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FACTORY AUTOMATION

MELSEC iQ-R series

iQ Platform-compatible PAC Safety CPU module, Safety Remote I/O module

Broadcast

Integrated general and safety control

The MELSEC iQ-R Series is equipped with a safety CPU module that is compliant with international safety standards, ISO 13849-1 PL e and IEC 61508 SIL 3. The safety CPU module can be installed directly on the MELSEC iQ-R Series base rack and can execute both safety and non-safety programs, enabling easy integration into existing or new control systems.

Consolidated network topology

The safety CPU module enables control of safety and non-safety communications across the same CC-Link IE TSN or CC-Link IE Field Network line. Wiring and space can be reduced as having multiple network cables are no longer required resulting in lower integration costs.

Highlights

- Complies with international safety standards
- Execute both safety and non-safety programs
- Integrated network communications
- Common engineering platform
- High-scalability safety remote I/Os available
- Integrated drives safety

Programming using GX Works3

The safety CPU module can be programmed using the engineering software GX Works3 enabling machine makers to realize lower cost safety solutions as only one engineering software is required for the MELSEC iQ-R Series, while utilizing its intuitive user interface and maintenance features.

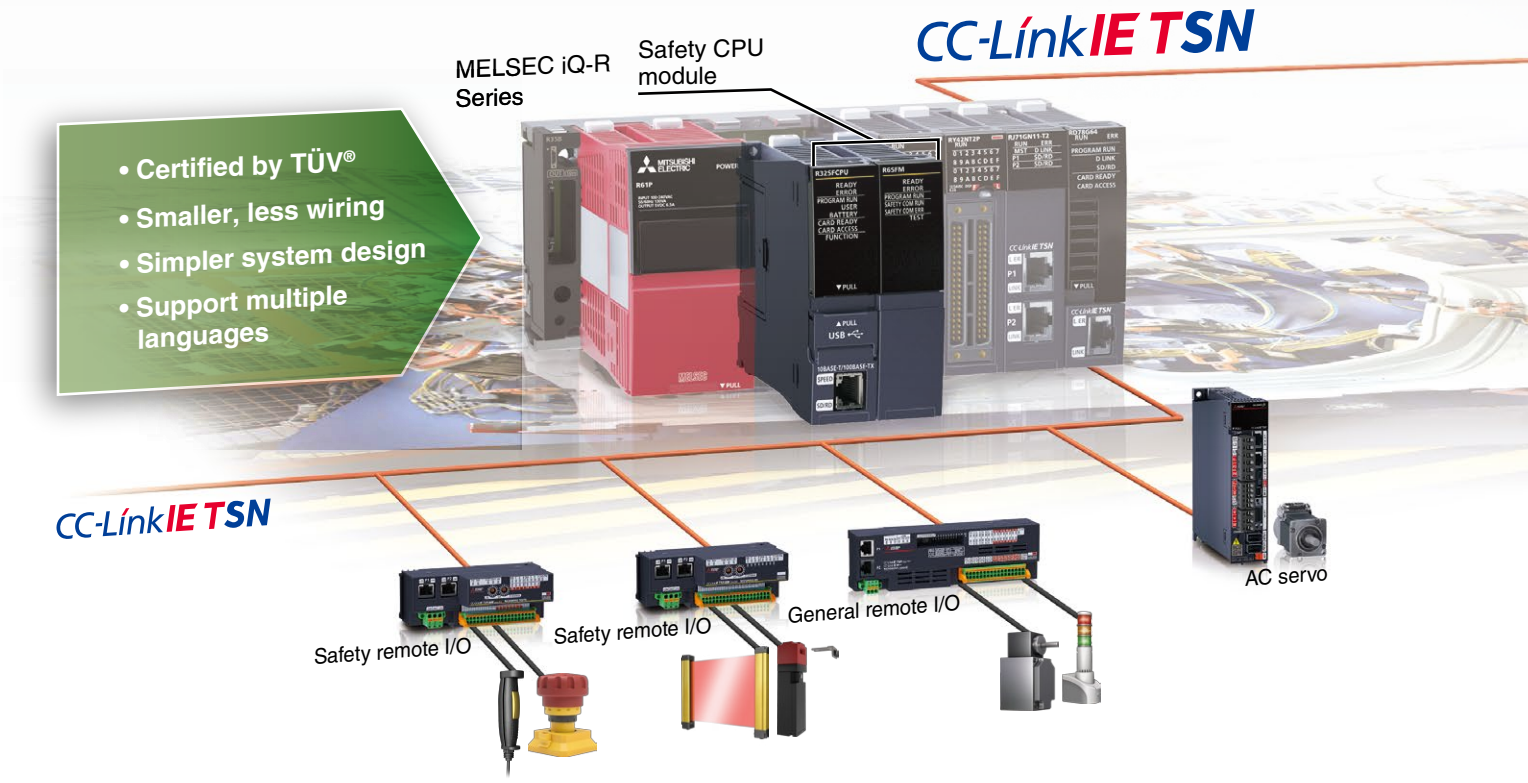
Integrated drives safety

CC-Link IE TSN integrates the MR-J5-G-RJ/MR-J5D-G4 AC servos, the FR-E800-SCE inverter, and the FR-R type robot. Utilization of safety sub-functions ensures a highly scalable system configuration reducing overall costs.

Safety

Integrated safety control offering a total system solution

The safety CPU module enables control of both general and safety programs in the same module and is easily programmed utilizing the intuitive features of the engineering software GX Works3. Both general control data and safety control data can be mixed on CC-Link IE TSN, realizing a system integrating general control and safety control.



Safety communication on the same network

Less wiring

The network is based on Ethernet technology and enables commercial cables and hubs to be used. Safety communication also takes advantage of highly flexible features offered by CC-Link IE TSN.

AC servo, inverter, and robot safety communication

Drives safety integration

The MR-J5-G-RJ/MR-J5D-G4 AC servos, the FR-E800-SCE inverter, and the FR-R type robot support safety communications as standard, realizing advanced safety control through its support of safety sub-functions.

Compliant with international safety standards

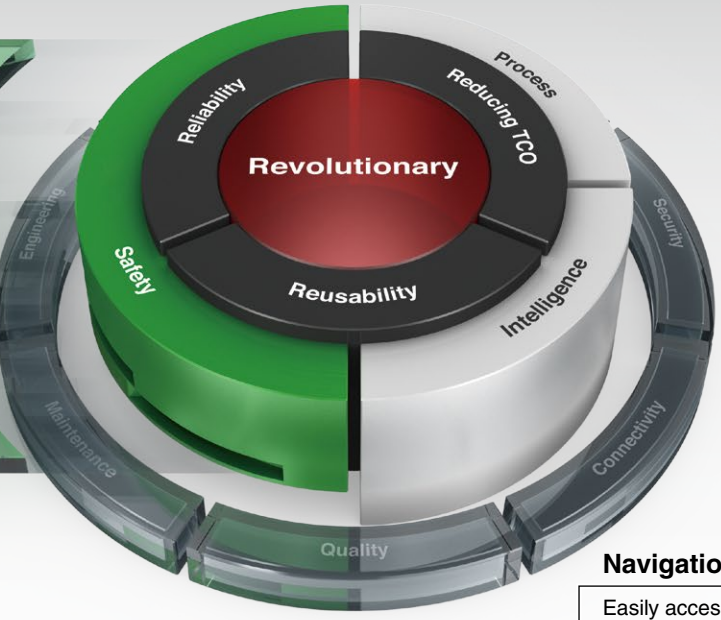
Quality

The safety CPU module is compliant with ISO 13849-1 PL e and IEC 61508 SIL 3 and is certified by TÜV Rheinland®/TÜV SÜD®.

General and safety control in one CPU

Space-saving

The safety CPU module can be installed directly on the MELSEC iQ-R base rack realizing easy integration into an existing or new control system. Also, compact remote I/Os are available ideal for systems with limited space.



Mitsubishi Electric PAC MELSEC iQ-R "Safety" Movie

Module list

Simply drag & drop modules directly into the module configuration

Navigation window

Easily access project components
Organize program file list

Module configuration

Easily parameterize each module directly from the configuration editor

Control program

Manage program files for safety and general control

CC-Link IE TSN configuration window

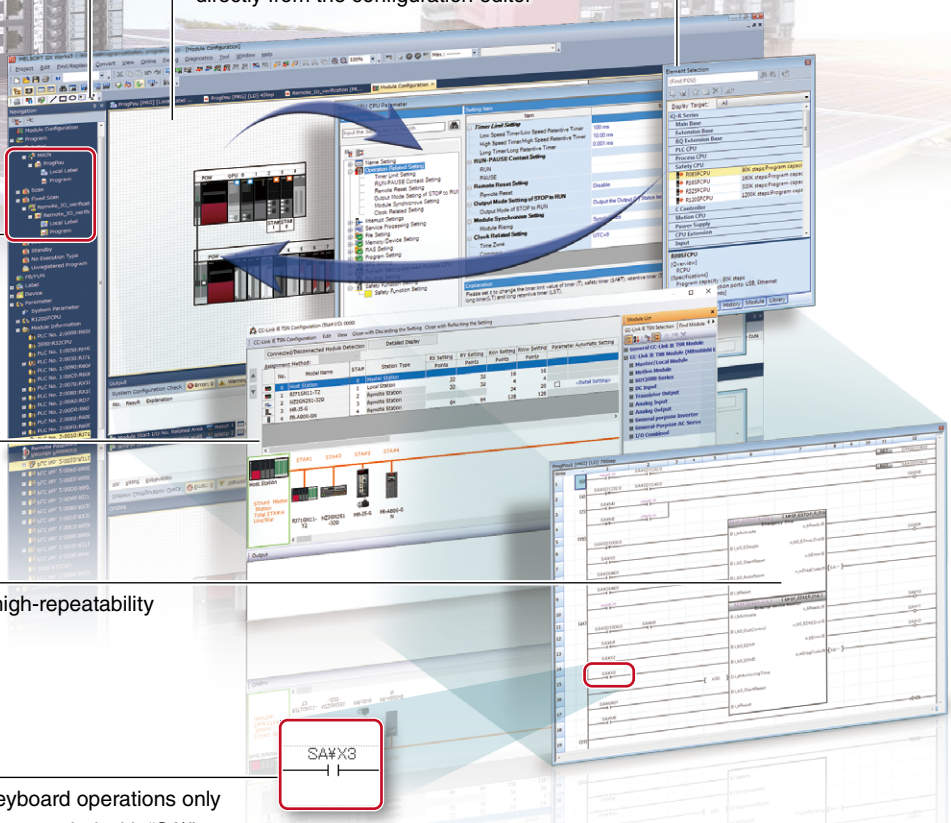
Set safety remote I/O parameters

Safety FB

Utilize safety function blocks when high-repeatability is required

Ladder editor

Ladder rungs can be created with keyboard operations only
Safety devices easily recognized as appended with "SA\"



GX Works3

One Software, Many Possibilities

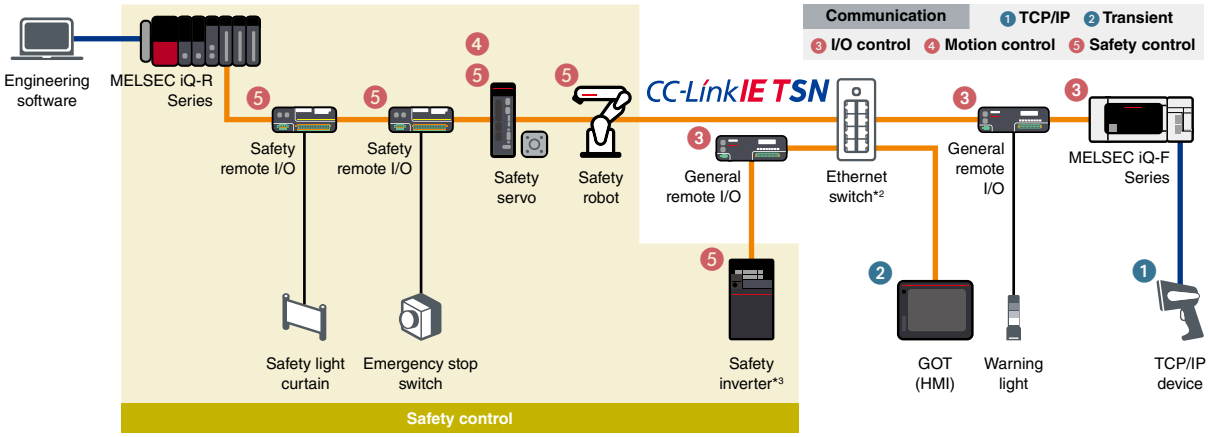
Common engineering platform

Design efficiency

In GX Works3, operation and safety programs are included in the same project folder, eliminating the need to manage multiple project folders. Various useful features of GX Works3 are also available for safety programs similar to other control programs. GX Works3 is highly adaptable to projects in different countries through its multiple language features.

System-wide safety control with drives safety integration

The safety CPU module can be installed directly on the MELSEC iQ-R Series base rack, and is easily integrated into an existing or new control system. Safety devices are connectable using CC-Link IE TSN with safety communication integrated into the network protocol over a widely-available industrial Ethernet topology.*1 The safety CPU module is compliant with ISO 13849-1 PL e and IEC 61508 SIL 3 and is certified by TÜV Rheinland®. CC-Link IE TSN integrates the MR-J5-G-RJ/MR-J5D-G4 AC servos, the FR-E800-SCE inverter, and the FR-R type robot.



*1. Some devices cannot be connected to CC-Link IE TSN depending on the system configuration.
*2. Class B managed Ethernet switch supporting CC-Link IE TSN recommended by the CC-Link Partner Association
*3. A device supporting 100 Mbps should be connected following the device supporting 1 Gbps (class B).

Safety CPU modules

R08SFCPU-SET R16SFCPU-SET
R32SFCPU-SET R120SFCPU-SET

R□SFCPU-SET

The safety CPU module enables safety devices such as safety light curtains, emergency switches, and door switches to be connected via CC-Link IE TSN or CC-Link IE Field Network without requiring a separate dedicated network line.

- The safety CPU module can execute both safety and general programs
- With the CC-Link IE TSN or CC-Link IE Field Network master/local module, general and safety communications can be integrated
- Safety control programming and various setting operations are done using the engineering software GX Works3

Specifications

LD : Ladder diagram ST : Structured text FBD : Function block diagram

Item	R08SFCPU-SET*4	R16SFCPU-SET*4	R32SFCPU-SET*4	R120SFCPU-SET*4
Category	Category 4 (EN ISO 13849-1)			
Safety integrity level (SIL)	SIL 3 (IEC 61508)			
Performance level (PL)	PL e (EN/ISO 13849-1)			
Operation control method	Stored program cyclic operation			
I/O control mode	Refresh mode (Direct access I/O is available by specifying direct access I/O (DX, DY))			
Programming language	LD ST*5 FBD*5			
Extended programming language	Function block (FB), label programming (local/global)			
Program execution type	Initial*5, scan*5, fixed scan, event execution*5, standby*5			
Number of I/O points (X/Y)	4096	4096	4096	4096
Memory capacity				
Program capacity (step)	80K (40K for safety programs)	160K (40K for safety programs)	320K (40K for safety programs)	1200K (40K for safety programs)
Program memory (byte)	320K	640K	1280K	4800K
Device/label memory*6 (byte)	1178K	1710K	2306K	3370K
Data memory (byte)	5M	10M	20M	40M
SLMP communication	●	●	●	●

*4. Product package includes a safety CPU module (R□SFCPU) and safety function module (R6SFM).
*5. Cannot be used for safety control programs.
*6. An extended SRAM cassette expands the device/label memory area.

MELSERVO-J5 Series AC servo

MR-J5-G-RJ/MR-J5D-G4 support CC-Link IE TSN safety communication function as standard. Safety sub-functions are used by combining the safety CPU module (R□SFCPU-SET) with the motion module (RD78G/RD78GH). Safety sub-functions of the servo amplifier can be controlled using safety signals of the safety remote I/O connected with CC-Link IE TSN without connecting with the servo amplifier, realizing the safety system with less wiring.

- CC-Link IE TSN (1 Gbps) and safety control embedded as standard
- Further improve the safety level by combining with the servo motor HK-_WS supporting functional safety
- Provide safety sub-functions complying with IEC/EN 61800-5-2 as SIL 2 or SIL 3 compliant safety level

MR-J5-G-RJ MR-J5D-G4

FREQROL-E800 Series inverter

The FR-E800-SCE is embedded with safety functions as standard eliminating the need for acquiring separate safety and general communication equipment. In addition, construction of a simpler safety system can be realized as wiring is kept to a minimum.

- CC-Link IE TSN (100 Mbps) and safety control embedded as standard
- Efficient protocol enables real-time collection of shop floor data
- Provide safety sub-functions (STO, SS1, SBC, SLS, SSM) complying with IEC 61800-5-2 as SIL 3 compliant safety level

MELFA FR Series industrial robot CR800-R controller

Safety devices connected with the safety remote modules of the safety programmable controllers can be used via the CC-Link IE TSN master/local modules.

- Safety communication and safety programmable controllers realize a system with less wiring and reduced costs
- Flexible system configuration through coordination with the safety programmable controller utilizing safety communication function
- Provide safety sub-functions (STO, SS1, SS2, SOS, SLS, SLP) complying with IEC 61800-5-2

For details on safety sub-functions, please refer to the relevant product catalog.

Block-type remote module with safety functions

- Block-type remote modules that support safety functions
- Performs safety control when used together with the MELSEC iQ-R Series safety CPU module
- Single or double wiring can be selected per input and output point
- Compliant with international safety standards, ISO 13849-1 Category 4 PL e and IEC 61508 SIL 3 (NZ2GNS12A2-14DT complies with Category 3)
- The waterproof/dustproof type complies with IP67. A control panel is no longer necessary, saving on hardware cost and space

CC-Link IE TSN

NZ2GNSS2-16DTE

NZ2GNS12A2-16DTE

Input module Spring-clamp terminal block

Model	Input type DC input	Input points	Rated input voltage/current	Wiring type
NZ2GNSS2-8D	Negative common	Single wiring: 8 points Double wiring: 4 points	24 V DC (7.3 mA)	2-wire

Output module Spring-clamp terminal block

Model	Output type Transistor output	Output points	Rated load voltage/Max. load current	Wiring type
NZ2GNSS2-8TE	Source + source	Single wiring: 8 points Double wiring: 4 points	24 V DC (0.5 A/point)	2-wire

I/O combined module Spring-clamp terminal block

Model	Input type DC input	Input points	Rated input voltage/ current	Output type Transistor output	Output points	Rated load voltage/ Max. load current	Wiring type
NZ2GNSS2-16DTE	Negative common	Single wiring: 8 points Double wiring: 4 points	24 V DC (7.3 mA)	Source + source	Single wiring: 8 points Double wiring: 4 points	24 V DC (0.5 A/point)	2-wire

Waterproof/dustproof type (IP67) I/O combined modules

Waterproof connector (screw lock)

Model	Input type DC input	Input points	Rated input voltage/current	Output type Transistor output	Output points	Rated load voltage/ Max. load current	Wiring type
NZ2GNS12A2-14DT	Negative common	Single wiring: 12 points Double wiring: 6 points	24 V DC (6.8 mA)	Source + sink	Single wiring: not possible Double wiring: 2 points	24 V DC (2 A/point, 4 A/point)*1	2-wire
NZ2GNS12A2-16DTE	Negative common	Single wiring: 12 points Double wiring: 6 points	24 V DC (6.8 mA)	Source + source	Single wiring: 4 points Double wiring: 2 points	24 V DC (2 A/point, 4 A/point)*1	2-wire

*1. Maximum load current specifications may vary depending on the output terminals. For more information, please refer to the relevant product manual.

CC-Link IE Field

Block-type safety remote CC-Link IE Field Network-compatible modules

NZ2GFSS2-16DTE-S1

Ⓒ Safety protocol version: 2

Input modules Spring-clamp terminal block

Model	Input type DC input	Input points	Rated input voltage/current	Wiring type	Extension module connectability	Connectable device	
						Ⓐ	Ⓑ
NZ2GFSS2-8D-S1 NEW	Negative common	Single wiring: 8 points Double wiring: 4 points	24 V DC (7 mA)	2-wire	●	●	-
NZ2GFSS2-32D-S1 NEW	Negative common	Single wiring: 32 points Double wiring: 16 points	24 V DC (6 mA)	2-wire	●	●	-

Output module Spring-clamp terminal block

Model	Output type Transistor output	Output points	Rated load voltage/ Max. load current	Wiring type	Extension module connectability	Connectable device	
						Ⓐ	Ⓑ
NZ2GFSS2-8TE-S1 NEW	Source + source	Single wiring: 8 points Double wiring: 4 points	24 V DC (0.5 A)	2-wire	●	●	-

I/O combined module Spring-clamp terminal block

Model	Input type DC input	Input points	Rated input voltage/ current	Output type Transistor output	Output points	Rated load voltage/ Max. load current	Wiring type	Extension module connectability	Connectable device	
									Ⓐ	Ⓑ
NZ2GFSS2-16DTE-S1 NEW	Negative common	Single wiring: 8 points Double wiring: 4 points	24 V DC (7 mA)	Source + source	Single wiring: 8 points Double wiring: 4 points	24 V DC (0.5 A)	2-wire	●	●	-

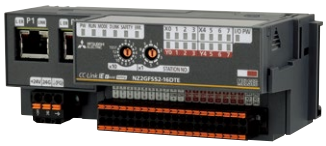
For details on Ⓐ, Ⓑ, Ⓒ, and Ⓓ, please refer to the back cover of this leaflet.

Extension output module Spring-clamp terminal block

Model	Output type Transistor output	Output points	Rated load voltage/ Max. load current	Wiring type
NZ2EXSS2-8TE*1	Source + source	Single wiring: 8 points Double wiring: 4 points	24 V DC (0.5 A/point)	2-wire

*1. This product is connectable with safety input modules (NZ2GFSS2-32D, NZ2GFSS2-32D-S1).

Block-type safety remote CC-Link IE Field Network-compatible modules



NZ2GFSS2-16DTE

Ⓓ Safety protocol version: 1

Input modules Spring-clamp terminal block

Model	Input type DC input	Input points	Rated input voltage/current	Wiring type	Extension module connectability	Connectable device	
						Ⓐ	Ⓑ
NZ2GFSS2-8D	Negative common	Single wiring: 8 points Double wiring: 4 points	24 V DC (7 mA)	2-wire	●	●	●
NZ2GFSS2-32D	Negative common	Single wiring: 32 points Double wiring: 16 points	24 V DC (6 mA)	2-wire	●	●	●

Output module Spring-clamp terminal block

Model	Output type Transistor output	Output points	Rated load voltage/ Max. load current	Wiring type	Extension module connectability	Connectable device	
						Ⓐ	Ⓑ
NZ2GFSS2-8TE	Source + source	Single wiring: 8 points Double wiring: 4 points	24 V DC (0.5 A/point)	2-wire	●	●	●

I/O combined module Spring-clamp terminal block

Model	Input type DC input	Input points	Rated input voltage/current	Output type Transistor output	Output points	Rated load voltage/ Max. load current	Wiring type	Extension module connectability	Connectable device	
									Ⓐ	Ⓑ
NZ2GFSS2-16DTE	Negative common	Single wiring: 8 points Double wiring: 4 points	24 V DC (7 mA)	Source + source	Single wiring: 8 points Double wiring: 4 points	24 V DC (0.5 A/point)	2-wire	●	●	●

For details on Ⓐ, Ⓑ, Ⓒ, and Ⓓ, please refer to the back cover of this leaflet.

CC-Link IE Field

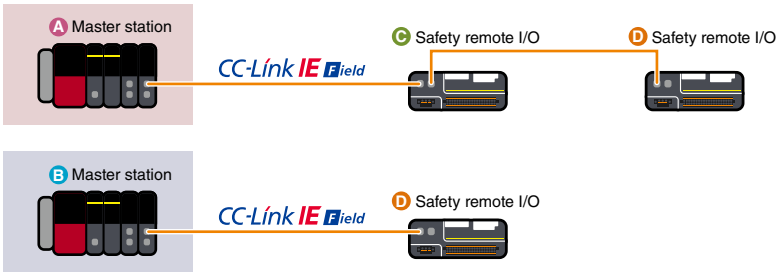
Safety protocol versions and safety communication standards

Safety communication of the CC-Link IE Field Network complies with safety communication standards (IEC61784-3).
Please note that said standards of different publication year applies to each safety protocol version.

Safety protocol version	Safety communication standards publication year
1	IEC 61784-3: 2010
2	IEC 61784-3: 2021

Safety protocol versions vary depending on the product types and firmware versions.
Please refer to connectability of the master stations and safety remote I/Os below.
For how to check firmware versions, please refer to the relevant product manuals.

Connectability of the master station and safety remote I/Os



A Safety protocol versions: 1 and 2 Master station (safety CPU module): firmware version 29 or later
(master module RJ71GF11-T2): firmware version 70 or later

B Safety protocol version: 1 Master station (safety CPU module): firmware versions 01 to 28
(master module RJ71GF11-T2): firmware versions 06 to 69

C Safety protocol version: 2 Safety remote I/O: Model name ends with "-S1"

D Safety protocol version: 1 Safety remote I/O: Model name does not end with "-S1"

●: System configuration is possible; ○: possible with constraints*1; -: not possible

Connected device (master station)	Safety remote I/O		
Firmware version of connected device	C	C + D	D
A	●	○*1	○*1
B	-	-	○*1

*1. Although a system can be configured, it is not possible to newly acquire a certification from a third-party certification body. As compliance with the latest standard is required to acquire a certification, it is recommended that only products that support safety protocol version 2 be used when acquiring a certification.

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