Mitsubishi Electric Safety Programmable Controller MELSEC iQ-R Series


Thank you for purchasing the Mitsubishi Electric safety programmable controller. MELSEC iQ-R Series.*

This series provides programmable controllers capable of meeting safety requirements for general industrial machinery and components with the Machinery Directive (2006/42/EC).

Before using this product, please read this manual (Operation manual) and the manuals included with the product (e.g., manuals provided by the supplier of the product supporting CC-Link IE TSN or CC-Link IE Field Network). In other cases, a safety control related error level.

1. Safety Programmable Controller Product List

<table>
<thead>
<tr>
<th>Model name</th>
<th>Description</th>
<th>Safety cycle time*1</th>
<th>Safety control related error level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MELSEC iQ-R</td>
<td>Programmable controller capable of meeting safety requirements for general industrial machinery and components</td>
<td>2s</td>
<td>1.02 \times 10^{-9}</td>
</tr>
</tbody>
</table>

2. Relevant Manuals

For details on the safety programmable controller manuals and manuals, please consult your local Mitsubishi Electric representative.

3. Safety Standards

Use the product in accordance with the following safety standards.

- Safety standards
  - IEC61508, IEC61784-5-1
  - IEC61784-5-2
  - IEC61784-5-3
  - Safety integrity level:
    - SIL 3
  - PFDavg/PFH of Safety CPU (paired with the safety function module) not performing safety communications on the safety loop.
  - PFDavg/PFH of Safety CPU (paired with the safety function module) performing safety communications on the safety loop.

4. Installations

When installing a programmable controller in a control panel or other parts so that good ventilation is ensured and the modules are positioned so that equipment fit operability, maintainability, and environmental resistance. For details, refer to the manual (MELSEC iQ-R Module Configuration Manual).

5. Precautions for Use

5.1 Location and Design of the Safety System

The safety system has been designed based on IEC61508. This safety system is designed to satisfy the Safety Integrity Level of SIL 3 for the safety application. The SIL 3 target for the safety system is to reduce the risk of dangerous failure to an acceptable level.

5.2 Safety Function Models

The safety function models are as follows:

- Safety function model (paired with the safety function module) performing safety communications on the safety loop.
- Safety function model not performing safety communications on the safety loop.

5.3 Calculations of the Target Failure Rate of the Safety System

The calculations of the target failure rate of the Safety System are performed using the following equations:

\[ \text{PFDavg} = \frac{1}{n} \sum_{i=1}^{n} \text{PFD}_{i} \]

where \( n \) is the number of safety functions and \( \text{PFD}_{i} \) is the target PFD for each safety function.

5.4 Calculations of the Target Failure Rate of the Safety Software

The calculations of the target failure rate of the Safety Software are performed using the following equation:

\[ \text{PFD}_{i} = \frac{1}{n} \prod_{j=1}^{n} \text{PFD}_{i,j} \]

where \( n \) is the number of safety functions and \( \text{PFD}_{i,j} \) is the target PFD for each safety function.

5.5 Calculations of the Target Failure Rate of the Safety Hardware

The calculations of the target failure rate of the Safety Hardware are performed using the following equation:

\[ \text{PFD}_{i} = \frac{1}{n} \prod_{j=1}^{n} \text{PFD}_{i,j} \]

where \( n \) is the number of safety functions and \( \text{PFD}_{i,j} \) is the target PFD for each safety function.

5.6 Calculations of the Target Failure Rate of the Safety System

The calculations of the target failure rate of the Safety System are performed using the following equation:

\[ \text{PFD}_{i} = \frac{1}{n} \prod_{j=1}^{n} \text{PFD}_{i,j} \]

where \( n \) is the number of safety functions and \( \text{PFD}_{i,j} \) is the target PFD for each safety function.

5.7 Calculations of the Target Failure Rate of the Safety Software

The calculations of the target failure rate of the Safety Software are performed using the following equation:

\[ \text{PFD}_{i} = \frac{1}{n} \prod_{j=1}^{n} \text{PFD}_{i,j} \]

where \( n \) is the number of safety functions and \( \text{PFD}_{i,j} \) is the target PFD for each safety function.

5.8 Calculations of the Target Failure Rate of the Safety Hardware

The calculations of the target failure rate of the Safety Hardware are performed using the following equation:

\[ \text{PFD}_{i} = \frac{1}{n} \prod_{j=1}^{n} \text{PFD}_{i,j} \]

where \( n \) is the number of safety functions and \( \text{PFD}_{i,j} \) is the target PFD for each safety function.

5.9 Calculations of the Target Failure Rate of the Safety System

The calculations of the target failure rate of the Safety System are performed using the following equation:

\[ \text{PFD}_{i} = \frac{1}{n} \prod_{j=1}^{n} \text{PFD}_{i,j} \]

where \( n \) is the number of safety functions and \( \text{PFD}_{i,j} \) is the target PFD for each safety function.

8. Declaration of Conformity

EU DECLARATION OF CONFORMITY

We, Manufacturer: MITSUBISHI ELECTRIC CORPORATION
Address: 1-1-5 Hikarinoike, Kita-ku, Tokyo 114-8510, Japan

declare under our sole responsibility, that the product described below complies with the relevant provisions of the Machinery Directive (2006/42/EC) for Programmable Controllers.

Type of controller: MELSEC iQ-R
Mitsubishi Electric series

The product complies with the following safety standards:

- IEC61508, IEC61784-5-1
- IEC61784-5-2
- IEC61784-5-3
- Safety integrity level:
  - SIL 3

The product also complies with the following directives:

- Machinery Directive (2006/42/EC)
- Low Voltage Directive (2014/35/EU)
- Electromagnetic Compatibility Directive (2014/30/EU)
- RoHS Directive (2011/65/EU)

The product is marked with the CE mark and is in conformity with the relevant provisions of the Machinery Directive (2006/42/EC) for Programmable Controllers.

The technical file is held at the following address:

MITSUBISHI ELECTRIC CORPORATION

European Technical File

EMC: 1-1-5 Hikarinoike, Kita-ku, Tokyo 114-8510, Japan

For more information, please visit our website at:

http://www.mitsubisheim.com

Appendix List of types name to declare

- MELSEC iQ-R
- MELSEC iQ-R A
- MELSEC iQ-R B
- MELSEC iQ-R C
- MELSEC iQ-R D
- MELSEC iQ-R E
- MELSEC iQ-R F
- MELSEC iQ-R G
- MELSEC iQ-R H
- MELSEC iQ-R I
- MELSEC iQ-R J
- MELSEC iQ-R K
- MELSEC iQ-R L
- MELSEC iQ-R M
- MELSEC iQ-R N
- MELSEC iQ-R O
- MELSEC iQ-R P
- MELSEC iQ-R Q
- MELSEC iQ-R R
- MELSEC iQ-R S
- MELSEC iQ-R T
- MELSEC iQ-R U
- MELSEC iQ-R V
- MELSEC iQ-R W
- MELSEC iQ-R X
- MELSEC iQ-R Y
- MELSEC iQ-R Z

For the type of the safety programmable controller name in the following table:

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