MITSUBISHI ELECTRIC

Changes for the Better

for a greener tomorrow eco Changes

Safety Programmable Controller/ Safety Controller

Safety FA solution

e-F@ctory

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems
A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance
Dependable consumer products like air conditioners and home entertainment systems.

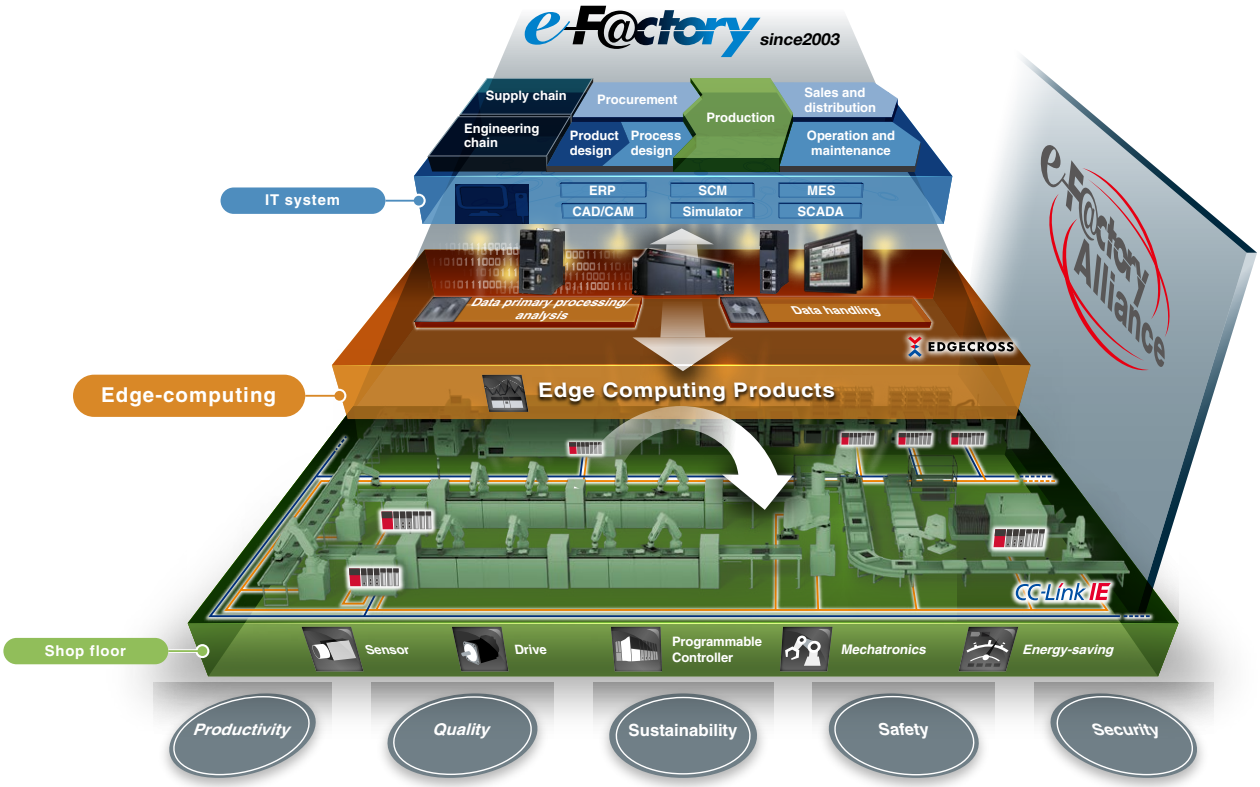
Information and Communication Systems
Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems
Maximizing productivity and efficiency with cutting-edge automation technology.

Maximizing productivity and reducing total cost while adding value across the manufacturing enterprise

e-F@ctory is the Mitsubishi Electric solution for adding value across the manufacturing enterprise by enhancing productivity, and reducing the maintenance and operations costs together with seamless information flow throughout the plant. e-F@ctory uses a combination of factory automation and IT technologies in combination with various best-in-class partner products through its alliance program, offering solutions to reduce total cost while improving operations, production yield, and efficient management of the supply chain.

FA integrated solution reducing total cost



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A wide range of safety to large-scale system

Ensuring next level of safety between the operator and machine

Based on a principle of separating machines from operators, safety protection measures were implemented on the basis of risk assessment and safety control such as implementation of an emergency stop. The advancement of technology realizes operations such as slowing down the operation speed when an operator approaches a machine and continuous operation without stopping when an operator is away from a machine. The concept of safety has shifted to a level where operators and machines can work in collaboration ensuring increased safety. Mitsubishi Electric offers a total safety solution which realizes “collaboration” of operators and machines with a large variety of products.

MELSEC iQ-R Series

- **Integrated generic and safety control**
- **Consolidated network topology**
- **Programming and managing both generic and safety control with GX Works3**

products for small-scale

MELSEC-QS Series

- Reduce costs and increase diagnostic capabilities and system flexibility
- Ladder programs and safety function blocks enable flexible programming

MELSEC-WS Series

- Flexible extensibility and 8 ms of responsiveness
- Safety control can be easily added to existing MELSEC programmable controllers

All Series comply with EN ISO 13849-1 Category 4/PL e and IEC 61508 SIL 3 safety standards

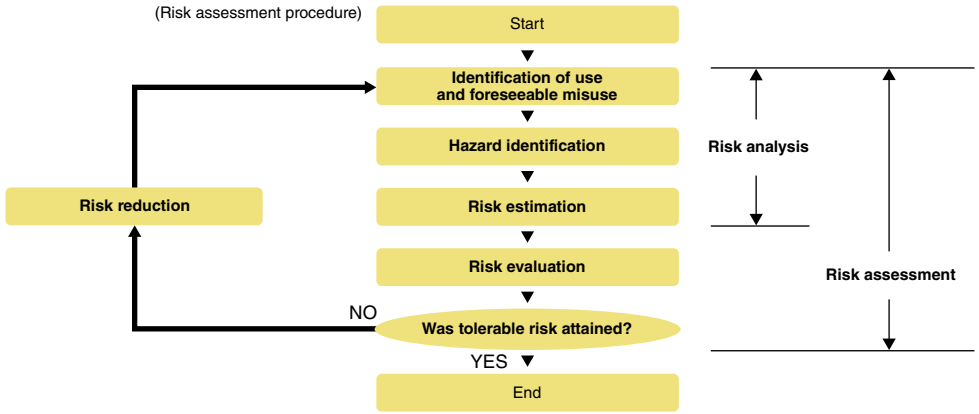
International safety standards

International standards for machinery safety are hierarchically classified into the following types:

- Type A standards (basic safety standards): ISO 12100
- Type B standards (group safety standards): ISO 13849-1, IEC 61508, etc.
- Type C standards: Individual product standards

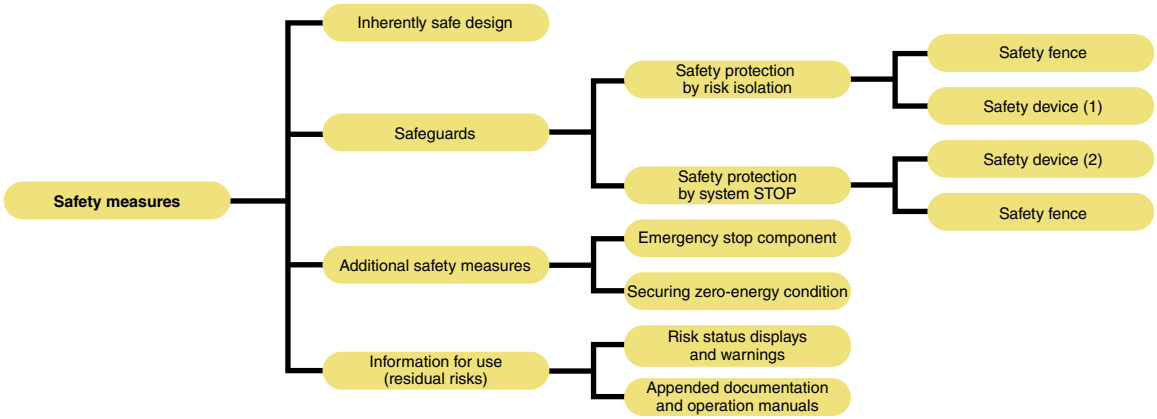
ISO 12100 Risk assessment

"Risk assessment" refers to identifying potential hazards present in machinery and evaluating the degree of hazard (risk).



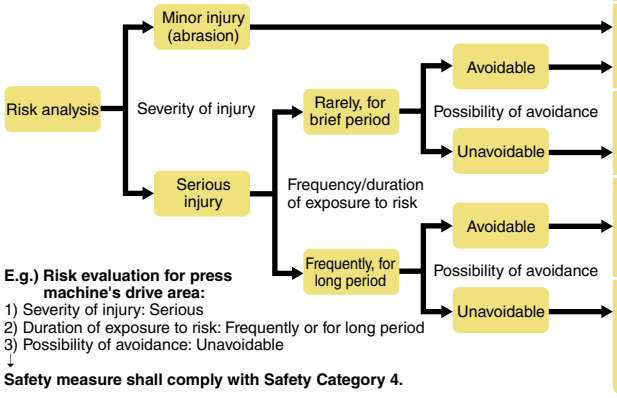
ISO 12100 Risk reduction and safety measures

Under the International Safety Standards, protective measures are implemented to reduce risks to the degree that risks can be tolerated.



EN ISO 13849-1 Safety categories

"Safety categories" are indicators used to determine specific safety measures based on risk assessment results.



E.g.) Risk evaluation for press machine's drive area:
1) Severity of injury: Serious
2) Duration of exposure to risk: Frequently or for long period
3) Possibility of avoidance: Unavoidable

↓

Safety measure shall comply with Safety Category 4.

■ Safety category requirements

Category	Requirement summary	System behaviour
B	• Shall realize the intended functions of safety-related parts of the machine control system	• The occurrence of a fault can lead to the loss of the safety function
1	• Shall meet the requirements of Category B • Shall use well-examined reliable components and observe safety principles	• The same as Category B, but the safety-related part has more reliable safety function
2	• Shall meet the requirements of Category B • Shall observe safety principles • Shall check the safety function at appropriate intervals	• Although the loss of the safety function can be detected by checking, the safety function is lost between checks
3	• Shall meet the requirements of Category B • Shall observe safety principles • Design requirements: A single fault shall not lead to the loss of the safety function • Detect as many single faults as possible	• The safety function is not lost by a single fault • Some but not all faults can be detected. Accumulation of undetected faults may lead to the loss of the safety function
4	• Shall meet the requirements of Category B • Shall observe safety principles • Design requirements: Detect a single fault at or before executing safety function. In cases where this is not possible, the safety function shall not be disabled by accumulated faults	• The safety function is always in effect whenever a fault occurs • Faults will be detected in time to prevent the loss of the safety function

EN ISO 13849-1 Performance level

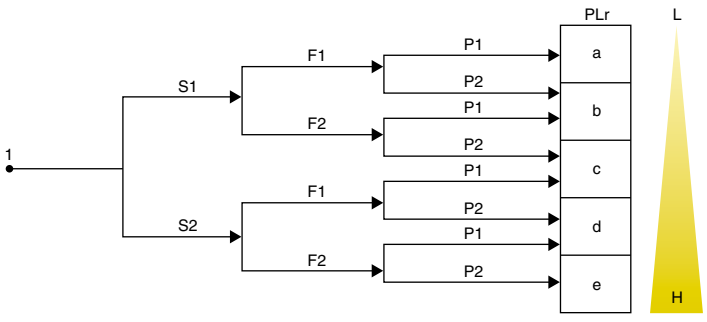
Frequency of a dangerous failure occurrence (the safety function does not work when needed), rate of a failure detection by diagnostics, etc. were added to evaluate comprehensively. The evaluation result is classified into five levels from "a" to "e" by the performance level (PL).

- The categories and the safety integrity level (SIL) described in the functional safety standard IEC 61508 can be referred to each other via the PL
- Like the safety categories, the risk is evaluated from a perspective of "S: Severity of injury, " "F: Frequency or duration of exposure to risk, " and "P: Possibility of avoidance"

The functional safety standard IEC 61508

With progress of microprocessor technologies, widespread IT, more complex control, etc., demands for configuring safety systems using microprocessors and software have been increased. To meet such demands of the time, the functional safety concept was developed, and the functional safety standard IEC 61508 (electrical/electronic/programmable electronic safety-related systems), which applies to programmable controllers, was issued in 2000.

■ Risk graph in EN ISO 13849-1 and PLr for safety function



S	F	P
Severity of injury	Frequency or duration of exposure to risk	Possibility of avoiding or deterring risk
S1	F1	P1
Minor injury	Rarely to low frequency or for a brief period	Possible under certain conditions
S2	F2	P2
Serious injury	Frequently to continuously or for a long period	Almost impossible

Advantages of installing safety programmable controller or safety controller

■ Complies with international safety standards

The MELSEC safety programmable controller and safety controller are international safety standard certified controllers for safety control. Compliance with international safety standards assures safety operation of electronic devices and programmable controllers, realizing safety applications easily.

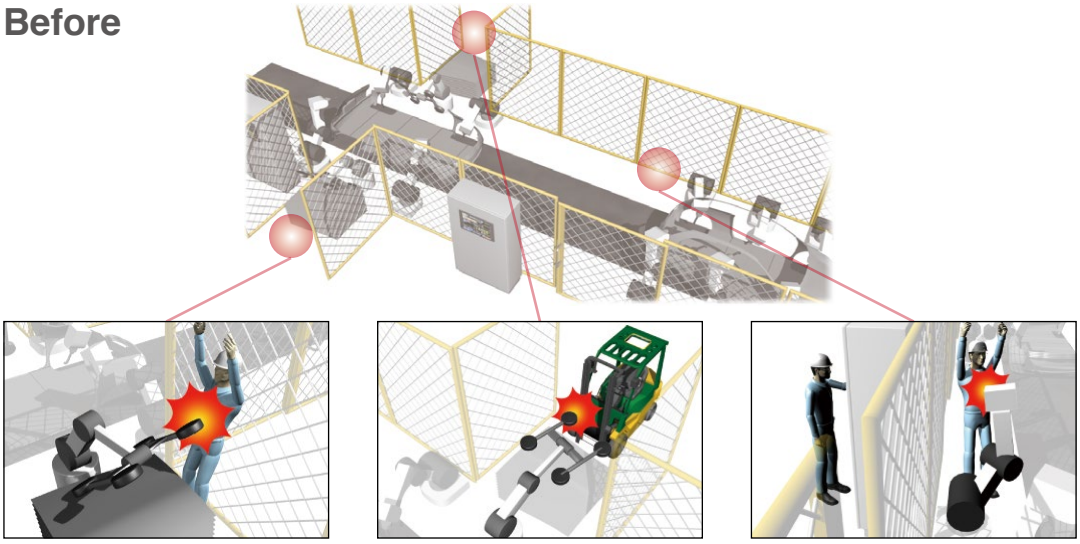
■ Safety control execution

When connected with safety devices such as an emergency stop switch or light curtain, the safety programmable controller executes safety control by turning safety output off to stop power to a source of potential hazard, such as a robot. Safety control program enables emergency stop operation safely and flexibly.

■ Equipped with fault monitoring function and self-diagnosis function fulfilling safety standard requirements

By periodically executing fault monitoring and self-diagnosis, power is safely shut off in the event of failure in the safety programmable controller or safety controller.

Before

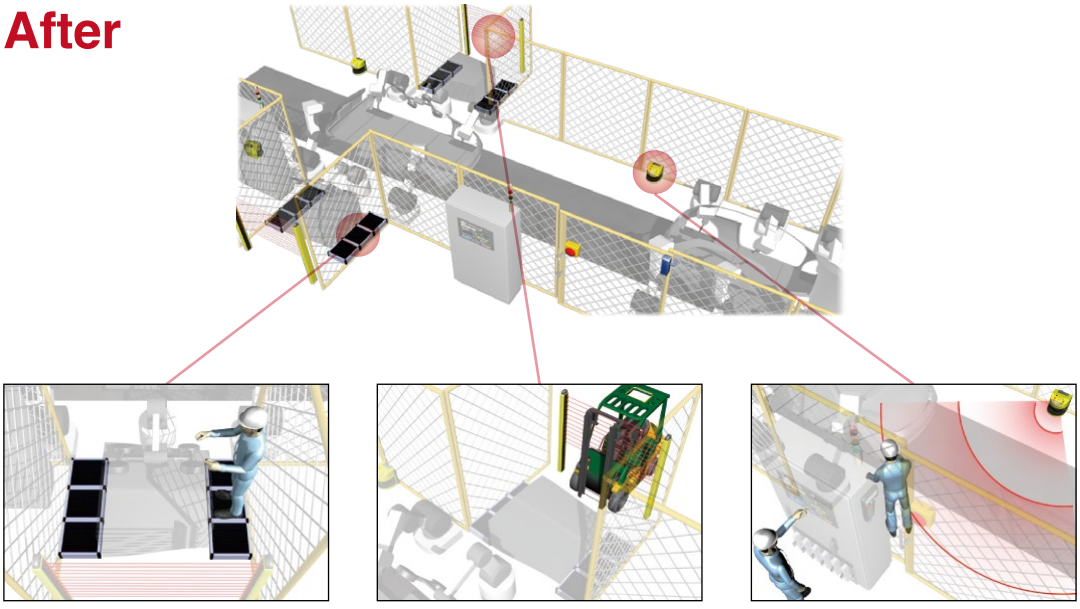


An operator loading materials can be caught between a robot area and a fence.

Dangerous when loading materials without noticing the production line in operation.

Starting a machine when an operator is within the safety fence can be dangerous.

After



The production line cannot start while an operator is within the area as detected by the safety mat.

The production line is safely stopped by detecting light curtain signals when an operator enters the exclusion zone.

By detecting laser scanner signals, startup is interlocked when an operator enters an exclusion zone, even if the operator is obscured from view.

Total safety solution lineup

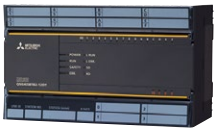
Mitsubishi Electric provides a total safety solution by incorporating safety devices complying with international safety standards.

Safety programmable controller

MELSEC iQ-R Series

▶ P.12

MELSEC-QS Series



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Safety controller

MELSEC-WS Series

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Safety drive products

MELSERVO-J4 Series

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FR-A800 Series

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MELFA FR Series

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Safety components partner products

Emergency stop switch

▶ P.40

Safety laser scanner

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Light curtain

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Guard lock switch

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Selection points

Select the safety control devices most suitable for your system configuration from the lineup.

Incorporating into a production line or distributed system

Used as standalone

Integrating safety and generic control

YES

NO

Using ladder programming (including safety FB)

YES

NO

MELSEC iQ-R Series
(Integrated programmable automation controller)

- Integrated generic and safety control of medium to large-scale systems
- Servos, inverters, and robots can be controlled through their connectivity with the MELSEC iQ-R Series via CC-Link IE Field Network
- Programming and maintenance using GX Works3

▶ P.12

MELSEC-QS Series
(Safety programmable controller)

- Safety control of medium to large-scale systems
- Ladder programs and safety function blocks enable flexible programming

▶ P.22

MELSEC-WS Series
(Safety controller)

- Safety control of small to medium-scale systems
- Supported Flexi Line/Flexi Link for safety communications between safety controllers
- Setup and logic creation are possible using the Setting and Monitoring Tool

▶ P.30

MELSEC SELECTION GUIDE

Select the products most suitable for your system.

Series	Modular type MELSEC iQ-R Series	Modular type MELSEC-QS Series	Baseless type MELSEC-WS Series
Safety CPU			
Number of safety CPU models	4	1	3
Integrated generic and safety control	●*1	-	-
Ladder diagram (LD)	●	●	-
Structured text (ST)	●*2	-	-
Function block diagram (FBD)	●*2	-	●
Program capacity (step)	80K/160K/320K/1200K (40K for safety programs*3)	14K	255 (Function Blocks)
Integrated safety and non-safety communication			
CC-Link IE Field Network	●	●*4	-
Safety communication			
CC-Link Safety	-	●*5	-
Flexi Line/Link	-	-	●*6
Non-safety communication			
Ethernet	●	●	●
CC-Link	●	●	●
CC-Link IE Control Network	●	●	-
MELSECNET/H	-	●	-
Safety I/O module			
Max. number of connectable safety remote I/Os per master station	120	42	-
No. of input points (single wiring) (point)	NZ2GFSS2-32D: 32	QS0J65BTB2-12DT: 16 QS0J65BTS2-8D: 16	WS0-XTIO: 8 WS0-XTDI: 8
No. of output points (single wiring) (point)	NZ2EXSS2-8TE: 8	QS0J65BTB2-12DT: 4*7 QS0J65BTS2-4T: 4*7	WS0-XTIO: 4
Engineering software			
Integrated programming of generic and safety control	●	-	-
Programming development environment	GX Works3	GX Developer	Setting and Monitoring Tool*8
Standards			
EN ISO 13849-1	Category 4/PL e	Category 4/PL e	Category 4/PL e
IEC 61508	SIL 3	SIL 3	SIL 3
KOSHA S-Mark	-	●	●

*1. A power supply module, base unit, and network module can be shared with the CPU for generic control.
*2. Only for executing generic control programs.
*3. Up to 40K steps of program capacity of general program can be used for safety program.
*4. Safety communication is enabled only between the MELSEC-QS Series CPUs.
*5. Safety communication is enabled only between the MELSEC-QS Series CPUs and Safety remote I/Os.
*6. Safety communication network which connects between the MELSEC-WS Series CPUs with dedicated cables.
*7. When source and sink type are selected
*8. For details on how to obtain the Setting and Monitoring Tool, please contact your local Mitsubishi Electric sales office or representative.

Network specifications (safety communication)

Item	CC-Link IE Field Network
Max. safety connections per network	1814
Max. number of safety connections per station	120
Max. safety link points per safety connection	8 words (Input 8 words, Output 8 words)

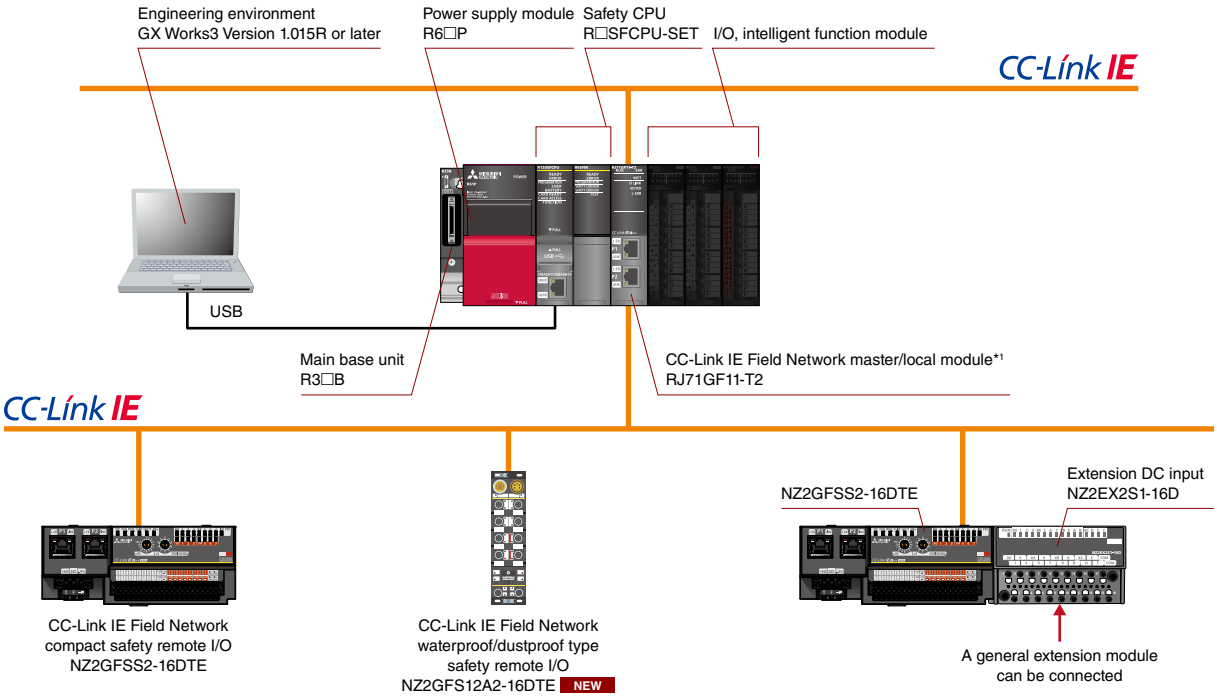
Item	Flexi Line	Flexi Link
Transmission data length (bit)	32/64/96	26/52
Cable length (m)	Between stations 125/250/500/1000	Overall length 100
Max. number of connectable stations	32	4
Compatible CPU module	WS0-CPU3 (F/W version V3.02 (revision 3.XX) or later)	WS0-CPU1/WS0-CPU3 (F/W version V2.01 (revision 2.XX) or later)
Project file	Managed by one project file per CPU (Network setting information of Flexi Line can be imported/exported to other files)	4 CPUs are managed by one project file

MELSEC iQ-R Series
iQ Platform-compatible PAC

MELSEC iQ-R Series programmable automation controller
Safety CPU and safety remote I/O modules

The MELSEC iQ-R Series is equipped with a safety CPU that is compliant with ISO 13849-1 PL e and IEC 61508 SIL 3. The safety CPU can be installed directly on the MELSEC iQ-R Series base rack and can execute both safety and generic programs.

MELSEC iQ-R Series system configuration



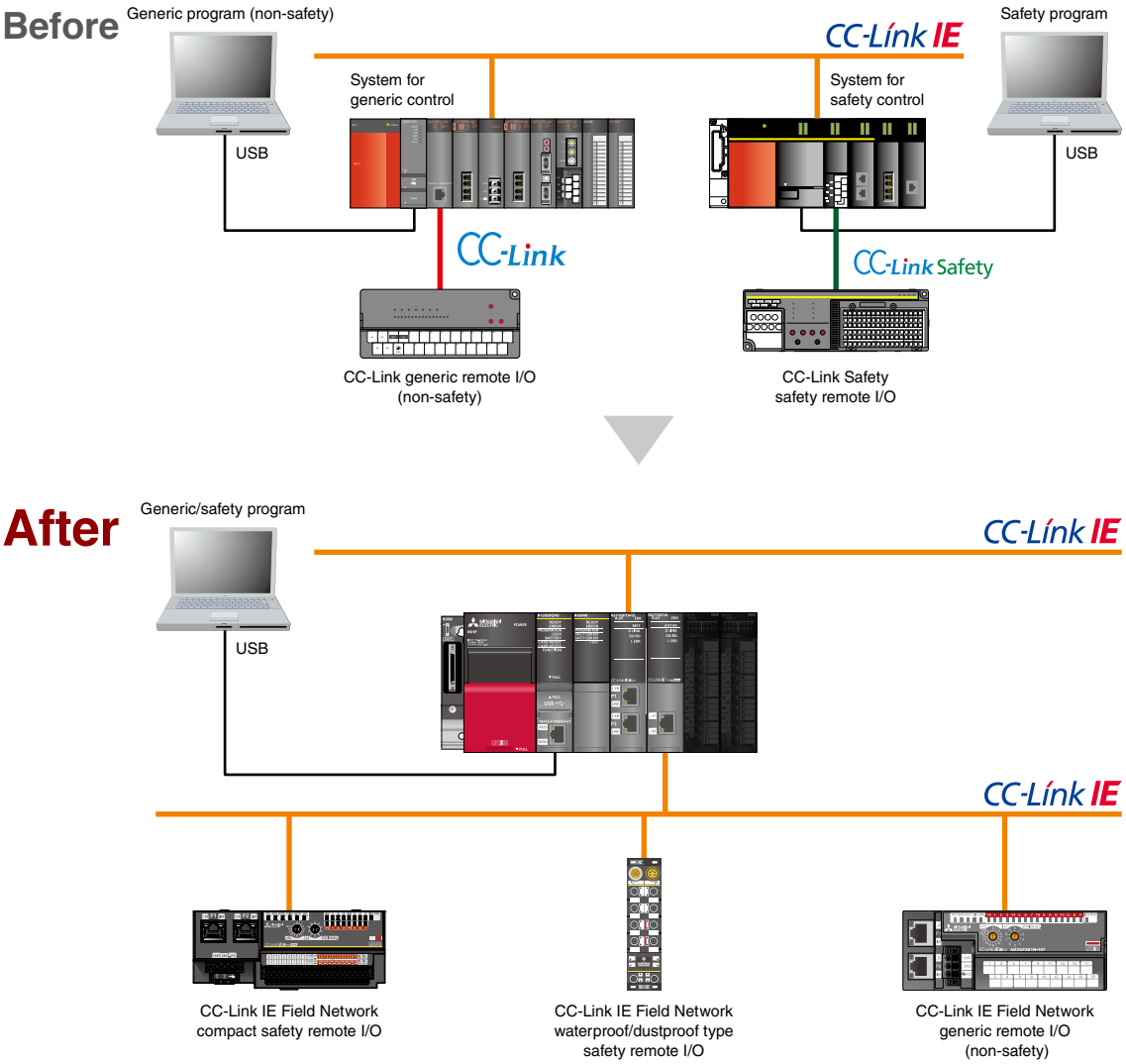
*1. Firmware version "07" or later

Integrated generic and safety control

The safety CPU can be installed directly on the MELSEC iQ-R Series base rack and can execute both safety and generic programs, enabling easy integration into existing or new control systems. The MELSEC iQ-R Series power supply module, base unit, and network module can be used with safety and generic control modules, reducing costs and saving space.

Consolidated network topology

The safety CPU enables control of safety and non-safety communications across the same 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.

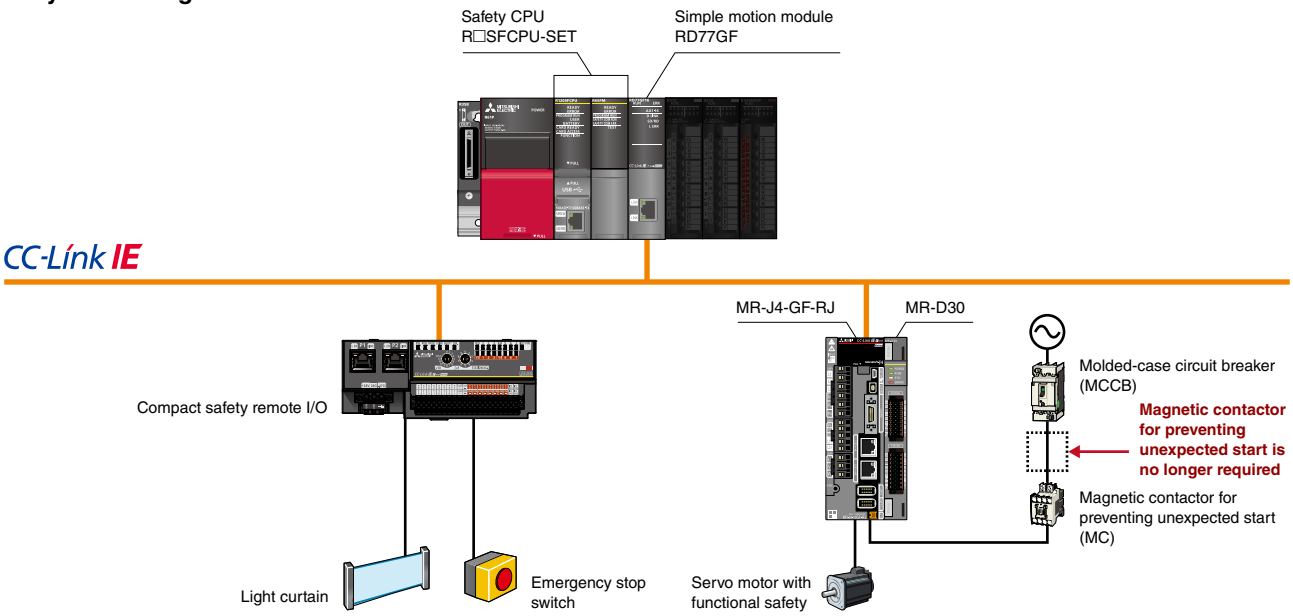


Supporting MELSERVO-J4 Series servo amplifiers and motors

The MELSERVO-J4 Series servo amplifiers can be controlled through their connectivity with the MELSEC iQ-R Series via CC-Link IE Field Network. When the safety CPU*1 is used with the simple motion module (RD77GF), the MELSERVO-J4 Series servo amplifier can receive safety signal data from the safety CPU via CC-Link IE Field Network. Wiring between the safety remote I/O and MR-D30 functional safety unit is unnecessary.

*1. Inter-modular synchronization function is not available with the safety CPU (R□SFCPU-SET).

■ System configuration



***For detailed information, please refer to "Servo Amplifiers & Motors MELSERVO-J4 Catalog (L(NA)03058)".**

■ MELSERVO-J4 Series servo amplifiers and motors

Combined with the MR-D30, the MELSERVO-J4 Series servo amplifiers and motors can perform safety operation compliant with "Category 4/PL e" and "SIL 3"

- When the MR-J4-GF-RJ is used with the MR-D30, safety observation functions (STO, SS1, SS2, SOS, SLS, SBC, and SSM) can be used. The safety observation functions can be easily set with parameters*2
- Turning off the control circuit power supply of the servo amplifier is not necessary, resulting in a shorter restart time and eliminating home position return
- A magnetic contactor for preventing unexpected motor start is not required*3

*2. Use the MR-D30 with software version "A1" or later.

*3. Two magnetic contactors are not required when STO function is used. Although in this diagram one magnetic contactor is used for preventing servo alarms and electrical shock.

IEC/EN 61800-5-2: 2007 function	Safety level
STO (Safe torque off)	Category 4/PL e, SIL 3
SS1 (Safe stop 1)	
SS2 (Safe stop 2)*4	
SOS (Safe operating stop)*4	
SLS (Safely-limited speed)*5	
SBC (Safe brake control)	
SSM (Safe speed monitor)*5	

*4. SS2 and SOS are achievable with the use of the servo motor with functional safety unit.

*5. The safety level would be Category 3/PL d, SIL 2 when the servo motor with functional safety is not used.

Common engineering platform realizes efficient engineering

■ GX Works3

In GX Works3, generic and safety programs are included in the same project folder. GX Works3 is highly adaptable to projects in different countries through its multiple language features.

Module list

Simply drag & drop modules directly into the module configuration

Navigation window

Manage program files for safety control on GX Works3

Module configuration

Easily parameterize each module directly from the configuration editor

CC-Link IE Field configuration window

Set safety remote I/O parameters

Tab view multiple editors

Conveniently work on multiple editors without having to switch between software screens.
Safety devices easily recognized as appended with "SA\"

■ Safety FB (Function blocks)

Functions that are frequently used for creating safety programs are provided as certified safety function blocks.

Safety FB list

FB name	Function	Description
M+SF_2HAND2_R	Two hand switch Type II	Provides the two-hand control functionality.
M+SF_2HAND3_R	Two hand switch Type III	Provides the two-hand control functionality. (Fixed specified time difference is 500 ms.)
M+SF_EDM_R	External device monitor	Controls a safety output and monitors controlled actuators, e.g. subsequent contractors.
M+SF_ENBLSW_R	Enable switch	Evaluates the signals of an enable switch with three positions.
M+SF_ESPE_R	Light Curtain (ESPE)	Safety-related FB for monitoring electro-sensitive protective equipment (ESPE).
M+SF_ESTOP_R	Emergency Stop	Safety-related FB for monitoring an emergency stop switch. This FB can be used for emergency switch off functionality (stop category 0).
M+SF_GLOCK_R	Guard Lock and Interlocking	Controls an entrance to a hazardous area via an interlocking guard with guard locking ("four state interlocking").
M+SF_GMON_R	Guard Monitoring	Monitors the relevant safety guard. There are two independent input parameters for two switches at the safety guard coupled with a time difference (Monitoring Time) for closing the guard.
M+SF_MODSEL_R	Mode Selector	Selects the system operation mode, such as manual, automatic, and semi-automatic, etc.
M+SF_OUTC_R	Output Control	Control of a safety output with a signal from the functional application and a safety signal with optional startup inhibits.
M+SF_MUTE2_R	Muting with 2 sensors	Muting is the intended suppression of the safety function. (e.g., light barriers) In this FB, parallel muting with two muting sensors is specified.
M+SF_MUTE2-2_R	Muting with 2 sensors 2	Muting is the intended suppression of the safety function. (e.g., light barriers) In this FB, parallel muting with two muting sensors is specified. The effective time of the muting control can be set to be unlimited.
M+SF_MUTEP_R	Parallel muting	Parallel muting with four muting sensors is specified.
M+SF_MUTEP-2_R	Parallel muting 2	In this FB, parallel muting with four muting sensors is specified. The effective time of the muting control can be set to be unlimited.
M+SF_MUTES_R	Sequential muting	Sequential muting with four muting sensors is specified.
M+SF_MUTES-2_R	Sequential muting 2	In this FB, sequential muting with four muting sensors is specified. The effective time of the muting control can be set to be unlimited.
M+SF_TSSEN_R	Testable safety sensor	Detects, for example, the loss of the sensing unit detection capability, the response time exceeding that specified, and static ON signal in signal-channel sensors systems. It can be used for external testable safety sensors.
M+SF_EQUI_R	Double input (NC + NC or NO + NO)	Converts two equivalent bit inputs (both NO or NC) to one bit with discrepancy time monitoring. This FB output shows the result of the evaluation of both channels.
M+SF_ANTI_R	Double input (NO + NC)	Converts two antivalent*1 bit inputs (NO/NC pair) to one bit output with discrepancy time monitoring. This FB output shows the result of the evaluation of both channels.

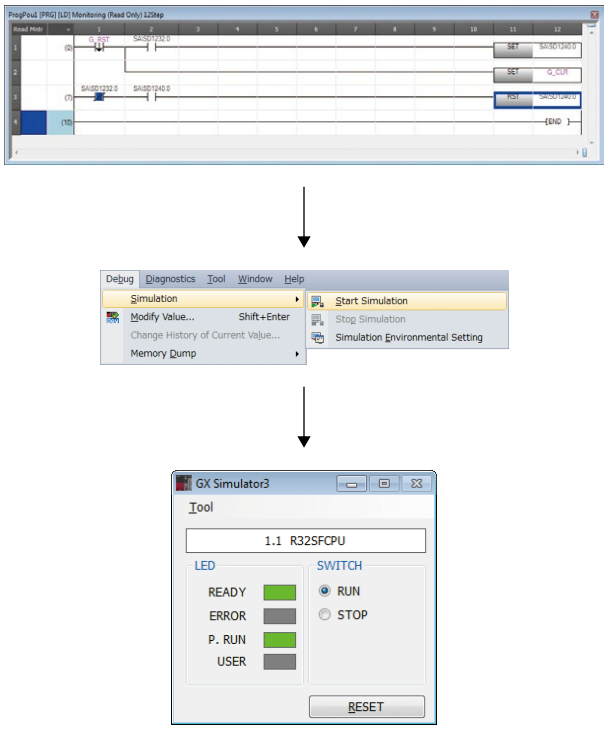
*1. "Antivalent" means that during normal operation, the two inputs are in opposite states at the same time. This is sometimes called "complementary" or "non-equivalent".

Integrated hardware simulator simplifying debugging

GX Works3 features an integrated simulator which helps to visualize the operation of the program during the debugging process.

- Programs can be debugged with a virtual safety programmable controller on the computer
- No need for connecting to the CPU module

■ Offline debugging without requiring a control CPU



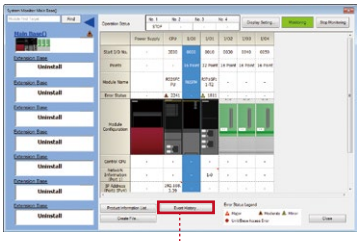
Offline debugging on the computer

Easier troubleshooting reducing downtime

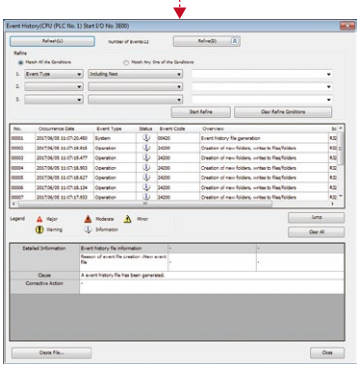
The MELSEC iQ-R Series includes various maintenance features:

■ Module diagnosis on base unit

Module configuration of the system and error status can be checked with the system monitor. Errors in each module and detailed operations are viewable in the event history improving troubleshooting.



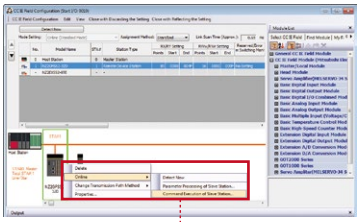
System monitor



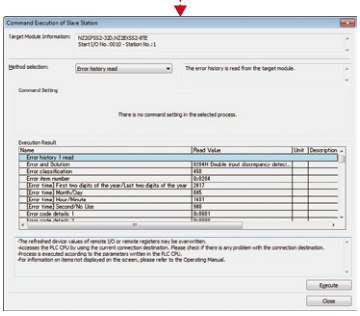
Event history

■ Remote station diagnosis

Error history of remote stations can be read from the CC-Link IE Field configuration window. Maximum of 15 errors are saved and an error history is held even when the power supply is cycled.



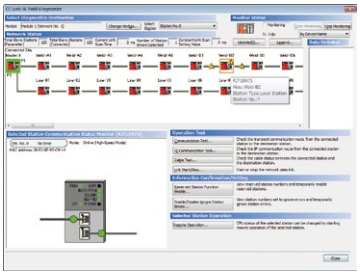
CC-Link IE Field configuration



Error history of remote stations

■ CC-Link IE Field Network diagnosis

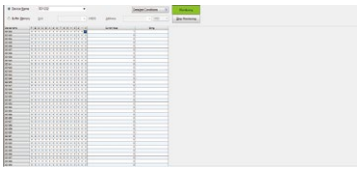
Network level diagnosis visualizes error location from network system image helping to reduce downtime.



CC-Link IE Field diagnosis window

■ Device/buffer memory batch monitor

From device/buffer memory batch monitor, operating status can be checked. Current value can be changed to check operation. For example, safety station interlock status and output by interlock release request and forced output can be easily confirmed.

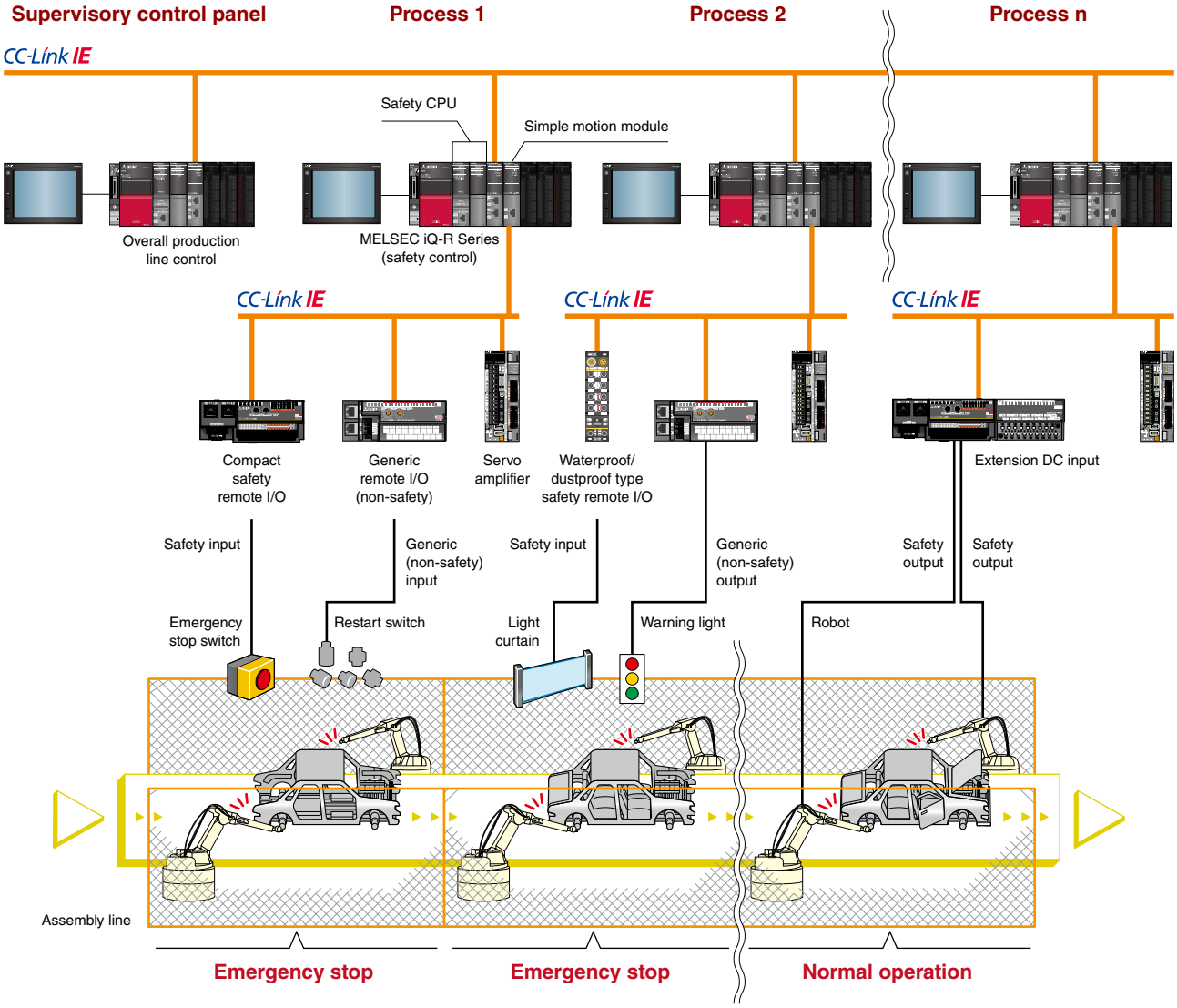


Device/buffer memory batch monitor

Application example

■ Automotive assembly line

Ensures safety on a large-scale production line and distributed system such as an automotive assembly line with multiple welding robots operating. In systems with multiple stations and safety controllers, critical safety data is shared over the network which allows an emergency stop in one station to safely stop the stations before and after within the production line. The safety CPU is connected using the CC-Link IE Field Network with safety communication integrated into the network protocol. Also, the simple motion module supports safety communication with the AC servo via CC-Link IE Field Network. Therefore, general devices, safety devices, and driving products can be connected with one CC-Link IE Field Network line (up to 120 devices in total), realizing a reduced wiring and highly scalable system, lowering total cost of ownership (TCO).

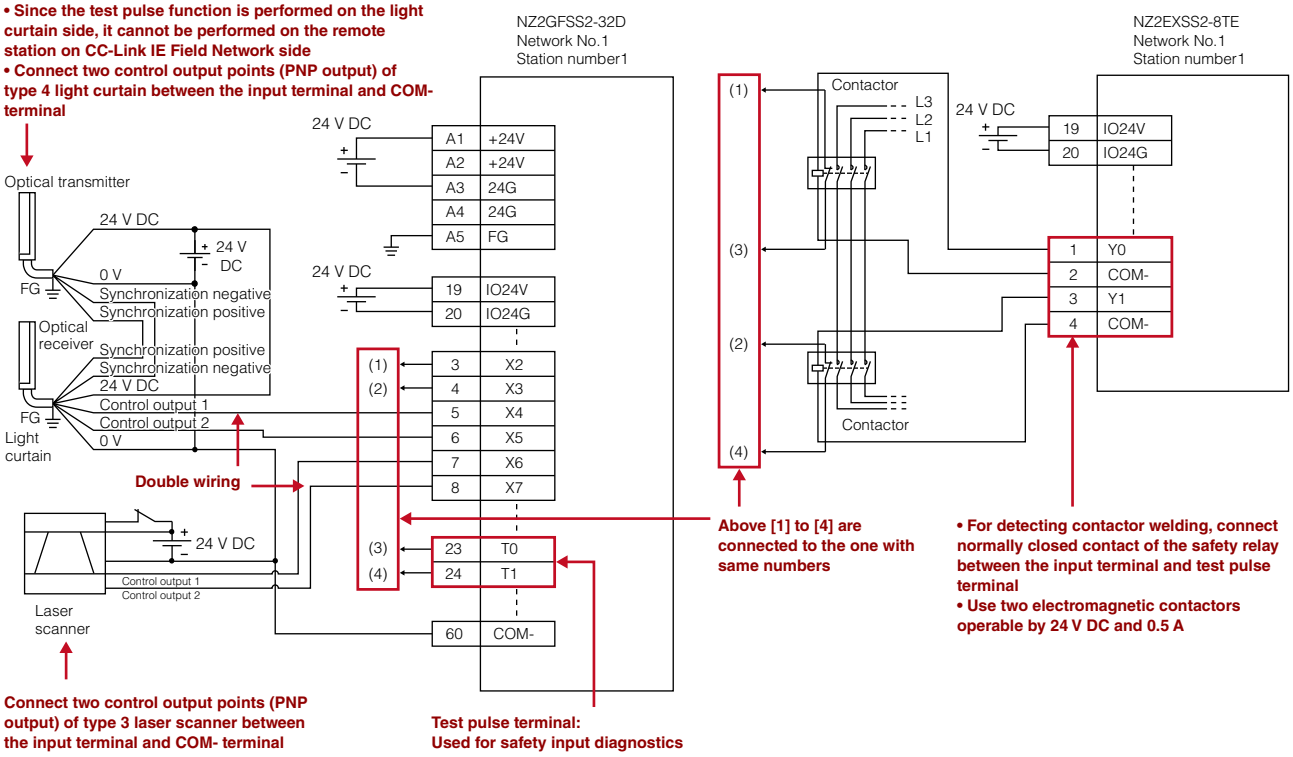


Error occurs at Process 2. Stations at Process 1 and Process 2 are made to stop with an emergency. Station at Process n keeps operation.

Wiring/parameter setting example

■ Wiring example*1

Wiring example of light curtain, laser scanner, and contactor.



■ Parameter setting example*1

The following is an example of parameter settings when a light curtain, a laser scanner, and two contactors are connected. The parameters used in this example are highlighted.

Item	Setting
Transmission interval monitoring time	35 (Setting range: 4…1000 ms) (Default: 35)
Wiring selection of input (X0, X1, X8…X1F)	0: No used (Default) 1: Double wiring (NC/NC) 2: Single wiring
Wiring selection of input (X2…X7)	0: No used (Default) 1: Double wiring (NC/NC) 2: Single wiring
Input response time (X0…X1F)*2	0: 1 ms (Default) 1: 5 ms 2: 10 ms 3: 20 ms 4: 50 ms
Double input discrepancy detection setting (X0, X1, X8…X1F)	0: Detect (Default) 1: Do not detect
Double input discrepancy detection setting (X2, X3) (X4, X5) (X6, X7)	0: Detect (Default) 1: Do not detect
Double input discrepancy detection type (X0, X1, X8…X1F)	0: Discrepancy detection time specified (Default) 1: Discrepancy detection time not specified
Double input discrepancy detection type (X2, X3) (X4, X5) (X6, X7)	0: Discrepancy detection time specified (Default) 1: Discrepancy detection time not specified
Auto recovery function at occurrence of a double input discrepancy error	0: Not used (Default) 1: Used
Double input discrepancy detection time (X0, X1, X8…X1F)*3	1 (Setting range: 1…6000 (Default: 1)) x 10 ms
Double input discrepancy detection time (X2, X3)*3	10 (Setting range: 1…6000 (Default: 1)) x 10 ms
Double input discrepancy detection time (X4, X5) (X6, X7)*3	2 (Setting range: 1…6000 (Default: 1)) x 10 ms
Input dark test execution setting (X0, X1, X4…X1F)	0: Execute (Default) 1: Not execute
Input dark test execution setting (X2, X3)	0: Execute (Default) 1: Not execute
Input dark test pulse OFF time*2	0: 400 µs (Default) 1: 1 ms 2: 2 ms
Number of pulse output for input dark test	0: 1 time (Default) 1: 2 times 2: 3 times
Extension 1_Wiring selection of output (Y0, Y1)	0: No use (Default) 1: Double wiring (Source/Source) 2: Single wiring
Extension 1_Wiring selection of output (Y2…Y7)	0: No use (Default) 1: Double wiring (Source/Source) 2: Single wiring
Extension 1_Output dark test execution setting (Y0, Y1)	0: Execute (Default) 1: Not execute
Extension 1_Output dark test execution setting (Y2…Y7)	0: Execute (Default) 1: Not execute
Extension 1_Output dark test pulse OFF time (Y0, Y1, Y2…Y7)*2	0: 400 µs (Default) 1: 1 ms 2: 2 ms
Extension 1_Number of pulse output for output dark test	0: 1 time (Default) 1: 2 times 2: 3 times

*1. For details of the wiring example and parameter setting example, refer to "MELSEC iQ-R Safety Application Guide (SH-081538ENG)".

*2. Adjust the values of input response time, input dark test pulse off time, and output dark test pulse off time according to the installation environment and wiring length.

*3. Set "Double input discrepancy detection time" to "100 ms" for the mechanical switch and "20 ms" for the sensor input as a guideline.

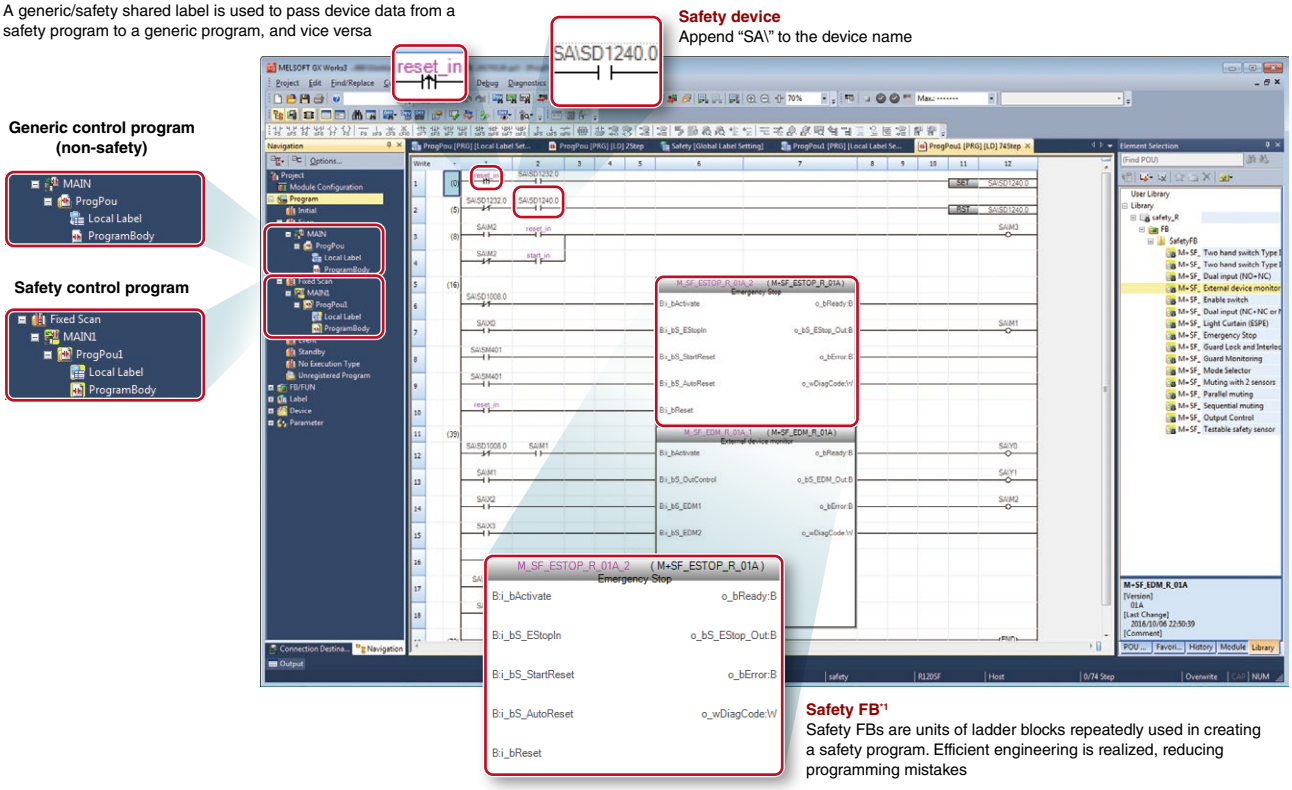
Programming example

The MELSEC iQ-R Series is easily programmed using GX Works3. Both safety and generic programs can be created in a project. Safety programs are created with ladder diagrams (including safety FBs). Fixed scan is specified as the program execution type and the program is created using safety devices, generic/safety shared labels, and safety FBs.

* For details of the programming example, refer to "MELSEC iQ-R Safety Application Guide (SH-081538ENG)".

Generic/safety shared labels
A generic/safety shared label is used to pass device data from a safety program to a generic program, and vice versa

Safety device
Append "SA\" to the device name

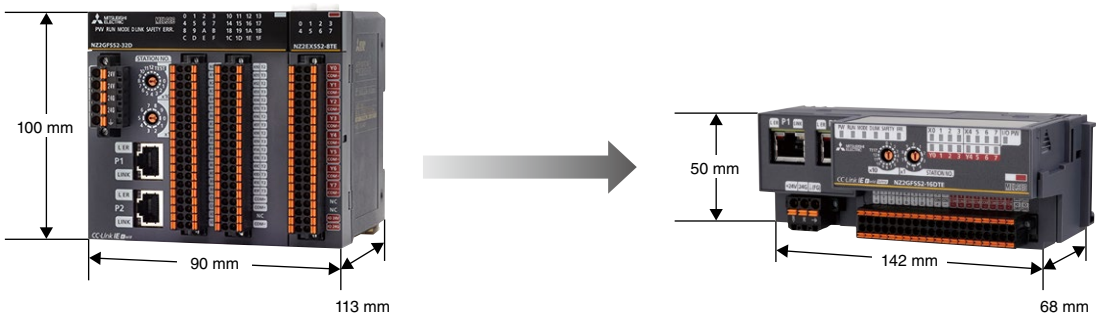


Safety FB[*1]
Safety FBs are units of ladder blocks repeatedly used in creating a safety program. Efficient engineering is realized, reducing programming mistakes

*1. On the actual GX Works3 screen, FB version is shown.

CC-Link IE Field Network compact safety remote I/O

Low count and compact safety remote I/O modules have been added to the existing CC-Link IE Field Network safety remote I/O modules. Three types of compact remote I/Os are available, offering flexibility and reducing hardware costs.



Main safety input module NZ2GFSS2-32D + Extension safety output module NZ2EXSS2-8TE

Compact safety I/O combined module NZ2GFSS2-16DTE

CC-Link IE Field Network Waterproof/dustproof type (IP67) safety remote I/O (two models)

The CC-Link IE Field Network waterproof/dustproof type (IP67) safety remote I/Os comply with IP67. A control cabinet is no longer necessary, saving on hardware cost and space. Push-to-lock connectors reduce wiring tasks and eliminate maintenance such as retightening of screws.*1

*1. Screw connector is also supported.

Powered by molex

This product was jointly developed and manufactured by Mitsubishi and Molex.
General specifications and product guarantee conditions may vary from those of general MELSEC products.
For more information, please refer to the relevant product manual or contact your local Mitsubishi Electric sales office or representative.

NZ2GFS12A2-16DTE

MELSEC iQ-R Series specifications

Safety CPU module specifications

Item	R08SFCPU-SET*2	R16SFCPU-SET*2	R32SFCPU-SET*2	R120SFCPU-SET*2
Category	Category 4 (EN ISO 13849-1)			
Safety Integrity Level (SIL)	SIL 3 (IEC 61508)			
Performance Level (PL)	PL e (EN ISO 13849-1)			
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	Ladder diagram (LD), structured text (ST)*3, function block diagram (FBD)*3			
Extended programming language	Function block (FB), label programming (system/local/global)			
Program execution type	Initial*3, scan*3, fixed scan, interrupt*3, standby type*3			
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 (KB)	320	640	1280	4800
Device/label memory*4 (KB)	1178	1710	2306	3370
Data memory (MB)	5	10	20	40
SLMP communication	●	●	●	●

*2. Product package includes a safety CPU (R□SFCPU) and safety function module (R6SFM).
*3. Only for executing generic programs.
*4. An extended SRAM cassette expands the device/label memory area.

Safety remote I/O module specifications

Item	Input module		Output module	I/O combined module
	NZ2GFSS2-8D	NZ2GFSS2-32D	NZ2GFSS2-8TE	NZ2GFSS2-16DTE
Rated input voltage (V DC)	24 (20.4…28.8)	24 (20.4…28.8)	-	24 (20.4…28.8)
Rated input current	7.0 mA TYP. (at 24 V DC)	6.0 mA TYP. (at 24 V DC)	-	7.0 mA TYP. (at 24 V DC)
Rated load voltage (V DC)	-	-	24	24
Maximum load current (A/points)	-	-	0.5	0.5
Common terminal arrangement (point/common)	8	32	8	Input: 8, Output: 8
Protection function	●	●	●	●
External interface	40 points, 2-piece spring-clamp terminal block	40 points, 2-piece spring-clamp terminal block (2x)	40 points, 2-piece spring-clamp terminal block	40 points, 2-piece spring-clamp terminal block
Points				
Single wiring	8	32	8	Input: 8, Output: 8
Double wiring	4	16	4	Input: 4, Output: 4

Item	Extension output module	Waterproof/dustproof type (IP67) I/O combined module	
	NZ2EXSS2-8TE*5	NZ2GFS12A2-14DT	NZ2GFS12A2-16DTE
Rated input voltage (V DC)	-	24 (20.4...28.8)	24 (20.4...28.8)
Rated input current	-	6.0 mA TYP. (at 24 V DC)	6.0 mA TYP. (at 24 V DC)
Rated load voltage (V DC)	24	24	24
Maximum load current (A/points)	0.5	2.0	1.0
Common terminal arrangement (point/common)	8	Input: 12, Output: 4	Input: 12, Output: 4
Protection function	●	●	●
External interface	40 points, 2-piece spring-clamp terminal block	Waterproof connector	Waterproof connector
Points			
Single wiring	8	Input: 12, Output: -	Input: 12, Output: 4
Double wiring	4	Input: 6, Output: 2	Input: 6, Output: 2

*5. Only NZ2GFSS2-32D can be connected.

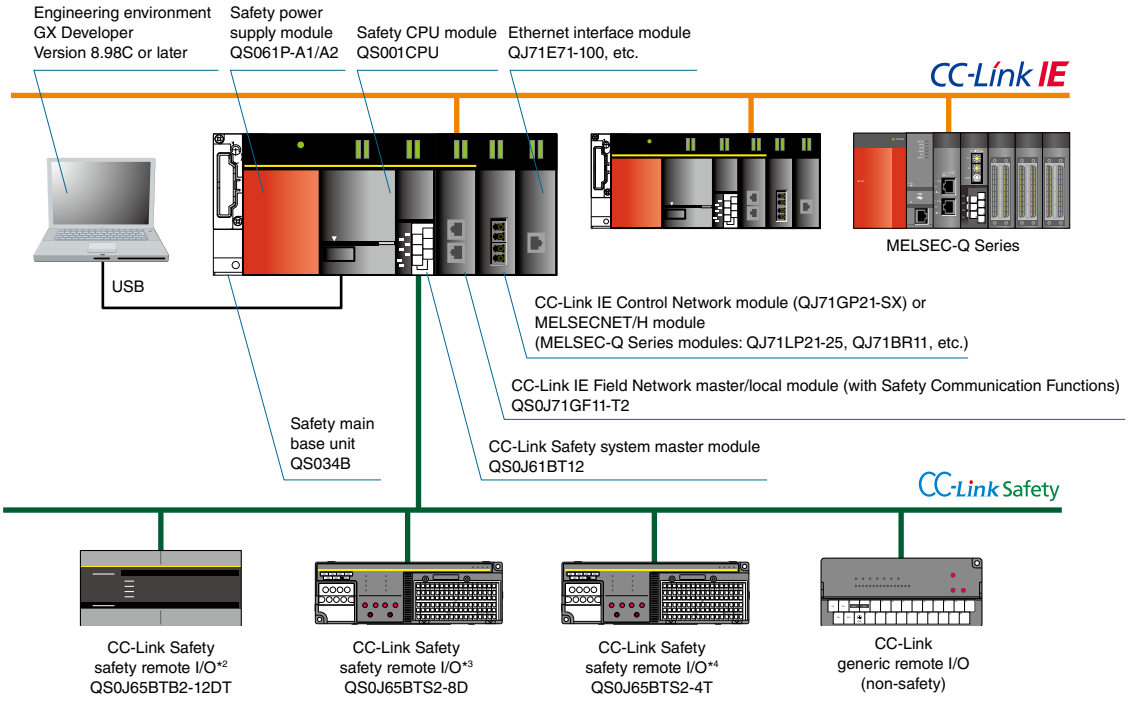
Safety Programmable Controller
MELSEC-QS Series

Safety programmable controller MELSEC-QS Series

The safety programmable controller is compliant with international safety standards, EN ISO 13849-1 Category 4/PL e and IEC 61508 SIL 3. It is ideal for medium to large-scale safety control systems. Ladder programs and certified safety function blocks*1 realize flexible programming.

*1. They can be used to structure EN ISO 13849-1 Category 4/PL e and IEC 61508 SIL 3 safety applications.

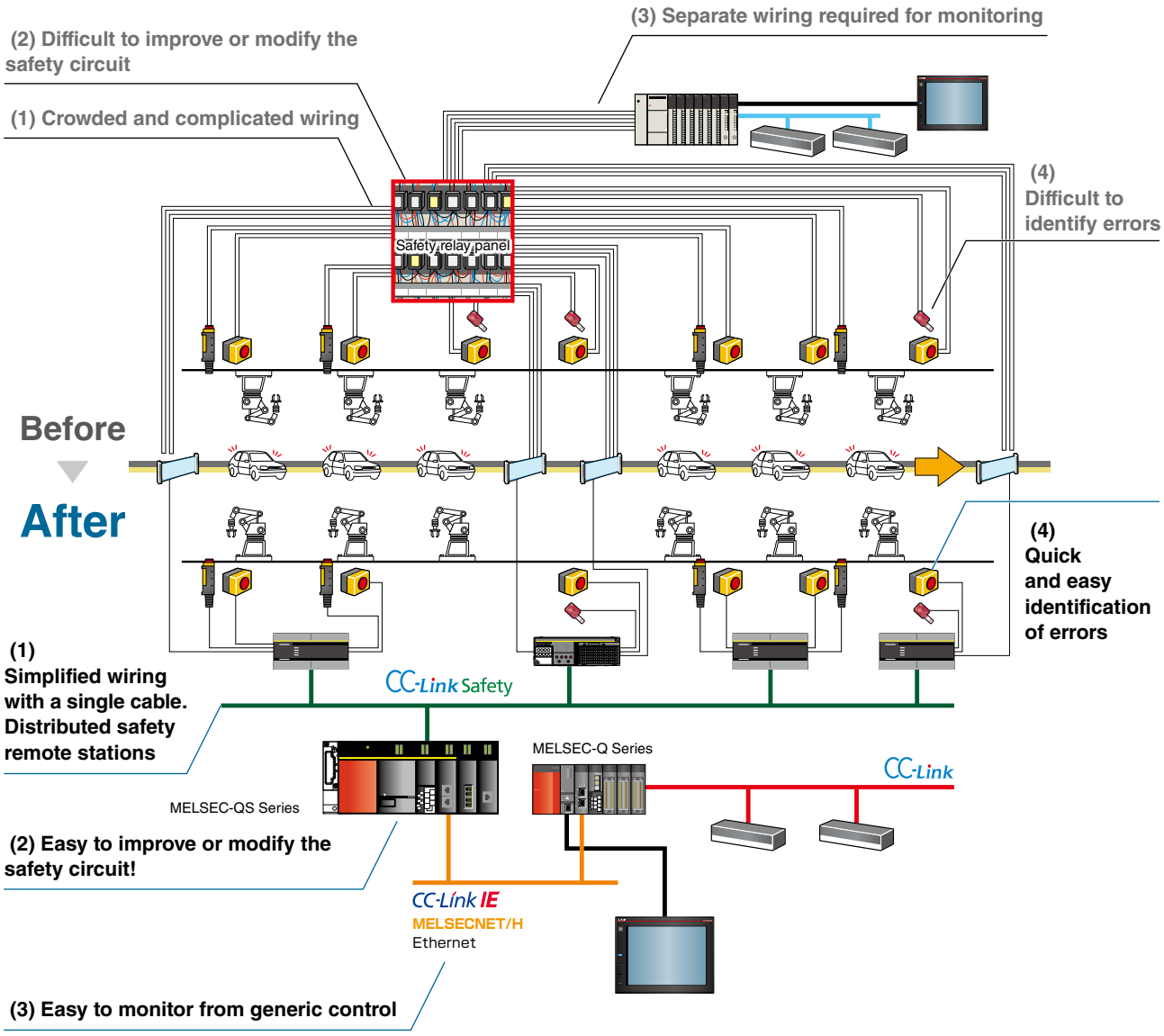
MELSEC-QS Series system configuration



*2. Number of input points: 8 points (double wiring), No. of output points: 4 points (source + sink type)
*3. Number of input points: 8 points (double wiring)
*4. Number of output points: 4 points (source + sink type)

Reducing costs while increasing diagnostic capabilities and system flexibility

The MELSEC-QS Series solves the complicated wiring and time-consuming troubleshooting issues associated with previous safety relay systems.

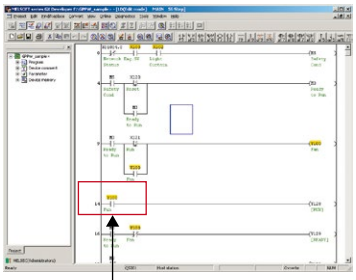


Programming with ladder diagrams and safety FBs

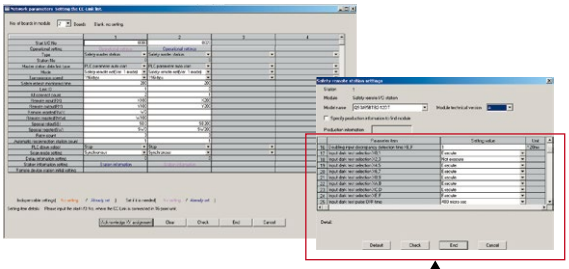
■ GX Developer

Use GX Developer to start up MELSEC-QS Series safety control systems (programming, monitoring, diagnosis, and debugging). GX Developer can configure CC-Link Safety, CC-Link IE Field Network and safety remote station parameters.*1

*1. GX Works2 is necessary to configure CC-Link IE Field Network settings when using generic programmable controllers.



Safety device
shown in yellow



Examples of settable safety remote station parameters

- Doubling input discrepancy detection time
- Input dark test selection
- Input dark test pulse OFF time

* Parameter setting examples are shown on page 27.

■ Safety FB (Function Block)*2

Functions that are frequently used for creating safety programs are provided as safety FBs. The safety FBs have been certified.

Safety FB list

FB name	Function	Description
F+2HAND2	Two hand switch Type II	Provides the two-hand control functionality.
F+2HAND3	Two hand switch Type III	Provides the two-hand control functionality. (Fixed specified time difference is 500 ms.)
F+EDM	External device monitor	Controls a safety output and monitors controlled actuators, e.g. subsequent contractors.
F+ENBLSW	Enable switch	Evaluates the signals of an enable switch with three positions.
F+ESPE	Light Curtain (ESPE)	Safety-related FB for monitoring electro-sensitive protective equipment (ESPE).
F+ESTOP	Emergency Stop	Safety-related FB for monitoring an emergency stop switch. This FB can be used for emergency switch off functionality (stop category 0).
F+GLOCK	Guard Lock and Interlocking	Controls an entrance to a hazardous area via an interlocking guard with guard locking ("four state interlocking").
F+GMON	Guard Monitoring	Monitors the relevant safety guard. There are two independent input parameters for two switches at the safety guard coupled with a time difference (Monitoring Time) for closing the guard.
F+MODSEL	Mode Selector	Selects the system operation mode, such as manual, automatic, and semi-automatic, etc.
F+MUTE2	Muting with 2 sensors	Muting is the intended suppression of the safety function. (e.g., light barriers) In this FB, parallel muting with two muting sensors is specified.
F+MUTEP	Parallel muting	Parallel muting with four muting sensors is specified.
F+MUTES	Sequential muting	Sequential muting with four muting sensors is specified.
F+OUTC	Output control	Control of a safety output with a signal from the functional application and a safety signal with optional startup inhibits.
F+TSSEN	Testable safety sensor	Detects, for example, the loss of the sensing unit detection capability, the response time exceeding that specified, and static ON signal in signal-channel sensors systems. It can be used for external testable safety sensors.
F+EQUI	Dual input (NC + NC or NO + NO)	Converts two equivalent bit inputs (both NO or NC) to one bit with discrepancy time monitoring. This FB output shows the result of the evaluation of both channels.
F+ANTI	Dual input (NO + NC)	Converts two antivalent*3 bit inputs (NO/NC pair) to one bit output with discrepancy time monitoring. This FB output shows the result of the evaluation of both channels.

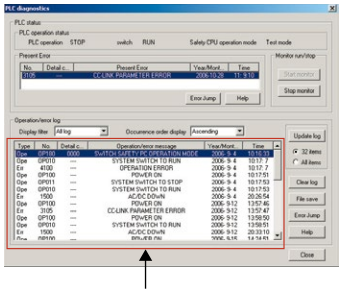
*2. The safety FBs are provided for GX Developer version 8.82L or later. (QS001CPU is supported with the first five digits of serial number "11042" or later.)

*3. "Antivalent" means that during normal operation, the two inputs are in opposite states at the same time. This is sometimes called "complementary" or "non-equivalent".

Easy error/failure troubleshooting

■ PLC diagnosis

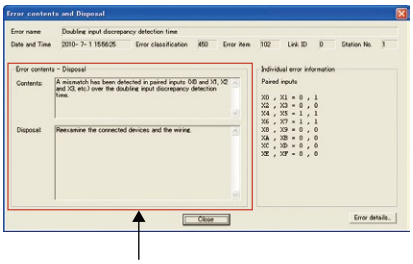
Safety CPU operating status, current error, operation/error history (including CC-Link Safety system error history) can be checked. Up to 3,000 safety CPU module operations/error histories can be recorded and stored in CSV files.



Remote STOP operation at 14: 12 on 2006-12-19
CC-Link Safety timeout at 15: 20 on 2006-12-19
Double input discrepancy in safety remote station at 0: 10 on 2006-12-20

■ Error details

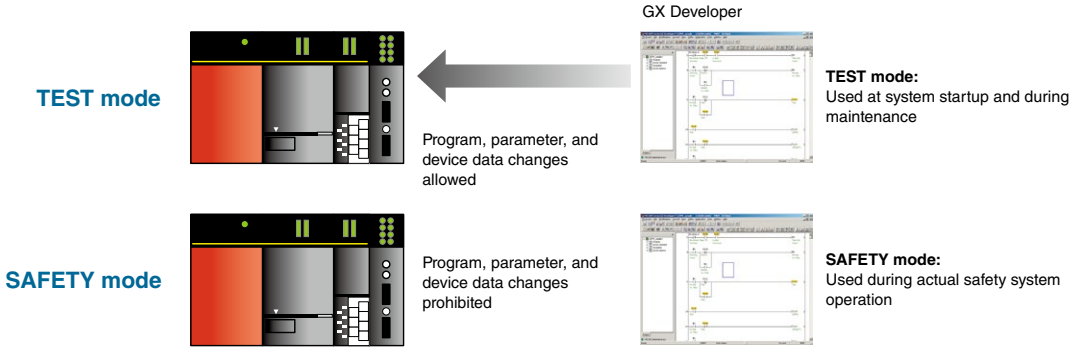
For safety remote I/O station, error name, date and time of occurrence, error details/troubleshooting are displayed.



CC-Link Safety remote I/O errors can be easily displayed

Debug functions

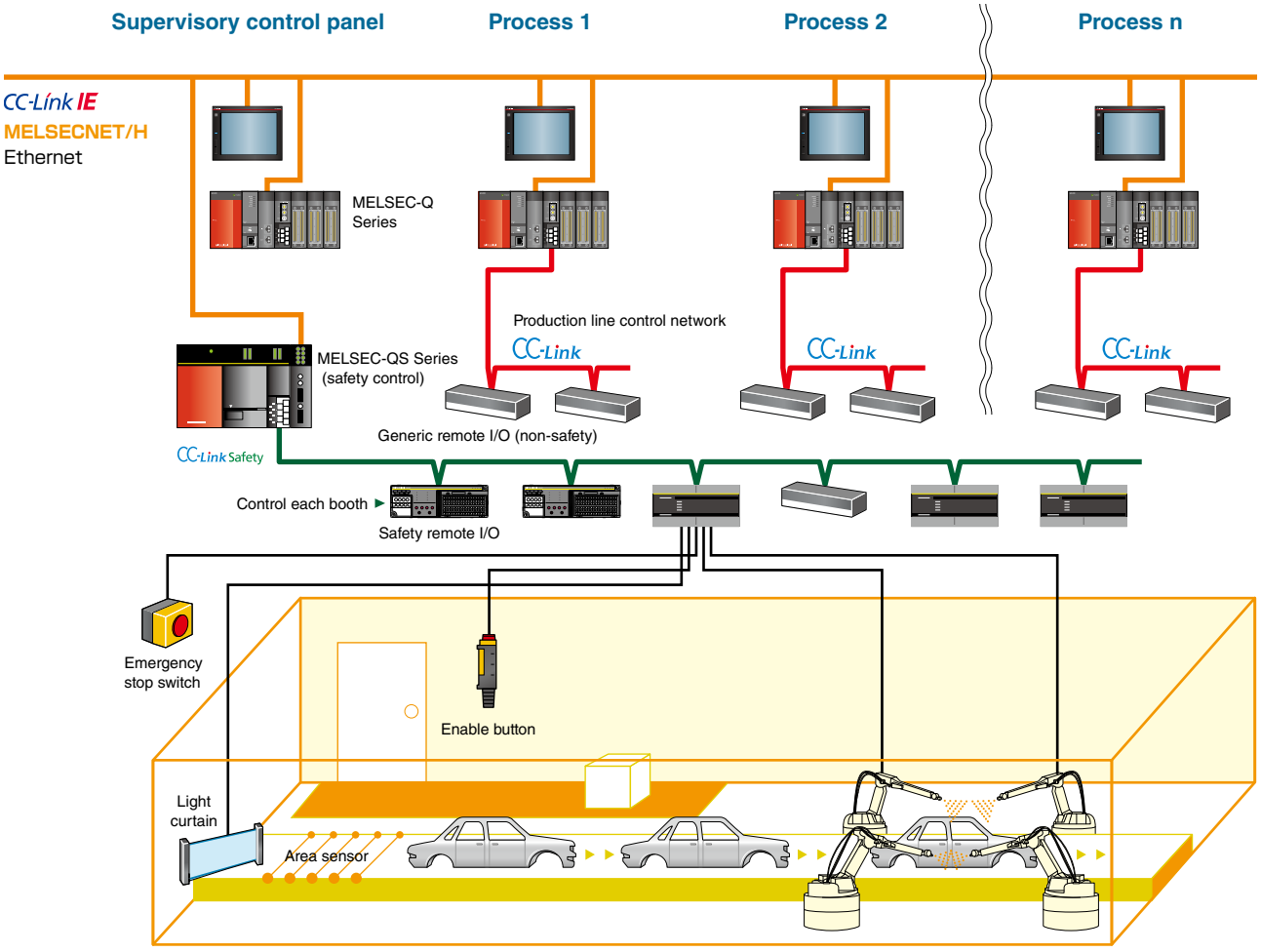
Debug functions (device test, write during RUN, etc.) are available in test mode.



Application example

■ Automotive paint line

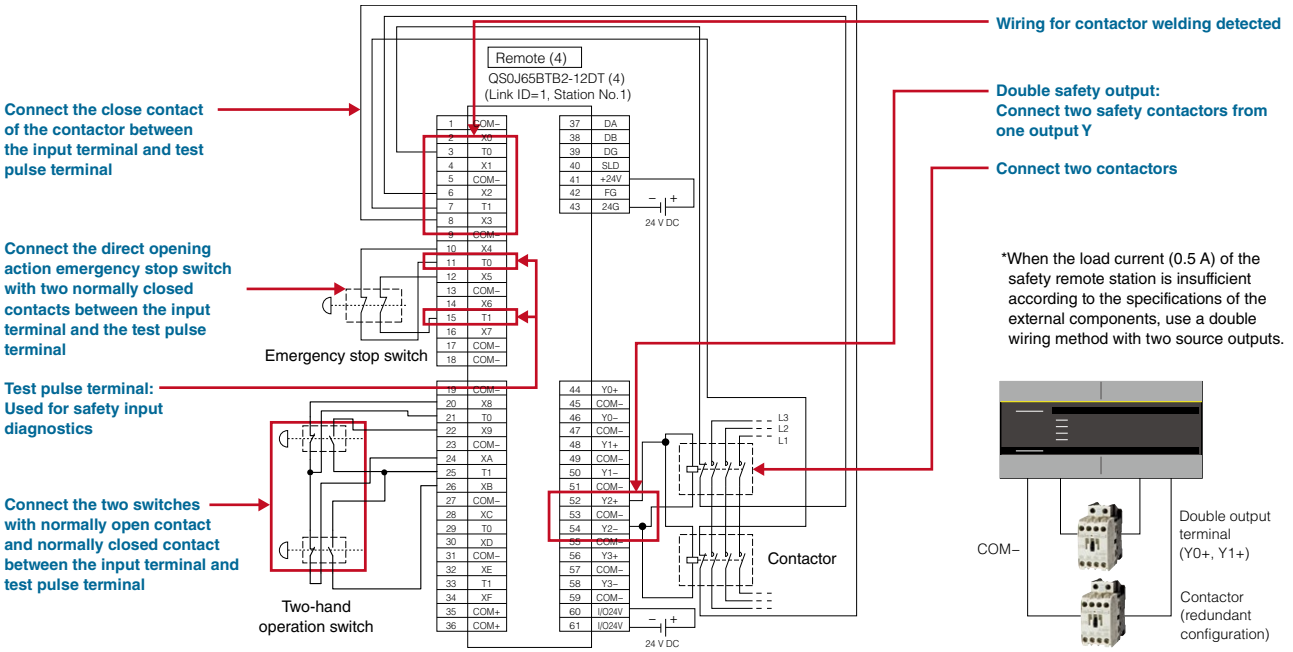
The operational condition of the paint booth and work area of a paint line can be monitored via the network ensuring safety on the paint line including multiple robots.



Wiring/parameter setting example

■ Wiring example*1

Wiring example of an emergency stop switch, a two-hand operation switch, and two contactors.



■ Parameter setting example*1

The following is an example of parameter settings when an emergency stop switch, a two-hand operation switch, and two contactors are connected. The parameters used in this example are highlighted.

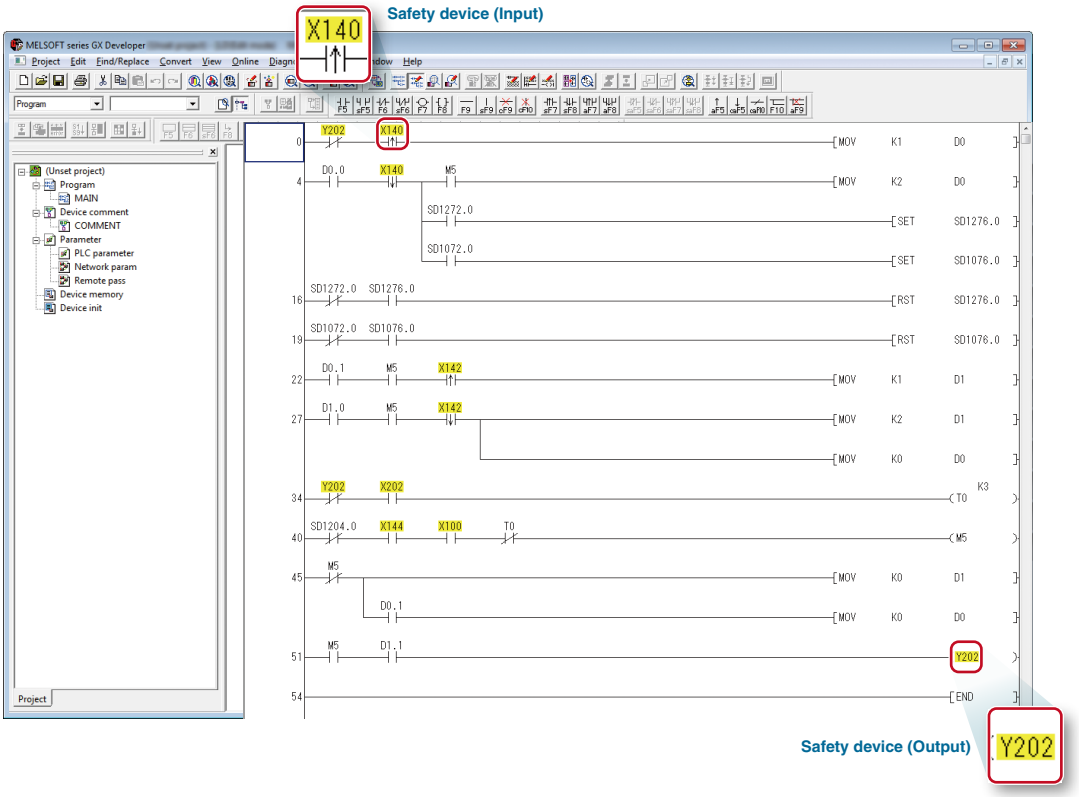
Item	Setting
Time of noise removal filter X2, X3*2	1 ms, 5 ms, 10 ms, 20 ms, 50 ms
Time of noise removal filter X4, X5*2	1 ms, 5 ms, 10 ms, 20 ms, 50 ms
Time of noise removal filter X8, X9*2	1 ms, 5 ms, 10 ms, 20 ms, 50 ms
Time of noise removal filter XA, XB*2	1 ms, 5 ms, 10 ms, 20 ms, 50 ms
Double input discrepancy detection time X2, X3*2	100 ms (Setting range: 20 ms…60 s*3)
Double input discrepancy detection time X4, X5*2	100 ms (Setting range: 20 ms…60 s*3)
Double input discrepancy detection time X8, X9*2	100 ms (Setting range: 20 ms…60 s*3)
Double input discrepancy detection time XA, XB*2	100 ms (Setting range: 20 ms…60 s*3)
Input dark test selection X2, X3	Execute, Not execute, X2*4: Execute X3*4: Not execute, X2*4: Not execute X3*4: Execute
Input dark test selection X4, X5	Execute, Not execute, X4*4: Execute X5*4: Not execute, X4*4: Not execute X5*4: Execute
Input dark test selection X8, X9	Execute, Not execute, X8*4: Execute X9*4: Not execute, X8*4: Not execute X9*4: Execute
Input dark test selection XA, XB	Execute, Not execute, XA*4: Execute XB*4: Not execute, XA*4: Not execute XB*4: Execute
Input dark test pulse OFF time	400 µs, 1 ms, 2 ms
Method of wiring of output Y2	No use, Double wiring (source + sink), Double wiring (source + source)
Output dark test selection Y2	Execute, Not execute
Output dark test pulse OFF time Y2	400 µs, 1 ms, 2 ms
Double input/single input selection X2, X3*4	Double input, X2-X3: Single input, X2: Single input X3: No use, X2: No use X3: Single input
Double input/single input selection X4, X5*4	Double input, X4-X5: Single input, X4: Single input X5: No use, X4: No use X5: Single input
Double input/single input selection X8, X9*4	Double input, X8-X9: Single input, X8: Single input X9: No use, X8: No use X9: Single input
Double input/single input selection XA, XB*4	Double input, XA-XB: Single input, XA: Single input XB: No use, XA: No use XB: Single input
Auto RTN Func to detect double input mismatch*4	Invalid, Valid

*1. For details of the wiring example and parameter setting example, refer to "Safety Application Guide (SH-080613ENG)".
*2. Adjust "Time of noise removal filter", "Input dark test pulse OFF time", and "Output dark test pulse OFF time" according to the installation environment and wiring length. Set "Double input discrepancy detection time" to "100 ms" for the mechanical switch and "20 ms" for the sensor input as a guideline.
*3. The setting range is 20 ms to 500 ms for QS0J65BTB2-12DT models prior to module technical version B. The range is 20 ms to 60 s for subsequent models.
*4. The setting is only possible for QS0J65BTB2-12DT units of technical version D or later, and QS0J65BTS2-8D units of technical version B or later.

Programming example

The MELSEC-QS Series is programmed using GX Developer. Safety programs are created with ladder diagrams (including safety FBs). Safety devices (input/output) can be highlighted in color set by user.

* For details of the programming example, refer to "Safety Application Guide (SH-080613ENG)".



MELSEC-QS Series specifications

Safety CPU module specifications

Item	QS001CPU
Program language	Relay symbol language, function blocks
Processing speed (sequence instruction) (µs)	0.10 (LD X0) 0.35 (MOV D0 D1)
Program capacity*1 (step)	14K (56 KB)
Memory capacity (KB)	Program memory (Drive 0): 128 Standard ROM (Drive 4): 128
Max. number of stored files	Program memory, Standard ROM: 3*2
Number of I/O device points	6144 (X/Y0…17FF)
Number of I/O points	1024 (X/Y0…3FF)
Weight (kg)	0.29
Degree of protection	IP2X
External dimensions (H x W x D, mm)	98 x 55.2 x 114

*1. The maximum number of executable sequence steps is calculated using the following formula: (Program capacity) - (File header size [default: 34 steps]). For details of program capacity and file, refer to the following manual. QSCPU User's Manual (Function Explanation, Program Fundamentals) (SH-080627ENG).

*2. The memory stores 1 file for each of parameter, sequence program, and device comment.

Safety power supply module specifications

Item	QS061P-A1	QS061P-A2
Input power supply (V AC)	100…120 +10% −15% (85…132)	200…240 +10% −15% (170…264)
Input frequency	50/60 Hz ±5%	
Weight (kg)	0.40	
External dimensions (H x W x D, mm)	98 x 55.2 x 115	

Safety main base unit specifications

Item	QS034B
Number of mountable I/O modules	4
Possibility of extension	Not extendable
Applicable modules	MELSEC-QS Series modules
Weight (kg)	0.28
External dimensions (H x W x D, mm)	98 x 245 x 44.1

Specifications for CC-Link IE Field Network master/local module (with Safety Communication Functions)

Item	QS0J71GF11-T2
Max. number of connectable stations per network*1	Generic station (non-safety): 121 (1 master plus 120 slave stations) Safety station: 32 (1 master plus 31 slave stations)
Weight (kg)	0.18
External dimensions (H x W x D, mm)	98 x 27.4 x 115

*1. For combining generic and safety stations, up to 121 stations can be connected per network. (Generic or safety station can be master station.)

CC-Link Safety system master module specifications

Item	QS0J61BT12
Max. number of connectable modules	64 (42 for safety remote stations)
Connection cable	Ver.1.10 compatible, CC-Link dedicated cable*2
Weight (kg)	0.12
External dimensions (H x W x D, mm)	98 x 27.4 x 90

*2. CC-Link dedicated cable (Ver.1.00) or CC-Link dedicated high-performance cable can also be used. Using a cable together with another type of cable is not allowed. Attach terminating resistors that match the cable type. Two terminating resistors (110 Ω) are included with the CC-Link Safety system master module.

CC-Link Safety system remote I/O module specifications

Item	QS0J65BTB2-12DT		
No. of input points*3	8 (double input) 16 (single input)	No. of output points	4 (source + sink type) 2 (source + source type)
Input type	Negative common (source type)	Output type	source + sink type source + source type
No. of stations occupied	1		
Degree of protection	IP2X		
Weight (kg)	0.67		
External connection method	Screw terminal block		
External dimensions (H x W x D, mm)	98 x 163 x 85		

*3. For module technical version C or earlier, the number of input points is 8 points. (The single input is not supported and two input terminals are always used for each input.)

CC-Link Safety system remote I/O module specifications

Item	QS0J65BTS2-8D	QS0J65BTS2-4T
No. of input points*4	8 (double input) 16 (single input)	-
No. of output points	-	4 (source + sink type) 2 (source + source type)
Input type	Negative common (source type)	-
Output type	-	source + sink type source + source type
No. of stations occupied	1	
Degree of protection	IP2X	
Weight (kg)	0.46	0.45
External connection method	Spring clamp terminal block	
External dimensions (H x W x D, mm)	65 x 197 x 74.5	

*4. For module technical version A, the number of input points is 8 points. (The single input is not supported and two input terminals are always used for each input.)

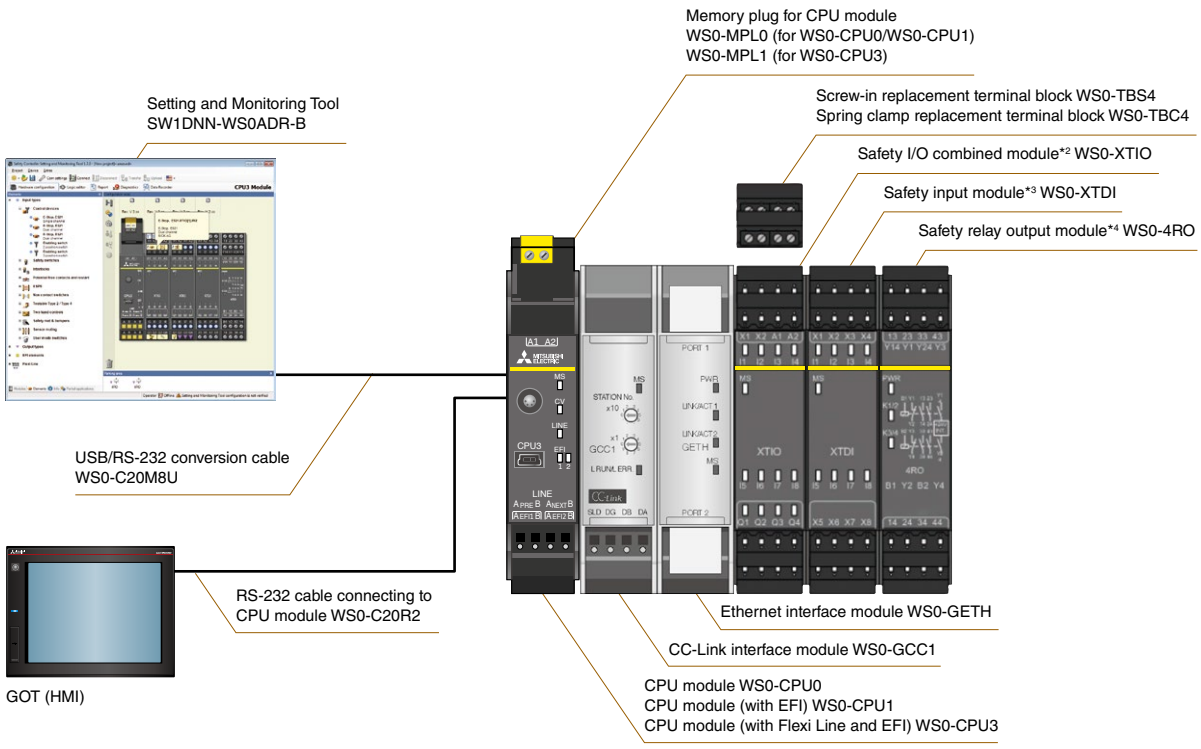
Safety Controller
MELSEC-WS Series

Safety controller MELSEC-WS Series

This compact safety controller complies with EN ISO 13849-1 Category 4/PL e and IEC 61508 SIL 3 safety standards. It is ideal for small to medium-scale safety control system. Safety I/O points can be extended to 144 points per CPU module according to the system configuration. Utilizing the dedicated Setting and Monitoring Tool*1, setup and logic creation can be easily done.

*1. For details on how to obtain the tool, please contact your local Mitsubishi Electric sales office or representative.

MELSEC-WS Series system configuration



*2. No. of input points: 8 points (single wiring), No. of output points: 4 points (single wiring)
*3. No. of input points: 8 points (single wiring)
*4. Safety relay output: 4 points

Powered by SICK

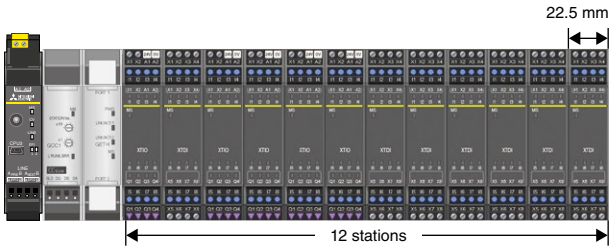
The MELSEC-WS Series was developed and manufactured by SICK AG. SICK is a German supplier of safety solutions. SICK designs and manufactures a broad range of safety products including industrial-use sensors and automatic identification systems.

* General specifications and product guarantee conditions for co-branded products may vary from those of general MELSEC products. For more information, please refer to the relevant product manuals or contact your local Mitsubishi Electric sales office or representative.

SICK AG http://www.sick.com/

Flexible extensibility

- Up to 12 safety input and I/O modules, 4 safety relay output modules, and 2 network modules can be installed
- I/O points can be extended to 144 points (single input). Safety input: 96 points (single input) and safety output: 48 points (single output)

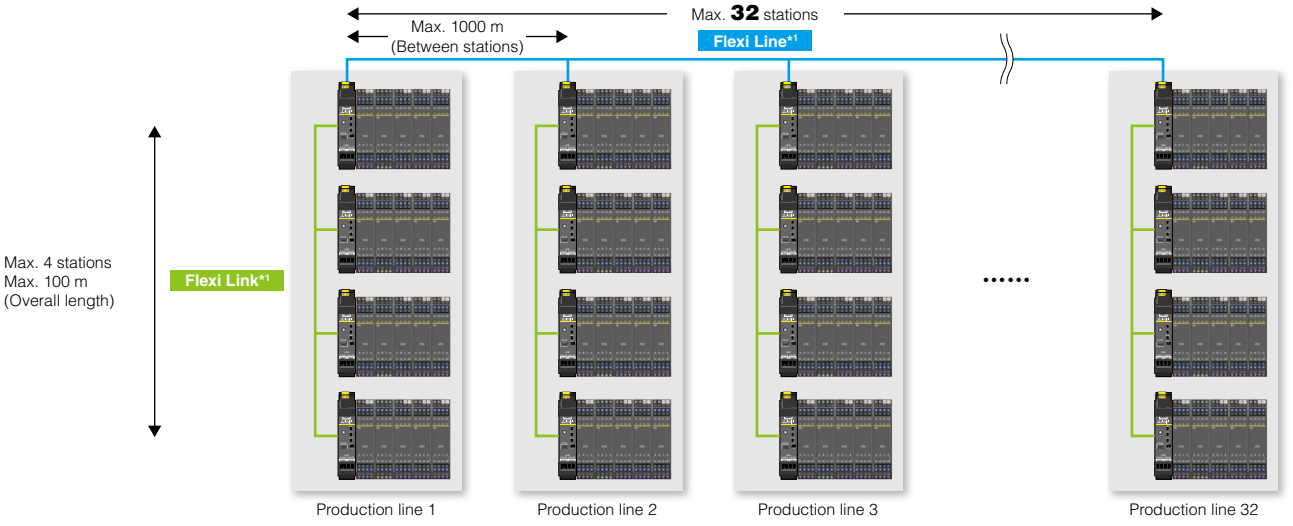


Fast shut off function realizing a response time of 8 ms

Fast shut off function that enables the safety I/O module to shut off safety output without going through the CPU module realizes a response time of 8 ms. This system can shorten safety distances in the safety system.

Flexi Line/Flexi Link
Safety communication network between safety controllers

Safety communications between safety controllers can be easily established at a low cost just by connecting the CPU modules with dedicated cables. Safety communication is realized without a dedicated network module, allowing utilization in various production site. In addition, coordination between multiple devices is possible, improving production system safety.



*1. Flexi Line is supported by WS0-CPU3 only and Flexi Link is supported by WS0-CPU1 and WS0-CPU3 only. For details about network specifications, refer to page 11.

Safety control can be easily added to existing MELSEC PLCs (CC-Link/Ethernet)

Connecting the safety controller to CC-Link, safety control can be performed with the existing MELSEC iQ-R/Q/L module. Furthermore, operation status and error status of the safety controller can be monitored with the existing MELSEC iQ-R/Q/L module. This helps quickly identifying the factor of emergency stop and faulty equipment.

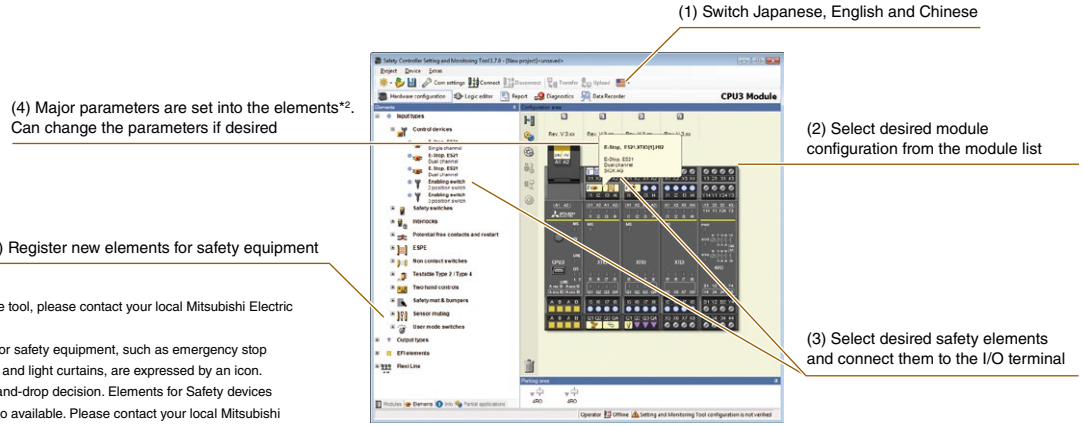
Applicable functions with network interface

	CC-Link (WS0-GCC1)	Ethernet (WS0-GETH)
PLC/PC		
Monitoring information	●	●
Notification data	●	●
Setting and Monitoring tool		
Connection via network	-	●

Dedicated "Setting and Monitoring Tool*1" provides intuitive system configuration environment

■ Configuration

Hardware configuration can be easily and quickly done using a wide range of elements.

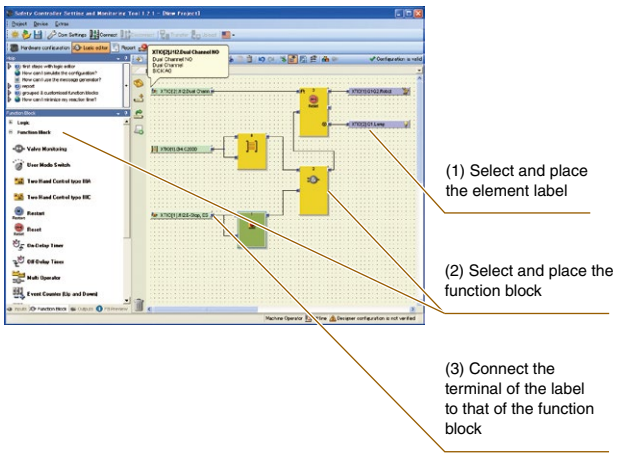


*1. For details on how to obtain the tool, please contact your local Mitsubishi Electric sales office or representative.

*2. Connecting parameters of major safety equipment, such as emergency stop switches, safety door switches and light curtains, are expressed by an icon. Make settings simply by drag-and-drop decision. Elements for Safety devices of Mitsubishi's partners are also available. Please contact your local Mitsubishi representative.

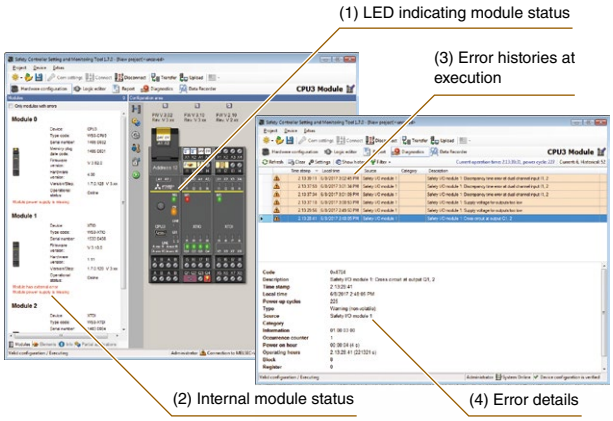
■ Logic Editor

Elements connected to the I/O terminal are automatically labeled, enabling logic creation easier using labels and function blocks.



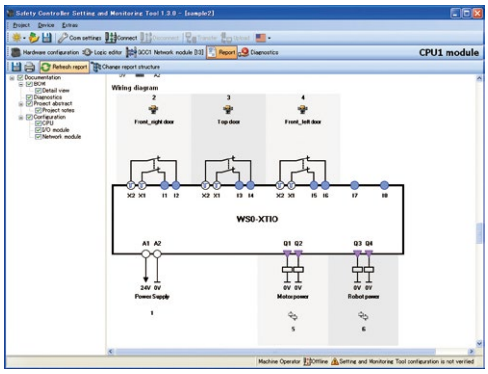
■ Diagnosis/monitor

Monitoring of the internal status of modules and error histories is possible.



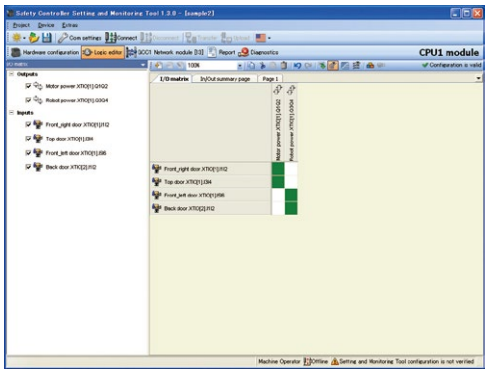
■ Report

The wiring diagram for I/O modules can be automatically created. Report such as error diagnosis can be created, printed, and saved as PDF.



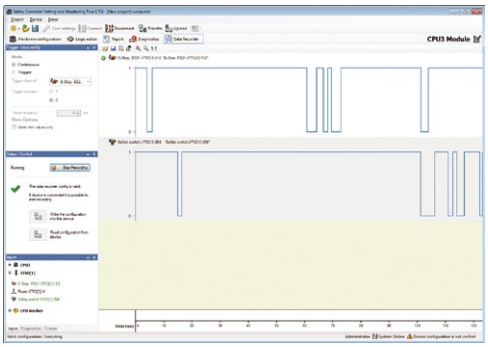
■ I/O matrix

The relation of inputs and outputs can be displayed as a matrix.



■ Data recorder

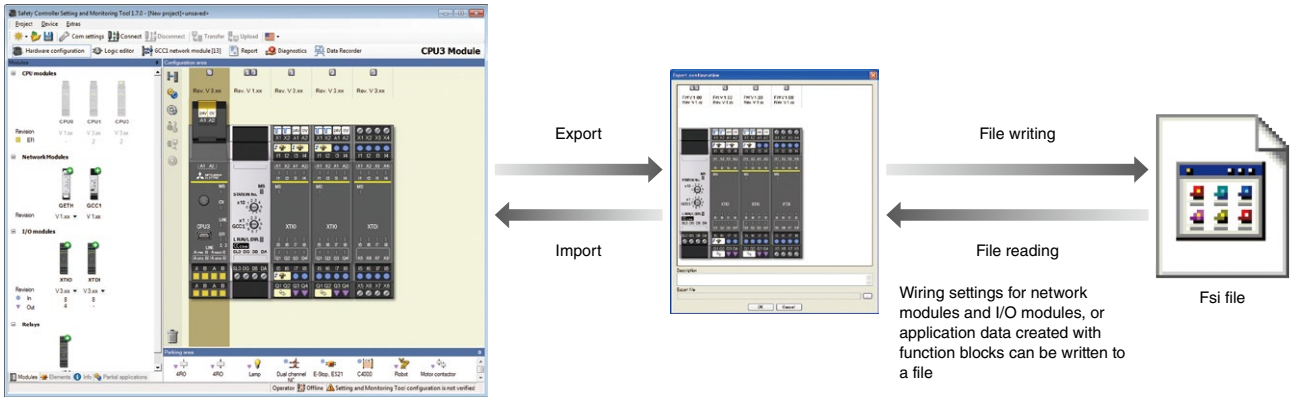
ON/OFF status of safety input signal and safety output signal processed by the safety controller can be stored.*1 Results recorded on the Setting and Monitoring Tool can also be viewed on the computer to utilize for troubleshooting.



*1. Available when a CPU module with firmware version of V2.01 (revision 2.XX) or later and a Setting and Monitoring Tool of V1.7.0 or later are used together.

■ Import and export of logic

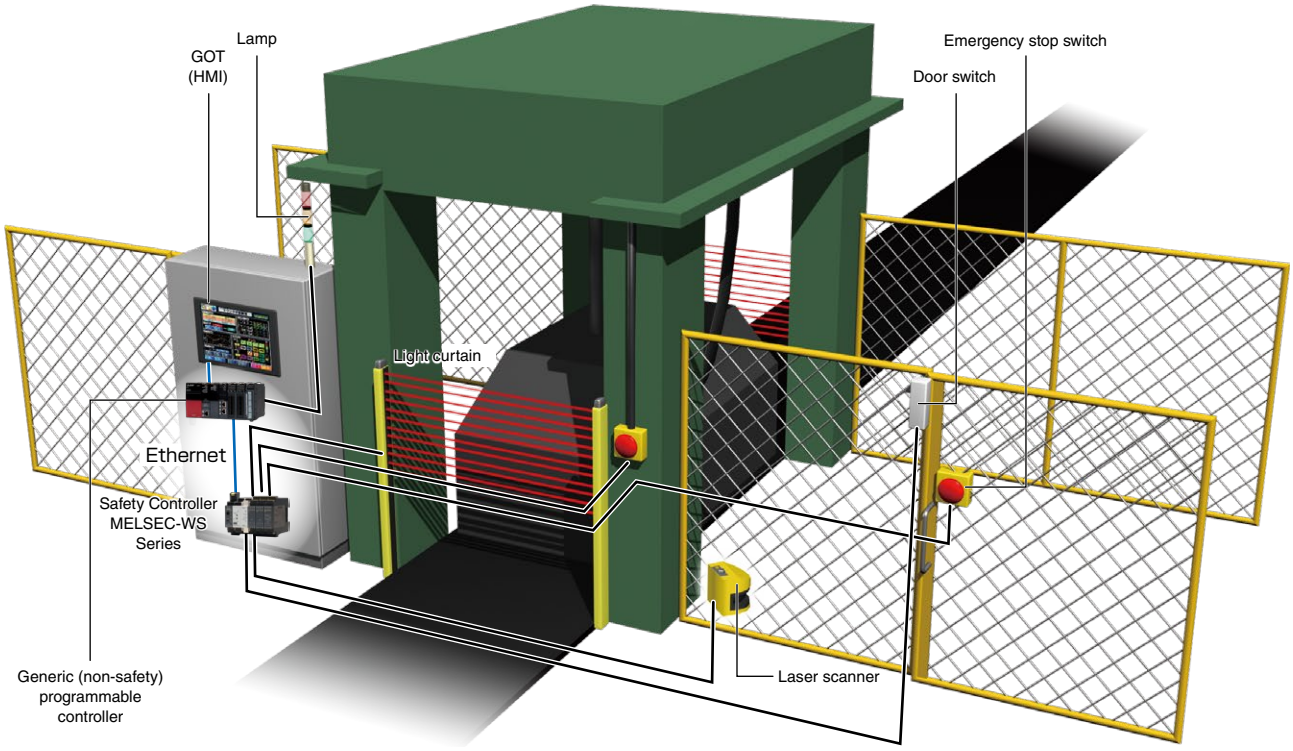
The connection settings to the I/O modules or application logic created with function blocks can be stored in a single setting file, and data can be read out of stored setting files.



Application example

■ Press machine

The MELSEC-WS Series secures safety of standalone devices such as press machine. The MELSEC-WS Series are compact controllers with flexible features such as extendable I/Os, safety communication between CPUs, communication with a generic programmable controller, and fast shut off function realizing faster response times.



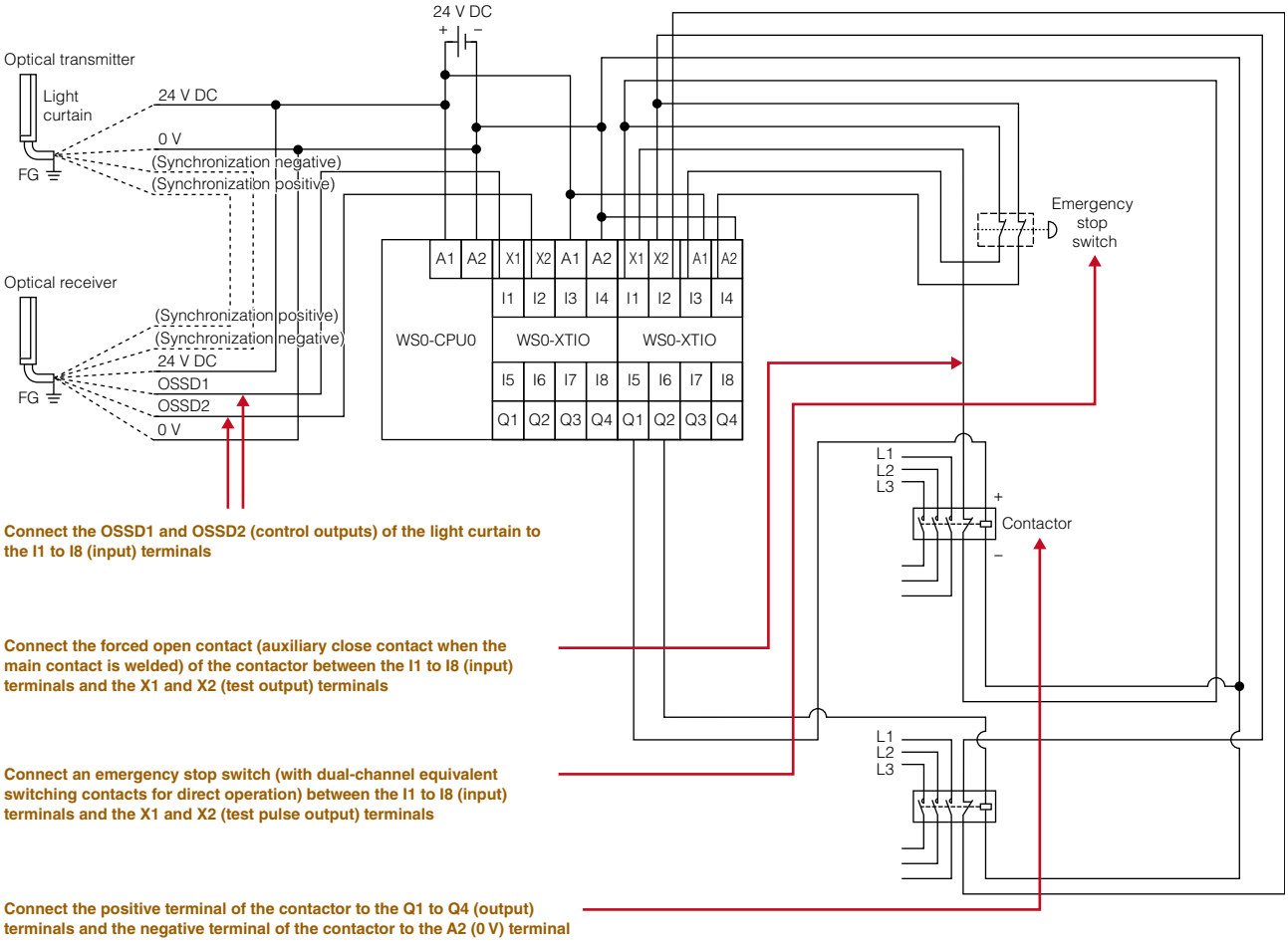
• Incorporating the MELSEC-WS Series into the existing system can easily add safety functions

Wiring/parameter setting example

■ Wiring example

Wiring example of light curtain, emergency stop switch, and safety contactor.

* For details of the wiring example, refer to "Safety Controller User's Manual (SH-080855ENG)".



Connect the OSSD1 and OSSD2 (control outputs) of the light curtain to the I1 to I8 (input) terminals

Connect the forced open contact (auxiliary close contact when the main contact is welded) of the contactor between the I1 to I8 (input) terminals and the X1 and X2 (test output) terminals

Connect an emergency stop switch (with dual-channel equivalent switching contacts for direct operation) between the I1 to I8 (input) terminals and the X1 and X2 (test pulse output) terminals

Connect the positive terminal of the contactor to the Q1 to Q4 (output) terminals and the negative terminal of the contactor to the A2 (0 V) terminal

■ Parameter setting example

The following is an example of parameter settings when an emergency stop switch is connected.

Safety element

When wiring the safety element, click the check box

ON-OFF filter

Enabling the ON-OFF filter (or OFF-ON filter) can prevent influences by minor disturbance of signals generating at turning on and off of element

Filter time

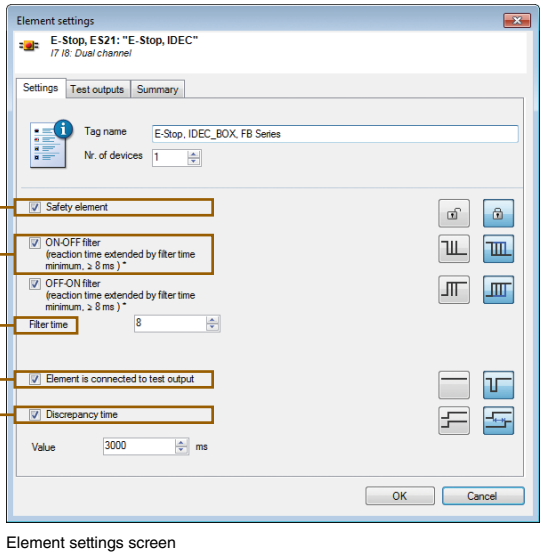
Filter time can be set in the range of 8 to 10000 ms
(WS0-XTIO and WS0-XTDI should be V 3.10 or later)

Element is connected to test output

Determine whether the respective element shall be tested or not by activating or deactivating the option

Discrepancy time

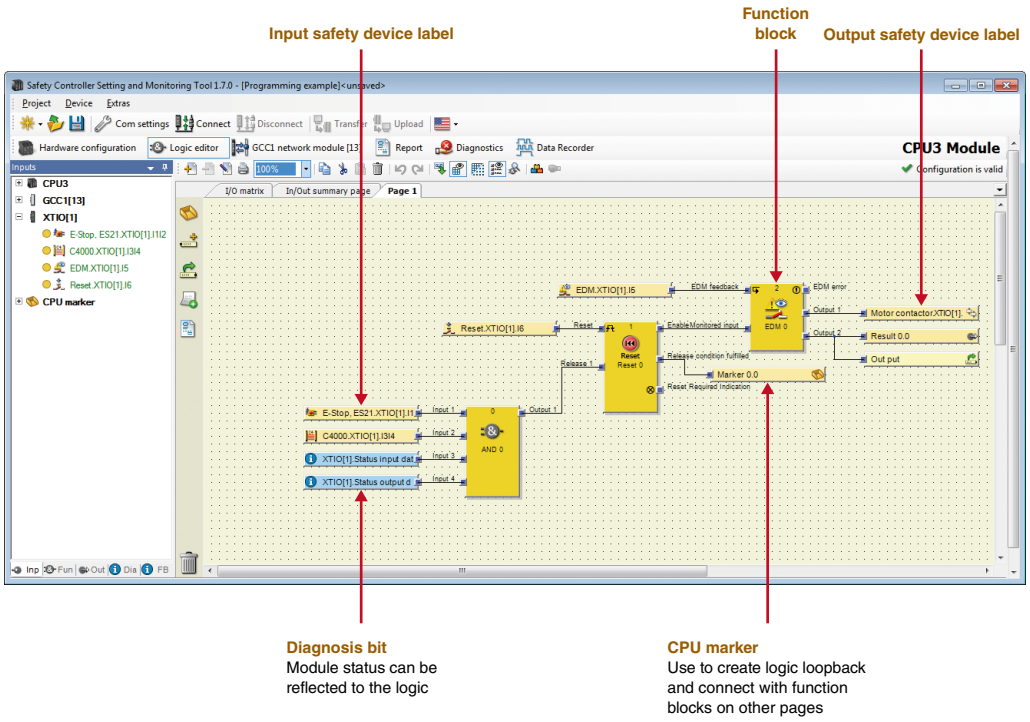
The discrepancy time can be selected for dual channel elements. When this setting is enabled, discrepancy time can be set to the multiple of 4 ms (within the range from 4 ms to 30 s). The discrepancy time defines for how long the two inputs may have discrepant values after one of the both input signals has changed without this being considered as an error



Element settings screen

Programming example

The MELSEC-WS Series is easily programmed using the Setting and Monitoring Tool. By utilizing function blocks, logic can be created. Simply drag & drop input and output safety device labels and function blocks, then wire function block terminal and label to create a safety program. Diagnosis bit and CPU marker can be also used. Parameters and programs written from the Setting and Monitoring Tool are stored in the memory plug for the CPU module, without having to upload parameters and programs after replacing the CPU module.



Diagnosis bit
Module status can be reflected to the logic

CPU marker
Use to create logic loopback and connect with function blocks on other pages

MELSEC-WS Series specifications

CPU module specifications

Item	WS0-CPU0	WS0-CPU1	WS0-CPU3
Category	Category 4 (EN ISO 13849-1)		
Safety Integrity Level (SIL)	SIL 3 (IEC 61508)		
Performance Level (PL)	PL e (EN ISO 13849-1)		
PFHd (probability of a dangerous failure per hour)	1.07×10^{-9}	1.69×10^{-9}	
Degree of protection (EN/IEC 60529)	Terminals: IP20, Housing: IP40		
EMC	EN 61000-6-2, EN 55011 (Class A)		
Protection class	3		
Number of EFI interfaces	0	2	
Number of Flexi Line interfaces	0		2
Configuration interface	RS-232		RS-232, USB
Weight (kg)	0.11	0.12	0.13
External dimensions (H x W x D, mm)	96.5 x 22.5 x 120.8	101.7 x 22.5 x 120.8	

CC-Link interface module specifications

Item	WS0-GCC1
Station type	Remote device station
CC-Link version	Ver.1.10
Number of stations occupied	1…4
Max. number of connectable modules	Max. 64 stations (number of stations connectable to one master station)
Connection cable	Ver.1.10 compatible CC-Link dedicated cable
Degree of protection (EN/IEC 60529)	Terminals: IP20, Housing: IP40
External dimensions (H x W x D, mm)	96.5 x 22.5 x 120.8

Ethernet interface module specifications

Item	WS0-GETH
Network type	Ethernet (TCP/IP) 100Base-TX 10Base-T
Number of connections	Max. 4 connections + 1 connection (for Setting and Monitoring Tool only)
Degree of protection (EN/IEC 60529)	Terminals: IP20, Housing: IP40
External dimensions (H x W x D, mm)	96.5 x 22.5 x 120.8

Safety input and I/O combined modules specifications

Item	WS0-XTIO	WS0-XTDI
Category	Category 4*1 (EN ISO 13849-1)	Category 4 (EN ISO 13849-1)
Safety Integrity Level (SIL)	SIL 3 (IEC 61508)	
Performance Level (PL)	PL e (EN ISO 13849-1)	
PFHd	0.9×10^{-9} (for dual channel outputs) 4.8×10^{-9} (for single channel outputs)	0.4×10^{-9}
Degree of protection (EN/IEC 60529)	Terminals: IP20, Housing: IP40	
EMC	EN 61000-6-2, EN 55011 (Class A)	
Protection class	3	
Weight (kg)	0.16	0.14
Number of input points	8 (single), 4 (double)	
Number of output points	4 (single), 2 (double)	-
External dimensions (H x W x D, mm)	106.5 x 22.5 x 120.8	

*1. It depends on the connection and setting methods with safety output devices. Please refer to the manual for the details.

Safety relay output module specifications

Item	WS0-4RO
Category	Category 4 (EN ISO 13849-1)
Safety Integrity Level (SIL)	SIL 3 (IEC 61508)
PFHd	1.2×10^{-9} (I = 0.75 A, switching frequency = h^{-1})*2
Degree of protection (EN/IEC 60529)	Terminals: IP20, Housing: IP40
EMC	EN 61131-2, EN 61000-6-2, EN 55011 (Class A)
Weight (kg)	0.19
Output circuit specs (13-14, 23-24, 33-34, 43-44)	
Number of NO contacts	2 (double output)
Output circuit specs (Y1-Y2, Y3-Y4)	
Number of NC contacts	2
Output circuit specs (Y14, Y24)	
Number of NO contacts	2
External dimensions (H x W x D, mm)	106.5 x 22.5 x 120.8

*2. It depends on output current or other output values. Please refer to the manual for the details.

Safety Drive Products

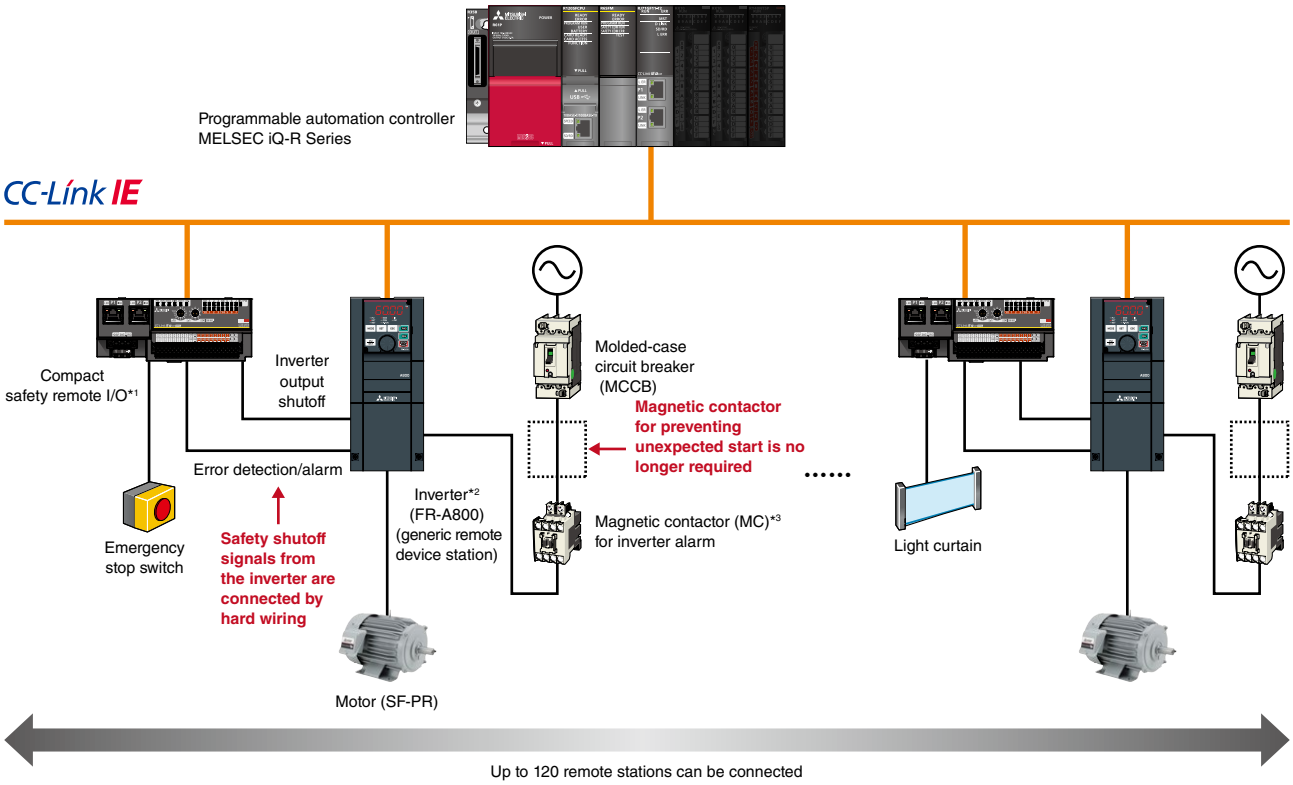
Inverter FR-A800 Series

■ Achieve safety standards at low cost

- The FR-A800 Series inverters comply with the STO (Safe Torque Off) safety function. Inverters with safety function achieve the safety standards at low cost
- By connecting with a programmable automation controller or a safety controller, operation of an emergency stop switch can immediately shut off the inverter output to the motor
- Turning off the main control power of inverter is not required, reducing the time for restart
- Magnetic contactor for preventing unexpected motor start is not required

*** For details of inverters, please refer to FR-A800 Series catalog (L (NA) 06075ENG), FR-F800 Series catalog (L (NA) 06085ENG), FR-E700 Series catalog (L (NA) 06051ENG), and FR-D700 Series catalog (L (NA) 06055ENG).**

■ System configuration



IEC/EN 61800-5-2: 2007 function	Description
STO (Safe torque off)	SIL 2, Category 3/PL d

*1. Safety communication is enabled between the programmable automation controller and safety remote I/O.

*2. Safety communication is not enabled between the programmable automation controller and the inverter.

*3. A magnetic contactor is not required when STO function is used. However, in this system configuration, one magnetic contactor is used to shut off the power at alarm occurrence.

Industrial robot MELFA FR Series

■ Operators can enter an operation area without stopping robots

- The safety input function enables safety doors to open without causing an emergency stop of the robot. Robot's automatic operation continues even with a safety fence opened
- While an operator is in a cooperative operation area, a robot does not approach the area (Operation range limit function). Operators and robots can share an operation area, enabling cooperative operation
- A robot in cooperative operation continues its operation at the safety speed to secure operator's safety
- Closing the safety door switches cooperative operation to single operation, and enables the robot to approach to the shared area
- Safety features are compliant with international standards, realizing enhanced safety

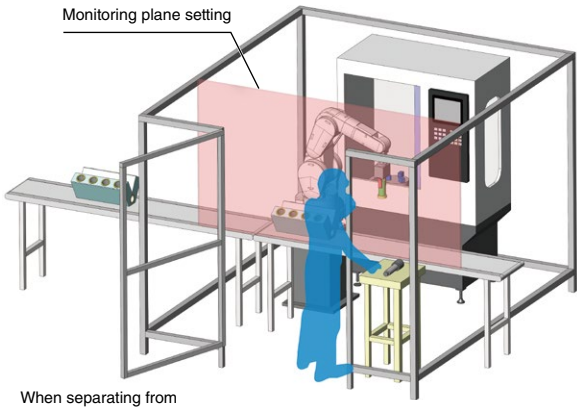
*** For details, refer to the MELFA FR Series catalogue (L (NA)-09091ENG).**

IEC/EN 61800-5-2: 2007 function	Description
STO (Safe torque off)	SIL 2, Category 3/PL d
SS1 (Safe stop 1)	
SLS (Safely-limited speed)	
SLP (Safely-limited position)	
STR (Safe torque range)	

■ Examples of safety options

The operator operation area and robot operation area are separated each other with a monitoring plane for safety

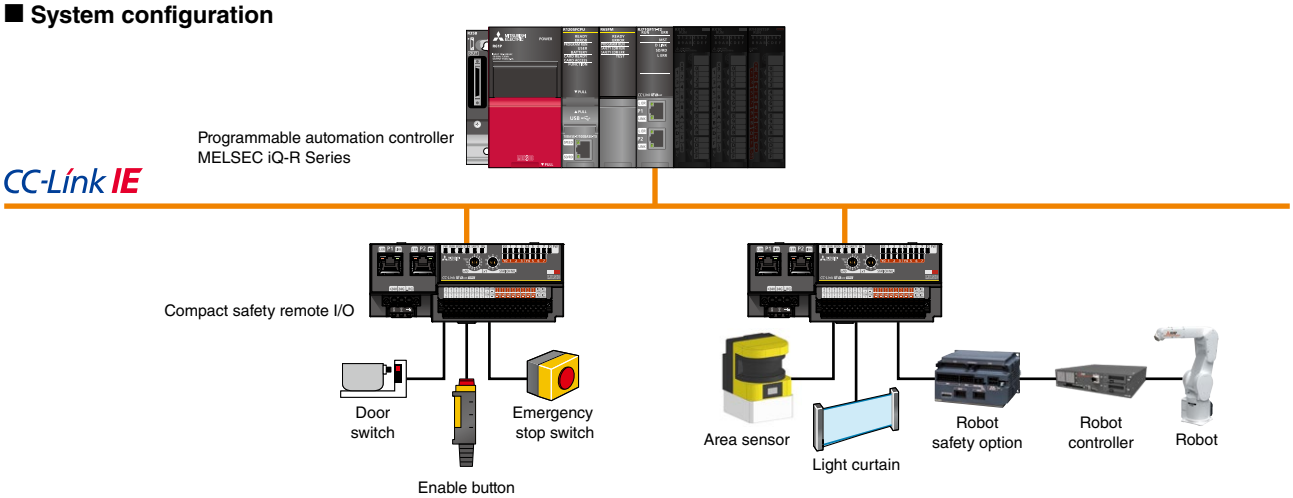
- The robot operates at high speed while the safety fence is close
- While the safety fence is open, the robot continues its operation at low speed inside the monitoring plane. The operator can perform inspection inside the safety fence and outside the monitoring plane



Area sensors secure the safety without safety fence

- When the operator enters the limit area, the robot operation speed is limited
- Further, the operator approaches to the stop area, the robot stops its operation

■ System configuration



Safety components partner products

IDEC

Providing safety devices to cover a wide range of requirements, assuring a safe environment for operators and machines

By thoroughly pursuing safety of environment where operators and machines work together, IDEC Corporation develops products and proposes system giving safety top priority to ensure personnel safety even if machines become faulty or operators make a mistake. To support safety and productivity, IDEC provides a variety of functional safety products. Along with proposals concerning safety related devices and safety systems according to risk, safety awareness and consulting activities help enhance safety at production sites.

Interlock switches
HS3, HS5, HS6

Interlock switches allow a machine to start only when the guard is closed or the closed guard is locked.

Safety laser scanner SE2L
Safety light curtains SE4D

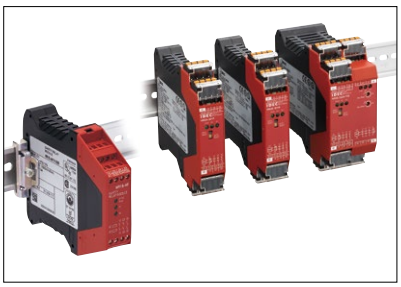
Light beams and laser beams are used to safeguard personnel. New model laser scanner is the world smallest with safety protection zone of 5 m and 270°. High functional model configurable using Master and Slave configuration.

Emergency stop switches
XA, XW, XN

IDEC original technology realizes the safety level higher than the international standard requirements. These switches are ideal for safety system configuration.

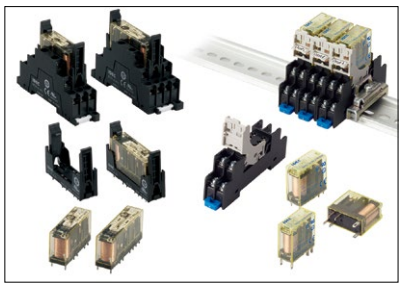
Enabling switches
HE2B, HE3B, HE6B, HE2G

Safety devices for preventing unexpected starting of a machine when operation is required in the hazardous area inside the guard.



Safety relay modules
HR1S-AF, HR2S

Detects safety circuit fault such as signal discrepancy of emergency stop switch, safety switch, and enabling switch. Use these modules for control required for Category 3 or higher.



Force guided relays
RF1, RF2

Detects contact welding. IDEC Corporation is the only one manufacturer providing 2-, 4- and 6-pole force guided relays in Japan.

IDEC CORPORATION

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Germany	IDEC Elektrotechnik GmbH	Tel: +49-40-25 30 54 - 0	service@eu.idec.com	**China/Shanghai**	IDEC (Shanghai) Corporation	Tel: +86-21-6135-1515	idec@cn.idec.com
Singapore	IDEC Izumi Asia Pte. Ltd.	Tel: +65-6746-1155	info@sg.idec.com	**China/Shenzhen**	IDEC (Shenzhen) Corporation	Tel: +86-755-8356-2977	idec@cn.idec.com
Thailand	IDEC Asia (Thailand) Co., Ltd	Tel: +66-2-392-9765	sales@th.idec.com	**China/Beijing**	IDEC (Beijing) Corporation	Tel: +86-10-6581-6131	idec@cn.idec.com
Australia	IDEC Australia Pty. Ltd.	Tel: +61-3-8523-5900	sales@au.idec.com	**Japan**	IDEC Corporation	Tel: +81-6-6398-2527	marketing@idec.co.jp
Taiwan	IDEC Taiwan Corporation	Tel: +886-2-2698-3929	service@tw.idec.com				

SICK
Sensor Intelligence.

State-of-the-art safety system satisfying the international standard

Other than efficiency and high-speed performance, operational safety is fundamental requirement of factory automation. At a factory where machines operate, safety measure needs to be taken in the blind zones around machines. SICK safety system is the ideal products for machinery safety. The product lineups include advanced products which meet high safety standard of Europe such as safety light curtains and safety laser scanners, etc. These best-in-class products in Europe provide strong support to customers worldwide.

Safety light curtain
deTec4 Core

Simple assembly with innovative mounting. Up to 10 m scanning range, ambient operating temperature of -30 °C to +55 °C. Flexi Loop-compatible M12 (5 pin) male connector.

Safety laser scanner
microScan3 Core

High level of prevention against tampering Innovative safe HDDM scanning technology. Scan angle: 275°, scanning range: 4.0 m, 5.5 m. Realizes reliable performance immune to ambient light and dust.

Transponder safety switches
STR1

High level of prevention against tampering. Universally coded, uniquely coded, and permanently coded sensors are available. Fast diagnostics via LED status indicator. OSSDs safety outputs type.

Safety light curtain
deTec4 Prime

Upper range model designed further developing the product concept of deTec4 Core. Cascade connection up to three devices. Scanning range up to 30 m.

Safety laser scanner
S300 Mini Remote

Ultra-compact housing dimensions. Scan angle: 270°, scanning range: 2.0 m, 3.0 m. Up to 4 devices can be connected to the MELSEC-WS Series safety controller via EFI interface.

Magnetic safety switches
RE1, RE2

Robust and long product life cycle with less maintenance design. Compact housing can be installed with a minimum use of space.

SICK AG

Erwin-Sick-Str. 1 79183 Waldkirch Germany TEL: +49 (0)7681 202-0 http://www.sick.com

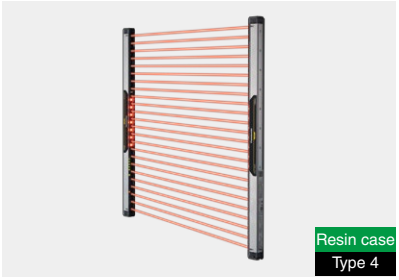
Panasonic

Diverse lineup of variety of safety light curtains and safety sensors

Safety regulations have been implemented around the world and safety product designs according to the risk level is the fundamental requirement. Panasonic Industrial Devices SUNX's safety light curtains and safety sensors, with their concept of "support for both safety and productivity", keep evolving and are available in a wide variation through extensive global distribution network.

Safety light curtain
SF4D Series

The SF4D Series are standard safety light curtains featuring robust and high-performance, and available from variety of types supporting minimum sensing object, Japanese press, etc.



Compact safety light curtain
SF4B-C Series

Realizes "compact", "light", and "optimum cost". Mounts flush on aluminum frames. Compact profile design, maximize the machinery opening area.

Ultra-slim safety light curtain
SF4C Series

Ultra-slim type with a slimness of 13 mm. Finger type with a shorter safety distance fits into a smaller equipment.

Ultra-slim safety light curtain
SF2C Series

Competitive priced Type 2 has been added to the Ultra-slim type Series with a slimness of 13 mm. Reduces wiring and adjusting beam axis is easy.

Safety beam sensor
ST4 Series

Safety beam sensor that can be used from a single beam axis. A standard sensor size can ensure safety in a narrow area.

Safety liquid leak sensor
SQ4 Series

Controls abnormal liquid leak in two stages. Improves productivity and ensures safety of personnel.

Panasonic Industrial Devices SUNX Co., Ltd. **Global Sales Department**
TEL: +81-568-33-7861 FAX: +81-568-33-8591 http://panasonic.net/id/pidsx/global

EUCHNER

EUCHNER - More than Safety

EUCHNER is a pioneer and world leader for Safety Systems for safeguarding humans and processes machine doors and safety guards. For more than 60 years, EUCHNER has been developing and producing high-quality electromechanical and electronic systems. Industrial safety engineering is our core business. Our safety switches and electronic key system reliably safeguard and monitor safety doors on machines and installations. We help to minimize risks and to increase product quality and productivity.

Multifunctional Gate Box MGB

Among safeguarding against dangerous machine movements, the MGB combines integrated operating functions with a simple and robust design. Intuitive operation is guaranteed.

Transponder-coded safety switches with guard locking CET/CTP/CEM

Safety switches with guard locking are used to prevent unintentional opening of a safety doors or covers while dangerous machine movements are being performed.

Transponder-coded safety switches with guard locking CES

CES safety switches monitor safety doors and covers on machines and installations. Depending on the application, various technologies and functional principles are available.

Key Adapter for external Transponder-coded evaluation CKS

CKS provides enhanced key reading for safety applications in PL e category4. Versatile use, e.g. as a lockout mechanism, authorization for selecting operating modes, key transfer system.

Electronic-Key-System EKS

Typical applications for the EKS are the controlling and management of access rights for machinery. The EKS is an open system specifically designed for industrial use.

Enabling switches ZS

Enabling switches are used wherever personnel must work in the danger area on machines and installations. The robust and ergonomic design is suitable for numerous applications.

EUCHNER GmbH + Co. KG KohlhammerstraBe 16 D-70771 Leinfelden-Echterdingen
TEL: +49 711 7597-0 FAX: +49 711 753316 http://www.euchner.de

Factory Automation Global website

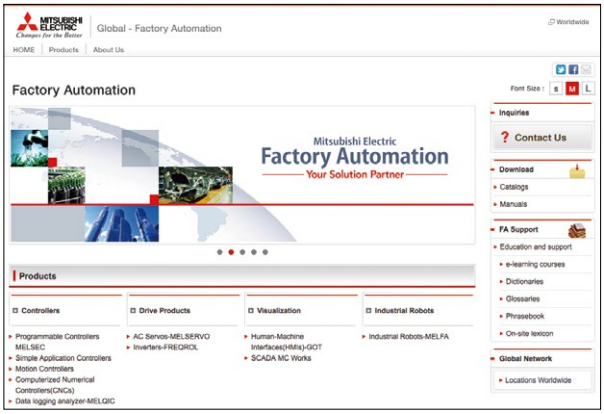
Mitsubishi Electric Factory Automation provides a mix of services to support its customers worldwide. A consolidated global website is the main portal, offering a selection of support tools and a window to its local Mitsubishi Electric sales and support network.

■ From here you can find:

- Overview of available factory automation products
- Library of downloadable literature
- Support tools such as online e-learning courses, terminology dictionary, etc.
- Global sales and service network portal
- Latest news related to Mitsubishi Electric factory automation

Mitsubishi Electric Factory Automation Global website:

www.MitsubishiElectric.com/fa



Online e-learning

An extensive library of e-learning courses covering the factory automation product range has been prepared. Courses from beginner to advanced levels of difficulty are available in various languages.

■ Beginner level

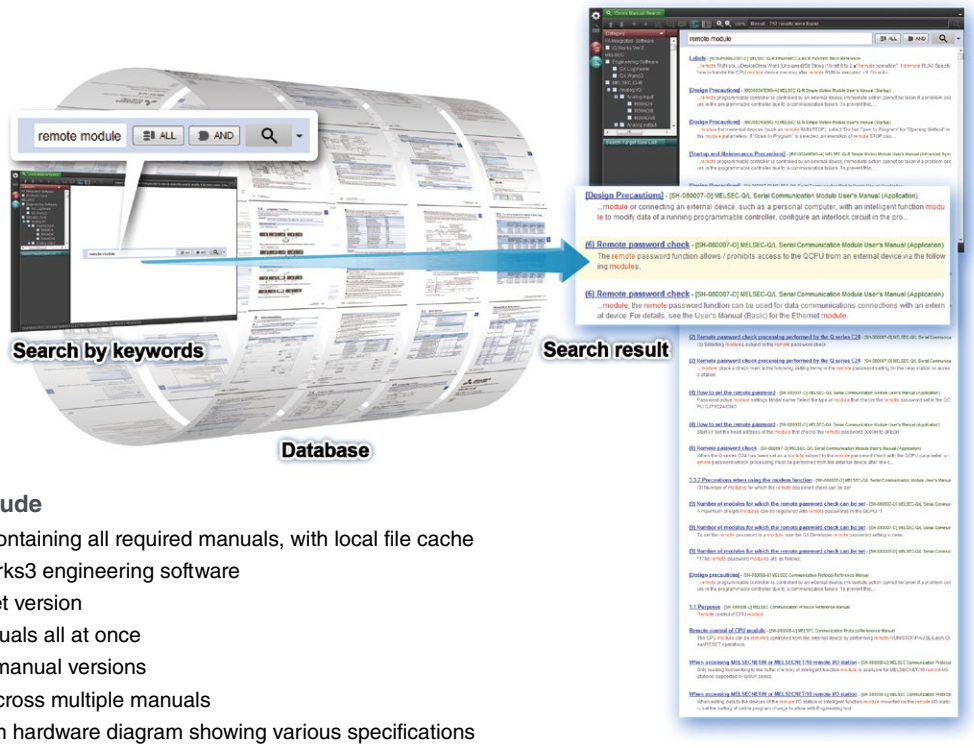
Designed for newcomers to Mitsubishi Electric Factory Automation products gaining a background of the fundamentals and an overview of various products related to the course.

■ Basic to Advanced levels

These courses are designed to provide education at all levels. Various different features are explained with application examples providing an easy and informative resource for in-house company training.

Innovative next-generation, e-Manual

The e-Manual viewer is a next-generation digital manual offered by Mitsubishi Electric that consolidates all manuals into an easy-to-use package with various useful features integrated into the viewer. The e-Manual is modeled around a centralized database allowing multiple manuals to be cross-searched at once, further reducing the time for reading individual product manuals when setting up a control system.



■ Key features include

- One-stop database containing all required manuals, with local file cache
- Included with GX Works3 engineering software
- Also available in tablet version
- Easily download manuals all at once
- Automatic update of manual versions
- Search information across multiple manuals
- Visual navigation from hardware diagram showing various specifications
- Customizable by adding user notes and bookmarks
- Directly port sample programs within manuals to GX Works3

■ MITSUBISHI ELECTRIC FA e-Manual (tablet version)

The e-Manual application is available on iOS and Android™ tablets.
e-Manual files are provided as in-app downloads.

iOS
Version 8.1 or later
Download on the App Store

Android™
Version 4.3/4.4/5.0
GET IT ON Google Play

■ Supported versions

OS	OS version	Model
iOS	iOS 8.1 or later	Apple iPad 2, iPad (3rd generation), iPad (4th generation), iPad Air, iPad Air 2, iPad mini, iPad mini 2, iPad mini 3, iPad mini 4, iPad Pro (12.9 inch), iPad Pro (9.7 inch)
Android™	Android™ 4.3/4.4/5.0	ASUS Nexus7™ (2013)*1

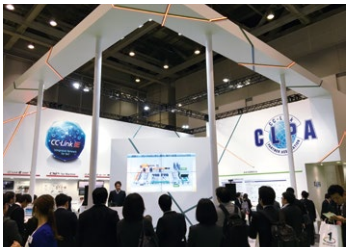
*1. When using a tablet not listed above, 7-inch (resolution of 1920 x 1200 dots (WUXGA)) or better is recommended.

CC-Link Partner Association (CLPA) - Actively promoting worldwide adoption of CC-Link networks

Proactively supporting CC-Link, from promotion to specification development

The CC-Link Partner Association (CLPA) was established to promote the worldwide adoption of the CC-Link open-field network. By conducting promotional activities such as organizing trade shows and seminars, conducting conformance tests, and providing catalogs, brochures and website information, CLPA activities are successfully increasing the number of CC-Link partner manufacturers and CC-Link-compatible products. As such, CLPA is playing a major role in the globalization of CC-Link.

Seminar



Trade show

Conformance testing lab

Visit the CLPA website for the latest CC-Link information.

URL:www.cc-link.org

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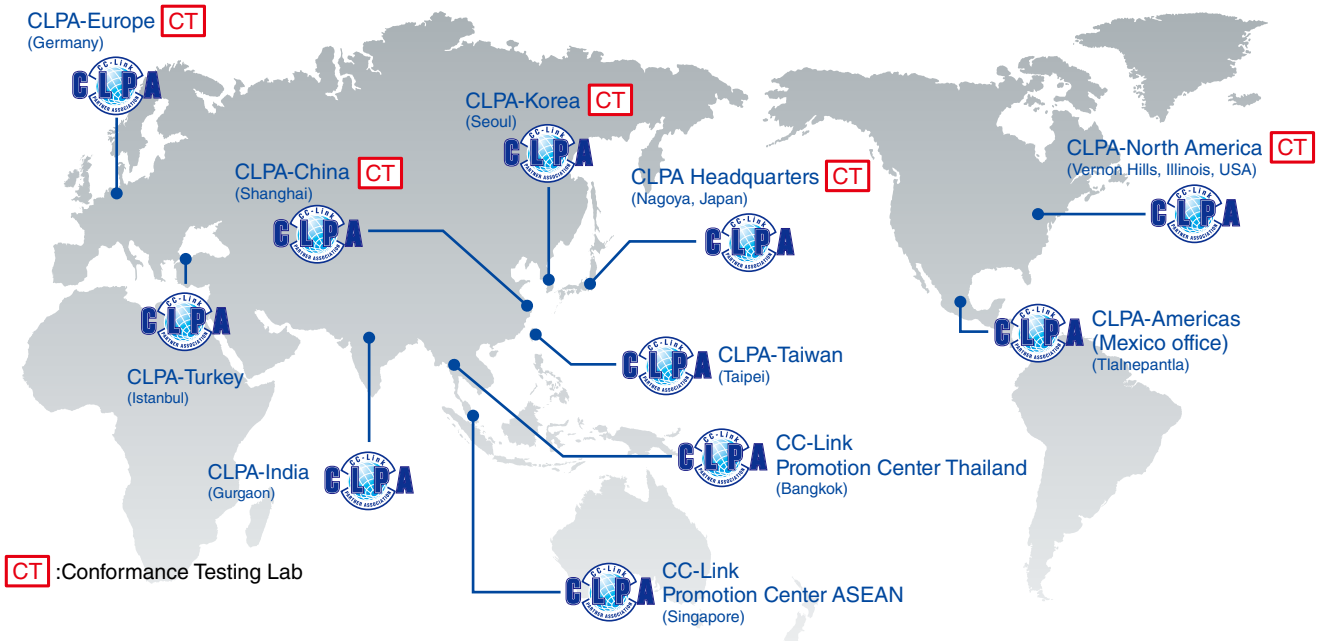
E-mail:info@cc-link.org

CC-Link
Partner Association

Global influence of CC-Link continues to spread

CC-Link is supported globally by CLPA. With offices throughout the world, support for partner companies can be found locally. Each regional CLPA office undertakes various support and promotional activities to further the influence of CC-Link/CC-Link IE in that part of the world. For companies looking to increase their presence in their local area, CLPA is well placed to assist these efforts through offices in all major regions.



Extensive global support coverage providing expert help whenever needed

■ Global FA centers

EMEA

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UK FA Center
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Tel: +420-255 719 200

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Brazil FA Center
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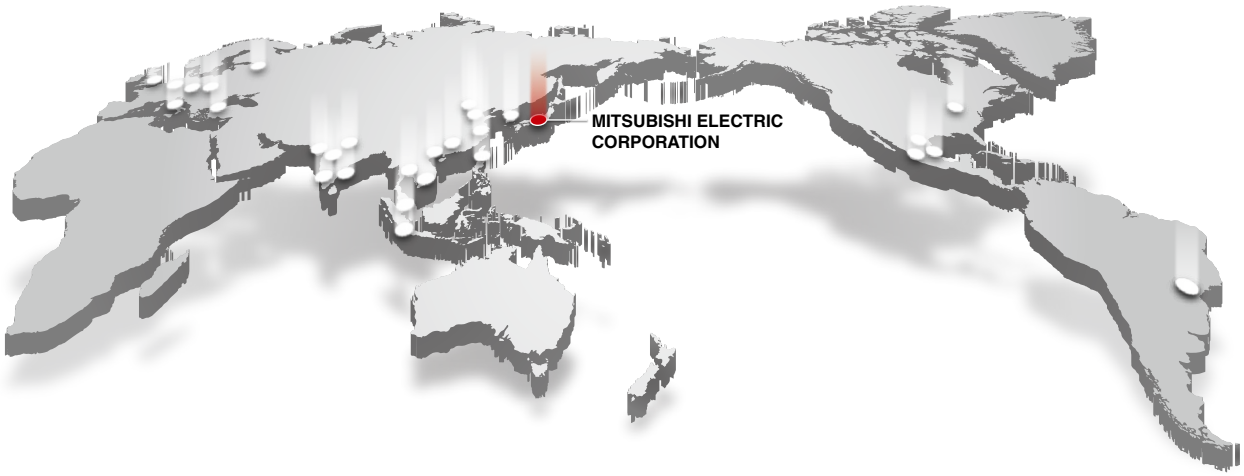

Product list

Programmable automation controller MELSEC iQ-R Series

DB: Co-branded product*1

Product name	Model	Outline
Safety CPU*2	R08SFCPU-SET	Program capacity: 80K steps (40K steps for safety programs); Basic operation processing speed (LD instruction), 0.98 ns
	R16SFCPU-SET	Program capacity: 160K steps (40K steps for safety programs); Basic operation processing speed (LD instruction), 0.98 ns
	R32SFCPU-SET	Program capacity: 320K steps (40K steps for safety programs); Basic operation processing speed (LD instruction), 0.98 ns
	R120SFCPU-SET	Program capacity: 1200K steps (40K steps for safety programs); Basic operation processing speed (LD instruction), 0.98 ns
Main base	R35B	5 slots, for MELSEC iQ-R Series modules
	R38B	8 slots, for MELSEC iQ-R Series modules
	R312B	12 slots, for MELSEC iQ-R Series modules
Power supply	R61P	AC power supply; input, 100…240 V AC; output, 5 V DC/6.5 A
	R62P	AC power supply; input, 100…240 V AC; output, 5 V DC/3.5 A, 24 V DC/0.6 A
	R64P	AC power supply; input, 100…240 V AC; output, 5 V DC/9 A
	R63P	DC power supply; input, 24 V DC; output, 5 V DC/6.5 A
CC-Link IE Field Network master/local module	RJ71GF11-T2	1 Gbps, master/local station
Simple motion	RD77GF4	4 axes, linear/circular interpolation, advanced synchronous control, CC-Link IE Field Network compatible
	RD77GF8	8 axes, linear/circular interpolation, advanced synchronous control, CC-Link IE Field Network compatible
	RD77GF16	16 axes, linear/circular interpolation, advanced synchronous control, CC-Link IE Field Network compatible
	RD77GF32	32 axes, linear/circular interpolation, advanced synchronous control, CC-Link IE Field Network compatible
Safety remote I/O module Main safety input	NZ2GFSS2-8D	Single wiring: 8 points/Double wiring: 4 points, 24 V DC, Response time: 0.4 ms, Negative common type, Spring clamp terminal block, 2-wire
	NZ2GFSS2-32D	Single wiring: 32 points/Double wiring: 16 points, 24 V DC, Response time: 0.4 ms, Negative common type, Spring clamp terminal block, 2-wire
Safety remote I/O module Main safety output	NZ2GFSS2-8TE	Single wiring: 8 points/Double wiring: 4 points, 24 V DC, Response time: 0.4 ms, Source + source type, Spring clamp terminal block, 2-wire
Safety remote I/O module Main safety I/O combined	NZ2GFSS2-16DTE	Single wiring (input/output): 8 points/Double wiring (input/output): 4 points, 24 V DC, Response time: 0.4 ms, Negative common type, Source + source type, Spring clamp terminal block, 2-wire
Safety remote I/O module Extension safety output	NZ2EXSS2-8TE*3	Single wiring: 8 points/Double wiring: 4 points, 24 V DC, Source + source type, Spring clamp terminal block, 2-wire
Waterproof/dustproof type (IP67) Safety remote I/O module Safety I/O combined	NZ2GFS12A2-14DT NEW DB	Single wiring (input): 12 points/Double wiring (input): 6 points, 24 V DC, Negative common type Single wiring (output): not possible/Double wiring (output): 2 points, 24 V DC, Source + sink type Waterproof connector, 2-wire
	NZ2GFS12A2-16DTE NEW DB	Single wiring (input): 12 points/Double wiring (input): 6 points, 24 V DC, Negative common type Single wiring (output): 4 points/Double wiring (output): 2 points, 24 V DC, Source + source type Waterproof connector, 2-wire
MELSOFT GX Works3	SW1DND-GXW3-E	Version 1.015R or later

*1. General specifications and product guarantee conditions for co-branded products may vary from those of general MELSEC products.
For more information, please refer to the relevant product manuals or contact your local Mitsubishi Electric sales office or representative.
*2. R□SFCPU-SET consists of R□SFCPU and R6SFM.
*3. Only NZ2GFSS2-32D can be connected.

Safety programmable controller MELSEC-QS Series

Product name	Model*4	Outline
Safety CPU	QS001CPU (-K)	Program capacity: 14K steps, number of I/O device points: 6144 points, operation/error history: 3,000 records
Safety main base	QS034B (-K)	4 slots; for QS Series, MELSECNET/H, CC-Link IE, and Ethernet interface modules
Safety power supply	QS061P-A1 (-K)	Input: 100…120 V AC, 50/60 Hz; output: 5 V 6 A; with overvoltage/overcurrent protection and shutdown circuit diagnostics
	QS061P-A2 (-K)	Input: 200…240 V AC, 50/60 Hz; output: 5 V 6 A; with overvoltage/overcurrent protection and shutdown circuit diagnostics
CC-Link IE Field Network master/local (with Safety Communication Functions)	QS0J71GF11-T2	Max. number of stations per network: 121 (32 for safety stations) Safety CPU module QS001CPU whose first five serial number digits are 13042 or later
CC-Link Safety system master	QS0J61BT12 (-K)	Max. number of connectable modules: 64 (42 for safety stations)
CC-Link Safety system remote I/O	QS0J65BTB2-12DT (-K)	No. of input points: 8 points (double input), 16 points (single input) No. of output points: 4 points (source + sink type), 2 points (source + source type)
	QS0J65BTS2-8D	No. of input points: 8 points (double input), 16 points (single input)
	QS0J65BTS2-4T	No. of output points: 4 points (source + sink type), 2 points (source + source type)
MELSOFT GX Developer*5	SW8D5C-GPPW-E	Version 8.98C or later

*4. S-mark compatible part models are indicated in parentheses.
*5. GX Works2 Version 1.50C or later product package also includes GX Developer.

Safety controller MELSEC-WS Series

DB: Co-branded product*1

Product name	Model	Outline
CPU	WS0-CPU000200 (WS0-CPU0)*2 DB	Program capacity: 255 FBs, Scan cycle: 4 ms, RS-232 Interface
CPU (with EFI)	WS0-CPU130202 (WS0-CPU1)*2 DB	EFI-equipped (EFI is the communication interface for setting SICK's safety products.) Flexi Link with EFI RS-232 Interface
CPU (with EFI, Flexi Line)	WS0-CPU320202 (WS0-CPU3)*2 DB	EFI-equipped (EFI is the communication interface for setting SICK's safety products.) Flexi Link with EFI Flexi Line with EFI RS-232 Interface, USB Interface
Memory plug for CPU	WS0-MPL000201 (WS0-MPL0)*2 DB	For storing CPU parameters and programs (required) (for WS0-CPU0/WS0-CPU1)
	WS0-MPL100201 (WS0-MPL1)*2 DB	For storing CPU parameters and programs (required) (for WS0-CPU3)
Safety input	WS0-XTDI80202 (WS0-XTDI)*2 DB	Safety input: 8 points (single input), Spring clamp terminal block
Safety I/O combined	WS0-XTIO84202 (WS0-XTIO)*2 DB	Safety input: 8 points (single input), Safety output: 4 points (single output) Output current: max. 2 A, Spring clamp terminal block, Fast shut off function (response of 8 ms)
Safety relay output	WS0-4RO4002 (WS0-4RO)*2 DB	Safety output: safety relay output 4 points Switching current: max. 6 A
USB/RS-232 conversion cable	WS0-C20M8U DB	USB/RS-232 conversion cable for PC-CPU connection (2 m)
	WS0-UC-232A*3 DB	USB/RS-232 conversion cable (35 cm)
RS-232 cable connecting to CPU	WS0-C20R2 DB	RS-232 cable for PC-CPU connection (2 m)
CC-Link interface	WS0-GCC100202 (WS0-GCC1)*2 DB	For CC-Link communication (generic communication) Remote device station, CC-Link version 1.10
Ethernet interface	WS0-GETH00200 (WS0-GETH)*2 DB	For Ethernet TCP/IP connection (generic communication)
Screw-in replacement terminal block	WS0-TBS4 DB	Screw-in replacement terminal block (4 pcs)
Spring clamp replacement terminal block	WS0-TBC4 DB	Spring clamp replacement terminal block (4 pcs)
Setting and Monitoring Tool	SW1DNN-WS0ADR-B*4	Setting and monitoring tool for safety controller

*1. General specifications and product guarantee conditions for co-branded products may vary from those of general MELSEC products.
For more information, please refer to the relevant product manuals or contact your local Mitsubishi Electric sales office or representative.

*2. Abbreviated product model name is shown in ( ) for this catalog. Please notify the full model name in the upper product list when contacting local Mitsubishi sales office or representative.

*3. Use this in combination with WS0-C20R2.

*4. For the acquisition of Setting and Monitoring Tool, please contact your local Mitsubishi sales office or representative.

Compliance with international quality assurance standards

All of Mitsubishi Electric's FA products have acquired the international quality assurance "ISO9001" and environment management system standard "ISO14001" certification. Mitsubishi Electric's products also comply with various safety standards, including UL standards.

*For jointly developed and partner products, guaranteed quality standards may differ. Please refer to the product manuals for details.

Safety Standards

CE	CE : Council Directive of the European Communities
c UL us	UL : Underwriters Laboratories Listing

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All other company names and product names used in this document are trademarks or registered trademarks of their respective companies.

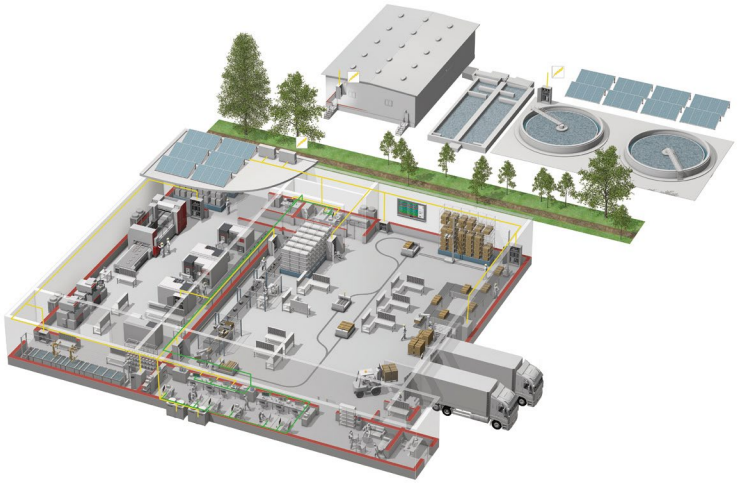
Precautions before use

This publication explains the typical features and functions of the products herein and does not provide restrictions or other information related to usage and module combinations. Before using the products, always read the product user manuals. Mitsubishi Electric will not be held liable for damage caused by factors found not to be the cause of Mitsubishi Electric; opportunity loss or lost profits caused by faults in Mitsubishi Electric products; damage, secondary damage, or accident compensation, whether foreseeable or not, caused by special factors; damage to products other than Mitsubishi Electric products; or any other duties.

⚠ For safe use

- To use the products given in this publication properly, always read the relevant manuals before beginning operation.
- The products have been manufactured as general-purpose parts for general industries, and are not designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.

YOUR SOLUTION PARTNER



Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

A NAME TO TRUST

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

Compact and Modular Controllers

Inverters, Servos and Motors

Visualisation: HMIs

Numerical Control (NC)

Robots: SCARA, Articulated arm

Processing machines: EDM, Lasers, IDS

Transformers, Air conditioning, Photovoltaic systems

* Not all products are available in all countries.

Country/Region	Sales office	Tel/Fax
USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100 Fax : +1-847-478-2253
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