

# Mitsubishi Electric Programmable Controller Upgrade Tool

## Conversion Adapter

Model

**ERNT-AQT20-S1**

## User's Manual



50CM-D180195-C(1811)

### MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED

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### SAFETY PRECAUTIONS

(Always read these precautions prior to use.)

Before attempting to use the Conversion Adapter (or the Products), read all instructions contained in this manual carefully to ensure safe and correct operation. The safety instructions appearing in this manual are limited to those that apply to the Products. For safety instructions to be heeded in regard to your programmable controller system as a whole, refer to the following manuals.

- MELSEC-Q series: QCPU User's Manual (SH-080483ENG)
- MELSEC iQ-R series: Safety Guidelines (IB-0800525E)

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In this manual, the safety precautions are ranked as "WARNING" and "CAUTION."

**WARNING** Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

**CAUTION** Indicates that incorrect handling may cause hazardous conditions, resulting in medium or minor injury and/or property damage.

Note that failure to observe the CAUTION level instructions may lead to a serious consequence according to the circumstances. Always follow the precautions of both levels because they are important to personal safety. Please keep this manual in an easy-to-access location for future reference, and be sure to provide the manual to the end user.

### Precautions before using

**CAUTION**

- When making a switch to the MELSEC-Q Series or MELSEC iQ-R Series, be sure to consult user's manual supplied with individual module under the MELSEC-Q Series or MELSEC iQ-R Series to confirm differences in various aspects including performance, function, CPU input/output signals between the two modules.

### Installation Precautions

**CAUTION**

- Use the Conversion Adapter in the environmental conditions that are specified in the general specification in the following manuals. If the Products are used in any environment beyond the bounds of the general specification, electric shock, fire, malfunction, or damage to or degradation of the Products will result.
  - MELSEC-Q Series: QCPU User's Manual (SH-080483ENG)
  - MELSEC iQ-R Series: Safety Guidelines (IB-0800525E)
- Do not directly touch any conductive parts of Conversion Adapter. Contact will cause malfunction or failure in the system.
- Fasten the Conversion Adapter and the Mounting Bracket securely with retaining screws, and tighten the screws by applying torque within specified limits. Loose screws can lead to the dropping of the Conversion Adapter or Mounting Bracket, possibly causing breakage thereof. Excessive tightness of the screws can lead to breakage of the screws, Conversion Adapter, Mounting Bracket, or MELSEC-Q Series Module, possibly causing the dropping, shorting, and malfunction thereof.
- When installing the Conversion Adapter, take care not to get your hand snagged on the Mounting Bracket or the like. Injury may result.
- When installing or removing the MELSEC-Q Series or MELSEC iQ-R Series Module complete with a Converter Adapter, be sure to hold it with both hands. Dropping may lead to breakage.

### Wiring Precautions

**WARNING**

- Before attempting to install the Unit or carry out the necessary wiring, make certain that the external power supply, used in the system, is shut off on all three phases. Failure to do so may result in electric shock or damage to the product.
- After installation and wiring, close the terminal block cover before turning on the module for operation. Failure to do so may result in electric shock.

**CAUTION**

- Carry out wiring for the Conversion Adapter correctly after checking the specification and terminal arrangement for the module used. Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Tighten the terminal installation screws and terminal screw securely by applying torque within the specified limits. Loose screws will cause short circuit, fire or malfunction. Excessive tightening will damage the screws or the Conversion Adapter which in turn will cause dropping of parts, short circuit or malfunction.
- Use care to prevent foreign materials including cuttings and wiring debris from entering the Conversion Adapter or the MELSEC-Q Series Module. These will be cause for fire, failure or malfunction.

### Startup and Maintenance Precautions

**WARNING**

- Do not touch live terminals. There is a danger of electric shock or malfunction.
- Shut off the external power supply for the system in all phases before cleaning or retightening the terminal screws. Failure to do so may result in electric shock or cause the MELSEC-Q Series or MELSEC iQ-R Series module to fail or malfunction. Loose screws can lead to dropping, shorting, and malfunction. Excessive tightness of the screws can lead to breakage of the screws, converter adapter, fittings, or MELSEC-Q Series or MELSEC iQ-R Series Module, possibly causing the dropping, shorting, and malfunction thereof.

**CAUTION**

- Do not modify the Conversion Adapter or take it apart. Doing so will cause failure, malfunction, personal injury, or fire.
- The Conversion Adapter comes in a resin case. Do not drop the Adapter or give a strong impact to it. This will cause damage to the Adapter.

### Disposal Precautions

**CAUTION**

- When disposing of the product, treat it as industrial waste.

### EMC AND LOW VOLTAGE DIRECTIVES

Compliance to the EMC Directive, which is one of the EU Directives, has been a legal obligation for the products sold in European countries since 1996 as well as the Low Voltage Directive since 1997. Manufacturers who recognize their products are compliant to the EMC and Low Voltage Directives are required to declare that print a "CE mark" on their products.

#### Authorized representative in Europe

Authorized representative in Europe is shown below.  
 Name: Mitsubishi Electric Europe BV  
 Address: Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany

## 1. Overview

This manual describes the Mitsubishi Electric Programmable Controller Upgrade Tool conversion adapter (ERNT-AQT20-S1). When replacing the current module with the MELSEC-Q Series or the MELSEC iQ-R Series, be sure to refer to the Programmable Controller Module manuals to check the differences in performance, functionality, CPU input/output signals, buffer memory addresses and the like. Once you have opened the packaging, verify that it contains the following products.

Product	Shape	Qty	Product	Shape	Qty
Conversion Adapter		1	Mounting bracket fixing screws (M3.5x6)		2
Mounting bracket		1	Terminal block (with a short bar)		1
			This manual	-	1

## 2. Specifications

### 2.1 General Specifications

Item	Specifications
Operating ambient temperature	0 to 55°C (Maximum surrounding air temperature 55°C)
Storage ambient temperature	-25 to 75°C
Operating ambient humidity	5 to 95%RH, non-condensing
Storage ambient humidity	
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2 Under intermittent vibration 5 to 8.4Hz 8.4 to 150Hz 9.8m/s <sup>2</sup> 3.5mm 10 times each in X, Y, Z directions Under continuous vibration 5 to 8.4Hz 8.4 to 150Hz 4.9m/s <sup>2</sup> - -
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147m/s <sup>2</sup> , 3 times each in 3 directions X, Y, Z)
Operating atmosphere	No corrosive gases
Operating altitude *1	0 to 2000m
Installation location	Inside a control panel *2
Overvoltage category *3	II or less
Pollution degree *4	2

- Do not use or store under pressure higher than the atmospheric pressure of altitude 0m.
- The enclosure is suitably designed for those specific environmental conditions, as applicable, and enclosure rate meets IP20 and minimum type 1 of UL 50.
- This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities.
- This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

## 3. Conversion Adapter Product Specifications

For detail specifications which do not appear in the specifications of the MELSEC-Q Series Module or the MELSEC iQ-R Series Module, see the user's manual supplied with the Programmable Controller Module you use. Also, check that the specifications of the connected devices meet the specifications of the Programmable Controller Module.

- MELSEC-Q Series, MELSEC iQ-R Series module  
 The conversion adapter can be used in combination with the following MELSEC-Q or MELSEC iQ-R series module.

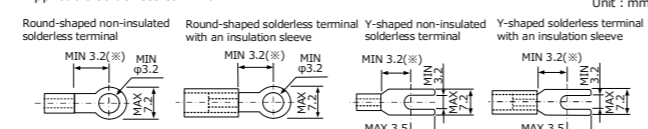
Output	MELSEC-Q Series module model
Output	QY22

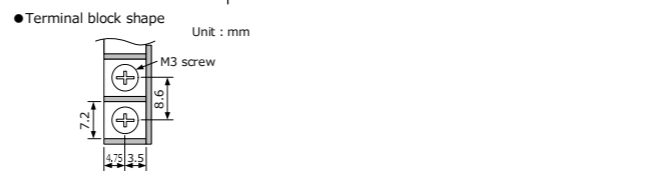
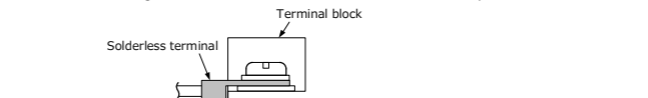
Input/Output	MELSEC iQ-R Series module model
Input	RX10 RX28 RX40C7 RX70C4 RX40PC6H RX40NC6H
Output	RY10R2 RY18R2A RY20S6 RY40PT5P RY40NT5P

### (2) Specifications of the terminal block (conversion adapter accessory)

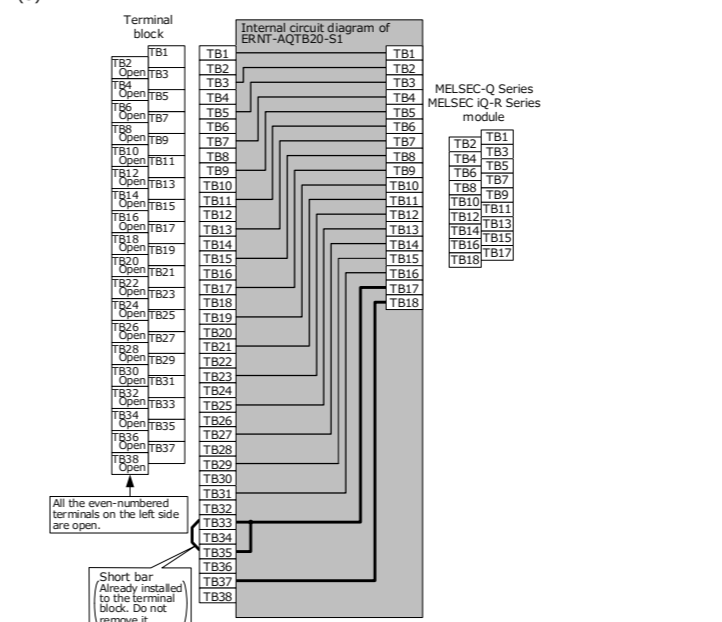
- Applicable solderless terminal



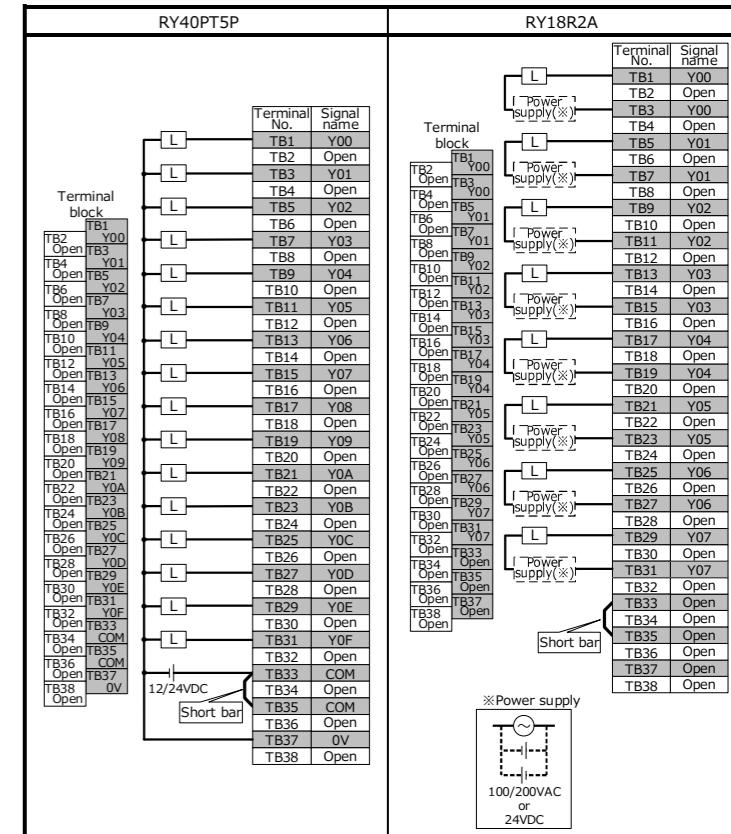
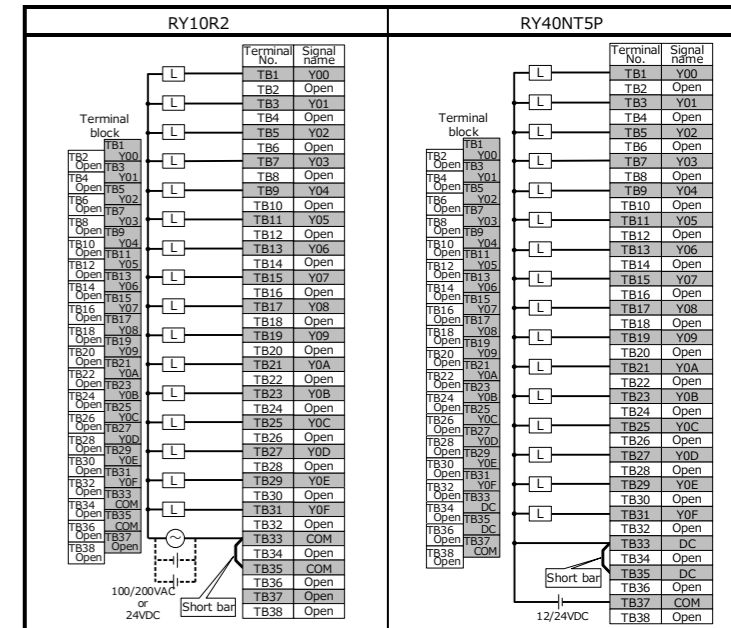
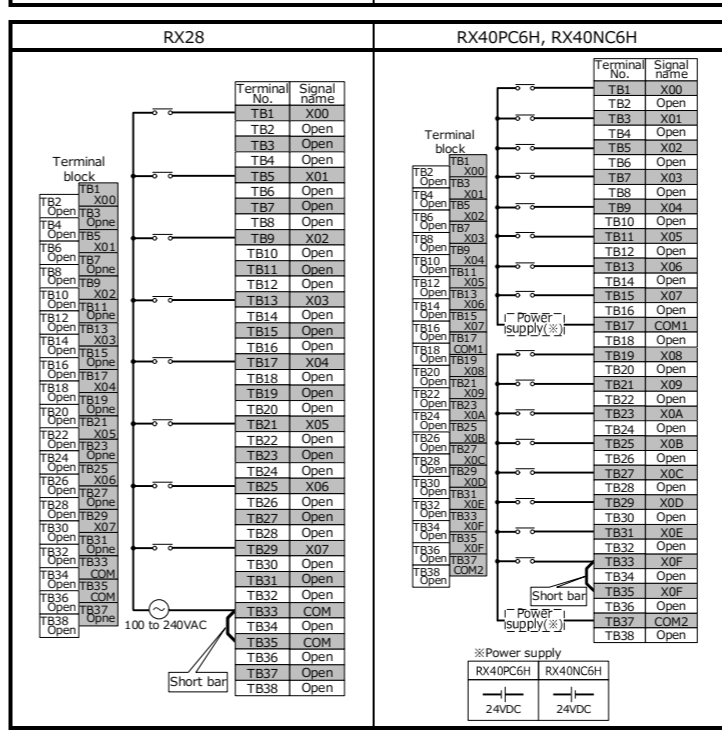
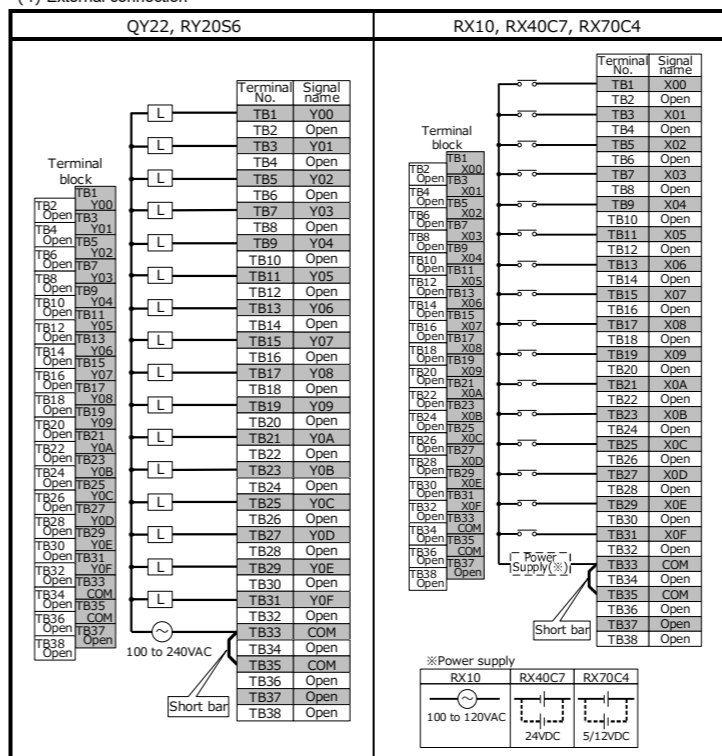
\*The minimum length is 5.0 mm when the solderless terminal is attached up side down as shown below.



### (3) Internal connection



### (4) External connection



### (5) MELSEC-Q Series module, MELSEC iQ-R Series module specification

① Input module

Specification	Model	MELSEC iQ-R Series	
		RX10	RX28
No. of input points		16 points	8 points
Rated input voltage		100 to 120VAC (+10%/-15%) 50/60Hz(±3Hz)	100 to 240VAC (+10%/-15%) 50/60Hz(±3%)
Rated input current		8.2mA (100VAC 60Hz) 6.8mA (100VAC 50Hz)	16.4mA (200VAC 60Hz) 13.7mA (200VAC 50Hz) 8.2mA (100VAC 60Hz) 6.8mA (100VAC 50Hz)
Inrush current		200mA maximum, with in 1ms	950mA maximum, with in 1ms
ON voltage/ON current		80VAC or higher/ 5mA or higher (50Hz, 60Hz)	80VAC or higher/ 5mA or higher (50Hz, 60Hz)
OFF voltage/OFF current		30VAC or lower/1.7mA or lower (50Hz, 60Hz)	30VAC or lower/1.7mA or lower (50Hz, 60Hz)
Input impedance		12.2kΩ (60Hz) 14.6kΩ (50Hz)	12.1kΩ (60Hz) 14.5kΩ (50Hz)
Response time	OFF to ON	1.5ms or less (100VAC 50Hz, 60Hz)	10ms or less (200VAC 50Hz, 60Hz)
	ON to OFF	20ms or less (100VAC 50Hz, 60Hz)	20ms or less (200VAC 50Hz, 60Hz)
Internal current Consumption (5VDC)		110mA (TYP. All points ON)	90mA (TYP. All points ON)
Wiring method for common		16 points/common	8 points/common

Specification	Model	MELSEC iQ-R Series			
		RX40C7 (Positive/Negative common shared type)	RX70C4 (Positive/Negative common shared type)	RX40PC6H (Positive common)	RX40NC6H (Negative common)
No. of input points	16 points	16 points	16 points	16 points	
Rated input voltage	24VDC (20.4 to 28.8VDC)	5VDC(4.25 to 6VDC) 12VDC(10.2 to 14.4VDC)	24VDC (20.4 to 28.8VDC)	24VDC (20.4 to 28.8VDC)	
Rated input current	7.0mA TYP. (24VDC)	1.7mA TYP. (5VDC) 4.8mA TYP. (12VDC)	6.0mA TYP. (24VDC)	6.0mA TYP. (24VDC)	
Inrush current	—	—	—	—	
ON voltage/ON current	15V or higher/4mA or higher	3.5V or higher/1mA or higher	15V or higher/4mA or higher	15V or higher/4mA or higher	
OFF voltage/OFF current	8V or lower /2mA or lower	1V or lower /0.1mA or lower	8V or lower/1.7mA or lower	8V or lower/1.7mA or lower	
Input impedance	3.3kΩ	2.3kΩ	3.9kΩ	3.9kΩ	
Response time	OFF to ON	0.1/0.2/0.4/0.6/ 1/5/10/20/70ms	0.2/0.3/0.4/0.5/ 1/5/10/20/70ms	5/20/50μs 0.1/0.2/0.4/0.6/1/5/10/20/70ms	
	ON to OFF	0.35/0.4/0.5/0.7 1/5/10/20/70ms	0.41/0.5/0.6/0.7/ 1/5/10/20/70ms	10/25/50μs 0.1/0.2/0.4/0.6/1/5/10/20/70ms	
Internal current Consumption(5VDC)	110mA (TYP. All points ON)	100mA (TYP. All points ON)	100mA (TYP. All points ON)	100mA (TYP. All points ON)	
Wiring method for common	16 points/common	16 points/common	8 points/common	8 points/common	

**② Output module**

Specification	Model	MELSEC iQ-R Series					
		MELSEC-Q Series	RY10R2	RY18R2A	MELSEC iQ-R Series	RY40NT5P (Sink type)	RY40PT5P (Source type)
No. of output points	16 points	16 points	8 points	16 points	16 points	16 points	
Rated load voltage	100 to 240VAC 50/60Hz±5%	—	—	100 to 240VAC (+10%/-15%), 50/60Hz(±3Hz)	12/24VDC (10.2 to 28.8VDC)	12/24VDC (10.2 to 28.8VDC)	
Maximum load current	0.6A/point, 4.8A/common	—	—	0.6A/point, 4.8A/common	0.5A/point, Pilot Duty, 5A/common	0.5A/point, Pilot Duty, 5A/common	
Minimum load voltage/current	—	—	—	24VAC 100mA 100VAC 25mA 240VAC 25mA	—	—	
Maximum inrush current	20A 1cycle or less	—	—	20A cycle or lower	Current is to be limited by the overload protection function	Current is to be limited by the overload protection function	
OFF leakage current	1.5mA or lower (120V 60Hz) 3mA or lower (240V 60Hz)	—	—	1.5mA or lower (120V 60Hz) 3mA or lower (240V 60Hz)	0.1mA or lower	0.1mA or lower	
Maximum voltage drop at power-ON	1.5V or lower	—	—	1.5V or lower (at load current of 0.6A)	0.2VDC (TYP.) 0.5A, 0.3VDC (MAX.) 0.5A	0.2VDC (TYP.) 0.5A, 0.3VDC (MAX.) 0.5A	
Rated switching voltage, current	—	240VAC 2A/point(COSφ=1) 24VDC 2A/point(resistive load) 8A/common	240VAC 2A/point(COSφ=1) 24VDC 2A/point(resistive load) 8A/module	—	—	—	
Minimum switching load	—	5VDC 1mA	—	—	—	—	
Maximum switching voltage	—	264VAC 125VDC	264VAC 125VDC	—	—	—	
Response time	OFF to ON	1ms+0.5 cycles or less	10ms or less	10ms or less	1ms+0.5 cycles or less	0.5ms or less	
	ON to OFF	1ms+0.5 cycles or less (rated load, resistive load)	12ms or less	12ms or less	1ms+0.5 cycles or less (rated load and resistive load)	1ms or less (rated load and resistive load)	
Surge suppressor	CR absorber	None	None	CR absorber	Zener diode	Zener diode	
Fuse	None	None	None	None (Attaching a fuse to each external wiring is recommended)	None	None	
Isolation method	Photocoupler isolation	—	—	—	—	—	
Internal current Consumption(5VDC)	250mA (TYP. All points ON)	450mA (TYP. All points ON)	260mA (TYP. All points ON)	280mA (TYP. All points ON)	140mA (TYP. All points ON)	130mA (TYP. All points ON)	
Wiring method for common	16 points/common	16 points/common	All points independent	16 points/common	16 points/common	16 points/common	

#### 4. Products Required by the Conversion Adapter

##### (1) Conversion Adapter Anchor Base (Sold Separately)

The conversion adapter anchor base secures the bottom of the conversion adapter. One anchor base is required per base unit.

Conversion Adapter Anchor Base Model	MELSEC-Q Series	
	Type	Weight (g)
ERNT-AQF12	12-slot conversion adapter anchor base	590
ERNT-AQF8	8-slot conversion adapter anchor base	410
ERNT-AQF5	5-slot conversion adapter anchor base	275
ERNT-AQF3	3-slot conversion adapter anchor base	185

Conversion Adapter Anchor Base Model	MELSEC iQ-R Series	
	Type	Weight (g)
ERNT-1AR12F	12-slot conversion adapter anchor base	775
ERNT-1AR8F	8-slot conversion adapter anchor base	540
ERNT-1AR5F	5-slot conversion adapter anchor base	360

##### (2) Base Adapter (Sold Separately)

Both the MELSEC-Q series or MELSEC iQ-R series base unit and the conversion adapter anchor base can be installed on the base adapter without drilling screw holes.

However, drilling screw holes (M5 screws) is required to install the base adapter to the panel surface.

For the base unit models marked with \*1 to \*8, two or more base adapter models are applicable. Select the most suitable base adapter according to the product dimensions.

Base adapter Model	Installable					Product dimensions	Weight (g)	
	MELSEC-Q Series Base Unit							
	12 slots	8 slots	5 slots	3 slots	2 slots			
ERNT-AQB38	Q312B	Q38B(*1)				ERNT-AQF12, ERNT-AQF8	480×240	970
ERNT-AQB35		Q38B(*1)	Q35B			ERNT-AQF8, ERNT-AQF5	382×240	795
ERNT-AQB32				Q33B		ERNT-AQF3	247×240	675
ERNT-AQB68	Q612B	Q68B(*2)				ERNT-AQF12, ERNT-AQF8	466×240	930
ERNT-AQB65		Q68B(*2)	Q65B(*3) Q55B(*4)			ERNT-AQF8, ERNT-AQF5	352×240	790
ERNT-AQB62			Q63B	Q52B(*5)		ERNT-AQF3	238×240	650
ERNT-AQB58		Q68B(*2)				ERNT-AQF8	411×240	870
ERNT-AQB55			Q65B(*3) Q55B(*4)			ERNT-AQF5	297×240	655
ERNT-AQB52				Q52B(*5)		ERNT-AQF3	183×240	505

#### 5. Mounting and Installation

##### 5.1 Handling Precautions

- Before attempting to install the Unit or carry out the necessary wiring, make certain that the external power supply, used in the system, is shut off on all three phases. Failure to do so may result in electric shock or damage to the product.
- Do not touch live terminals. There is a danger of electric shock or malfunction.
- Do not modify the Conversion Adapter or take it apart. Doing so will cause failure, malfunction, personal injury, or fire.
- Do not touch the energized part of the Conversion Adapter directly. Contact will cause malfunction or failure in the system.
- Fully secure the conversion adapter and conversion adapter anchor base using the installation screws, and securely tighten the screws within the specified torque range. Failure to do so could cause the conversion adapter and anchor base to fall, resulting in conversion adapter and conversion adapter anchor base damage.
- Take care to prevent foreign materials including cutting chips and wire scraps from entering the Conversion Adapter or the Programmable Controller Module, possibly causing fire, failure or malfunction thereof.
- Do not drop the Conversion Adapter or do not give a strong impact to it. This will cause damage.
- Conversion Adapter is intended for indoor use only.

##### 5.2 Use Precautions

Series	MELSEC-Q	MELSEC iQ-R
Width dimension of module	The module width dimension is 27.4 mm. Check the conditions for wiring space and installation. 	The module width dimension is 27.8 mm. Check the conditions for wiring space and installation. 

Series	MELSEC-Q	MELSEC iQ-R
Depth and Height dimension	The depth dimension required for installation is 176.2 mm. Check the installation condition. 	The depth dimension required for installation is 194.7 mm. Check the installation condition. 

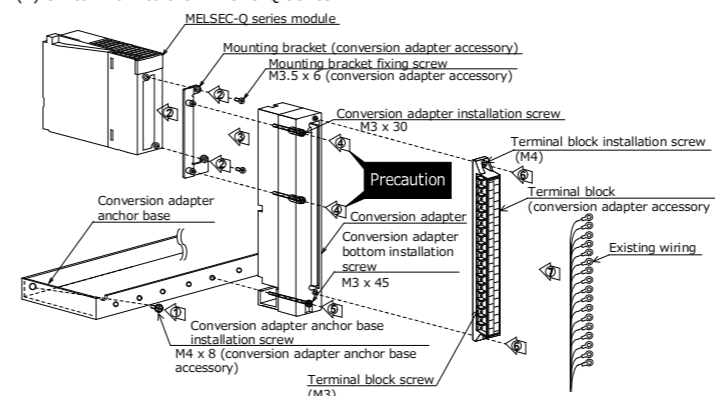
##### 5.3 Installation Environment

Refer to the manual supplied with the MELSEC-Q Series or MELSEC iQ-R Series module you use.

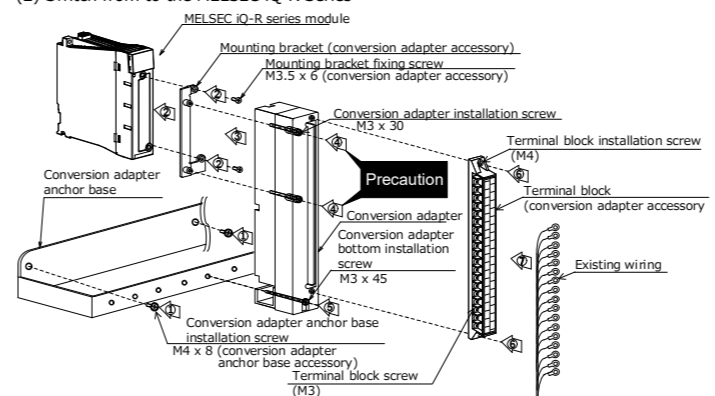
- MELSEC-Q Series: QCPU User's Manual (SH-080483ENG)
- MELSEC iQ-R Series: Safety Guidelines (IB-0800525E)

#### 6. Part Names and Installation Method

##### (1) Switch from to the MELSEC-Q Series

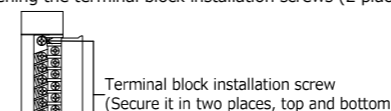


##### (2) Switch from to the MELSEC iQ-R Series



##### 6.1 Installation Method

- Secure the conversion adapter anchor base to the base adapter or control panel using the conversion adapter anchor base installation screws (M4 × 8) provided as an accessory. (MELSEC-Q Series: 2 locations at both sides, MELSEC iQ-R Series: 2 locations at both sides and 1 location at the center)
- Remove the terminal block attached with the Programmable Controller Module after loosening the terminal block installation screws (2 places top and bottom).



- Secure the mounting bracket to the Programmable Controller Module using the mounting bracket fixing screws [M3.5 × 6 (conversion adapter accessory); two upper/lower locations].
- Mount the conversion adapter onto the mounting bracket.
- Secure the conversion adapter using the conversion adapter installation screws (M3 × 30; 2 locations).

##### Precaution

Before tightening the installation screws, check that the Conversion Adapter has been securely installed on the Programmable Controller Module. Tightening the screws in floating-off state or tilting state will damage the Conversion Adapter installation screws and the mounting bracket.

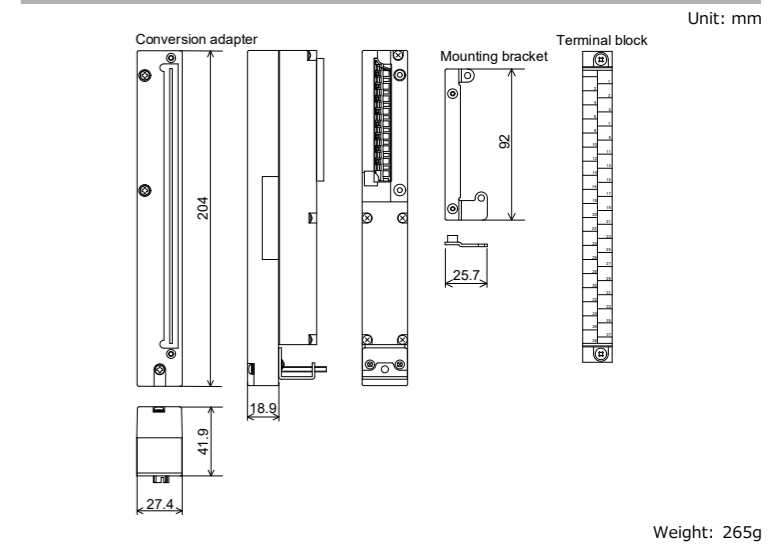
- Secure the conversion adapter using the conversion adapter bottom installation screw (M3 × 45; 1 location).
- Secure the terminal block to the conversion adapter using the terminal block installation screws (M4; two upper/lower locations).
- Connect the existing wiring to the terminal block (Terminal block screw M3). When any wires are left unconnected, connect them to open terminals or insulate them.

##### 6.2 Tightening Torque

Tighten the module installation screws to the specified torque below. An inappropriate tightening torque could cause the product to fall or result in a short circuit, product failure or malfunction.

Screw Location	Tightening Torque Range
Conversion adapter anchor base installation screw (M4×8)	1.39 to 1.89 N·m
Mounting bracket fixing screw (M3.5×6)	0.68 to 0.92 N·m
Conversion adapter installation screw (M3×30)	0.43 to 0.57 N·m
Conversion adapter bottom installation screw (M3×45)	
Terminal block installation screw(M4 screw)	1.02 to 1.38 N·m
Terminal block screw (M3 screw)	0.43 to 0.57 N·m

#### 7. External Dimensions



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MELSEC and MELSEC iQ-R is a registered trademark of Mitsubishi Electric Corporation in Japan.  
ERNT is a registered trademark of Mitsubishi Electric Engineering Company Limited in Japan.

#### Product Warranty Details

Please confirm the following product warranty details prior to product use.

##### Gratis Warranty Terms and Gratis Warranty Range

If any fault or defect (hereinafter referred to as "Failure") attributable to Mitsubishi Electric Engineering Company Limited (hereinafter referred to as "MEE") should occur within the gratis warranty period, MEE shall repair the product free of charge via the distributor from whom you made your purchase.

##### Gratis Warranty Period

The gratis warranty period of this product shall be one (1) year from the date of purchase or delivery to the designated place.  
Note that after manufacture and shipment from MEE, the maximum distribution period shall be six (6) months, and the gratis warranty period after manufacturing shall be limited to eighteen (18) months.  
In addition, the gratis warranty period for repaired products shall not exceed the gratis warranty period established prior to repair.

##### Gratis Warranty Range

The gratis warranty range shall be limited to normal use based on the usage conditions, methods and environment, etc., defined by the terms and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

##### Warranty Period after Discontinuation of Production

- MEE shall offer product repair services (fee applied) for seven (7) years after production of the product has been discontinued. Discontinuation of production shall be reported via distributors.
- Product supply (including spare parts) is not possible after production has been discontinued.

##### Exclusion of Opportunity Loss and Secondary Loss from Warranty Liability

Regardless of the gratis warranty period, MEE shall not be liable for compensation for damages arising from causes not attributable to MEE, opportunity losses or lost profits incurred by the user due to Failures of MEE products, damages or secondary damages arising from special circumstances, whether foreseen or unforeseen by MEE, compensation for accidents, compensation for damages to products other than MEE products, or compensation for other work carried out by the user.

##### Changes in Product Specifications

The specifications given in the catalogs, manuals and technical documents are subject to change without notice.

This document is a new publication, effective November 2018. Specifications are subject to change without notice.