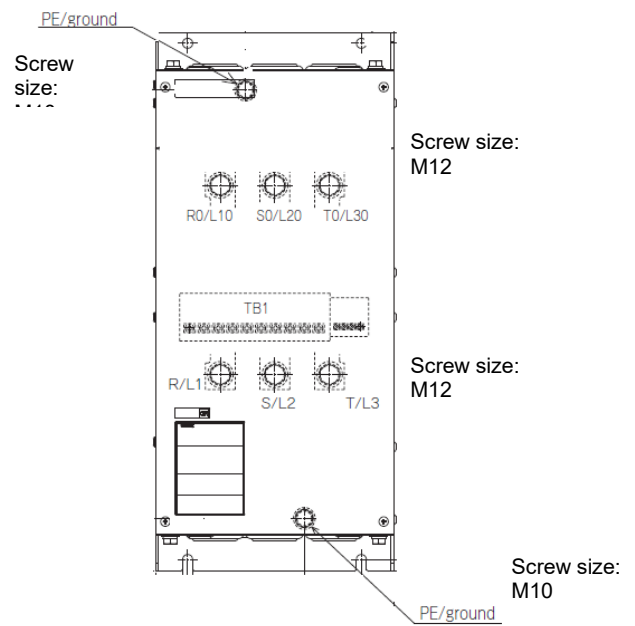
■ FR-MCB-H150



TB1 Screw size: M3

RX1/L1X1	RX2/L1X2	RX3/L1X3	SX/L2X	RY/L1Y	SY/L2Y	DR1	DR2	A1	A2	DROH1	DROH2	43(23)	44(24)
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■ FR-MCB-H400



Screw size: M5

Screw size: M3.5

RX1/L1X1	RX2/L1X2	RX3/L1X3	SX/L2X	RY/L1Y	SY/L2Y	DR1	DR2	A1	A2	DROH1	DROH2	43(23)	44(24)
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Control circuit terminal layout

The following shows the control circuit terminal layouts of the MT-RC series and the FR-XC series.

The control circuit terminal layout of the MT-RC series differs from that of the FR-XC series. Check the terminal names and positions before performing wiring.

■ Control circuit terminal layout of the MT-RC series

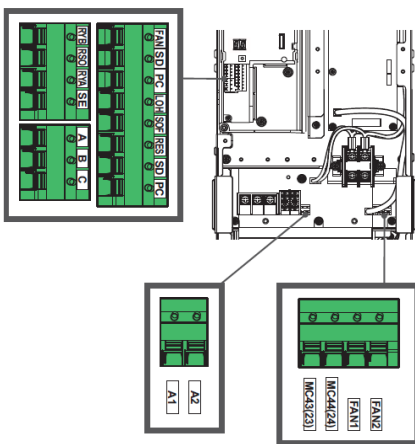


Terminal block (M4 screw)

Recommended cable gauge: 1.25 to 2 mm²

■ Control circuit terminal layout of the FR-XC series

Recommended cable gauge: 0.3 to 1.25 mm²



Wiring connection

Use crimp terminals and stripped wire for the control circuit wiring. For single wire, the stripped wire can be used without crimp terminal. Connect the end of wires (crimp terminal or stranded wire) to the terminal block.

(1) Strip the signal wires as follows. If too much of the wire is stripped, a short circuit may occur with neighboring wires.

If not enough of the wire is stripped, wires may become loose and fall out.

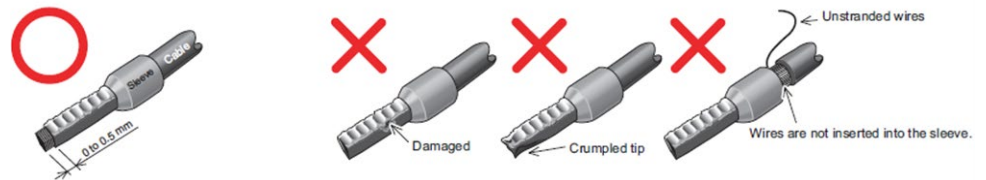
Twist the stripped end of wires to prevent them from fraying. Do not solder them.



(2) Crimp the terminals on the wire.

Insert the wire into a crimp terminal, making sure that 0 to 0.5 mm of the wire protrudes from the end of the sleeve.

Check the condition of the crimp terminals after crimping. Do not use the crimp terminals of which the crimping is inappropriate, or the face is damaged.



• Crimp terminals commercially available (as of October 2020)
PHOENIX CONTACT GmbH & Co. KG

Wire gauge (mm ²)	Ferrule part No.			Crimping tool model No.
	With insulation sleeve	Without insulation sleeve	For UL wire*1	
0.3	AI 0,34-10TQ	—	—	CRIMPFOX 6
0.5	AI 0,5-10WH	—	AI 0,5-10WH-GB	
0.75	AI 0,75-10GY	A 0,75-10	AI 0,75-10GY-GB	
1	AI 1-10RD	A 1-10	AI 1-10RD/1000GB	
1.25, 1.5	AI 1,5-10BK	A 1,5-10	AI 1,5-10BK/1000GB*2	
0.75 (two-wire product)	AI-TWIN 2×0,75-10GY	—	—	

*1 A ferrule with an insulation sleeve compatible with the MTW wire which has a thick wire insulation.

*2 Applicable for terminals A, B, and C.

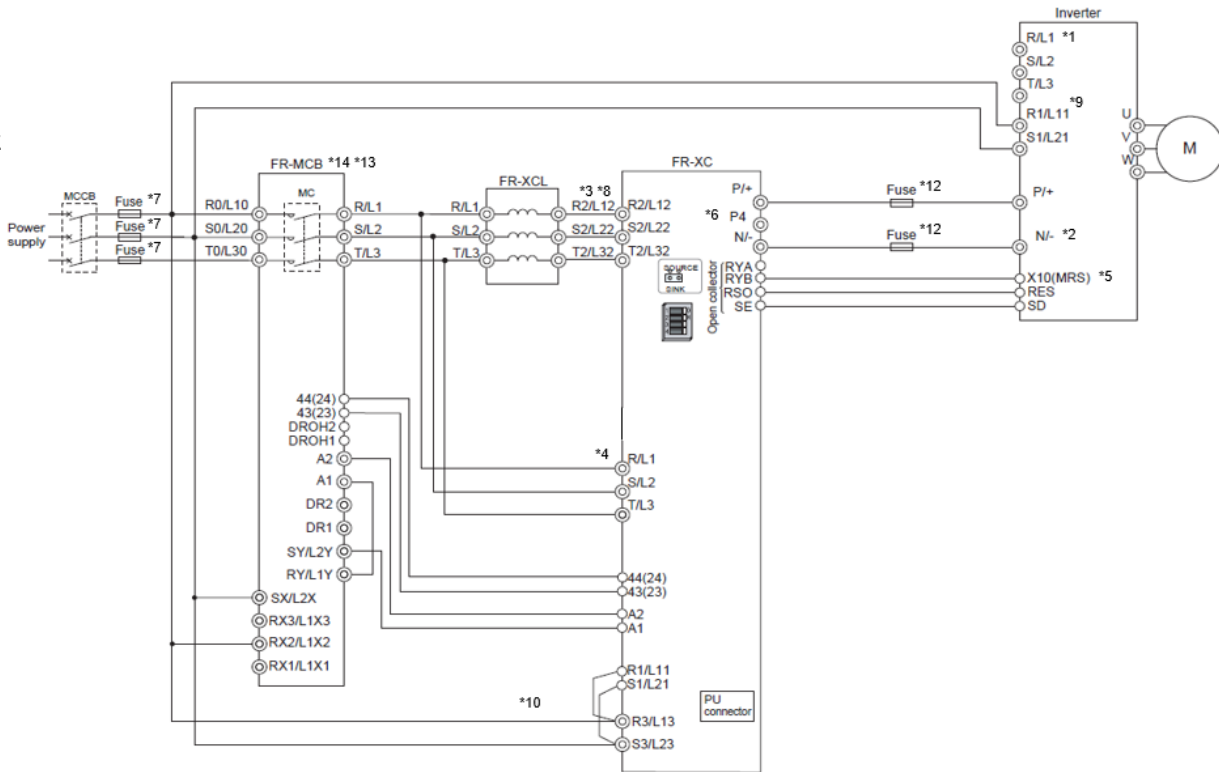
NICHIFU Co., Ltd.

Wire gauge (mm ²)	Blade terminal part No.	Insulation cap part No.	Crimping tool model No.
0.3 to 0.75	BT 0.75-11	VC 0.75	NH 69

(3) Insert the wire into a socket.

When using single wire or stranded wires without a crimp terminal, push the open/close button all the way down with a flathead screwdriver, and insert the wire.

■ Connection diagram of the FR-XC series
Common bus regeneration mode



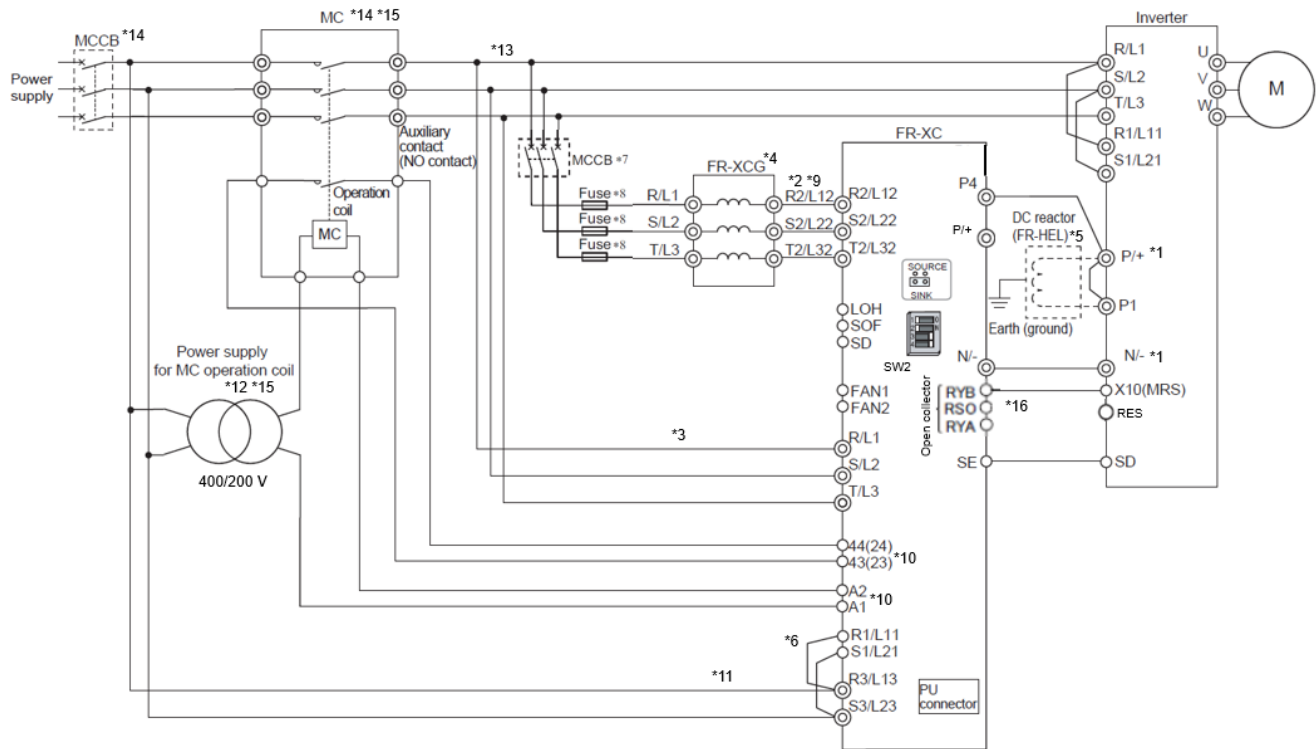
Do not change the setting of switch 1 in the function selection switch assembly (SW2) from ON (common bus regeneration mode) which is the initial state. Set Pr.416 = "0". For the FR-A800 inverter, Pr.30 Regenerative function selection must be set to "2".
 For details, refer to the Instruction Manual.

- *1 Never connect the power supply to terminals R/L1, S/L2, and T/L3 on the inverter.
- *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.
- *3 Confirm the correct power phase sequence to connect the reactor and the converter, and the power supply and terminals R/L1, S/L2, and T/L3.
- *4 Always connect the power supply and terminals R/L11, S/L21, and T/L31 on the converter.
- *5 Assign the X10 signal to any of the input terminals.
- *6 Do not connect anything to terminal P4.
- *7 Install the UL certified fuse on the input side of the reactor to meet the UL/cUL standards.
- *8 Do not install an MCCB or MC between the reactor and the converter.
- *9 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.
- *10 Always connect the power supply and terminals R3/L13 and S3/L23 on the converter.
 To use separate power supply for the control circuit, remove each jumper at terminal R3/L13 and terminal S3/L23.
- *11 Connect either terminal RX2/L1X2 or RX3/L1X3 to the power supply according to the input power supply voltage.
- *12 Fuses between the converter and the inverter are not required for some combinations as the internal fuses of the converter can be used.
 For details, refer to the Instruction Manual.
- *13 For wiring when the FR-MCB is not used, refer to the Instruction Manual. Select an appropriate magnetic contactor (MC) according to the inverter capacity.
 Select an MC whose operation coil section has a surge absorbing function. In addition, adjust the settings of Pr.455 and Pr.456 (delay time for the magnetic contactor).
- *14 FR-MCB is required for coordination with the charging circuit because the main circuit charging part is different between the MT-RC and the FR-XC.

For details, refer to the Instruction Manual.

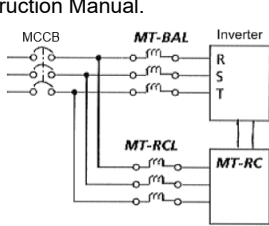
- In the common bus regeneration mode, always connect the converter terminal RYB and the inverter terminal to which the X10 (MRS) signal is assigned, and connect the converter terminal SE and the inverter terminal SD. The control logic (sink/source) of the converter and the inverter must be matched.
- Keep the wiring length between terminals as short as possible.
- Do not connect a DC reactor to the inverter when using the converter in the common bus regeneration mode.
- Configure a system so that the FR-MCB contactor box or the MC at the converter input side shuts off the power supply at a failure of the converter or the connected inverter. (The converter does not shut off the power supply by itself.)
 For wiring example, refer to the Instruction Manual.
- When the power is distorted or falls off sharply, the reactors may generate abnormal acoustic noise. This acoustic noise is caused by the power supply fault and not by the damage of the converter.

■ Connection diagram of the FR-XC series
Power regeneration mode 2

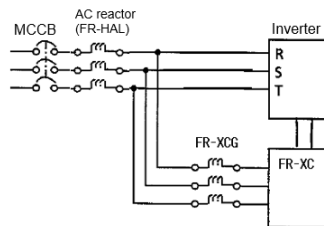


Set switches 1 and 2 in the function selection switch assembly (SW2) to the OFF position (power regeneration mode 2).
 For the FR-A800 inverter, Pr.30 Regenerative function selection must be set to "0".
 For details, refer to the Instruction Manual.

- *1 Connect the inverter terminal P/+ with the converter terminal P4, and the inverter terminal N/- with the converter terminal N/- for polarity consistency.
- *2 Confirm the correct power phase sequence to connect the reactor and the converter, and the power supply and the reactor.
- *3 Always connect the power supply and terminals R/L1, S/L2, and T/L3 on the converter. A branch point to each of these terminals must be placed between the power supply and the AC reactor.
- *4 Connect the dedicated stand-alone reactor as specified in the diagram.
- *5 To connect a DC reactor, remove a jumper installed across terminals P1 and P/+ before installing the DC reactor.
- *6 When using a separate power supply for the control circuit, remove the jumpers connected to terminals R1/L11 and S1/L21.
- *7 To select an appropriate MCCB, refer to the Instruction Manual.
- *8 Install the UL certified fuse on the input side of the reactor to meet the UL/cUL standards.
- *9 Do not install an MCCB or MC between the reactor and the converter.
- *10 Use a 200 VAC class coil magnetic contactor and connect it to terminals A1, A2, 43 (23), and 44 (24).
- *11 Always connect the power supply and terminals R3/L13 and S3/L23 on the converter.
- *12 Prepare an appropriate 200 VAC class power supply to operate the magnetic contactor (MC).
- *13 When using the AC reactor (FR-HAL) with the inverter and converter, the wiring layout differs. For the layout and selection, refer to the Instruction Manual.



For MT-RC



For FR-XC

- *14 Select an appropriate magnetic contactor (MC) according to the inverter capacity.
 Select an MC whose operation coil section has a surge absorbing function. In addition, adjust the settings of Pr.455 and Pr.456 (delay time for the magnetic contactor).
- *15 FR-MC is required for coordination with the charging circuit because the main circuit charging part is different between the MT-RC and the FR-XC.
 The diagram indicates that the positions of the magnetic contactor (MC) for the main circuit power supply are different and shows the wiring to control the power-on timing.
- *16 Always wire the control signal cable (RYB) as shown in the diagram above. Failure to do so may shorten the life of the converter or damage the converter.
- *17 The time from power-on of the inverter until the operation is ready becomes longer (maximum 4 seconds).
- *18 When connecting the FR-XC-H75K or higher with the 315K or higher FR-A800 and FR-CC2, refer to the Instruction Manual.

For details, refer to the Instruction Manual.

4. PARAMETER

No parameters need to be set in the MT-RC series converters.

When replacing the MT-RC series with the FR-XC series, the parameter settings in the FR-XC series are not necessary to be changed from the initial values.

However, **be sure to set switch 1 in the function selection switch assembly (SW2) to the ON position for the operation in the common bus regeneration mode, and set switches 1 and 2 to the OFF position for the operation in the power regeneration mode 2.** The switch setting can be checked with Pr.415.

The changed switch setting is applied at the next power-ON or converter reset.

For the common bus regeneration mode, set Pr.416 = "0".

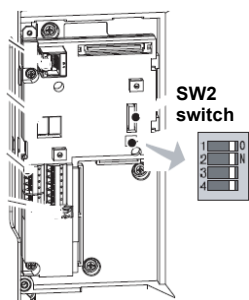
FR-XC parameter				Parameter setting	
Function number	Name	Setting range	Initial value	Setting	Remarks
0	Simple mode selection	0, 9999	0		
1	Maximum power supply frequency	60 Hz (Read only)	60 Hz		
2	Minimum power supply frequency	50 Hz (Read only)	50 Hz		
3	LOH terminal function selection	0, 3 to 5, 9999	5		
4	SOF terminal function selection		0		
7	RES terminal function selection		3		
8	SOF input selection	0, 1, 2	0		
9	OH input selection	0, 1	0		
11	RSO terminal function selection	0 to 4, 6 to 11, 14 to 18, 98, 99, 101 to 104, 106 to 111, 114 to 118, 198, 199, 9999	1		
12	RYA terminal function selection		0		
16	ABC terminal function selection		99		
22	Current limit level	0 to 190%	150		
23	Current limit level (regenerative)	0 to 190%, 9999	9999		
31	Life alarm status display	0, 1, 4, 5, 8, 9, 12, 13 (Read only)	0		
32	Inrush current limit circuit life display	0 to 100% (Read only)	100		
33	Control circuit capacitor life display	0 to 100% (Read only)	100		
34	Maintenance timer	0 (1 to 9998)	0		
35	Maintenance timer warning output set time	0 to 9998, 9999	9999		
44	Instantaneous power failure detection signal clear	0, 9999	9999		
46	Watt-hour meter clear	0, 10, 9999	9999		
47	Energization time carrying-over times	Read only	0		
48	Cumulative power monitor digit shifted times	0 to 4, 9999	9999		
52	PU main monitor selection	0, 5 to 10, 25, 28	0		
57	Restart selection	0, 9999	9999		
58	Free parameter 1	0 to 9999	9999		
59	Free parameter 2	0 to 9999	9999		
61	Key lock operation selection	0, 10	0		
65	Retry selection	0 to 4	0		
67	Number of retries at fault occurrence	0 to 10, 101 to 110, 1001 to 1010, 1101 to 1110	0		
68	Retry waiting time	0.1 to 600 s	1		
69	Retry count display erase	0	0		

FR-XC parameter				Parameter setting	
Function number	Name	Setting range	Initial value	Setting	Remarks
75	Reset selection / disconnected PU detection / PU stop selection	0 to 3, 14 to 17	14		
77	Parameter write selection	1, 2	2		
80	Voltage control proportional gain	0 to 1000%	100		
81	Voltage control integral gain	0 to 1000%	100		
82	Current control proportional gain	0 to 200%	100		
83	Current control integral gain	0 to 200%	100		
117	PU communication station number	0 to 31	0		
118	PU communication speed	48, 96, 192, 384	192		
119	PU communication stop bit length	0, 1, 10, 11	1		
120	PU communication parity check	0, 1, 2	2		
121	PU communication retry count	0 to 10, 9999	1		
123	PU communication waiting time setting	0 to 150 ms, 9999	9999		
124	PU communication CR/LF selection	0, 1, 2	1		
145	PU display language selection	0 to 7	0		
342	Communication EEPROM write selection	0, 1	0		
415	SW2 setting status	0 to 15 (Read-only)	15		For details on SW2 setting status, refer to the Instruction Manual.*
416	Control method selection	0, 1, 9999	9999		For the common bus regeneration mode, set "0".
455	MC-ON delay time	1 to 4000 ms, 9999	9999		When the FR-MCB is not used, adjust the setting according to the magnetic contactor (MC).
456	MC-OFF delay time	1 to 4000 ms, 9999	9999		
460	Operation selection after MC external shutoff	1, 9999	9999		
500	Communication error execution waiting time	0 to 999.8 s	0		
501	Communication error occurrence count display	0	0		
502	Stop mode selection at communication error	0, 3	0		
542	Station number (CC-Link)	1 to 64	1		
543	Transmission speed selection (CC-Link)	0 to 4	0		
544	CC-Link extended setting	0, 1, 12	0		
896	Power unit cost	0 to 500	0		
989	Parameter copy alarm release	10, 100	100		
990	PU buzzer control	0, 1	1		
991	PU contrast adjustment	0 to 63	58		

* Set switch 1 in the function selection switch assembly (SW2) to the ON position for the operation in the common bus regeneration mode.

Set switches 1 and 2 in the function selection switch assembly (SW2) to the OFF position for the operation in the power regeneration mode 2.

The changed switch setting is applied at the next power-ON or converter reset.



Function selection switch assembly (SW2)

Switch	Function
1	Connection mode selection
2	Select the mode from among the common bus regeneration mode, the power regeneration mode 1, and the power regeneration mode 2.
3	Temperature derating selection ON: Surrounding air temperature of 50°C rating OFF: Surrounding air temperature of 40°C rating
4	For manufacturer setting. (Do not change from ON)

Switch		Function
1	2	
ON	ON or OFF	Common bus regeneration mode
OFF	ON	Not used.
	OFF	Power regeneration mode 2

Pr.30 Regenerative function selection in the inverter parameters must be set.

Set Pr.30 to "2" to select the common bus regeneration mode or "0" to select the power regeneration mode 2.

When harmonic suppression is enabled, set the rated motor voltage in Pr.19 Base frequency voltage (under V/F control) or Pr.83 Rated motor voltage (under control other than V/F control).

The converter parameters can be set on the operation panel DU08 or optional parameter unit of the inverter when either of them is installed on the converter. Use the optional FR-CB2[] cable. To install the operation panel, the optional connector (FR-ADP) is also required.

