

## Before Using the Product

Before using the product, please read this manual. Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

### ■ Relevant manuals

Before using the product, please read the Safety Guidelines included with the base unit used, especially the following sections.

- SAFETY PRECAUTIONS
- CONDITIONS OF USE FOR THE PRODUCT
- EMC AND LOW VOLTAGE DIRECTIVES
- WARRANTY

For the product information, refer to the following.

Description	Manual name [manual number]
Common information on MELSEC iQ-R series programmable controllers <sup>*1</sup>	MELSEC iQ-R Module Configuration Manual [SH-081262ENG]
Detailed information on the product	MELSEC iQ-R CPU Module User's Manual (Startup) [SH-081263ENG] MELSEC iQ-R CPU Module User's Manual (Application) [SH-081264ENG]

<sup>\*1</sup> The information includes the system configuration, specifications, installation, wiring, maintenance, and inspection.

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

### ■ Manuels correspondants

Avant d'utiliser ce produit, prière de lire les "Safety Guidelines" (directive de sécurité) fournies avec l'unité de base, en particulier dans les sections suivantes.

- PRÉCAUTIONS DE SÉCURITÉ
- CONDITIONS D'UTILISATION DE PRODUIT
- DIRECTIVES CEM ET BASSE TENSION
- DIRECTIVES SUR LES MACHINES
- GARANTIE

### ■ Packing list

Check that the following items are included in the package of the product.

Item	Quantity
Module (R0PSFCPU and R6PSFM)	1 each
Before Using the Product (this manual)	1

### ■ Mounting modules

When installing the programmable controller in a control panel, fully consider its operability, maintainability, and environmental resistance.

Securely mount all the MELSEC iQ-R series modules used on the base unit.

For details on the mounting method, refer to the MELSEC iQ-R Module Configuration Manual.

### ■ Montage des modules

Pour installer l'automate programmable dans un tableau de commande, prendre en compte tous les aspects d'opérabilité, de maintenabilité et de résistance à l'environnement.

Monter fermement sur l'unité de base tous les modules de la série MELSEC iQ-R à utiliser.

Pour le détail de la méthode de montage, voir le MELSEC iQ-R Module Configuration Manual (Manuel de configuration du module MELSEC iQ-R).

### ■ Operating ambient temperature

Use the product within the following range.

- 0 to 55°C (when an extended temperature range base unit is not used)
- 0 to 60°C (when an extended temperature range base unit is used)

### ■ Température ambiante de fonctionnement

Ce produit doit être utilisé dans les conditions suivantes.

- 0 et 55°C (quand une unité de base à gamme de température élargie n'est pas utilisée)
- 0 et 60°C (quand une unité de base à gamme de température élargie est utilisée)

### ■ Safety standards

- For UL listed

UL evaluation was performed only to UL508.

Functional safety evaluation was performed by TÜV Rheinland®.<sup>\*1</sup>

<sup>\*1</sup> TÜV Rheinland is a registered trademark.

- For IEC 61508 SIL 2

The SIL2 Process CPU can be used to configure safety functions of general industrial machinery.

For details, refer to the MELSEC iQ-R CPU Module User's Manual (Application).

### ■ Calculation of the target failure measure (PFDavg/PFH)

The systems using the SIL2 Process CPU obtained safety approval (IEC 61511: 2015 SIL 2 and IEC 61508: 2010 SIL 2). The target failure measure (PFDavg/PFH) is a target value of reliability for each SIL level defined in IEC 61508: 2010 and IEC 61511: 2015.

When a system using the SIL2 Process CPU is configured, a SIL2 application shall configure a safety path, including safety input devices through safety output devices.

Calculate the PFDavg/PFH for each safety application using the following formula. If the safety path goes through the module set to operate in SIL2 mode multiple times, add the PFDavg/PFH for that module multiple times.

$$\text{PFDavg/PFH} = (\text{PFDavg/PFH of A}) + (\text{PFDavg/PFH of B}) \times \alpha^{*5} + (\text{PFDavg/PFH of C}) \times \beta^{*5} + (\text{PFDavg/PFH of D}) + (\text{PFDavg/PFH of E})$$

Symbol	Definition
A <sup>*1</sup>	SIL2 Process CPU
B <sup>*2,4</sup>	Module set to operate in SIL2 mode connected to safety input devices
C <sup>*2,4</sup>	Module set to operate in SIL2 mode connected to safety output devices
D <sup>*3,4</sup>	Safety input device
E <sup>*3,4</sup>	Safety output device

<sup>\*1</sup> When performing safety communications between SIL2 Process CPUs on the safety path, add the PFDavg/PFH for SIL2 Process CPUs performing safety communications on the safety path. Add no PFDavg/PFH for SIL2 Process CPUs not performing safety communications on the safety path, even if they are on the same network.

<sup>\*2</sup> Calculate the PFDavg/PFH using the PFDavg/PFH for the modules, that are set to operate in SIL2 mode, used.

<sup>\*3</sup> For PFDavg/PFH of D and E, refer to manuals for the safety devices used.

<sup>\*4</sup> When the SIL2 application includes multiple safety input devices or safety output devices, perform the calculation by adding all PFDavg/PFH for the safety input devices, safety output devices, and modules, that are set to operate in SIL2 mode, connected to the devices.

<sup>\*5</sup> For SIL2-mode modules used in a SIL2 application configured with multiple inputs and outputs, multiply the PFDavg/PFH of these modules by the number of input points ( $\alpha$ ) and the number of output points ( $\beta$ ) for the calculation.

The following table lists the total PFDavg/PFH of the SIL2 Process CPU and the SIL2 function module.

PFDavg <sup>*6</sup>		
2 years	5 years	10 years
$5.83 \times 10^{-6}$	$2.08 \times 10^{-5}$	$6.23 \times 10^{-5}$
PFH <sup>*6</sup>		
2 years	5 years	10 years
$7.61 \times 10^{-10}$	$1.19 \times 10^{-9}$	$1.90 \times 10^{-9}$

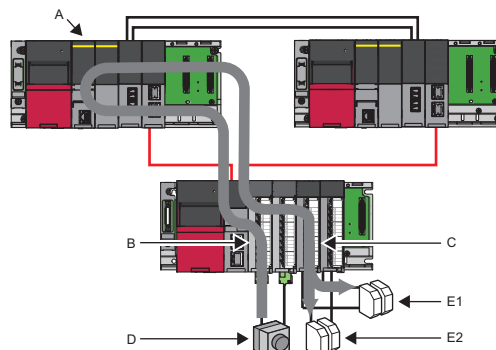
<sup>\*6</sup> The PFDavg/PFH values of each proof test interval

The following formulas show calculation examples of PFDavg/PFH for a SIL2 application with multiple outputs where SIL2 Process CPUs and an I/O module with diagnostic functions are used.

Connect an emergency stop switch to the input module with diagnostic functions. Connect multiple safety relays to the output module with diagnostic functions.

A SIL2 Process CPU controls ON/OFF of the safety relays according to the input from the emergency stop switch.

- $\text{PFDavg} = (\text{PFDavg of A}) + (\text{PFDavg of B}) + (\text{PFDavg of C}) \times 2 + (\text{PFDavg of D}) + (\text{PFDavg of E1}) + (\text{PFDavg of E2})$
- $\text{PFH} = (\text{PFH of A}) + (\text{PFH of B}) + (\text{PFH of C}) \times 2 + (\text{PFH of D}) + (\text{PFH of E1}) + (\text{PFH of E2})$



### ■ Information and services

For further information and services, please consult your local Mitsubishi representative.