

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

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

# 1. SIZE

The following table shows the 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				Installation size			
Power regeneration converter	AC reactor (option)	Multifunction regeneration converter*1	Function selection switch	Dedicated stand-alone reactor (option)	Contactor box*3	Converter	Stand-alone reactor	Enclosure cut dimensions	
MT-RC-H75K	MT-RCL-H75K	Inverter capacity (FR-A840: 75K)				FR-MCB-H150*4	Different size	Different size	Different size
		FR-XC-H75K	Common bus regeneration mode with harmonic suppression enabled/disabled (50°C rating)	FR-XCB-H75K or FR-XCL-H75K*2					
		Inverter of higher capacity (FR-A840: 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 and the 400/200 V power transformer for MC operation coil*5				
MT-RC-H160K	MT-RCL-H160K	Inverter capacity (FR-A840: 132K)				FR-MCB-H400*4	Different size	Different size	Different size
		FR-XC-H160K	Common bus regeneration mode with harmonic suppression enabled/disabled (50°C rating)	FR-XCB-H160K or FR-XCL-H160K*2					
		Inverter of higher capacity (FR-A840: 160K to 280K)							
		FR-XC-H160K	Power regeneration mode 2 (50°C rating)*6	FR-XCG-H132K	Magnetic contactor (MC) with auxiliary contact (NO contact) recommended for the inverter and the 400/200 V power transformer for MC operation coil*5				

Existing		Replacement				Installation size			
Power regeneration converter	AC reactor (option)	Multifunction regeneration converter*1	Function selection switch	Dedicated stand-alone reactor (option)	Contactor box*3	Converter	Stand-alone reactor	Enclosure cut dimensions	
MT-RC-H220K	MT-RCL-H220K	Inverter capacity (FR-A840: 185K)				FR-MCB-H400*4	Different size	Different size	Different size
		FR-XC-H220K	Common bus regeneration mode with harmonic suppression enabled/disabled (50°C rating)	FR-XCB-H220K or FR-XCL-H220K*2					
MT-RC-H220K	MT-RCL-H220K	Inverter of higher capacity (FR-A840: 220K to 280K)				Magnetic contactor (MC) with auxiliary contact (NO contact) recommended for the inverter and the 400/200 V power transformer for MC operation coil*5	Different size	Different size	Different size
		FR-XC-H220K	Power regeneration mode 2 (50°C rating)*6	FR-XCG-H185K					

\*1 Slim model.

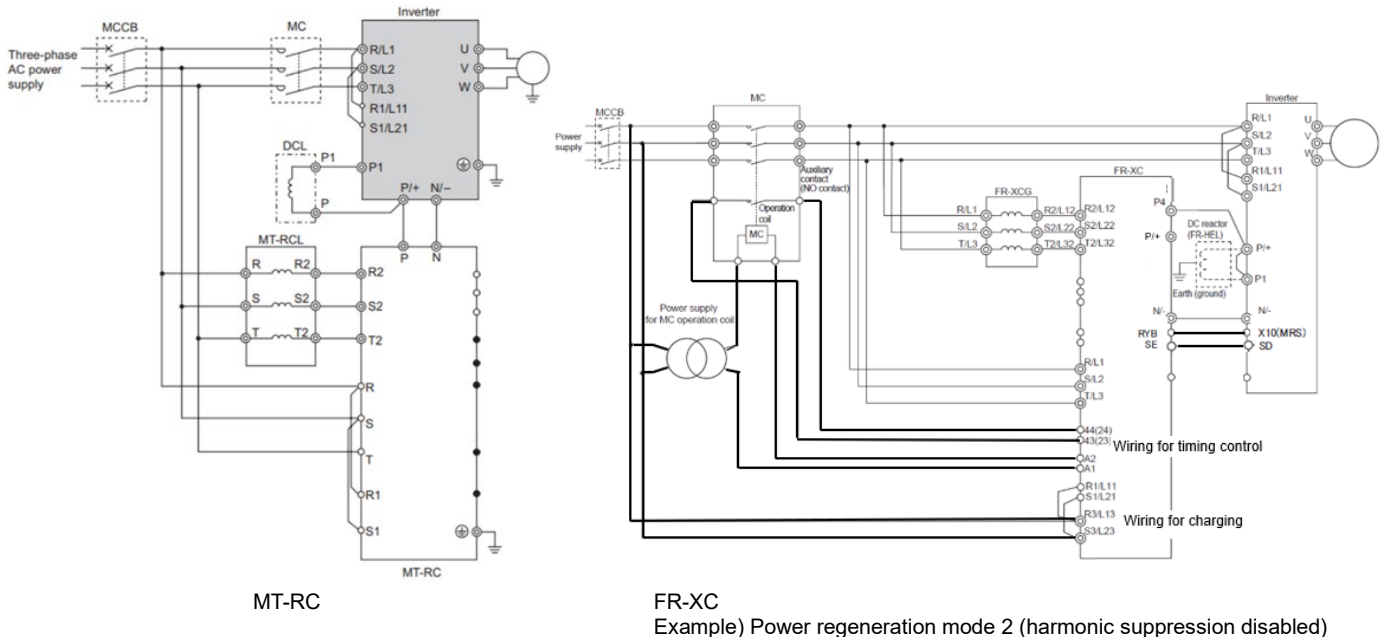
When installing the heat sink outside the enclosure, change the mount point of the upper and lower installation frames from the rear to the front.

For details, refer to the Instruction Manual.

\*2 If it is required to achieve the K33 value of the conversion factor shown in the Harmonic suppression guideline as is the case in the existing converter, the FR-XCB (with harmonic suppression enabled) is recommended.

\*3 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.



\*4 When the FR-MCB is not used, prepare a magnetic contactor and a 400/200 V power supply for MC operation coil according to the inverter capacity.

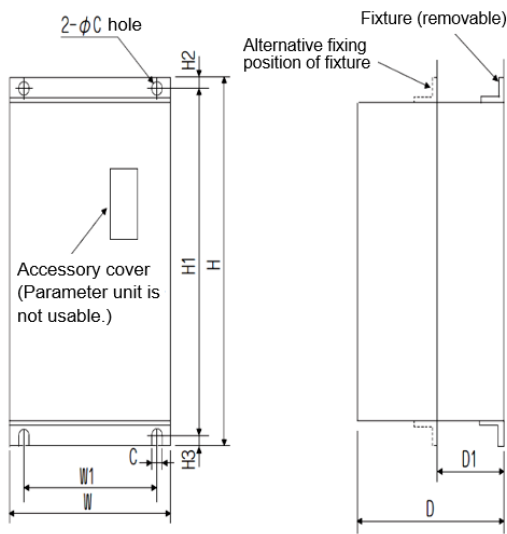
In such case, adjust the settings of Pr.455 and Pr.456 (delay time for the magnetic contactor). For wiring with the FR-XC, refer to the Instruction Manual.

- \*5 Select a magnetic contactor according to the inverter capacity. In such case, adjust the settings of Pr.455 and Pr.456 (delay time for the magnetic contactor). For details, refer to the Instruction Manual. Do not use the 400/200 V power transformer for MC operation coil whose specification exceeds the rated specifications of terminals A1 and A2 of the FR-XC. For the rated specifications, refer to the Instruction Manual. For wiring with the FR-XC, refer to the connection diagram or the Instruction Manual.
- \*6 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

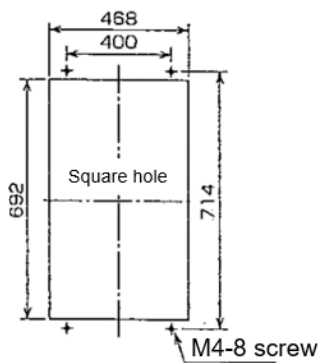


Model	W	W1	H	H1
MT-RC-H75K	480	400	740	714
MT-RC-H160K	498	200×2	1010	984
MT-RC-H220K	680	300×2	1010	984

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

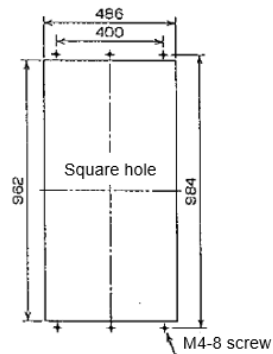
H75K

When cooling fin is positioned outside the panel

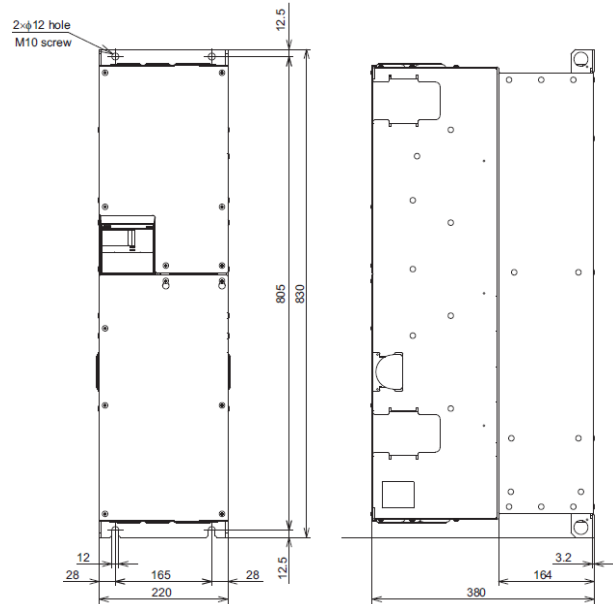


H160K

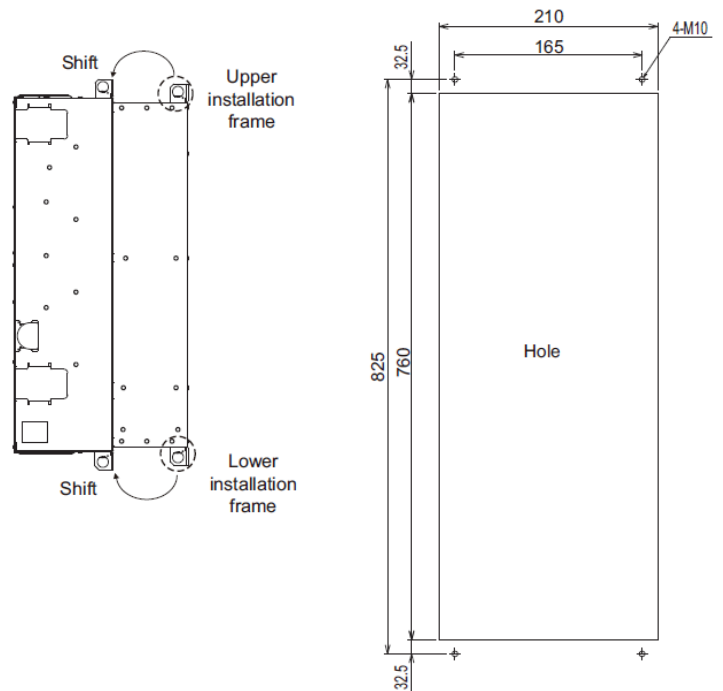
When cooling fin is positioned outside the panel



■ FR-XC-H75K

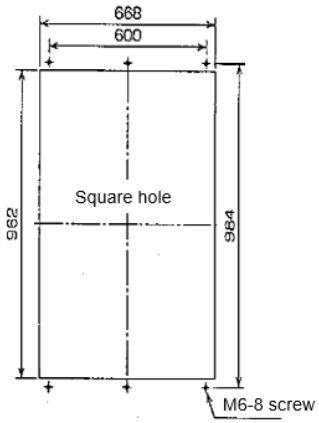


Enclosure cutting

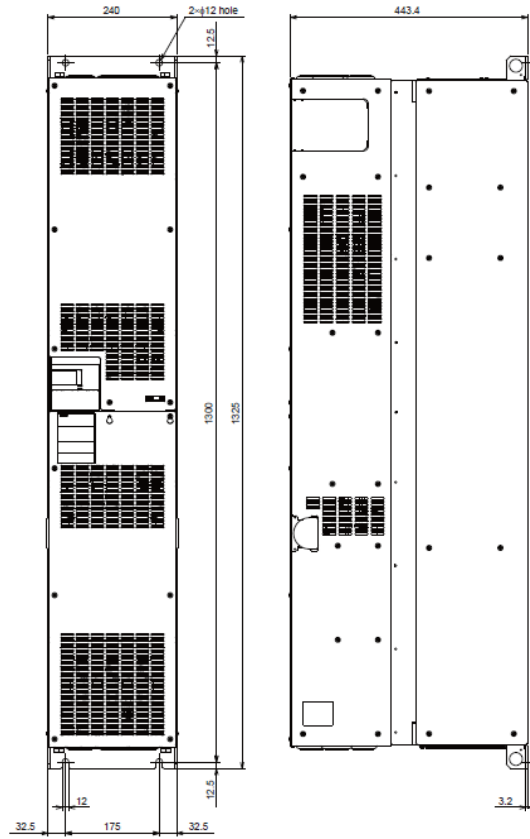


H220K

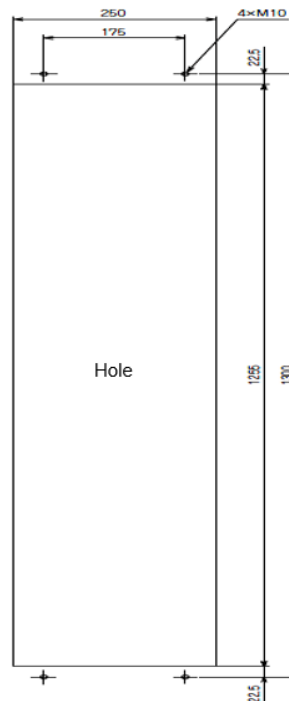
When cooling fin is positioned outside the panel



■ FR-XC-H160K, H220K

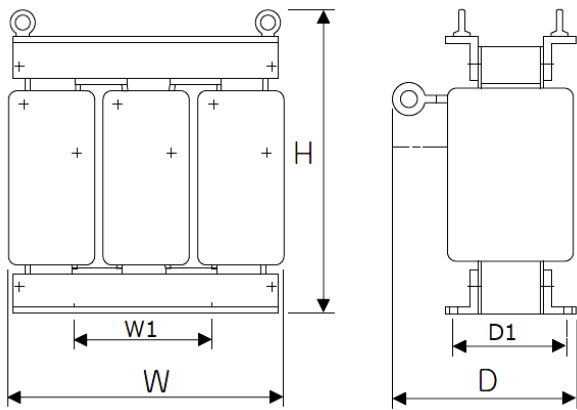


Enclosure cutting



[Reactor]

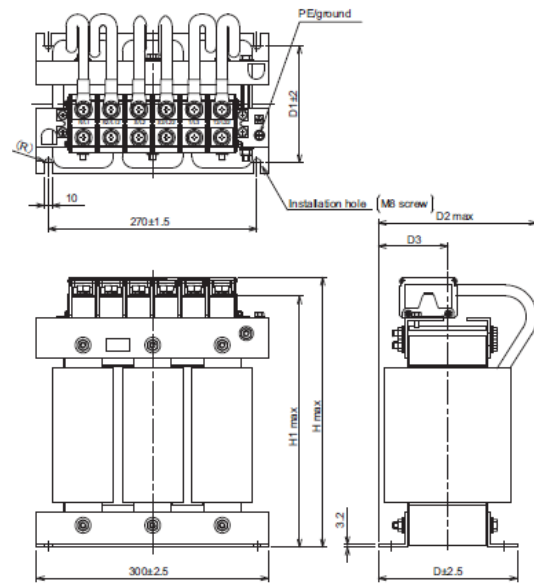
■ MT-RCL-H75K



M12 installation bolt

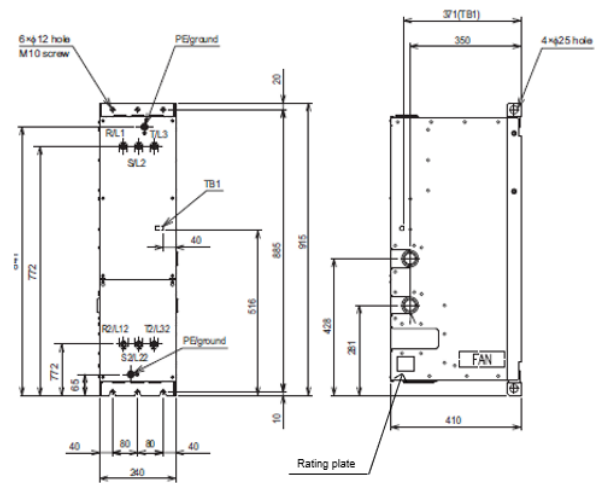
Model	W	W1	H	D	D1
MT-RCL-H75K	390	150	385	358	195
MT-RCL-H160K	515	200	465	380	250
MT-RCL-H220K	630	400	655	565	445

■ FR-XCL/XCG-H75K

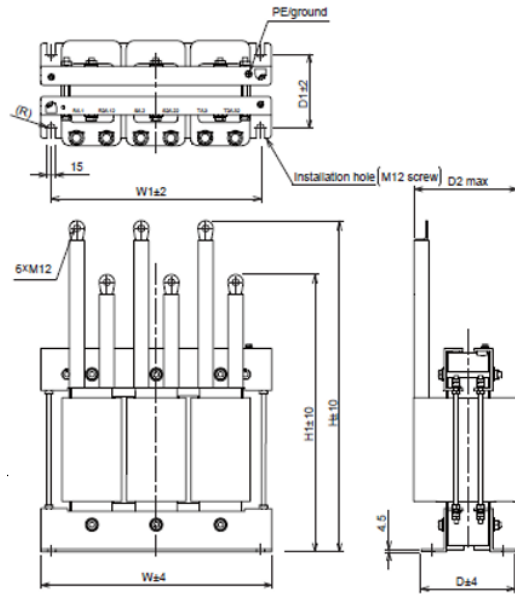


Model	D	D1	D2	D3	H	H1
FR-XCL/XCG-H75K	170	140	200	90	335	311

■ FR-XCB-H75K

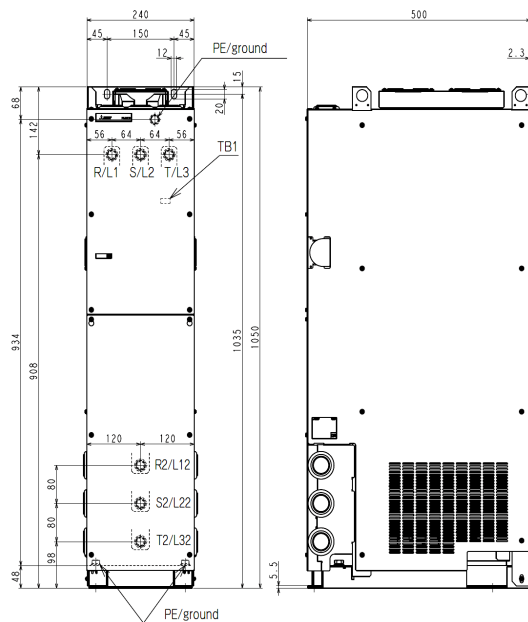


■ FR-XCL-H160K, H220K, FR-XCG-H132K, H185K



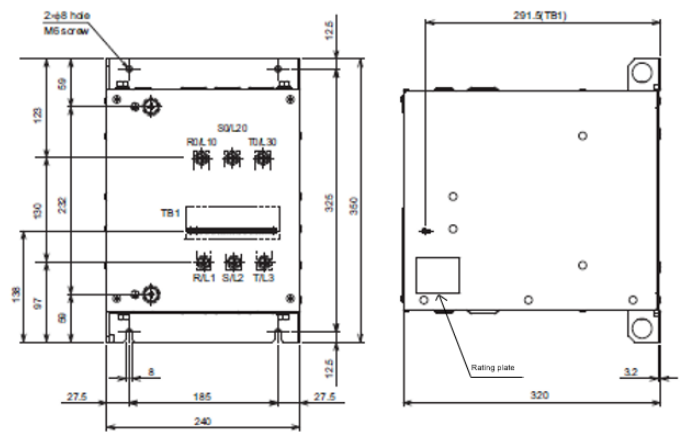
Model	W	W1	D	D1	D2	H	H1
FR-XCL-H160K	430	390	176	140	190	600	500
FR-XCL-H220K	500	460	196	160	210	640	540
FR-XCG-H132K	430	390	176	140	195	560	460
FR-XCG-H185K	430	390	196	160	210	600	500

■ FR-XCB-H160K, H220K

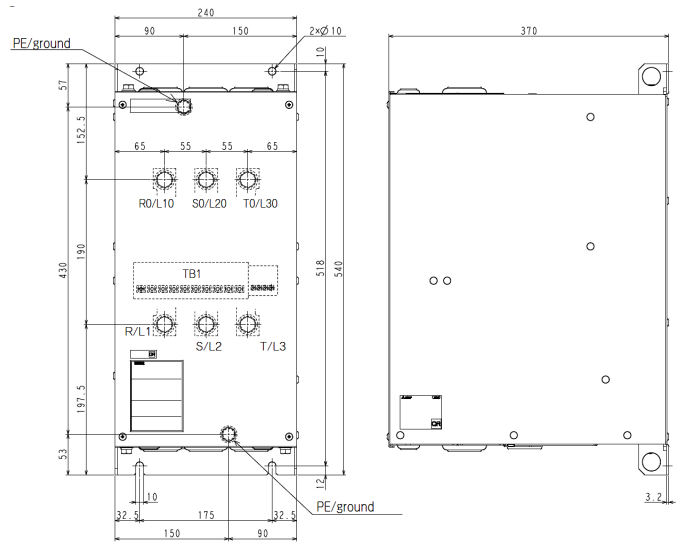




■ FR-MCB-H150




■ FR-MCB-H400



## 2. 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 with harmonic suppression enabled/disabled

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													
			RDY	-													
		Open collector	-	RYB	<b>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.</b>												
-			RS0														
SE			SE														
-	A1, A2	Contact output terminals for the operation command for the magnetic contactor (FR-MCB).															
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	FR-XC	<table border="1"> <tr> <td>LED display indication</td> <td> *1 Input power value is displayed as a percent. *2</td> <td> *1 Input power value *2 Regenerative power value *2 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	*1 Input power value *2 Regenerative power value *2 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	*1 Input power value *2 Regenerative power value *2 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 Harmonic suppression disabled FR-XCB terminal name Harmonic suppression enabled	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	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	-			
	Control circuit / output signal	Open collector	SD	SD			
			-	43 (23), 44 (24)	Auxiliary contact (NO contact) input terminals for the magnetic contactor.		
LED indicator	Contact	A, B, C	A, B, C				
		RDY	RYA (RDY)				
	Open collector	SE	SE	<b>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.</b>			
		-	A1, A2	Contact output terminals for the operation command for the magnetic contactor.			
Function selection switch	7-segment LED in four digits for fault indication		7-segment LED in two digits for operating status display	FR-XC			
			<table border="1"> <thead> <tr> <th>LED display indication</th> <th>Input power value is displayed as a percent. *2</th> <th>Input Regenerative power value *2 drive indication</th> </tr> </thead> <tbody> <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> </tbody> </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	Input power value is displayed as a percent. *2	Input Regenerative power value *2 drive indication
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Converter status	During power driving.	During regenerative driving. The regenerative drive indication (a decimal point LED) is ON during operation.					
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.

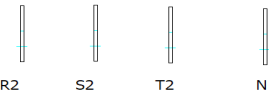
The main circuit terminal layout and the position of the earth (ground) terminal differ. Check the terminal names and positions before performing wiring.

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



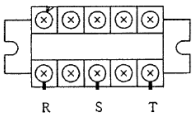
R2 S2 T2 N

##### Converter input terminals



P

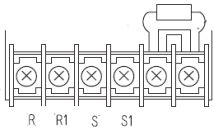
##### Power supply phase detection terminals



M3.5 screw

R S T

##### Control circuit power terminals



M4 screw

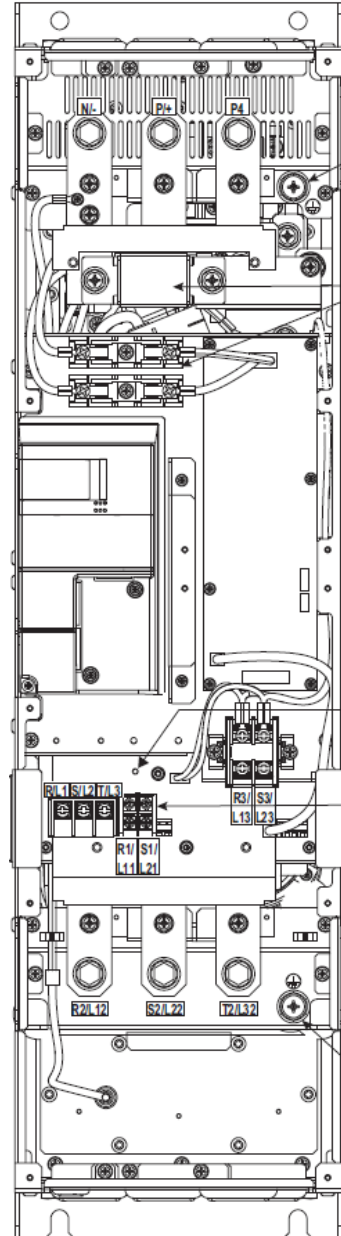
R R1 S S1



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

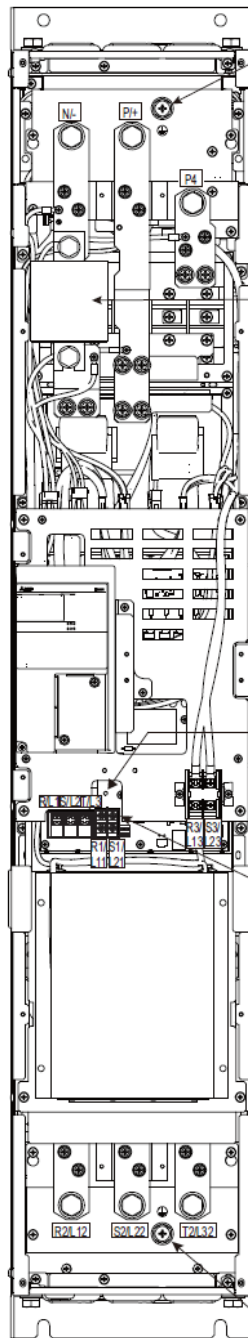
Screw size for terminals R/L1, S/L2, T/L3, R1/L11, and S1/L21: M4

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

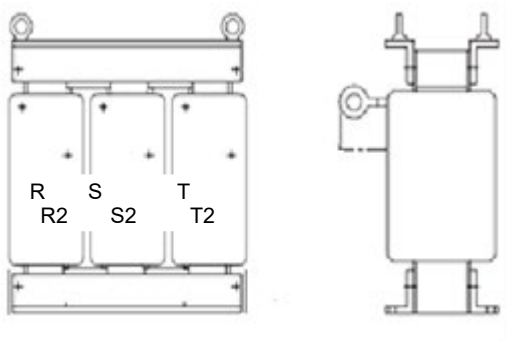
Screw size for terminals  
R2/L12, S2/L22, and T2/L32:  
M12

Earth (ground) terminal

Earthing (grounding) screw size:  
M10

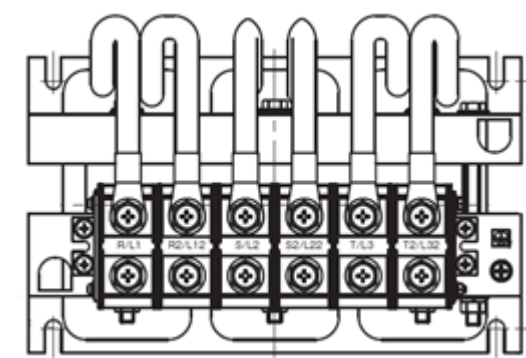
[Reactor]

■ MT-RCL-H75K to H220K



H75K: M8 bolt  
H160K, H220K: M12 bolt

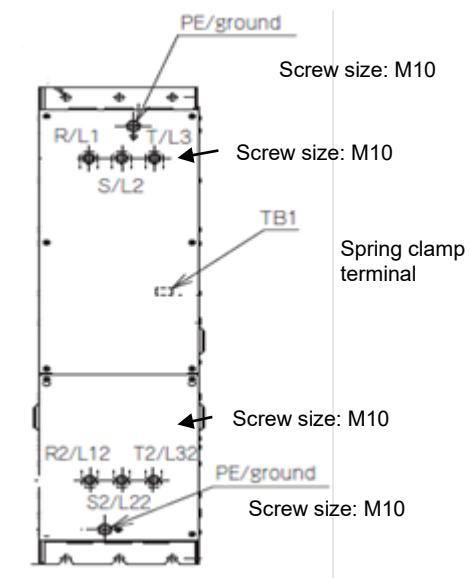
■ FR-XCL/XCG-H75K



Screw size: M10

Earthing  
(grounding)  
screw size:  
M6

■ FR-XCB-H75K



Screw size: M10

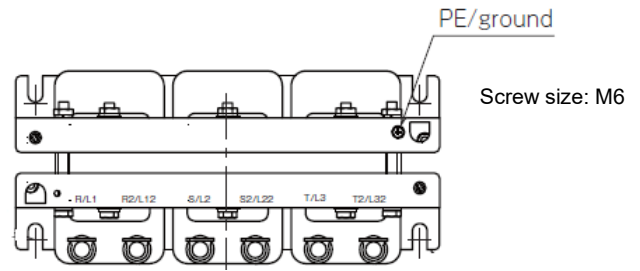
Screw size: M10

Spring clamp  
terminal

Screw size: M10

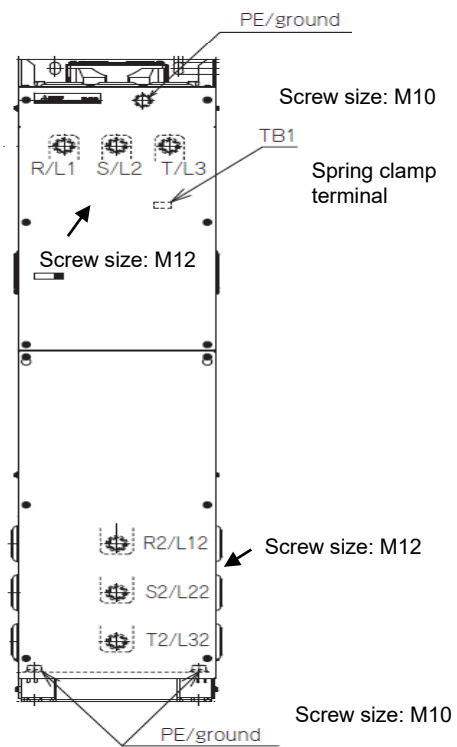
Screw size: M10

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



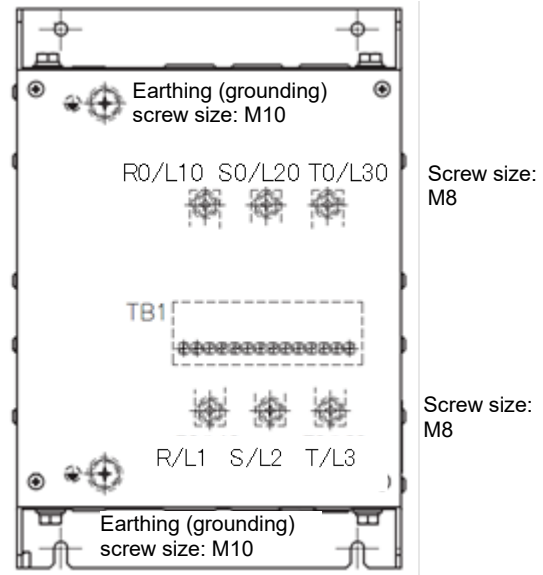
FR-XCL-H160K, H220K  
Screw size: M12  
FR-XCG-H132K, H185K  
Screw size: M12

■ FR-XCB-H160K, H220K





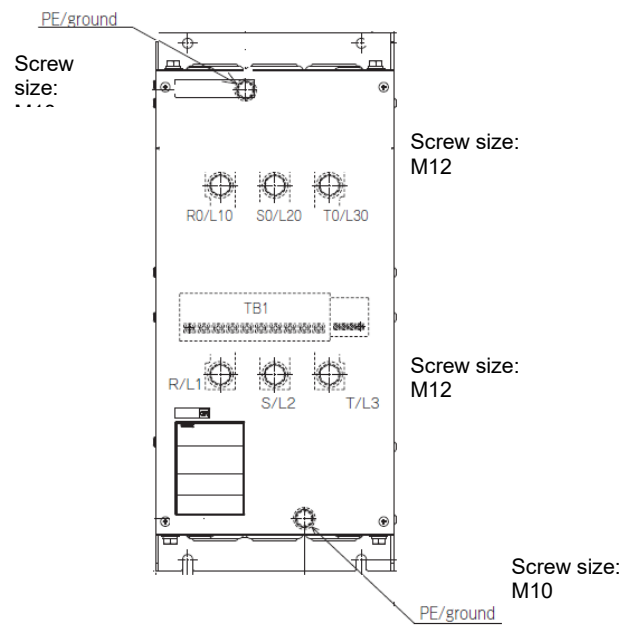
■ FR-MCB-H150



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

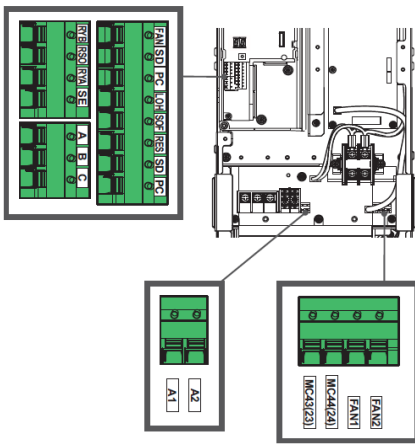


Terminal block (M4 screw)

Recommended cable gauge: 1.25 to 2 mm<sup>2</sup>

### ■ Control circuit terminal layout of the FR-XC series

Recommended cable gauge: 0.3 to 1.25 mm<sup>2</sup>



#### 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.

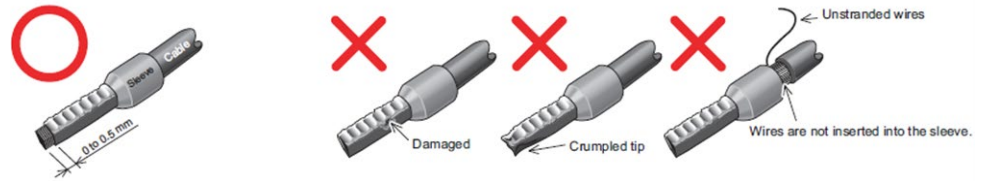
Twist the stripped end of wires to prevent them from fraying. Do not solder them.



(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 <sup>2</sup> )	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 <sup>2</sup> )	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.

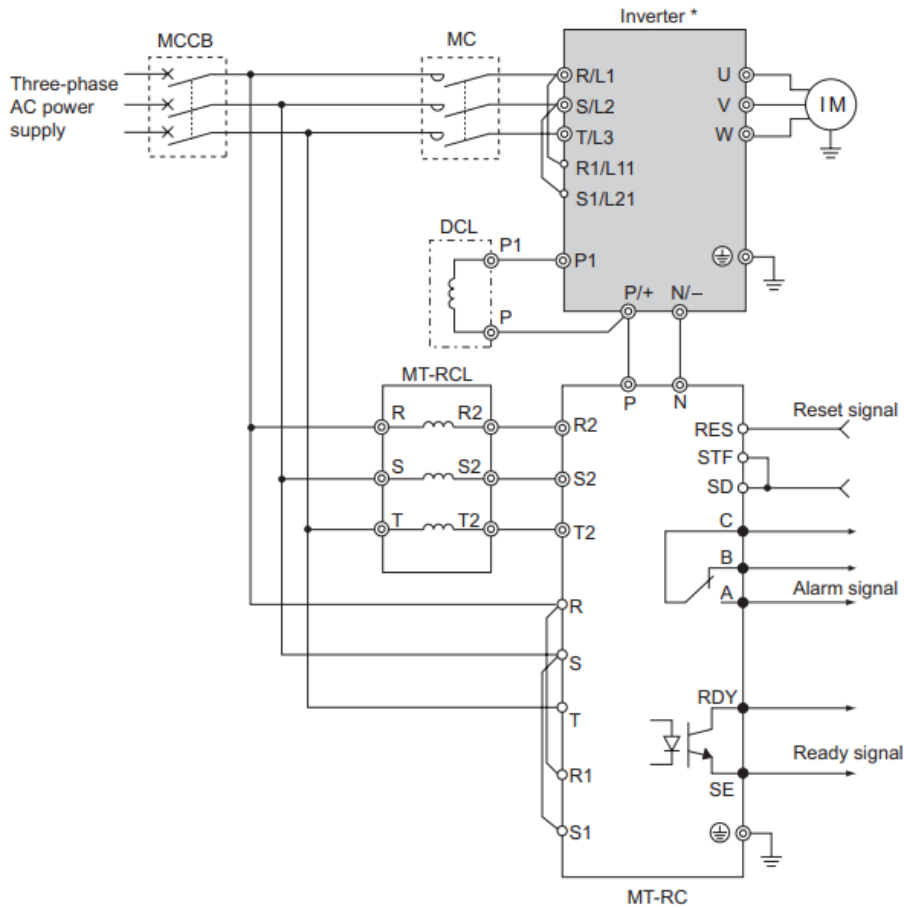
## Wiring of main circuit

The following shows the connection diagrams of the MT-RC series and the FR-XC series.

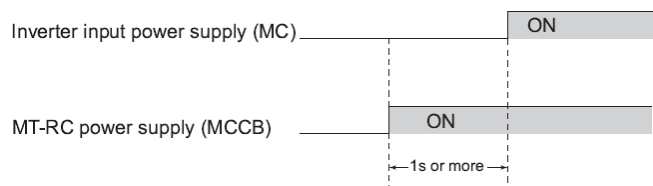
Note that some of the wiring are different.

Additionally, the wiring varies depending on the series of the inverter used with the converter. Before wiring, check the wiring shown on the Instruction Manual of the inverter.

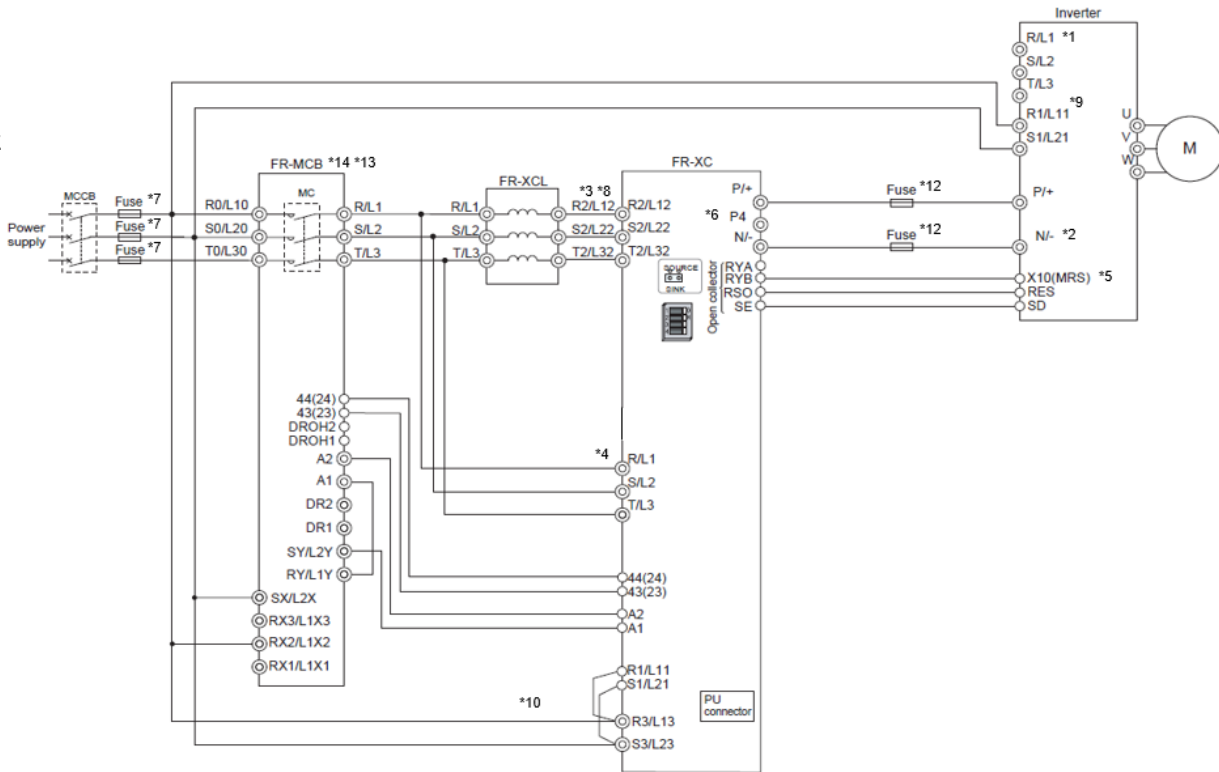
### ■ Connection diagram of the MT-RC series



When using either the FR-A700 series or FR-F700 series with the MT-RC, install a magnetic contactor(MC) at the input side of the inverter and power on the inverter 1s or more after powering on MT-RC. When power is supplied to the inverter before the MT-RC, the inverter and the MT-RC may be damaged or the MCCB may trip or be damaged.



■ Connection diagram of the FR-XC series  
**Common bus regeneration mode with harmonic suppression disabled**



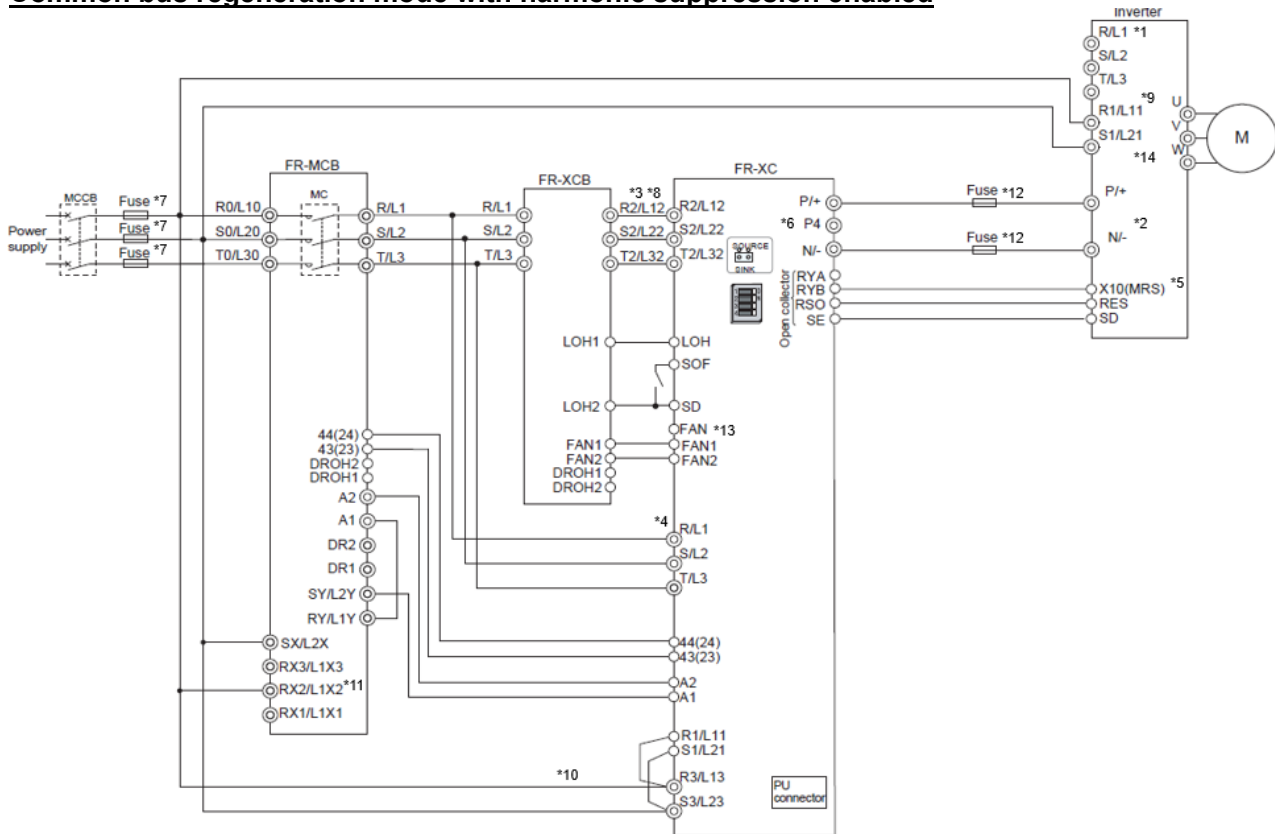
Do not change the setting of switch 1 in the function selection switch assembly (SW2) from ON (common bus regeneration mode) which is the initial state. Set Pr.416 = "0" (or "9999" in the FR-XC). For the FR-A800 inverter, Pr.30 Regenerative function selection must be set to "2". For details, refer to 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  
**Common bus regeneration mode with harmonic suppression enabled**



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 = "1" (or "9999" in the FR-XC-PWM). For the FR-A800 inverter, Pr.30 Regenerative function selection must be set to "2". In addition, 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. 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 the inverter terminal P/+ with the converter terminal P/+, and the inverter terminal N/- with 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/L1, S/L2, and T/L3 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. Otherwise, the control circuit power supply is not started and the converter will not be charged.
- \*11 Connect either terminal RX2/L1X2 or RX3/L1X3 to the power supply according to the input power supply voltage. For details, refer to the Instruction Manual.
- \*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 Terminal FAN is used in the FR-XC-(H)55K or lower. This terminal is not used in the FR-XC-H75K or higher.
- \*14 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.
- \*15 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.

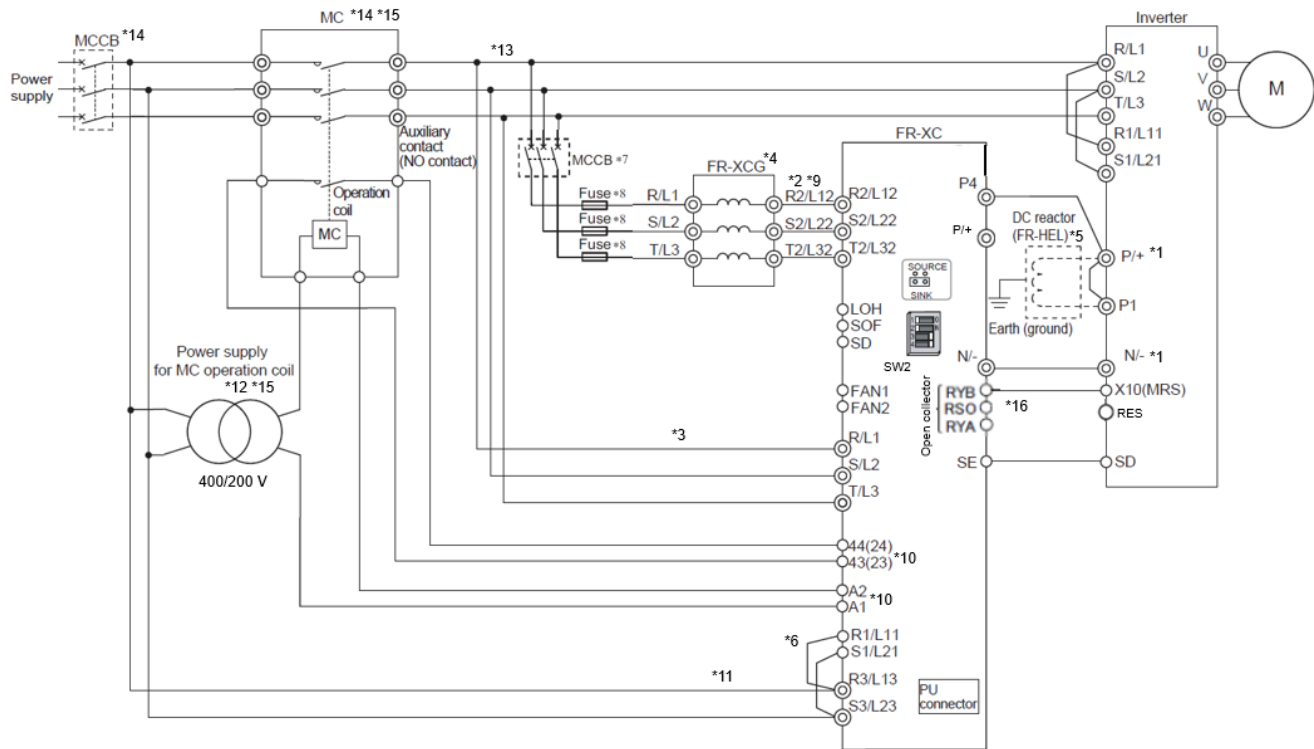
For details, refer to the Instruction Manual.

- 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.

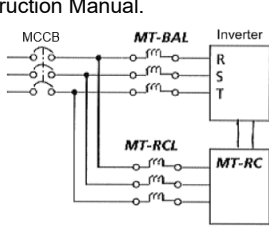
- When the power is distorted or falls off sharply, the reactors may generate abnormal acoustic noise. This acoustic noise is caused by the power supply fault and not by the damage of the converter.
- Connect the FR-MCB between the power supply and the box-type reactor. A magnetic contactor (MC) can be used instead of the FR-MCB. For details, refer to the Instruction Manual.

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

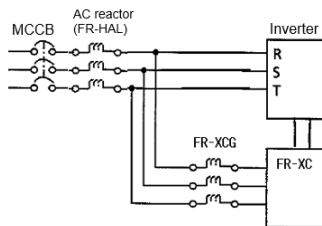


Set switches 1 and 2 in the function selection switch assembly (SW2) to the OFF position (power regeneration mode 2).  
 For the FR-A800 inverter, Pr.30 Regenerative function selection must be set to "0".  
 For details, refer to the Instruction Manual.

- \*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.

### 3. 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, enable/disable harmonic suppression by setting Pr.416.**

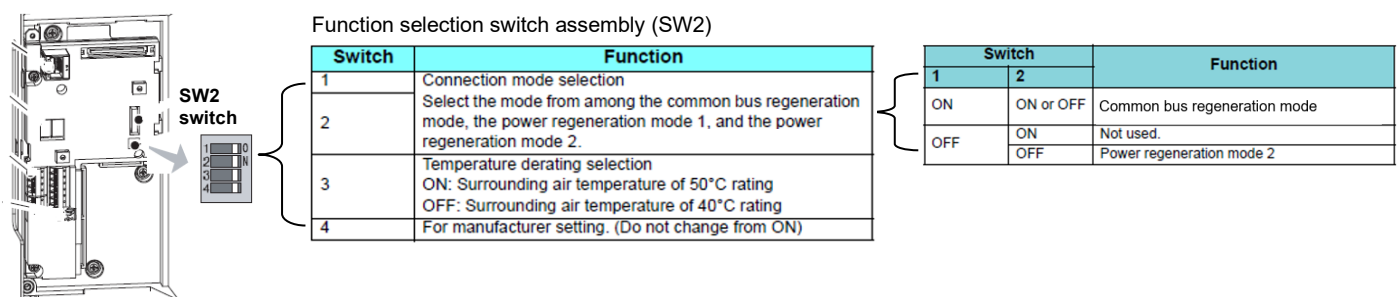
FR-XC parameter				Parameter setting	
Function number	Name	Setting range	Initial value	Setting	Remarks
0	Simple mode selection	0, 9999	0		
1	Maximum power supply frequency	60 Hz (Read only)	60 Hz		
2	Minimum power supply frequency	50 Hz (Read only)	50 Hz		
3	LOH terminal function selection	0, 3 to 5, 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		<b>For the common bus regeneration mode, enable or disable harmonic suppression.</b>
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.





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.

## **REVISIONS**

Revision date	Version	Revision
Sep. 2020	*	First edition
Dec. 2021	A	Capacities applicable for power regeneration mode 2 added. Wiring for terminal RYB added.
Nov. 2023	B	H160K and H220K models added. Descriptions on enabling harmonic suppression added.

### Discontinuation of the MT-RC Series General-Purpose Inverter Options

Thank you for your continued patronage of Mitsubishi Electric drive control products, FA products, and power distribution control products.

We have released FR-XC series multifunction regeneration converters as the successors to MT-RC series converters. Due to this, we are discontinuing the production of the highly valued MT-RC series according to the following schedule.

We ask for your understanding in this matter.

#### 1. Models to be Discontinued

MT-RC power regeneration converter (4 models in total)

MT-RCL AC reactor (standard accessory) (4 models in total)

#### 2. Schedule

Production continues on orders received by the last day of December 2024.

Requests for repair service will be accepted by the last day of December 2031.

Note) Repairs are subject to the supply of service parts and may not be possible even within the repair service period.

#### 3. Products Affected

Power supply voltage	MT-RC model	MT-RCL model
Three-phase 400 V	MT-RC-H75K	MT-RCL-H75K
	MT-RC-H160K	MT-RCL-H160K
	MT-RC-H220K	MT-RCL-H220K
	MT-RC-H280K	MT-RCL-H280K

#### 4. Successor Models

Discontinued model	Successor model
MT-RC-H75K MT-RCL-H75K	Multifunction regeneration converter FR-XC-H75K Stand-alone reactor dedicated to the FR-XC series converter FR-XCL-H75K
MT-RC-H160K MT-RCL-H160K	Multifunction regeneration converter FR-XC-H160K Stand-alone reactor dedicated to the FR-XC series converter FR-XCL-H160K
MT-RC-H220K MT-RCL-H220K	Multifunction regeneration converter FR-XC-H220K Stand-alone reactor dedicated to the FR-XC series converter FR-XCL-H220K
MT-RC-H280K MT-RCL-H280K	No successor model

Date of issue	Title	Content
December 2023	Discontinuation of the MT-RC Series General-Purpose Inverter Options	Mitsubishi Electric Corp., Nagoya Works 5-1-14 Yada-minami, Higashi-ku, Nagoya 461-8670 Tel.: +81 (52) 721-2111 Main line