

RY48PT20S-TS

Compliance with the Machinery Directive (2006/42/EC) and UL Standards

This product is suitable for establishing safety functions for general industrial machinery, and complies with the Machinery Directive (2006/42/EC) and the UL standards. Before using this product, please read this manual and the relevant manuals carefully, and pay full attention to safety to handle the product correctly.

1. Relevant manuals

For the product information, refer to the following.

Contents	Manual name [manual number]
Detailed information on the product	MELSEC IQ-R I/O Module (With Safety Functions) User's Manual [SH-082639ENG]

Please develop familiarity with the functions and performance of the product to handle the product correctly.

2. Installation

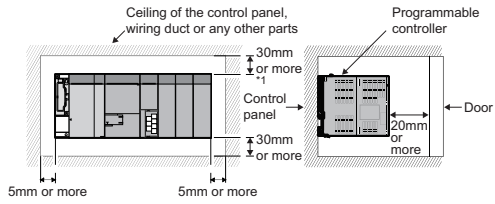
When installing this product to a control panel, fully consider its operability, maintainability, and environmental resistance.

Precautions

Beware that the module could be very hot while power is on and immediately after power-off.

Installation position

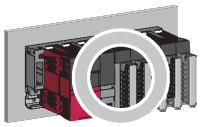
Keep the clearances shown below between the top/bottom faces of the modules and the control panel or other parts so that good ventilation is ensured and the modules can be easily replaced.



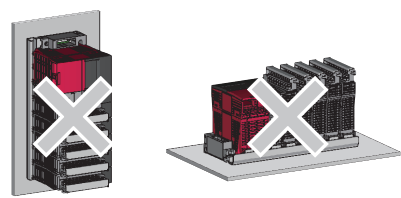
*1 A clearance required when the wiring duct is 50mm or less in height. A 40mm or more clearance is required when the wiring duct is taller.

Installation orientations

Install a programmable controller in the following orientation to ensure good ventilation for heat release.



Do not install a programmable controller in the following orientations.

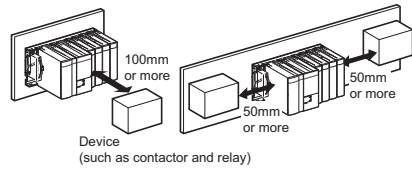


Installation precautions

Install a base unit on a flat surface. If the surface is uneven, an excessive force is applied to the printed circuit board, resulting in malfunction of the modules mounted.

Install the programmable controller separated from a vibration source such as an electromagnetic contactor (large type) or non-fuse breaker. (For instance, install it in a different control panel from a vibration source.) In addition, keep clearances between the programmable controller and devices (such as contactors and relays) as shown below to avoid the effects of radiation noise or heat.

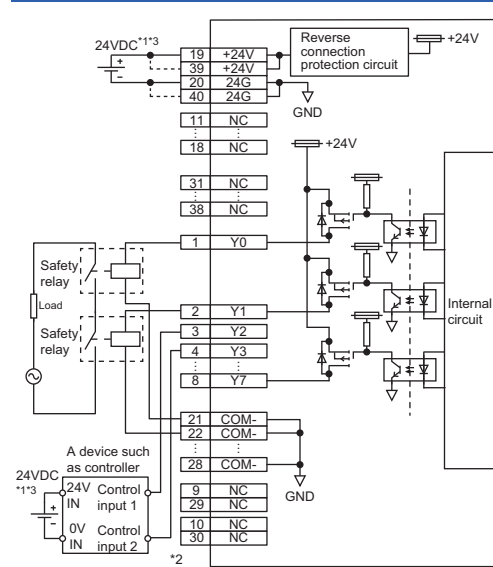
For devices installed in front of the programmable controller: 100mm or more
For devices installed on the right or left of the programmable controller: 50mm or more



Install the base unit to a control panel with no module mounted in the rightmost slot of the base unit. For uninstallation, remove the module in the rightmost slot first, then remove the base unit.

3. Wiring

3.1 Wiring diagrams



- *1 For a power supply to supply 24VDC, use the one satisfying both of the following: SELV power supply that does not exceed 30VAC (effective value), 42.4V (peak value), or 60VDC; power supply that meets the requirements of "limited-energy circuit" specified in IEC 61010-1.
- *2 The Δ mark on the rating plate indicates that wires with an appropriate temperature rating (105°C or greater) must be used for wiring.
- *3 For 24VDC wiring, use only wires with an applicable wire size of 1.5mm² (16 AWG).

3.2 Wiring products

When using the safety output module as a UL listed product, use the wire listed below for wiring to the terminal block.

Diameter	Type	Material	Temperature rating	Strip length of wire
22 to 16 AWG	Stranded	Copper	105°C or greater	10mm

When using ferrules, the products in the following table are recommended. For processing methods of the cable terminal, such as a strip length of wire, refer to the specifications of the terminal used. Use UL listed ferrules and, for processing, use a tool recommended by their manufacturer.

Terminal shape	Model ^{*1}	Applicable wire size	Crimping tool	Contact
Ferrule (with insulation sleeve)	AI 0.34-10TQ	0.34mm ² (22 AWG)	CRIMPFOX6	PHOENIX CONTACT GmbH & Co. KG
	AI 0.5-10WH	0.5mm ² (20 AWG)		
	AI 0.75-10GY	0.75mm ² (18 AWG)		
Ferrule (without insulation sleeve)	A 0.5-10	0.5mm ² (20 AWG)		
	A 0.75-10	0.75mm ² (18 AWG)		
	A 1-10	1.0mm ² (18 AWG)		
	A 1.5-10	1.5mm ² (16 AWG)		

*1 When using the safety output module as a UL listed product, use the terminals whose model name ends with -10 or -10□□.

4. Module status after power-on and LED indication

No.	Name	Application
(1)	RUN LED	Indicates the operating status. On: Operating normally Off: A major error has occurred.
(2)	ERR. LED	Indicates the error status of the module. On: A minor error has occurred. Flashing: A moderate error or major error has occurred. Off: Operating normally
(3)	SAFETY LED	Indicates the status of the safety I/O refresh. On: Safety I/O refresh being performed Flashing (400ms): Safety module position being checked Flashing (2s): Safety module reset waiting Off: Safety I/O refresh stopped
(4)	OUTPUT LED	When error points are not indicated: Indicates the ON/OFF status of output. On: The output signal is on. Off: The output signal is off.
		When error points are indicated: Flashes to indicate the error points. On: The output signal is on. Flashing: An error has occurred. Off: The output signal is off.

5. Precautions for use of safety programmable controller

Users must prove that their entire safety system complies with the safety standards and the Machinery Directive. The third-party certification organization will validate the safety of product for the entire safety system, including a safety programmable controller and safety components.

Target failure measure (PFDavg/PFH) calculation

To establish a safety system, calculate the target failure measure (PFDavg/PFH) for each safety application (safety function) based on the PFDavg/PFH values of the safety programmable controller and connected safety components. The target failure measure (PFDavg/PFH) is the reliability target value for each Safety Integrity Level (SIL) defined in IEC 61508 and can be calculated by the following formula.
PFDavg/PFH = A + B + C + D.....Calculation formula of PFDavg/PFH

Variable	Definition
A	PFDavg/PFH of the Safety CPU
B	PFDavg/PFH of the safety output module (1) When safety input device(s) and safety output device(s) are connected to the same safety output module: B = B1 (2) When safety input device(s) and safety output device(s) are connected to the different safety output modules: B = B1 + B2
B1	PFDavg/PFH of the safety output module to which safety input device(s) is connected
B2	PFDavg/PFH of the safety output module to which safety output device(s) is connected
C ^{*1}	PFDavg/PFH of safety input device(s)
D ^{*1}	PFDavg/PFH of safety output device(s)

*1 For the values of PFDavg/PFH, refer to the manuals for the safety components used. The following table lists the PFDavg/PFH of the safety output module.

Module	PFDavg ^{*2,3}	PFH ^{*2,3}
Safety output module (RY48PT20S-TS)	2.71×10 ⁻⁶	1.24×10 ⁻⁹

*2 Proof test interval is 5 years.
*3 The values are for when the module is used at the ambient temperature of 40°C.

PL evaluation described in ISO 13849-1

For the PL evaluation described in ISO 13849-1, use the MTTFD₀ (mean time to dangerous failure) and the DCavg (average diagnostic coverage) listed in the following table.

Module	MTTF _D ^{*1}	DCavg ^{*1}
Safety output module (RY48PT20S-TS)	1194 years	98.1%

*1 The values are for when the module is used at the ambient temperature of 40°C.

Combinations of the safety output module and other modules

When using the safety output module together with other modules, ensure that all the modules meet Class III or SELV.

Refer to the following after reading this manual.
L_MELSEC IQ-R I/O Module (With Safety Functions) User's Manual

6. EU declaration of conformity

MITSUBISHI ELECTRIC
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EU DECLARATION OF CONFORMITY

We, Manufacturer : MITSUBISHI ELECTRIC CORPORATION
Address (Place of Declare) : TOKYO 100-8310, JAPAN
Brand Name : MITSUBISHI ELECTRIC

declare under our sole responsibility that the product
Description : Programmable Logic Controller
Type of Model : MELSEC IQ-R series
Notice : Refer to next page about each type name

to which this declaration relates is in conformity with the following standard and directive.

Directive	Harmonized Standard	Notified Body
EMC Directive	2014/53/EU	EN6132-2:2007
Machinery Directive	2006/42/EC	EN ISO 13849-1:2015
RoHS Directive	2011/65/EU (EU2015/863) ^{*1}	EN IEC 63000:2018

*1 Category 9 "Industrial monitoring and control instruments" is applicable.

This declaration is based on the conformity assessment of following Notified Body

No.	Name and Address	Identification Number	Issued certificate No.
1	TUV RHEINLAND INDUSTRIE SERVICE GMBH, Am Grauen Stein, 51105 Köln, Germany	0030	01205/0951/0023

Authorized representative in Europe
(The person authorized to compile the Technical file or relevant Technical documentation)
Hermann Pitz
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Issue Date (Date of Declaration): 29 Aug. 2024

Signed for and on behalf of
(Signature) Kazuki Yamazaki
(Kazuki Yamazaki)
Senior Manager, I/O Module Development Section
FA Systems Dept.2
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Appendix List of type name to declare

Type name	Serial No.
RX40NC6S-TS	#####70####
RY48PT20S-TS	#####7A####
RX40NC6S-TS(C)	#####7B####
RY48PT20S-TS(C)	#####7C####

(#: 0-9, A-F)

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