

Mitsubishi Safety Programmable Controller

MELSEC **QS** series

CC-Link Safety System Remote I/O Module User's Manual



● SAFETY PRECAUTIONS ●

(Always read these instructions before using this equipment.)

Before using the product, please read this manual, the relevant manuals introduced in this manual, standard programmable controller manuals, and the safety standards carefully and pay full attention to safety to handle the product correctly.

In this manual, the safety instructions are ranked as "  WARNING" and "  CAUTION".



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Note that the  CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Design Precautions]

WARNING

- When a safety programmable controller detects an error in an external power supply or a failure in programmable controller main module, it turns off all the outputs.
Create an external circuit to securely stop the power of hazard by turning off the outputs.
Incorrect configuration may result in an accident.
- Create short current protection for a safety relay, and a protection circuit such as a fuse, and breaker, outside a safety programmable controller.
- If load current more than the rating or overcurrent due to a short circuit in the load has flowed in the CC-Link Safety remote I/O module, the module defines it as a fault and turns off all the outputs.
However, if overcurrent flows in the CC-Link Safety remote I/O module for a long time, it may cause smoke or a fire. To prevent it, create a safety circuit such as a fuse outside the module.
- When a safety remote I/O module has detected CC-Link Safety error, it turns off all the outputs.
Note that the outputs in a sequence program are not automatically turned off.
If CC-Link Safety error has been detected, create a sequence program that turns off the outputs in the program.
If the CC-Link Safety is restored with the outputs on, it may suddenly operate and result in an accident.
- To inhibit restart without manual operation after safety functions was performed and outputs were turned OFF, create an interlock program which uses a reset button for restart.

[Design Precautions]

CAUTION

- Do not bunch the wires of external devices or communication cables together with the main circuit or power lines, or install them close to each other.
They should be installed 100 mm (3.94 inch) or more from each other.
Not doing so could result in noise that would cause malfunctions.
- Select the external devices to be connected to the CC-Link Safety remote I/O module, considering the maximum inrush current with reference to the CC-Link Safety System Remote I/O Module User's Manual.

[Installation Precautions]

CAUTION

- Use a safety programmable controller in the environment that meets the general specifications described in the QSCPU User's Manual (Hardware Design, Maintenance and Inspection).
Using this programmable controller in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product.
- Make sure to fix CC-Link Safety remote I/O module with a DIN rail or mounting screws and tighten the screws with the specified torque.
If the screws are too loose, it may cause a drop of the screw or module.
Overtightening may cause a drop due to the damage of the screw or module.
- Do not directly touch the module's conductive parts or electronic components.
Doing so may cause malfunctions or a failure.

[Wiring Precautions]

WARNING

- Be sure to shut off all phases of the external supply power used by the system before wiring.
Not completely turning off all power could result in electric shock or damage to the product.
- When energizing or operating the module after installation or wiring, be sure to close the attached terminal cover.
Not doing so may result in electric shock.

[Wiring Precautions]

CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100Ω or less. Failure to do so may result in electric shock or malfunction.

- Wire the module correctly after confirming the rated voltage and terminal layout.
Connecting a power supply of a different rated voltage or incorrect wiring may cause a fire or failure.

- Tighten a terminal block mounting screw, terminal screw, and module mounting screw within the specified torque range.
If the terminal block mounting screw or terminal screw is too loose, it may cause a short circuit, fire, or malfunctions.
If too tight, it may damage the screw and/or the module, resulting in a drop of the screw or module, a short circuit or malfunctions.
If the module mounting screw is too loose, it may cause a drop of the screw or module.
Overtightening the screw may cause a drop due to the damage of the screw or module.

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Failure to do so may result in malfunction due to noise.

- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause a fire, failure, or malfunctions.

- Be sure to fix the communication cables or power cables by ducts or clamps when connecting them to the module.
Failure to do so may cause damage of the module or cables due to a wobble, unintentional shifting, or accidental pull of the cables, or malfunctions due to poor contact of the cable.

- When removing the connected communication cables or power cables, do not pull the cable with grasping the cable part.
Remove the cable connected to the terminal block after loosening the terminal block screws.
Pulling the cable connected to a module may result in malfunctions or damage of the module or cable.

[Startup and Maintenance precautions]

WARNING

- Do not touch the terminals while power is on.
Doing so could result in electric shock.
- Turn off all phases of the external supply power used in the system when cleaning the module or retightening the terminal block mounting screws, terminal screws, or module mounting screws.
Not doing so could result in electric shock.
Tighten a terminal block mounting screw, terminal screw, and module mounting screw within the specified torque range.
If the terminal block mounting screw or terminal screw is too loose, it may cause a short circuit, fire, or malfunctions.
If too tight, it may damage the screw and/or the module, resulting in a drop of the screw or module, a short circuit or malfunctions.
If the module mounting screw is too loose, it may cause a drop of the screw or module.
Overtightening the screw may cause a drop due to the damage of the screw or module.

CAUTION

- Do not disassemble or modify the modules.
Doing so could cause a failure, malfunctions, injury, or fire.
If the product is repaired or remodeled by other than the specified FA centers or us, the warranty is not covered.
- Restrict the mounting/removal of a module, base unit, and terminal block up to 50 times (IEC61131-2-compliant), after the first use of the product.
Failure to do so may cause the module to malfunction due to poor contact of connector.
- Since the module case is made of resin, do not drop or apply any strong impact to the module.
Doing so may damage the module.
- Completely turn off the externally supplied power used in the system before mounting or removing the module to/from the panel.
Not doing so may result in a failure or malfunctions of the module.

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.

● CONDITIONS OF USE FOR THE PRODUCT ●

- (1) Although MELCO has obtained the certification for Product's compliance to the international safety standards IEC61508, EN954-1/ISO13849-1 from TUV Rheinland, this fact does not guarantee that Product will be free from any malfunction or failure. The user of this Product shall comply with any and all applicable safety standard, regulation or law and take appropriate safety measures for the system in which the Product is installed or used and shall take the second or third safety measures other than the Product. MELCO is not liable for damages that could have been prevented by compliance with any applicable safety standard, regulation or law.

- (2) MELCO prohibits the use of Products with or in any application involving, and MELCO shall not be liable for a default, a liability for defect warranty, a quality assurance, negligence or other tort and a product liability in these applications.
 - (a) power plants,
 - (b) trains, railway systems, airplanes, airline operations, other transportation systems,
 - (c) hospitals, medical care, dialysis and life support facilities or equipment,
 - (d) amusement equipments,
 - (e) incineration and fuel devices,
 - (f) handling of nuclear or hazardous materials or chemicals,
 - (g) mining and drilling,
 - (h) and other applications where the level of risk to human life, health or property are elevated.

REVISIONS

*The manual number is given on the bottom left of the back cover.

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Japanese Manual Version SH-080609-K

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INTRODUCTION

Thank you for purchasing the Mitsubishi Electric safety programmable controller MELSEC-QS series.

Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the QS series programmable controller you have purchased, so as to ensure correct use.

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ABOUT MANUALS

Introduction manual

Before constructing or designing the safety system, be sure to read the following manual.

Manual Name	Manual Number (Model Code)
Safety Application Guide Explains the overview, construction method, laying and wiring examples, and application programs of the safety-related system. (Sold separately)	SH-080613ENG (13JR90)

Related manuals

The following manuals are related to this product.
If necessary, order them by quoting the details in the tables below.

Manual Name	Manual Number (Model Code)
CC-Link Safety System Master Module User's Manual QS0J61BT12 Explains the specifications, procedures and settings before system operation, parameter setting, and troubleshooting of the QS0J61BT12 CC-Link Safety system master module. (Sold separately)	SH-080600ENG (13JR88)
QSCPU User's Manual (Hardware Design, Maintenance and Inspection) Explains the specifications of the QSCPU, safety power supply module, safety base unit and others. (Sold separately)	SH-080626ENG (13JR92)
QSCPU User's Manual (Function Explanation, Program Fundamentals) Explains the functions, programming methods, devices and others that are necessary to create programs with the QSCPU. (Sold separately)	SH-080627ENG (13JR93)
QSCPU Programming Manual (Common Instructions) Explains how to use the sequence instructions, basic instructions, application instructions, and QSCPU dedicated instructions. (Sold separately)	SH-080628ENG (13JW01)
GX Developer Version 8 Operating Manual Explains the online functions of GX Developer, such as the programming, printout, monitoring, and debugging methods. (Sold separately)	SH-080373E (13JU41)
GX Developer Version 8 Operating Manual (Safety Programmable Controller) Explains the GX Developer functions added and modified for the compatibility with the safety programmable controller. (Sold separately)	SH-080576ENG (13JU53)

REMARK

If you would like to obtain a manual individually, printed matters are available separately. Order the manual by quoting the manual number on the table above (model code).

COMPLIANCE WITH THE EMC, LOW VOLTAGE, AND MACHINERY DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC, Low Voltage, and Machinery Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- QSCPU User's Manual (Hardware Design, Maintenance and Inspection)
- Safety Guidelines

(This manual is included with the base unit.)

The CE mark on the side of the programmable controller indicates compliance with EMC, Low Voltage, and Machinery Directives.

(2) For the product

This product complies with the EMC, Low Voltage, and Machinery Directives. Before using this product, please read this manual, the relevant manuals, the manuals for standard programmable controllers, and the safety standards carefully and pay full attention to safety to handle the product correctly.

The descriptions are based on the requirements of the Directives and the harmonized standards. However, they do not guarantee that the entire machinery constructed according to the descriptions complies with the EMC, Low Voltage, and Machinery Directives. The manufacture of the machinery must determine the testing method for compliance and declare conformity to the EMC, Low Voltage, and Machinery Directives.

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations to explain the CC-Link Safety system remote I/O module.

Generic Term/Abbreviation	Description
QS0J65BTS2-8D	Abbreviation for QS0J65BTS2-8D CC-Link Safety system remote I/O module
QS0J65BTS2-4T	Abbreviation for QS0J65BTS2-4T CC-Link Safety system remote I/O module
QS0J65BTB2-12DT	Abbreviation for QS0J65BTB2-12DT CC-Link Safety system remote I/O module
Safety remote I/O module	Generic term for QS0J65BTS2-8D, QS0J65BTS2-4T, and QS0J65BTB2-12DT
Safety master station	Station which controls the CC-Link Safety system. One station is required per system.
Safety remote I/O station	Remote station which handles only the information in bit unit. Compatible with the safety-related system.
Safety remote station	Another name for Safety remote I/O station.
Safety master module	Another name for QS0J61BT12 CC-Link Safety system master module.
Standard remote I/O module	Generic term for AJ65BTB1-16D, AJ65SBTB1-16D, AJ65BT-64AD, AJ65BT-64DAV, AJ65BT-64DAI, and A852GOT.
SB	Link special relay (For CC-Link Safety system) Information of the bit unit that indicates the module operation status and data link status of the safety master station. Represented by SB expediently.
SW	Link special register (For CC-Link Safety system) Information of the 16-bit unit that indicates the module operation status and data link status of the safety master station. Represented by SW expediently.
RX	Remote input (For CC-Link Safety system) Information which is input in bit unit from the safety remote station to the safety master station. Represented by RX expediently.
RY	Remote output (For CC-Link Safety system) Information which is output in bit unit from the safety master station to the safety remote station. Represented by RY expediently.
Safety CPU module	Abbreviation for QS001CPU safety CPU module.
Safety programmable controller	Generic term for safety CPU module, safety power supply module, safety main base unit, CC-Link safety master module and CC-Link safety remote I/O module.
Standard programmable controller	Generic term of each module for MELSEC-Q series, MELSEC-QnA series, MELSEC-A series and MELSEC-FX series (Used for distinction from safety programmable controller.)
GX Developer	General product name for the models, SW8D5C-GPPW, SW8D5C-GPPW-A, SW8D5C-GPPW-V and SW8D5C-GPPW-VA.
Dark test	Outputs a pulse to turn OFF the input/output when it is ON, and performs the failure diagnostics to contacts including external devices.
NC	Abbreviation for normally closed contact which is normally closed, but opened when a switch or other function is operated.
NO	Abbreviation for normally open contact which is normally opened, but closed when a switch or other function is operated.

PACKING LIST

The following indicates the packing list of each product.

(1) QS0J65BTS2-8D

Item	Quantity
QS0J65BTS2-8D	1
CC-Link Safety System Remote I/O Module User's Manual (Hardware)QS0J65BTS2-8D	1

(2) QS0J65BTS2-4T

Item	Quantity
QS0J65BTS2-4T	1
CC-Link Safety System Remote I/O Module User's Manual (Hardware)QS0J65BTS2-4T	1

(3) QS0J65BTB2-12DT

Item	Quantity
QS0J65BTB2-12DT	1
Holding fixtures for screw installation	2
CC-Link Safety System Remote I/O Module User's Manual (Hardware)QS0J65BTB2-12DT	1

CHAPTER1 OVERVIEW

This User's Manual describes the specifications, handling and wiring methods of the safety remote I/O module of the CC-Link Safety system.

1.1 Safety Programmable Controller Product List

Product Name	Model	Description
CC-Link Safety system remote I/O module	QS0J65BTB2-12DT	A safety I/O module connected to external devices. The module has eight safety input points and four safety output points, and sends/receives safety data to/from the safety programmable controller over CC-Link Safety.
	QS0J65BTB2-12DT-K	An S-mark ^{*1} certified CC-Link Safety system remote I/O module
	QS0J65BTS2-8D	A safety input module connected to external devices. The module has eight safety input points and sends/receives safety data to/from the safety programmable controller over CC-Link Safety.
	QS0J65BTS2-4T	A safety output module connected to external devices. The module has four safety output points and sends/receives safety data to/from the safety programmable controller over CC-Link Safety.

* 1: S-mark is a safety certification issued by Korea Occupational Safety and Health Agency (KOSHA).

1.2 Features

The following describes the features of the safety remote I/O module.

- (1) Highest level of safety approval acquired
 The safety remote I/O module has acquired certification of the highest safety level (SIL3 of IEC 61508, Category 4 of EN 654-1, and Category 4 performance level "e" of EN ISO 13849-1) applicable to programmable controllers.
 The safety-related system with high security can be configured.
- (2) Space-saving system design
 Compared to the system with the safety relay, this system can be configured with a smaller space.
- (3) Improvement of wiring work efficiency
 Adopting a 2-piece terminal block allows shortened wiring work hours so that incorrect wiring can be avoided at module replacement.
 In addition, multiple COM terminals avoid the necessity to add a relay terminal block.

- (4) Fail-safe function
When a failure occurs inside the module, the self-diagnostic function detects the failure and turns OFF the output.
- (5) Enhanced failure diagnostics
Conducting a dark test (contact fixing diagnosis) allows an error diagnostics on the external safety devices included.
The self-diagnostic such as memory diagnostics or circuit block diagnostics is conducted.
- (6) Simple settings in parameters
Using the parameter setting screen of the programming tool allows the easier settings for the safety remote I/O module.
- (7) Improved maintenanceability at trouble occurrence
Classifying error information into major/moderate/minor allows the easier judgment of failures/errors.
- (8) Reset available for single module
When an error occurs in the module, the reset operation can be performed for the CPU module alone without turning the power from OFF to ON.
- (9) The module can be installed in six orientations
The safety remote I/O module can be installed in six different orientations.
The module can also be installed using the DIN rail.

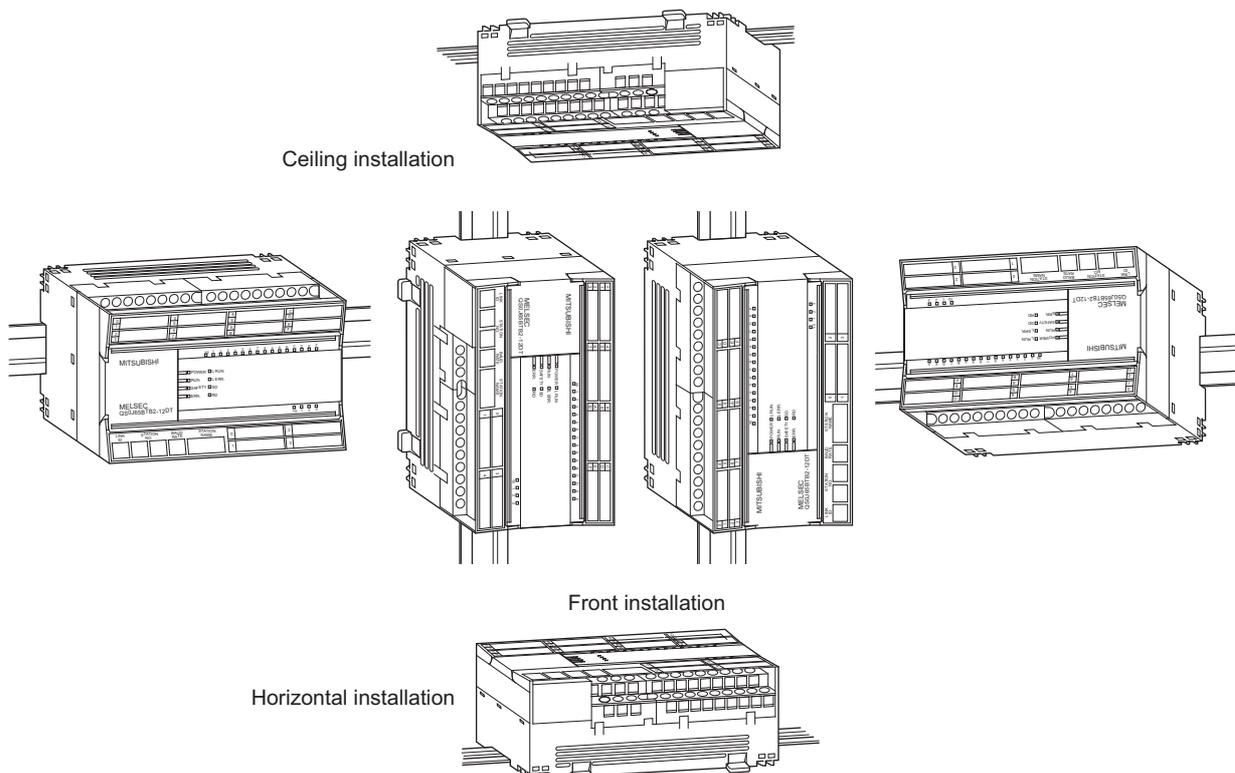


Figure 1.1 Module installation orientation

CHAPTER2 SYSTEM CONFIGURATION

This chapter describes the system configuration, precautions for use, and applicable devices of the safety remote I/O module.

2.1 Overall Configuration

Figure 2.1 shows the system configuration of the safety remote I/O module. The safety remote I/O module is connected to various safety devices such as an emergency stop or a light curtain, and the safety-related system is configured by combining the safety remote I/O module with a safety CPU module or safety master module.

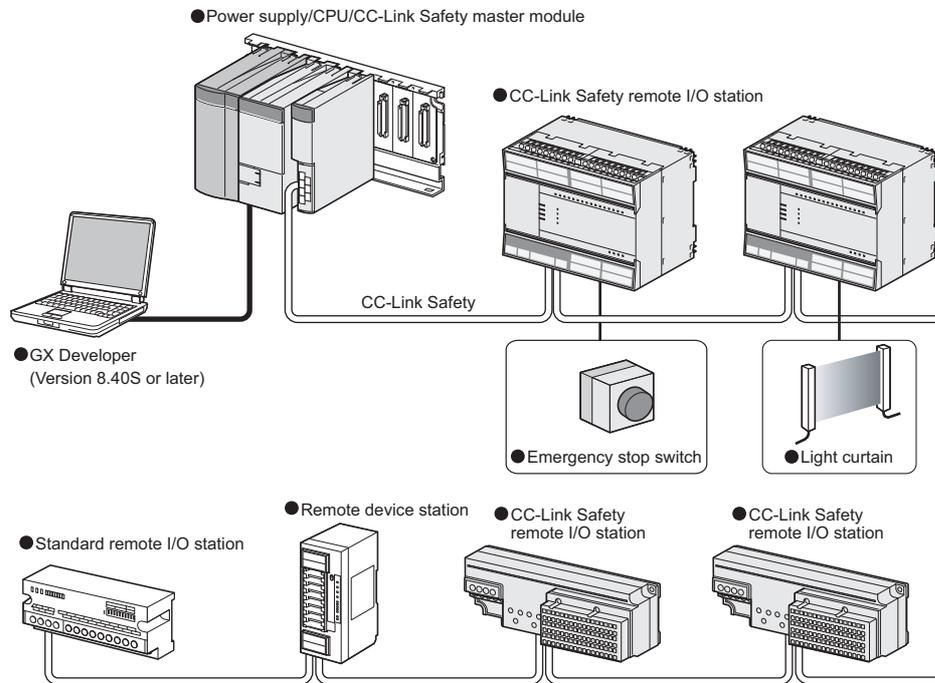


Figure 2.1 Overall Configuration

2.2 Precautions for System Configuration

This section describes the applicable devices and software packages configuring the system with the safety remote I/O module.

(1) Applicable master module

The safety remote I/O module can connect only to the safety master module.

(2) Applicable software package

The following shows the software package compatible with the safety remote I/O module.

Product name	Model	Supported version	Remark
GX Developer	QS0J65BTB2-12DT (Module technical version A)	Version8.40A or later	Mandatory. MELSEC programmable controller programming software
	QS0J65BTB2-12DT (Module technical version B or later), QS0J65BTS2-8D, QS0J65BTS2-4T	Version8.65T or later	

2.3 Confirming Production Information

The production information of the safety remote I/O module can be confirmed on the rating plate located on the side of the module.

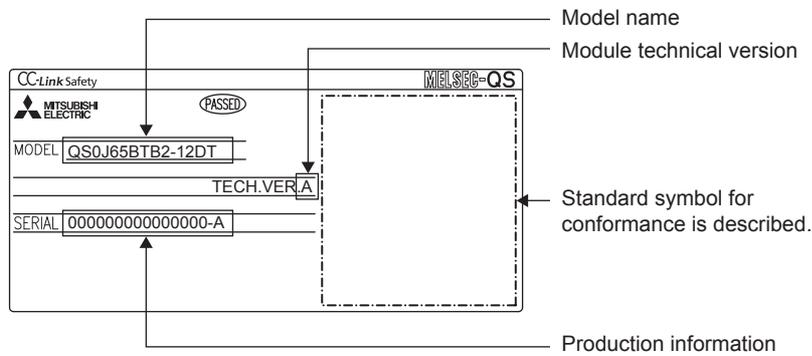


Figure 2.2 Production information confirmation

2.4 Module Replacement

Replace the module according to the following replacement cycle.

Module	Replacement Cycle
CC-Link Safety system remote I/O module	5 years

CHAPTER3 SPECIFICATIONS

This chapter describes the specifications of safety remote I/O module.

3.1 General Specifications

Table3.1 shows the general specifications of safety remote I/O module.

Table3.1 General specifications

Item	Specification					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-40 to 75°C					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity						
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2	Under intermittent vibration	Frequency	Constant acceleration	Half amplitude	Sweep count
			5 to 8.4Hz	----	3.5mm	
		Under continuous vibration	8.4 to 150Hz	9.8m/s ²	----	10 times each in X, Y, Z directions
			5 to 8.4Hz	----	1.75mm	----
8.4 to 150Hz	4.9m/s ²	----				
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147m/s ² , duration of action 11ms, 3 times each in 3 directions X, Y, Z by sine half-wave pulse)					
Operating atmosphere	No corrosive gases					
Operating altitude ^{*3}	0 to 2000m					
Installation location	Inside a control panel					
Overvoltage category ^{*1}	II or I less					
Pollution degree ^{*2}	2 or less					
Equipment class	Class III					

*1: This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.

Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

*2: This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution degree 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

*3: Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the programmable controller under pressure, please consult your local Mitsubishi Electric representative.

3.2 Performance Specifications

Table3.2, 3.3, 3.4 show the performance specifications of safety remote I/O modules.

3.2.1 QS0J65BTS2-8D

Table3.2 Performance specifications of QS0J65BTS2-8D (1/2)

Item		DC input module
		QS0J65BTS2-8D
No. of input points*2		8 points (double input), 16 points (single input)
Insulation method		Photocoupler
Rated input voltage		24 VDC
Rated input current		Approx.5.9mA
Operating voltage range		19.2 to 28.8VDC (Ripple ratio: 5% or less)
Maximum number of simultaneous input points		100%
ON voltage/ON current		15VDC/2mA or more
OFF voltage/OFF current		5VDC/0.5mA or less
Input resistance		Approx.4.3k Ω
Input format		Negative common (source type)
Response time	OFF → ON	0.4ms or less (at 24VDC)
	ON → OFF	0.4ms or less (at 24VDC)
Safety remote station input response time		11.2ms or less + time of noise removal filter (1ms, 5ms, 10ms, 20ms, 50ms)
External power supply	Voltage	19.2V to 28.8VDC (Ripple ratio: 5% or less)
	Current	40mA (24VDC, all points ON, excluding the external load current)
	Protection function	External power supply overvoltage/overcurrent protection function
	Fuse	8A (Not replaceable)
Wiring method for common		16 input points per common (Spring clamp terminal block 2-wire type)
Number of occupied stations		1 station
Number of accesses to nonvolatile memory inside module		10 ¹² times
Safety refresh response processing time		9.6ms
Module power supply *1	Voltage	19.2V to 28.8VDC (Ripple ratio: 5% or less)
	Current	120mA or less (24VDC, all points ON)
	Protection function	Module power supply overvoltage/overcurrent protection function
	Fuse	0.8A (Not replaceable)
	Momentary power failure period	10ms or less
Noise immunity		Tested by a DC-type noise simulator with noise voltage of 500Vp-p, noise width of 1 μs and frequency of 25 to 60Hz.
Dielectric withstand voltage		500VAC between all external DC terminals and ground, for 1 minute
Insulation resistance		10M Ω or more between all external DC terminals and ground, by a 500VDC insulation resistance tester
Level of protection		IP2X
Weight		0.46kg
External connection system	Communication section, module power supply section	7-point two-piece terminal block [Transmission circuits, module power, FG] M3 x 5.2 Tightening torque: 0.425 to 0.575N·m, 2 solderless terminals or less
	External power supply section, input section	Two-piece spring clamp terminal block [External power supply, input section]
Module mounting screw		M4 screw with plain washer finished round (Tightening torque range: 0.824 to 1.11N·m) Mountable with a DIN rail (in 6 orientations)

*1: The power supply connected to the QS0J65BTS2-8D must satisfy the following conditions:

- (1) Reinforced insulation
 - SELV (Safety Extra Low Voltage): Hazardous potential part (48V or more)
- (2) Compliance with the LVD (Low Voltage Directive)
- (3) Output voltage within 19.2V to 28.8VDC (Ripple ratio: 5% or less.)

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

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Table 3.2 Performance specifications of S0J65BTS2-8D (2/2)

Item		DC input module
		QS0J65BTS2-8D
Applicable DIN rail		TH35-7.5Fe, TH35-7.5Al (Compliant with IEC60715)
Applicable wire size	Communication section, module power supply section	0.3 to 2.0mm ² (22 to 14 AWG)
	Applicable solderless terminal	<ul style="list-style-type: none"> • RAV1.25-3 [Applicable wire size: 0.3 to 1.25mm² (22 to 16 AWG) Twisted wire] • V2-MS3 (JST Mfg. Co., Ltd.), RAP2-3SL (Nippon Tanshi Co., Ltd.), TGV2-3N (NICHIFU Co., Ltd.) [Applicable wire size: 1.25 to 2.0mm² (16 to 14 AWG) Twisted wire]
	External power supply section, input section	Twisted wire 0.08 to 1.5mm ² (28 to 16AWG) *3 Applicable wire strip length: 8 to 11mm
	Applicable solderless terminal	<ul style="list-style-type: none"> • TE0.5 (NICHIFU Co., Ltd.) [Applicable wire size: 0.5mm²] • TE0.75 (NICHIFU Co., Ltd.) [Applicable wire size: 0.75mm²] • TE1 (NICHIFU Co., Ltd.) [Applicable wire size: 0.9 to 1.0mm²] • TE1.5 (NICHIFU Co., Ltd.) [Applicable wire size: 1.25 to 1.5mm²] • FA-VTC125T9 (Mitsubishi Electric Engineering Co.,Ltd. [Applicable wire size: 0.3 to 1.65mm²] • FA-VTCW125T9 (Mitsubishi Electric Engineering Co.,Ltd. [Applicable wire size:0.3 to 1.65mm²]

*3: Do not insert two or more wires into one terminal.

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3.2.2 QS0J65BTS2-4T

Table 3.3 Performance specifications of QS0J65BTS2-4T (1/2)

Item		Transistor output module	
		QS0J65BTS2-4T	
No. of output points		4 points (source + sink type) 2 points (source + source type)	
Insulation method		Photocoupler	
Rated load voltage		24VDC	
Operating load voltage range		19.2V to 28.8VDC (Ripple ratio: 5% or less)	
Maximum load current		0.5A per point	
Maximum inrush current		1.0A, 10ms or less	
Leakage current at OFF		0.5mA or less	
Maximum voltage drop at ON		1.0VDC or less	
Protection function		Output overload protection function	
Output format		Source + Sink type Source + Source type	
Response time	OFF → ON	0.4ms or less (at 24VDC)	
	ON → OFF	0.4ms or less (at 24VDC)	
Safety remote station output response time		10.4ms or less (at ON → OFF), 11.2ms or less (at OFF → ON)	
Surge suppressor		Zener diode	
External power supply	Voltage	19.2V to 28.8VDC (Ripple ratio: 5% or less)	
	Current	45mA (24VDC, all points ON, excluding the external load current)	
	Protection function	External power supply overvoltage/overcurrent protection function	
	Fuse	8A (Not replaceable)	
Wiring method for common		4 output points per common (Spring clamp terminal block 2-wire type)	
Common current		Maximum 2A	
Number of occupied stations		1 station	
Number of accesses to nonvolatile memory inside module		10 ¹² times	
Safety refresh response processing time		9.6ms	
Module power supply ^{*1}	Voltage	19.2V to 28.8VDC (Ripple ratio: 5% or less)	
	Current	95mA or less (24VDC, all points ON)	
	Protection function	Module power supply overvoltage/overcurrent protection function	
	Fuse	0.8A (Not replaceable)	
	Momentary power failure period	10ms or less	
Noise immunity		Tested by a DC-type noise simulator with noise voltage of 500Vp-p, noise width of 1 μs and frequency of 25 to 60Hz.	
Dielectric withstand voltage		500VAC between all external DC terminals and ground, for 1 minute	
Insulation resistance		10M Ω or more between all external DC terminals and ground, by a 500VDC insulation resistance tester	
Level of protection		IP2X	
Weight		0.45kg	
External connection system	Communication section, module power supply section	7-point two-piece terminal block [Transmission circuits, module power, FG] M3 x 5.2 Tightening torque: 0.425 to 0.575N·m, 2 solderless terminals or less	
	External power supply section, output section	Two-piece spring clamp terminal block [External power supply, output section]	
Module mounting screw		M4 screw with plain washer finished round (Tightening torque range: 0.824 to 1.11N·m) Mountable with a DIN rail (in 6 orientations)	

*1: The power supply connected to the QS0J65BTS2-4T must satisfy the following conditions:

- (1) Reinforced insulation
SELV (Safety Extra Low Voltage): Hazardous potential part (48V or more)
- (2) Compliance with the LVD (Low Voltage Directive)
- (3) Output voltage within 19.2V to 28.8VDC (Ripple ratio: 5% or less.)

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Table 3.3 Performance specifications of QS0J65BTS2-4T (2/2)

Item		Transister output module	
		QS0J65BTS2-4T	
Applicable DIN rail		TH35-7.5Fe, TH35-7.5Al (Compliant with IEC60715)	
Applicable wire size	Communication section, module power supply section	0.3 to 2.0mm ² (22 to 14 AWG)	
	Applicable solderless terminal	<ul style="list-style-type: none"> • RAV1.25-3 [Applicable wire size: 0.3 to 1.25mm² (22 to 16 AWG) Twisted wire] • V2-MS3 (JST Mfg. Co., Ltd.), RAP2-3SL (Nippon Tanshi Co., Ltd.), TGV2-3N (NICHIFU Co., Ltd.) [Applicable wire size: 1.25 to 2.0mm² (16 to 14 AWG) Twisted wire] 	
	External power supply section, output section	Twisted wire 0.08 to 1.5mm ² (28 to 16AWG) *2 Applicable wire strip length: 8 to 11mm	
	Applicable solderless terminal	<ul style="list-style-type: none"> • TE0.5 (NICHIFU Co., Ltd.) [Applicable wire size: 0.5mm²] • TE0.75 (NICHIFU Co., Ltd.) [Applicable wire size: 0.75mm²] • TE1 (NICHIFU Co., Ltd.) [Applicable wire size: 0.9 to 1.0mm²] • TE1.5 (NICHIFU Co., Ltd.) [Applicable wire size: 1.25 to 1.5mm²] • FA-VTC125T9 (Mitsubishi Electric Engineering Co.,Ltd. [Applicable wire size: 0.3 to 1.65mm²] • FA-VTCW125T9 (Mitsubishi Electric Engineering Co., Ltd. [Applicable wire size: 0.3 to 1.65mm²] 	

*2: Do not insert two or more wires into one terminal.

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3.2.3 QS0J65BTB2-12DT

Table3.4 Performance specifications of QS0J65BTB2-12DT (1/2)

Item	DC-input transistor-output combined module				
	QS0J65BTB2-12DT				
Input specifications		Output specifications			
No. of input points ^{*2}	8 points (double input), 16 points (single input)	No. of output points	4 points (source + sink type) 2 points (source + source type)		
Isolation method	Photocoupler	Isolation method	Photocoupler		
Rated input voltage	24VDC	Rated load voltage	24VDC		
Rated input current	Approx. 4.6mA	Operating load voltage range	19.2V to 28.8VDC (Ripple ratio: 5% or less)		
Operating voltage range	19.2V to 28.8VDC (Ripple ratio: 5% or less)	Maximum load current	0.5A/point		
Maximum simultaneous input points	100%	Maximum inrush current	1.0A, 10ms or less		
ON voltage/ON current	15VDC/2mA or more	Leakage current at OFF	0.5mA or less		
OFF voltage/OFF current	5VDC/0.5mA or less	Max. voltage drop at ON	1.0VDC or less		
Input resistance	Approx.5.6k Ω	Protection function	Output overload protection function		
Input type	Negative common (source type)	Output type	Source + sink type Source + source type		
Response time	OFF → ON	0.4ms or less (at 24VDC)	Response time	OFF → ON	0.4ms or less (at 24VDC)
	ON → OFF	0.4ms or less (at 24VDC)		ON → OFF	0.4ms or less (at 24VDC)
Safety remote station input response time	11.2ms ^{*3} or less + time of noise removal filter (1ms, 5ms, 10ms, 20ms, 50ms)	Safety remote station output response time	10.4ms or less (at ON → OFF), 11.2ms or less (at OFF → ON) ^{*4}		
		Surge suppressor	Zener diode		
External power supply	Voltage	19.2V to 28.8VDC (Ripple ratio: 5% or less)			
	Current	60mA (24VDC, with all points ON, excepting for external load current)			
	Protection function	External power supply overvoltage/overcurrent protection function			
	Fuse	8A (Not replaceable)			
Wiring method for common	16 input points/common, 4 output points/common (Terminal block 2-wire type)				
Common current	Maximum 4A (Total of inputs and outputs)				
No. of stations occupied	1 station				
No. of access to nonvolatile memory inside module	10 ¹² times				
Safety refresh response processing time	9.6ms ^{*5}				
Module power ^{*1}	Voltage	19.2V to 28.8VDC (Ripple ratio: 5% or less)			
	Current	140mA or less (24VDC, with all points ON)			
	Protection function	Module power overvoltage/overcurrent protection function			
	Fuse	0.8A (Not replaceable)			
	Momentary power failure period	10ms or less			
Noise immunity	Tested by a DC-type noise simulator with noise voltage of 500Vp-p, noise width of 1μs and frequency of 25 to 60Hz.				
Dielectric withstand voltage	500VAC between all external DC terminals and ground, for 1 minute				
Insulation resistance	10M Ω or more between all external DC terminals and ground, by a 500VDC insulation resistance tester				
Level of protection	IP2X				
Weight	0.67kg				

*1: The power supply connected to the QS0J65BTB2-12DT must satisfy the following conditions:

- (1) Reinforced insulation
SELV (Safety Extra Low Voltage): Hazardous potential part (48V or more)
- (2) Compliance with the LVD (Low Voltage Directive)
- (3) Output voltage within 19.2V to 28.8VDC (Ripple ratio: 5% or less.)

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

*3: For module technical version A, the safety remote station input response time is 32ms or less + time of noise removal filter.

*4: For module technical version A, the safety remote station output response time is 32ms or less.

*5: For module technical version A, the safety refresh response processing time is 38ms.

Table 3.4 Performance specifications of QS0J65BTB2-12DT (2/2)

Item		DC-input transistor-output combined module
		QS0J65BTB2-12DT
External connection system	Communication section, module power section	7-point two-piece terminal block [Transmission circuits, module power, FG] M3 x 5.2 Tightening torque: 0.425 to 0.575N•m, 2 solderless terminals or less
	External power supply section, I/O section	18-point two-piece terminal block x 3 [External power supply, I/O signals] M3 x 5.2 Tightening torque: 0.425 to 0.575N•m, 2 solderless terminals or less
Module mounting screw		M4 screw with plain washer finished round (Tightening torque range: 0.824 to 1.11N•m) Mountable with a DIN rail (in 6 orientations)
Applicable DIN rail		TH35-7.5Fe, TH35-7.5Al (Compliant with IEC60715)
Applicable cable size		0.3 to 2.0mm ² (22 to 14 AWG)
Applicable solderless terminal*6		<ul style="list-style-type: none"> RAV1.25-3 [Applicable wire size: 0.3 to 1.25mm² (22 to 16 AWG) Twisted wire] V2-MS3 (JST Mfg. Co., Ltd.), RAP2-3SL (Nippon Tanshi Co., Ltd.), TGV2-3N (NICHIFU Co., Ltd.) [Applicable wire size: 1.25 to 2.0mm² (16 to 14 AWG) Twisted wire]
Wire	Material	Copper
	Temperature rating	75°C or more

*6: These are the applicable solderless terminals connected to the terminal block. When wiring, use applicable wires and tightening torque ranges. Use UL listed solderless terminals and, for crimping, use a tool recommended by their manufacturer.

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3.3 I/O Signals

The safety remote I/O module is operated as a safety remote I/O station of 1 occupied station.

Number of I/O points per station is 32 points. However, in the safety remote I/O module, only 16 input points and 4 output points can be used.

(1) Availability of I/O signals

Table3.5 shows the availability of I/O signals in each module.

Table3.5 Availability of I/O signals

Model	Input signal	Output signal
QS0J65BTS2-8D	○	×
QS0J65BTS2-4T	×	○
QS0J65BTB2-12DT	○	○

○ : Available × : Not available

(2) Assignment of I/O signals

Table3.6 and Table3.7 show the assignment of I/O signals.

Table3.6 Assignment of input signal

Remote input (RX)	Description	Remarks
RXn0	External input signal X0 of safety remote I/O module	—
to	to	—
RXnF	External input signal XF of safety remote I/O module	—
RX(n+1)0	Double input discrepancy error X0, 1	Turns ON only when the "Auto RTN Func to detect double input mismatch" parameter is set to "valid".
to	to	
RX(n+1)7	Double input discrepancy error XE, F	—
RX(n+1)8	Reserved	
to		
RX(n+1)E	Auto recovery enabled (after double input discrepancy error) signal	Turns ON only when the "Auto RTN Func to detect double input mismatch" parameter is set to "valid". This signal is used as an interlock for the parameter setting.
RX(n+1)F		

Table3.7 Assignment of output signal

Remote output (RY)	Description	Remarks
RYn0	External output signal Y0 of safety remote I/O module	—
to	to	—
RYn3	External output signal Y3 of safety remote I/O module	—
RYn4	Reserved	—
to		
RYnF		
RY(n+1)0		
to		
RY(n+1)F		

☒ POINT

The devices of reserved shown in Table3.6 and Table3.7 cannot be used by a user.

When used (ON/OFF) by a user, normal operation is not guaranteed.

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(3) How to use I/O signals

The method of using I/O signals is described below.

(a) Relationships between I/O signals

Table3.8 and 3.9 show the relationship between I/O signals.

Table3.8 RX assignment

Setting of "Double input/single input selection" parameter	Input		Remote input		Remarks
	X00	X01	RXn0	RXn1	
Double input	OFF	OFF	OFF	OFF	<ul style="list-style-type: none"> • 1 signal for 2 inputs. *1 • When 2 inputs are mismatched, both RXn0 and RXn1 are turned OFF.
	OFF	ON	OFF	OFF	
	ON	OFF	OFF	OFF	
	ON	ON	ON	ON	
Single input*2	OFF	OFF	OFF	OFF	<ul style="list-style-type: none"> • X00 and X01 are independent signals. • Remote inputs are sent as RX00 and RX01 independently.
	OFF	ON	OFF	ON	
	ON	OFF	ON	OFF	
	ON	ON	ON	ON	

*1: For the program, both RXn0 and RXn1 can be used.

*2: Check if this function is available in the module technical version used. (☞ Appendix 2)

Table3.9 RY assignment

Setting of "Method of wiring of output" parameter	Remote output		Output				Remarks
	RYn0	RYn1	Y0+	Y0-	Y1+	Y1-	
Reserved	OFF	—	OFF	OFF	—	—	Output (Y0+) and (Y0-) remain OFF even if RYn0 is turned ON.
	ON	—	OFF	OFF	—	—	
Double wiring (Source+Sink)	OFF	—	OFF	OFF	—	—	<ul style="list-style-type: none"> • 2 outputs for 1 signal. • Both source side output (Y0+) and sink side output (Y0-) turn ON when RYn0 is turned ON.
	ON	—	ON	ON	—	—	
Double wiring (Source+Source)	OFF	OFF	OFF	—	OFF	—	<ul style="list-style-type: none"> • 2 outputs for 2 signals. • Source output (Y0+) and source output (Y1+) simultaneously turn ON when both RYn0 and RYn1 are turned ON.
		ON	OFF	—	OFF	—	
	ON	OFF	OFF	—	OFF	—	
		ON	ON	—	ON	—	

(b) Combinations of signals

Table3.10 and 3.11 shows the combinations of signals for double wiring.

Table3.10 Combinations of input signals

Signal	Combination							
Input signal (X)	X0	X2	X4	X6	X8	XA	XC	XE
	X1	X3	X5	X7	X9	XB	XD	XF
Remote input (RX)	RXn0	RXn2	RXn4	RXn6	RXn8	RXnA	RXnC	RXnE
	RXn1	RXn3	RXn5	RXn7	RXn9	RXnB	RXnD	RXnF

Table3.11 Combinations of output signals

Signal	Combination					
	Source+Sink				Source+Source	
Remote output (RY)	RYn0	RYn1	RYn2	RYn3	RYn0	RYn2
					RYn1	RYn3
Output signal (Y)	Y0+	Y1+	Y2+	Y3+	Y0+	Y2+
	Y0-	Y1-	Y2-	Y3-	Y1+	Y3+

3.4 Cable Specifications

Use CC-Link dedicated cables for the CC-Link Safety System.

The performance of the CC-Link Safety System cannot be guaranteed when any other cables are used.

For the specifications or any other inquiries, visit the following website:

CC-Link Partner Association: www.cc-link.org

REMARK

For details, refer to the CC-Link Cable Wiring Manual issued by the CC-Link Partner Association.

CHAPTER4 FUNCTIONS

This chapter describes the functions of safety remote I/O modules.

4.1 List of Functions

Table4.1, 4.2, 4.3 list the functions of safety remote I/O modules.

Table4.1 List of common functions for input/output modules

Classification	Function	Description	Reference	
Safety function	I/O diagnostic function	Checks whether I/O signals are normal.	—	
	Self-diagnostic function	Hardware diagnostic function	Checks whether the safety remote I/O module operates normally.	—
		Power supply diagnostic function	Checks whether an overvoltage or undervoltage occurs to the power supply which is input.	—
		CC-Link diagnostic function	Checks whether the CC-Link Safety system operates normally.	—
	Protection function	Avoids the effects of overvoltage and overcurrent to other modules of the safety-related system.	Section 4.4	
Error history function	Error history function	Saves the error description saved inside the safety remote I/O module to the inside nonvolatile memory as an error history. Sends the saved error history to the safety CPU module.	Section 4.5	

Table4.2 List of functions for input module

Classification	Function	Description	Reference
Input function	Double input wiring	Doubles the input wiring.	Section 4.2
	Noise removal filter	Reduces the noise of an input signal. Set the time between an external input turning ON/OFF and the X input signal inside the module turning ON/OFF.	
	Auto recovery after double input discrepancy error	Turns OFF the send data of a corresponding input signal without stopping the module when a double input discrepancy error is detected.	
Parameter function	Input setting function	Sets the input parameters.	Section 5.2.1

Table4.3 List of functions for output module

Classification	Function	Description	Reference
Output function	Output function	Doubles the output wiring.	Section 4.3
Parameter function	Output setting function	Sets the output parameters.	Section 5.2.2

4.2 Input Function

The safety remote I/O module has two input functions: double input wiring function and noise removal filter function.

(1) Double input wiring function

This function is used to double the input wiring.

An input error can be detected immediately by verifying the status of two input signals.

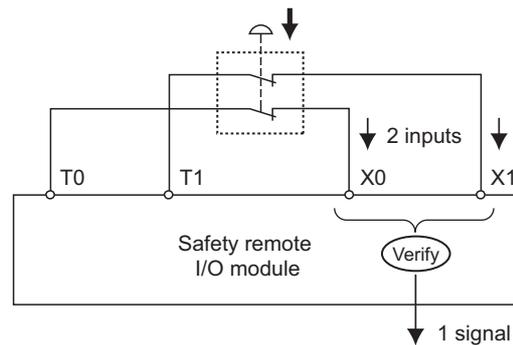


Figure 4.1 Double input wiring

REMARK

With a single input, an input error can be detected using the following wiring system.

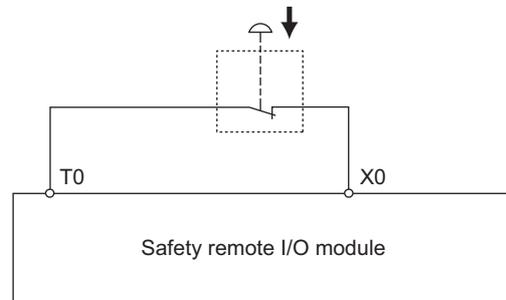


Figure 4.2 Single input wiring

(2) Noise removal filter

This function is used to set the filter time for reducing noise of the input signal. The noise removal filter can be set to the following five stages.

- 1ms
- 5ms
- 10ms
- 20ms
- 50ms

Set the noise removal filter in the "Time of noise removal filter" parameter. For the setting of the "Time of noise removal filter", refer to section 5.2.1(2)

The longer the noise removal filter is, the higher the durability to chattering or noise becomes. However, the response to the input signal will become slow. On the other hand, the shorter the noise removal filter is, the faster the response to the input signal becomes. However, the durability to chattering or noise will become low.

Example) When setting "1ms" to "Time of noise removal filter."

If there is no effect of noise, the time set for "Time of noise removal filter" and the time taken from when the external input turns ON/OFF until when X input signal inside the module turns ON/OFF will be equal.

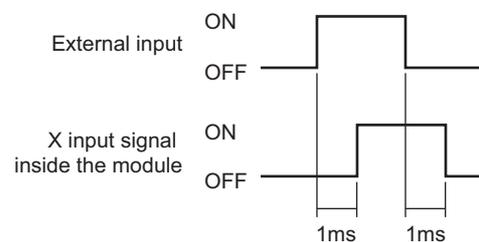


Figure 4.3 Delay of input signal

(3) Auto recovery after double input discrepancy error

This function enables the module automatically recover from a double input discrepancy error after the error cause is eliminated.

With this function, resetting the safety remote I/O module to reset the error status is not required.

When this function is used and a double input discrepancy is detected, a minor error^{*1} occurs in the safety remote I/O module.

* 1: Minor error status means the status under which the safety remote I/O module continues its operation despite an error and there is no impact on other I/O signals.

To clear the double input discrepancy error, both input signals need to be turned OFF. The following figure shows the auto recovery timing after a double input discrepancy error is detected.

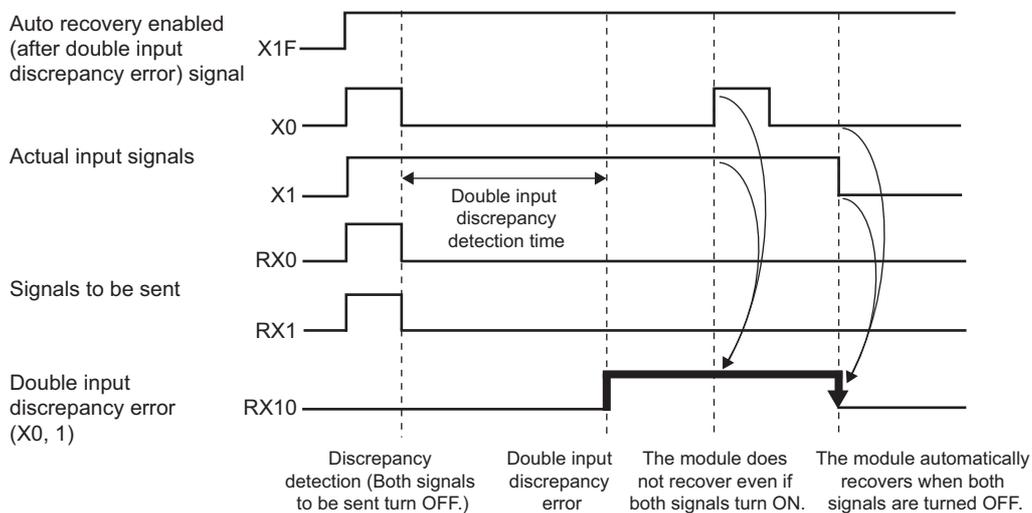


Figure 4.4 Auto recovery timing after a double input discrepancy error is detected

POINT

Under a minor error that occurs in this function, CC-Link Safety communication can return even if it is disconnected because the safety remote I/O module continues to operate.

When the CC-Link Safety communication returns, Double input discrepancy error (RX(n+1)0 to RX(n+1)7) is cleared once.

4.3 Output Function

The safety remote I/O module has one output function: double output wiring function.

(1) Double output wiring function

This function is used to double the output wiring.

An output error can be detected immediately by verifying the status of two output signals.

The following two double output wiring methods are available for the safety remote I/O module. Select either method depending on the wiring with connected external safety devices.

- Double wiring with source output and sink output

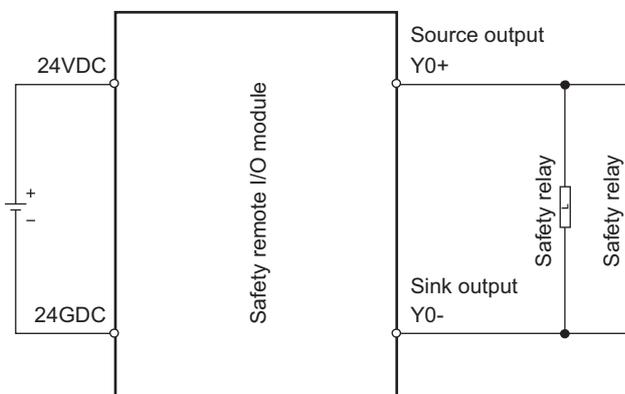


Figure 4.5 Double wiring with source output and sink output

- Double wiring with source output and source output

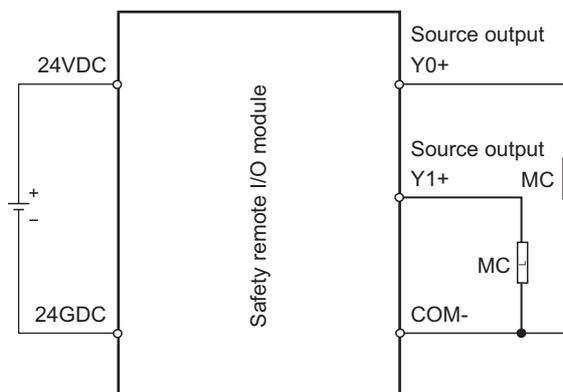


Figure 4.6 Double wiring with source output and source output

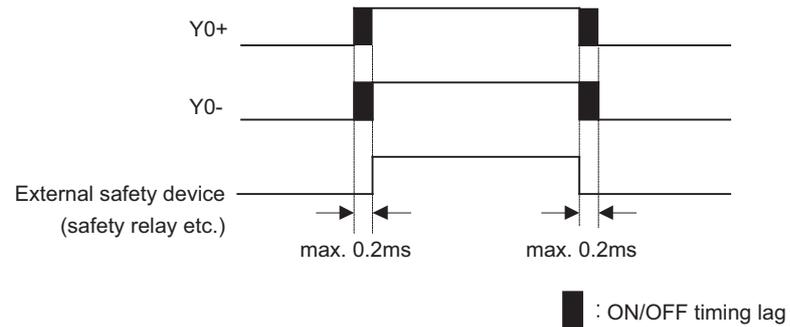
Set the method in the "Method of wiring of output" parameter.

For the setting of the "Method of wiring of output", refer to Section 5.2.2(1).

POINT

- (1) Double wiring with sink output and sink output is not available for the safety remote I/O module.
- (2) In double wiring with source output and sink output, a time lag (up to 0.2ms) may occur between the ON/OFF timing of Y0+ and the ON/OFF timing of Y0- as shown below due to the internal processing of the safety remote I/O module.

However, there is no impact on the operation of external safety devices.



4.4 Protection Function

The safety remote I/O module has five protection functions as shown in Table4.4.

Table4.4 Protection function list

Name	Purpose	Description
Module power supply overvoltage protection function	Prevents fire or burning from the safety remote I/O module due to the primary side overvoltage.	Operates when the module internal power supply goes into the primary side overvoltage status.
Module power supply overcurrent protection function	Prevents fire or burning from the safety remote I/O module due to the primary side overcurrent.	Operates when the module internal power supply goes into the primary side overcurrent status.
I/O control power supply overvoltage protection function	Prevents fire or burning from the safety remote I/O module and load circuit due to the overvoltage.	Operates when the I/O control power supply circuit goes into the primary side overvoltage status.
I/O control power supply overcurrent protection function	Prevents fire or burning from the safety remote I/O module and load circuit due to the overcurrent.	Operates when the I/O control power supply circuit goes into the primary side overcurrent status.
Output overload protection function	Prevents fire or burning from the safety remote I/O module due to the overcurrent or overheat caused by the short-circuit of the output circuit.	Operates when 5A/1 point or more current flows. Recovers when the safety remote I/O module is reset in the condition that the load becomes the rated load.

4.5 Error History Function

The safety remote I/O module has two error history functions; saving and reading error history data.

(1) Saving error history data

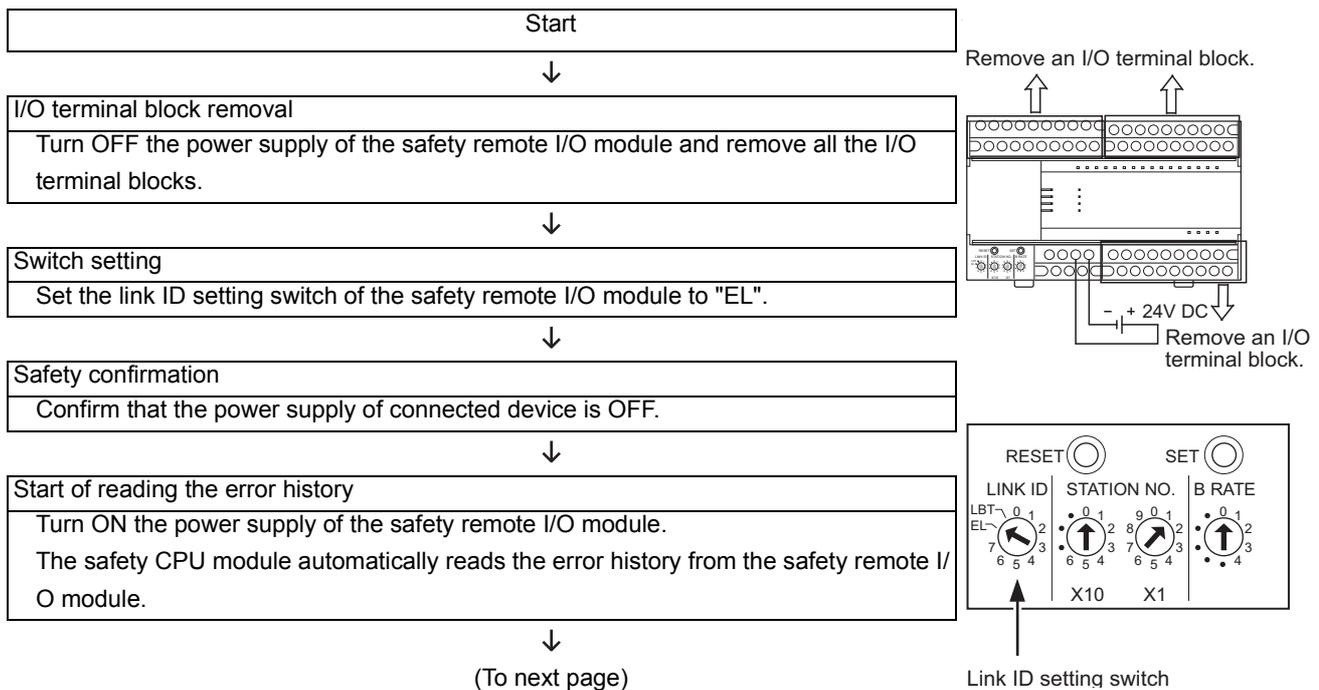
When an error occurs in the remote I/O module, the error description is saved to the nonvolatile memory inside the module as an error history.

(2) Reading error history data

The description of error saved in the nonvolatile memory inside the safety remote I/O module can be read from the safety CPU module by the previous link ID setting switch setting and confirmed by GX Developer.

The safety CPU module reads all the error histories inside the safety remote I/O module.

Figure 4.7 shows the procedure of reading the error history data.



(From previous page)



Completion of reading the error history		
[Normal]	When "RUN" LED flashes, the reading of error history is completed normally. Turn OFF the power supply of the safety remote I/O module.	[Normal] Flashes → <input type="checkbox"/> POWER <input type="checkbox"/> L RUN <input checked="" type="checkbox"/> RUN <input type="checkbox"/> L ERR. <input type="checkbox"/> SAFETY <input type="checkbox"/> SD <input type="checkbox"/> ERR. <input type="checkbox"/> RD
[Error]	When "ERR." LED flashes, the reading of error history is completed abnormally. Turn OFF the power supply of the safety remote I/O module and read the error history again.	[Error] Flashes → <input type="checkbox"/> POWER <input type="checkbox"/> L RUN <input type="checkbox"/> RUN <input type="checkbox"/> L ERR. <input type="checkbox"/> SAFETY <input type="checkbox"/> SD <input checked="" type="checkbox"/> ERR. <input type="checkbox"/> RD

Figure 4.7 Procedure for reading error history

(3) Checking error history

After the error history has been read, the cause of an error can be identified by executing the PLC diagnostic function in GX Developer.

For how to check errors, refer to Section 9.4.

Also, for error classification, refer to Section 9.5.

☒ POINT

- 1) Error history can be read only when the safety remote I/O module can be connected in CC-Link Safety at power-on.
If the "ERR." LED is flashing and error history cannot be read, follow the troubleshooting procedure to solve the problem. (☞ Section 9.2)
- 2) Read error history data on one safety remote I/O module per reading.
When error history data are read on several safety remote I/O modules at the same time, the error history data of the modules are displayed mixed on the PLC diagnostics window.
- 3) If error history data are not displayed due to reasons such as CC-Link communication error even after the reading is completed, perform the reading again.

CHAPTER5 PARAMETER SETTING

This chapter describes the parameter setting of safety remote I/O module.

The following must be considered for safety remote I/O module before setting parameters.

- Determine the type of certification to be obtained from the third-party certification organization.
- Determine the devices to be connected, wiring methods, and diagnostic functions compliant with the certification.

The parameters of the safety remote I/O module are written via the safety master module when the following operation is performed;

- Reset operation or power OFF → ON of the safety CPU module on the safety master station
- Reset operation or power OFF → ON of the safety remote I/O module

(1) Parameter setting method

The parameters of the safety remote I/O module are set on the Network parameter setting screen in GX Developer.

For the operation method of GX Developer, refer to the "GX Developer Version 8 Operating Manual".

The parameter setting method using GX Developer is shown below.

(a) Display of station information setting screen

Select [Parameter] → [Network parameter] → **CC-Link** button →

Station information button to display the station information setting screen.

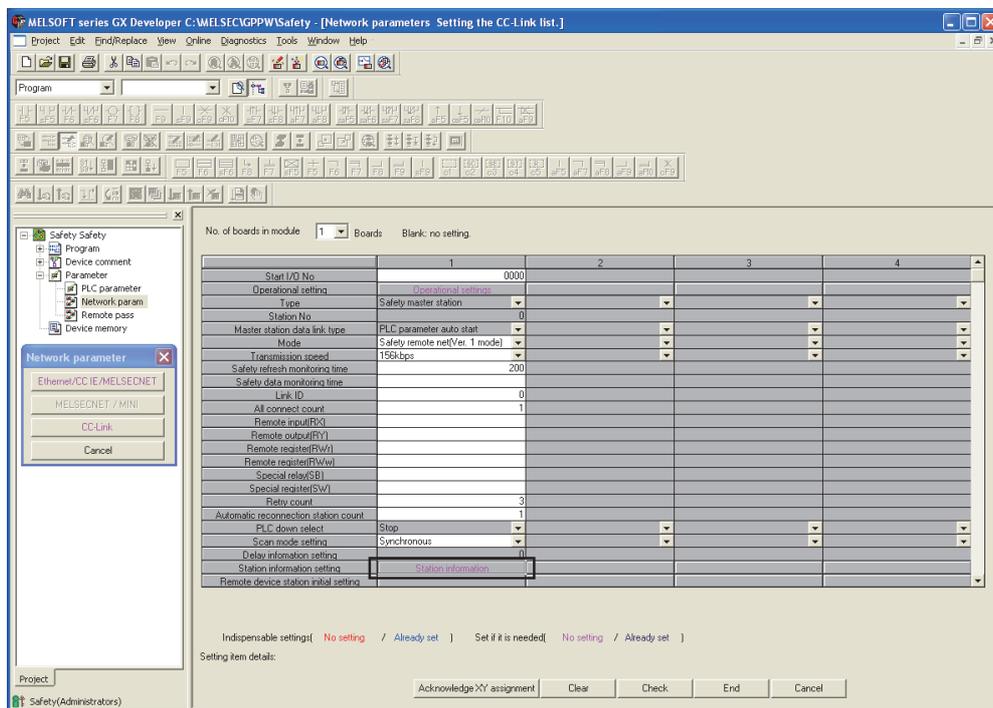


Figure 5.1 CC-Link setting screen

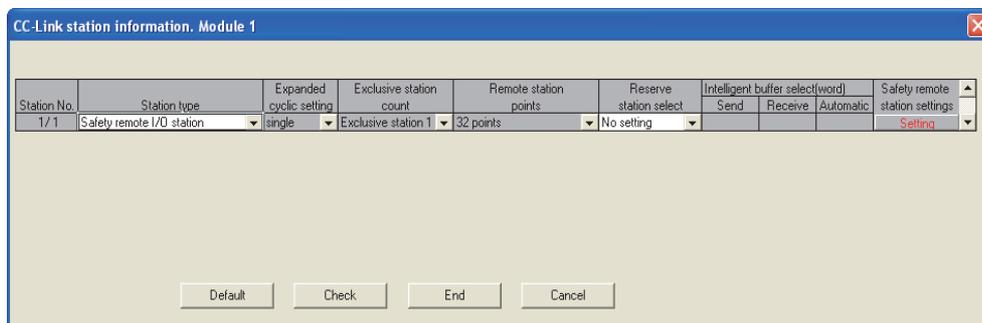


Figure 5.2 Station information setting screen

(b) Display of safety remote station setting screen

Click the **Setting** button on the station information setting screen to display the safety remote station setting screen.

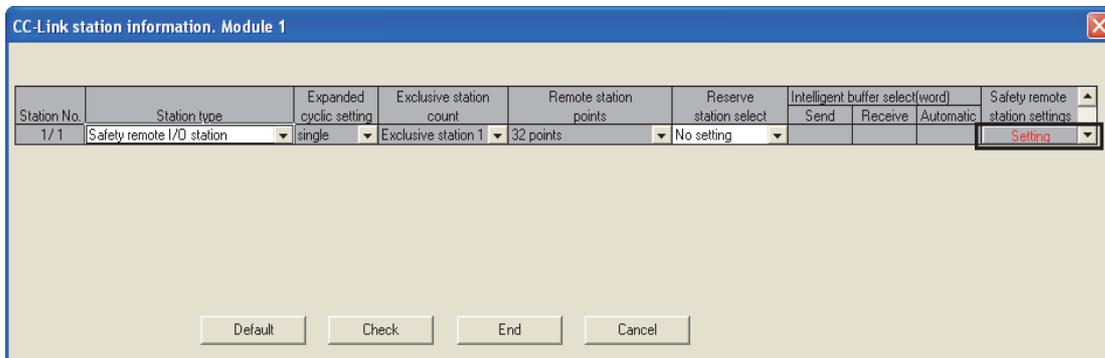


Figure 5.3 Station information setting screen

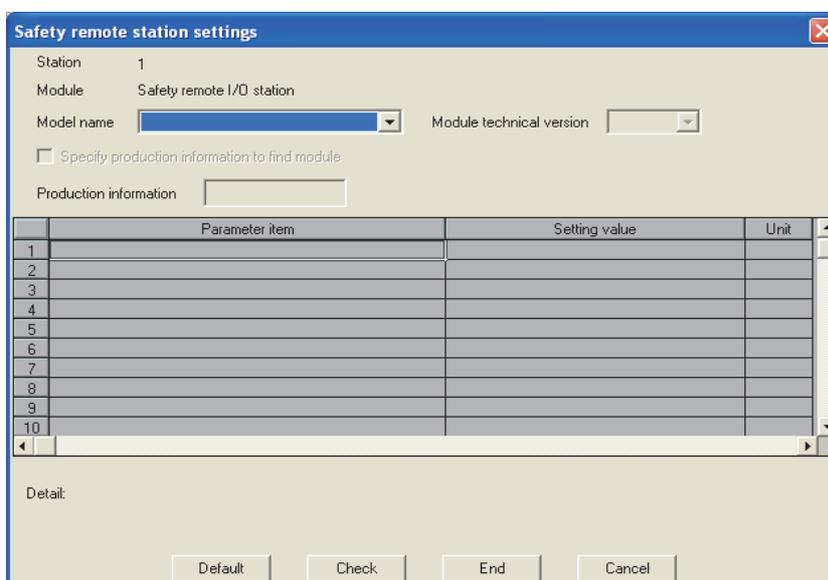


Figure 5.4 Safety remote station setting screen

(c) Model and module technical version settings

Set the model and module technical version of the safety remote I/O module.
 The module technical version of the safety remote I/O module used must be set.
 For the module technical version checking method, refer to Section 2.3.

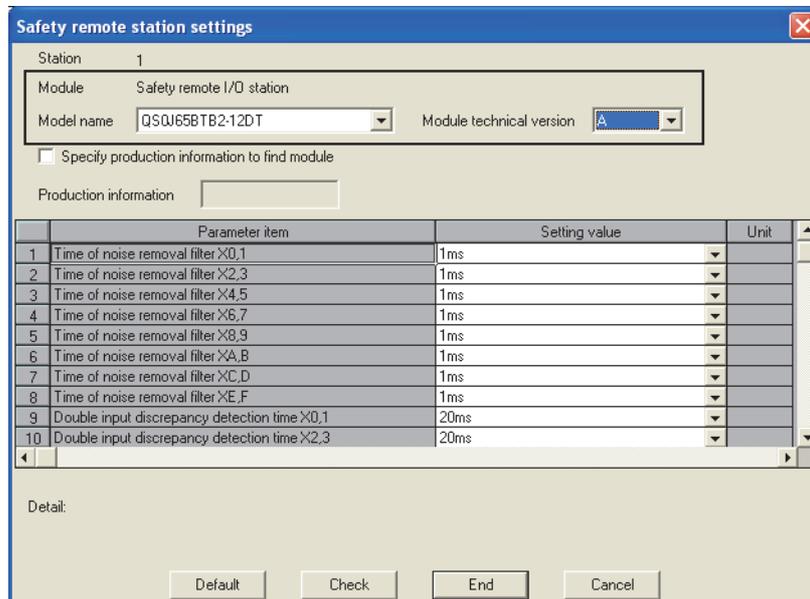


Figure 5.5 Model and module technical version settings

POINT

The module technical version indicates the functions can be used in the safety remote I/O module.
 Specifications according to the module technical version upgrade differ depending on the type of safety slave station.
 For the difference of specifications according to the module technical version upgrade of the safety remote I/O module, refer to Appendix 2.

(d) Production information setting

To manage a system by the production information, put a check in "specify production information to find module".

When a check is put, whether the safety remote I/O module connected to the safety master station is correct can be judged.

For details of the production information management, refer to the "CC-Link Safety System Master Module User's Manual".

For checking the production information, refer to Section 2.3.

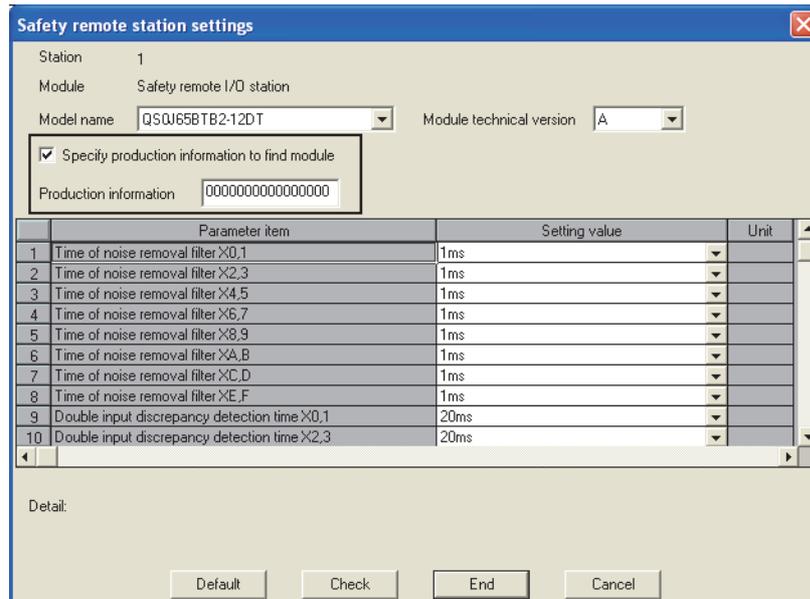


Figure 5.6 Production information setting

POINT

The "Production information" shows the management number inherent to the safety remote I/O module.

As for production information, enter the upper 15 digits out of 17 digits described in SERIAL column of the rated plate.

(e) Parameter setting

The parameter setting is made for each parameter.

For details on the parameter, refer to Section 5.2.1 and Section 5.2.2.

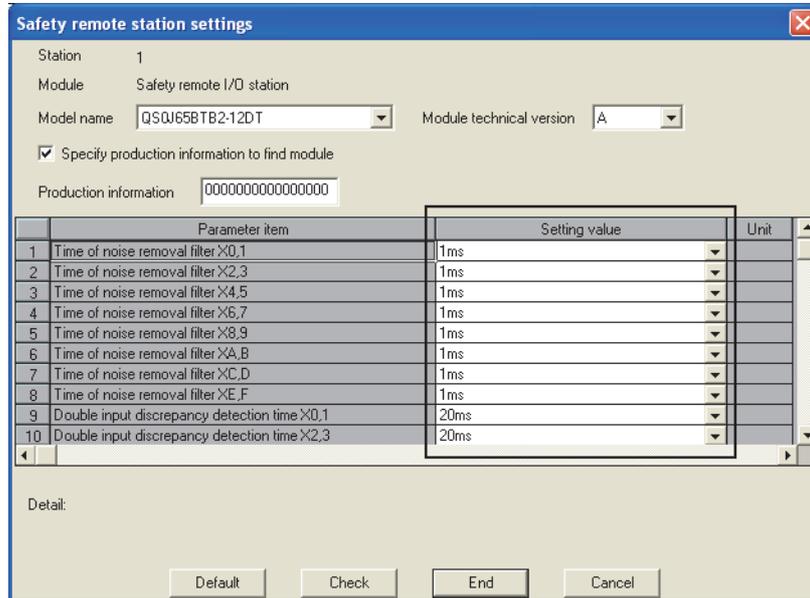


Figure 5.7 Parameter setting

(f) Settings check

Click the **check** button to confirm if the parameter setting is correct.

When the setting is incorrect, an error occurs.

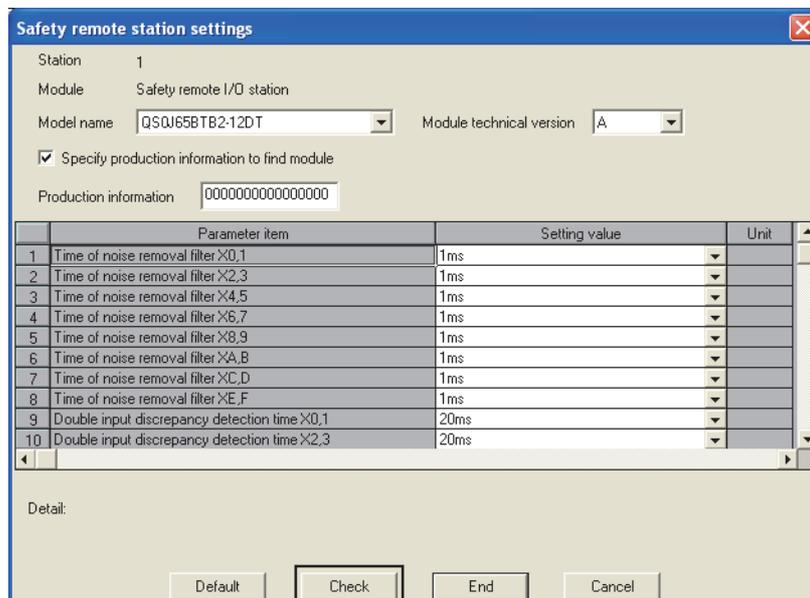


Figure 5.8 Settings check

(g) Parameter setting completion

Click the **End** button to complete each parameter setting.

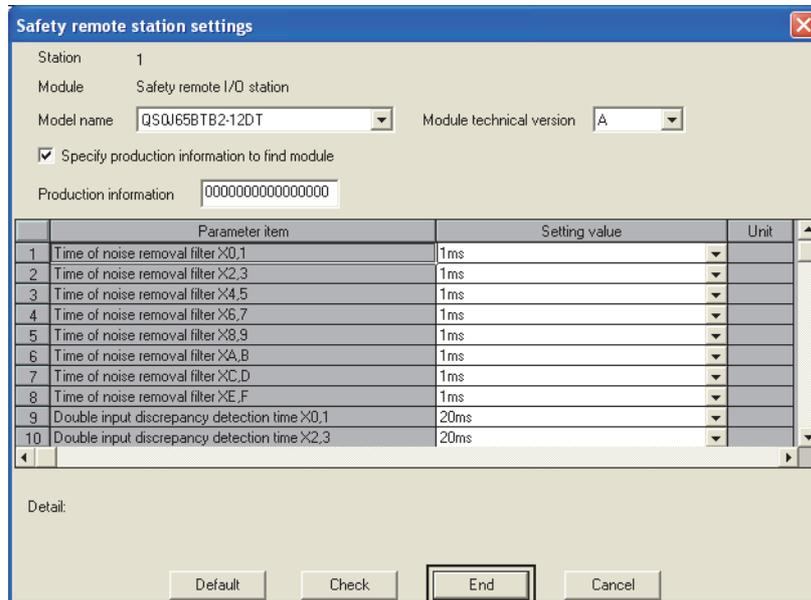


Figure 5.9 Setting completion

(2) Safety CSP file registration

The safety CSP file defines the information for setting the parameters of the safety remote station.

The parameters of the safety remote station cannot be set without safety CSP file corresponding to the technical version of the safety remote I/O module.

Obtaining/registering the safety CSP file corresponding to the technical version of the safety remote I/O module is described below.

(a) Safety CSP file download

Download the latest safety CSP file from the CC-Link Partner Association website.

For details, refer to the CC-Link Partner Association website: <http://www.cc-link.org/>.

(b) Safety CSP file registration

Store the downloaded safety CSP file into the "CSP" folder in the installation folder of GX Developer.

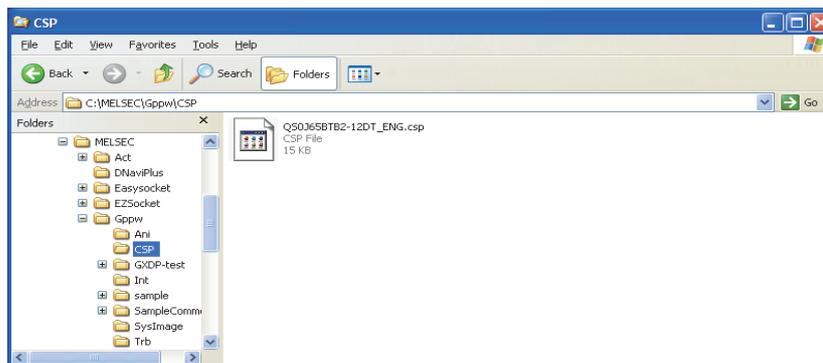


Figure 5.10 Safety CSP file storage destination

POINT

The safety CSP file of the safety remote I/O module is automatically registered when GX Developer is installed.

Therefore, when the installation of GX Developer is performed after the safety CSP file is registered, the registered CSP file may be updated with the old safety CSP file.

If updated with the old safety CSP file, register the latest safety CSP file again.

5.1 List of Parameters

This section describes the parameters of safety remote I/O modules. Input parameters can be set to input modules, output parameters can be set to output modules, and both input/output parameters can be set to I/O combined modules.

(1) Input parameters

(a) Applicable modules

Table5.1 lists the modules to which the input parameters can be set.

Table5.1 Input parameters settable module

Module	Model
Input module	• QS0J65BTS2-8D
I/O combined module	• QS0J65BTB2-12DT

(b) List of input parameters

Table5.2 List of input parameters

Parameter name	Parameter item	Description	Reference section
Time of noise removal filter	1. Time of noise removal filter X0,1 to 8. Time of noise removal filter XE,F	Sets the filter time for reducing noise of the input signal. The filter time must be longer than the Input dark test pulse OFF time. Default : "1ms" Setting range : "1ms", "5ms", "10ms", "20ms", 50ms"	5.2.1(2)
Double input discrepancy detection time	9. Double input discrepancy detection time X0,1 to 16. Double input discrepancy detection time XE,F	Sets the ON/OFF transient time in double wiring. If the ON/OFF discrepancy continues longer than the preset time, an error occurs. Default : "20ms" Setting range*1 : "Do not detect", "20ms", "40ms", "60ms", "80ms", "100ms", "120ms", "140ms", "160ms", "180ms", "200ms", "220ms", "240ms", "260ms", "280ms", "300ms", "320ms", "340ms", "360ms", "380ms", "400ms", "420ms", "440ms", "460ms", "480ms", "500ms", "1s", "2s", "5s", "10s", "20s", "30s", "60s"	5.2.1(3)
Input dark test selection	17. Input dark test selection X0,1 to 24. Input dark test selection XE,F	Sets whether the "Input dark test function" of the safety remote I/O module diagnostic function is executed or not. Default : "Execute" Setting range : "Execute", *1*3 "Not execute", "Xn: Execute, Xn+1: Not execute", "Xn: Not execute, Xn+1: Execute"	5.2.1(5)
Input dark test pulse OFF time	25. Input dark test pulse OFF time	Sets the OFF pulse width that T0 and T1 terminals output. Default : "400 μs" Setting range : "400 μs", "1ms", "2ms"	5.2.1(6)
Double input/single input selection*2	38. Double input/single input selection X0,1 to 45. Double input/single input selection XE,F	Sets the wiring method of input signals. Default : "Double input" Setting range : "No Use", "Double input", *3 ""Xn,Xn+1: Single input", "Xn: Single input, Xn+1: No Use", "Xn: No Use, Xn+1: Single input"	5.2.1(1)
Auto RTN Func to detect double input mismatch*2	46. Auto RTN Func to detect double input mismatch	Sets whether to enable the auto recovery after double input discrepancy error or not. Default : "invalid" Setting range : "invalid", "valid"	5.2.1(4)

* 1: The setting range differs depending on the module technical version.
Check if the module supports the setting items by the module technical version.

(Appendix 2)

* 2: Check if the module supports the setting by the module technical version. (Appendix 2)

* 3: "Xn, Xn+1" represents "X0, X1", "X2, X3"... "XE, XF".

(2) Output parameters

(a) Applicable modules

Table5.3 lists the modules to which the output parameters can be set.

Table5.3 Output parameter settable module

Module	Model
Output module	• QS0J65BTS2-4T
I/O combined module	• QS0J65BTB2-12DT

(b) List of output parameters

Table5.4 List of output parameters

Parameter name	Parameter item	Description	Reference section
Method of wiring of output	26. Method of wiring of output Y0 to 29. Method of wiring of output Y3	Sets the "Output wiring method". Default : "No Use" Setting range : "No Use" "Double wiring (Source+Sink)" "Double wiring (Source+Source)"	5.2.2(1)
Output dark test selection	30. Output dark test selection Y0 to 33. Output dark test selection Y3	Sets whether the "Output dark test function" of the safety remote I/O module diagnostic function is executed or not. Default : "Execute" Setting range : "Execute" "Not execute"	5.2.2(2)
Output dark test pulse OFF time	34. Output dark test pulse OFF time Y0 to 37. Output dark test pulse OFF time Y3	Sets the OFF pulse width used in the output dark test. Default : "400 μ s" Setting range : "400 μ s", "1ms", "2ms"	5.2.2(3)

5.2 Parameter Details

This section describes the settings of each parameter.

5.2.1 Input parameter

The following is the input parameter setting procedure.

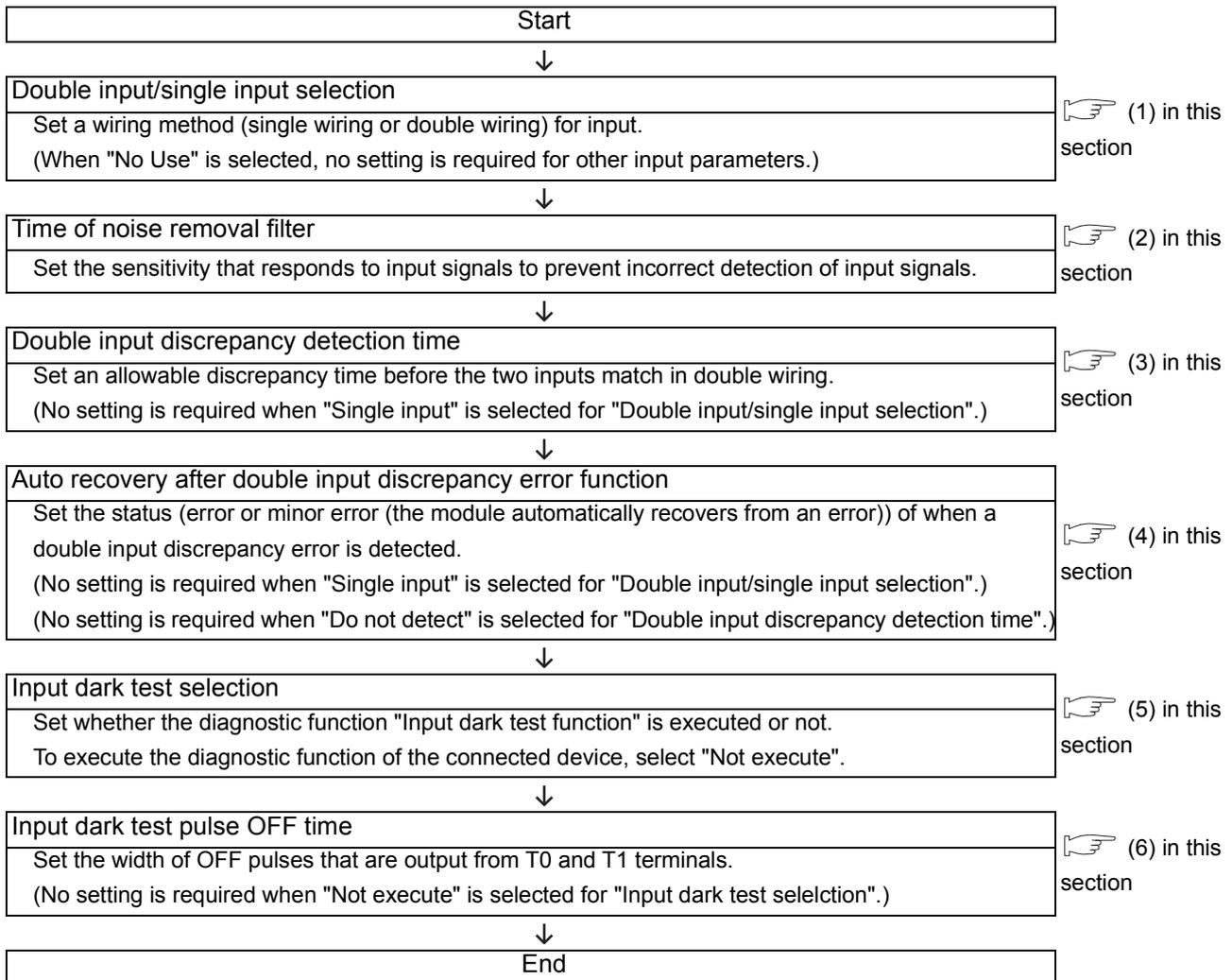


Figure 5.11 Flowchart for the input parameter setting

(1) Double input/single input selection*1

This parameter is used to set a wiring method (double wiring or single wiring) for input.

The settings are shown in Table5.5.

Table5.5 Settings

Parameter item	Setting range*2	Default
38. Double input/single input selection X0,1	"No Use" "Double input", "Xn,Xn+1: Single input", "Xn: Single input, Xn+1: No Use", "Xn: No Use, Xn+1: Single input"	"Double input"
39. Double input/single input selection X2,3		
40. Double input/single input selection X4,5		
41. Double input/single input selection X6,7		
42. Double input/single input selection X8,9		
43. Double input/single input selection XA,B		
44. Double input/single input selection XC,D		
45. Double input/single input selection XE,F		

* 1: Check if the module supports the setting by the module technical version. (Appendix 2)

* 2: "Xn, Xn+1" represents "X0, X1", "X2, X3"... "XE, XF".

(2) Time of noise removal filter

This parameter is used to set the filter time for reducing noise of the input signal in 2 input points unit.

The settings are shown in Table5.6.

Table5.6 Settings

Parameter item	Setting range	Default
1. Time of noise removal filter X0,1	"1ms", "5ms", "10ms", "20ms", "50ms"	"1ms"
2. Time of noise removal filter X2,3		
3. Time of noise removal filter X4,5		
4. Time of noise removal filter X6,7		
5. Time of noise removal filter X8,9		
6. Time of noise removal filter XA,B		
7. Time of noise removal filter XC,D		
8. Time of noise removal filter XE,F		

The following error occurs depending on the setting value.

- Out of the setting range of "Time of noise removal filter"

For details of the error, refer to Section 9.5.

POINT

1. Set the "Time of noise removal filter" longer than the "Input dark test pulse OFF time". When the input dark test is not executed, the relationships between the "Time of noise removal filter" and the "Input dark test pulse OFF time" need not be considered.
For the setting of the "Input dark test pulse OFF time", refer to (6) in this section.
2. When "No Use" is set for the double input/single input selection parameter, the time of noise removal filter is ignored even if it is set.
For the double input/single input selection parameter setting, refer to (1) in this section.

(3) Double input discrepancy detection time

This parameter is used to set an allowable discrepancy time before the two inputs match in double wiring.

The settings are shown in Table5.7.

Table5.7 Settings

Parameter item	Setting range*1	Default
9. Double input discrepancy detection time X0,1	"Do not detect", "20ms", "40ms",	"20ms"
10. Double input discrepancy detection time X2,3	"60ms", "80ms", "100ms", "120ms",	
11. Double input discrepancy detection time X4,5	"140ms", "160ms", "180ms", "200ms",	
12. Double input discrepancy detection time X6,7	"220ms", "240ms", "260ms", "280ms",	
13. Double input discrepancy detection time X8,9	"300ms", "320ms", "340ms", "360ms",	
14. Double input discrepancy detection time XA,B	"380ms", "400ms", "420ms", "440ms",	
15. Double input discrepancy detection time XC,D	"460ms", "480ms", "500ms", "1s",	
16. Double input discrepancy detection time XE,F	"2s", "5s", "10s", "20s", "30s", "60s"	

* 1: The setting range differs depending on the module technical version.
Check if the module supports the setting items by the module technical version.

(Appendix 2)

If a value out of the setting range is set, an error occurs.

For details of the error, refer to Section 9.5.

POINT

When "No Use" or "Single input" is set for the double input/single input selection parameter, the double input discrepancy detection time is ignored even if it is set. For the double input/single input selection parameter setting, refer to (1) in this section.

REMARK

To set the double input discrepancy detection time for the QS0J65BTB2-12DT with module technical version B or earlier using GX Developer (earlier than version 8.88S), enter the value within the range 1 to 25. (The value multiplied by 20ms will be the detection time.)

The set value can be used even after GX Developer is upgraded (version 8.88S or later). The parameter value does not need to be set again.

- (a) Double input discrepancy detection
The module determines a failure of a connected device when the discrepancy between two input signals continues longer than the double input discrepancy detection time set and adjusted by a user.
- (b) Double input discrepancy detection time setting
Set the double input discrepancy detection time, referring to the following as a guide.
 - 1) When the synchronous time for double input is determined
For devices such as safety relays and safety switches, of which synchronous time is provided in its specifications, set the time value twice as long as the respective synchronous time values considering the safety margin for a false detection.
(Example: When the synchronous time is 1s, set 2s for the detection time.)
 - 2) When the synchronous time for double input is not determined
When using a device such as a door switch, where a door is manually opened and closed, and therefore synchronous time is not determined, perform one of the following actions:
Set "Do not detect".
Set the time long enough for the user's system.

POINT

The doubled input signals perform a fail-safe operation (both signals turn OFF) when a discrepancy is detected (1) in the figure below), and the system stops safely.

The same operation is also performed when the double input discrepancy detection time parameter is set to "Do not detect".

The double input discrepancy detection time parameter determines the error detection timing (2) in the figure below) as well. To avoid a false detection, set a suitable value in parameter.

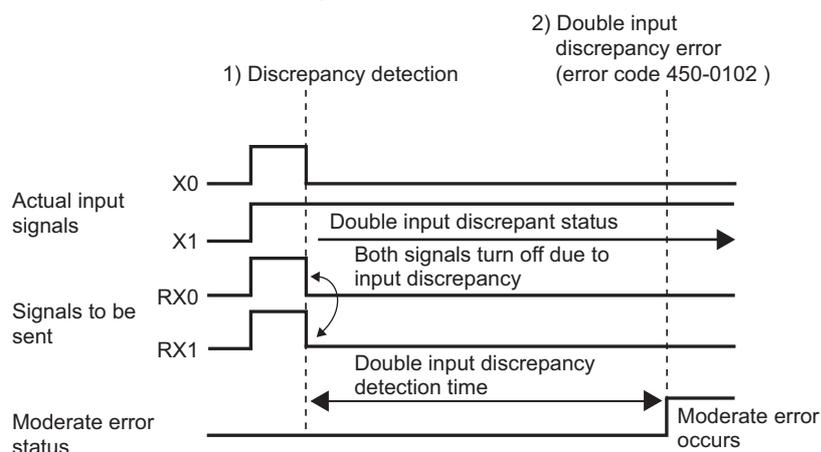


Figure 5.12 Operation of the double input discrepancy detection

- (c) Auto recovery after double input discrepancy error
 This function turns OFF the send data of a corresponding input without stopping the module when a double input discrepancy detection error occurs.
 When both input signals are turned OFF, the module determines that the error has been removed and automatically recovers.
 For the parameter setting, refer to (4) in this section.
 For details on the function, refer to Section 4.2.

- (4) Auto recovery after double input discrepancy error function *1
 This parameter is used to set the operating status of the module (stop or auto recovery) after a double input discrepancy detection error occurs. When "valid" is set, the module automatically recovers from an error after the error cause is eliminated.
 The settings are shown in Table5.8.

Table5.8 Settings

Parameter item	Setting range	Default
46. Auto RTN Func to detect double input mismatch	"invalid", "valid"	"invalid"

* 1: Check if the module supports the setting by the module technical version. (Appendix 2)

- (5) Input dark test selection
 This parameter is used to set in 2 input points unit if the "Input dark test function" of the safety remote I/O module diagnostic function is executed or not.
 The settings are shown in Table5.9.

Table5.9 Settings

Parameter item	Setting range *1 *2	Default
17. Input dark test selection X0,1	"Execute", "Not execute", "Xn: Execute, Xn+1: Not execute", "Xn: Not execute, Xn+1: Execute"	"Execute"
18. Input dark test selection X2,3		
19. Input dark test selection X4,5		
20. Input dark test selection X6,7		
21. Input dark test selection X8,9		
22. Input dark test selection XA,B		
23. Input dark test selection XC,D		
24. Input dark test selection XE,F		

* 1: The setting range differs depending on the module technical version.
 Check if the module supports the setting items by the module technical version.

(Appendix 2)

* 2: "Xn, Xn+1" represents "X0, X1", "X2, X3"... "XE, XF".

An error occurs depending on the setting value.
 For details of the error, refer to Section 9.5.

☒ POINT

When "No Use" is set for the double input/single input selection parameter, the input dark test selection is ignored even if it is set.

In addition, setting will be restricted depending on the double input/single input selection parameter setting as shown below.

Setting range for input dark test selection	Double input/single input selection	
	"Double input"	Other than "Double input"
"Execute"	Can be set.	Can be set.
"Not execute"	Can be set.	
"X0: Execute, X1: Not execute"	Cannot be set.	
"X0: Not execute, X1: Execute"	Cannot be set.	

For the double input/single input selection parameter setting, refer to (1) in this section.

(6) Input dark test pulse OFF time

This parameter is used to set the width of OFF pulses that are output from T0 and T1 terminals.

The settings are shown in Table5.10.

Table5.10 Settings

Parameter item	Setting range	Default
25. Input dark test pulse OFF time	"400 μs," "1ms," "2ms"	"400 μs"

When a value out of the setting range is set, an error occurs.

For details of the error, refer to Section 9.5.

☒ POINT

When "No Use" is set for the double input/single input selection parameter, the input dark test pulse OFF time is ignored even if it is set.

For the double input/single input selection parameter setting, refer to (1) in this section.

5.2.2 Output parameter

The following is the output parameter setting procedure.

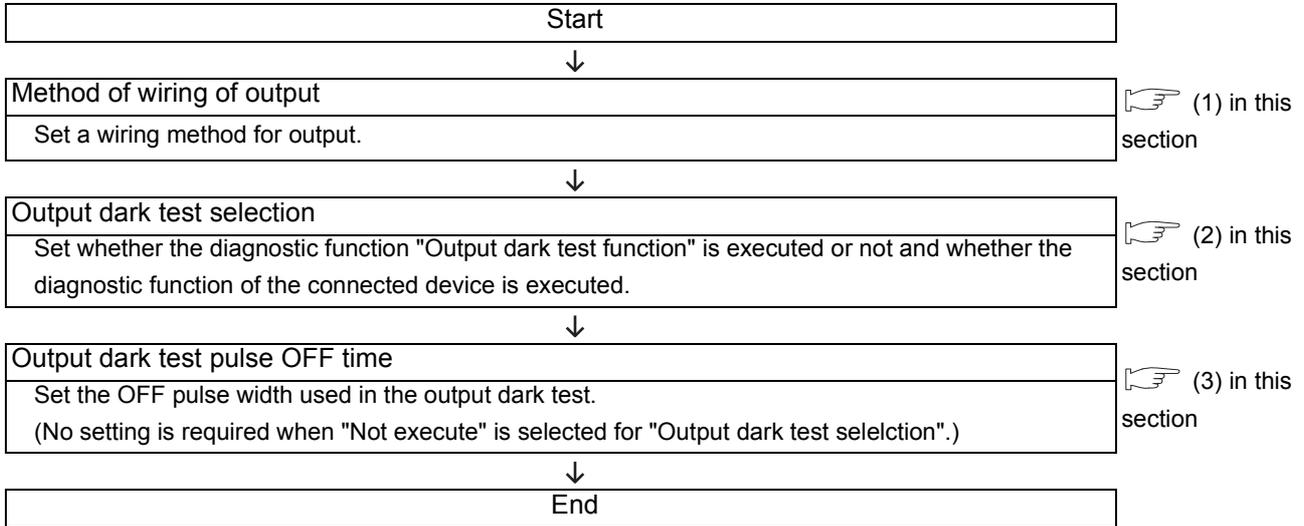


Figure 5.13 Flowchart for the output parameter setting

(1) Method of wiring of output

This parameter is used to set a wiring method for each output point. The settings are shown in Table5.11.

Table5.11 Settings

Parameter item	Setting range	Default
26. Method of wiring of output Y0	"No Use", "Double wiring (Source+Sink)", "Double wiring (Source+Source)"	"No Use"
27. Method of wiring of output Y1		
28. Method of wiring of output Y2		
29. Method of wiring of output Y3		

When a value out of the setting range is set, the following errors occur.

- Out of the setting range of "Method of wiring of output"
- Output wiring method combination error

For details of the errors, refer to Section 9.5.

(2) Output dark test selection

This parameter is used to set in the output point unit whether the "Output dark test function" of the safety remote I/O module diagnostic function is executed or not. The settings are shown in Table5.12.

Table5.12 Settings

Parameter item	Setting range	Default
30. Output dark test selection Y0	"Execute", "Not execute"	"Execute"
31. Output dark test selection Y1		
32. Output dark test selection Y2		
33. Output dark test selection Y3		

When a value out of the setting range is set, the following errors occur.

- Out of the setting range of "Output dark test selection"
- Output dark test selection combination error

For details of the errors, refer to Section 9.5.

(3) Output dark test pulse OFF time

This parameter is used to set the OFF pulse width used in the output dark test for each output point.

The settings are shown in Table5.13.

Table5.13 Settings

Parameter item	Setting range	Default
34. Output dark test pulse OFF time Y0	"400 μs", "1ms", "2ms"	"400 μs"
35. Output dark test pulse OFF time Y1		
36. Output dark test pulse OFF time Y2		
37. Output dark test pulse OFF time Y3		

When a value out of the setting range is set, an error out of the setting range of "Output dark test pulse OFF" occurs.

For details of the error, refer to Section 9.5.

POINT

When "No Use" is set for the method of wiring of output parameter, the output dark test selection and the output dark test pulse OFF time are ignored even if they are set.

CHAPTER 6 PROCEDURES AND SETTINGS BEFORE SYSTEM OPERATION

This chapter describes the procedures and settings before the operation of the safety remote I/O module.

6.1 Procedures and Settings before System Operation

This section describes the procedures before the operation of the safety remote I/O module and the replacement of the module.

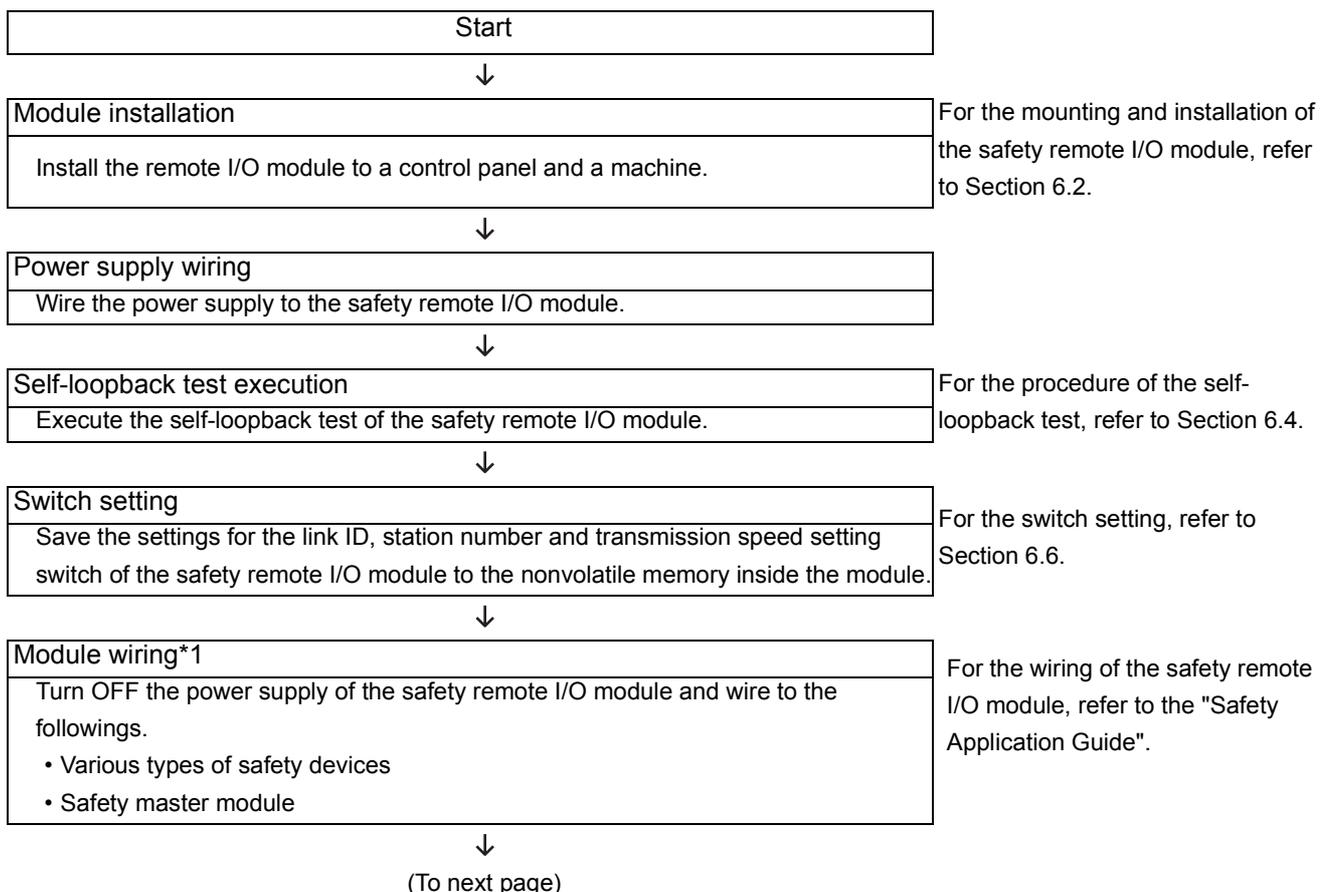
6.1.1 Procedure from module installation to system operation

Figure 6.1 shows the procedure from the installation of the safety remote I/O module to the CC-Link Safety system operation.

Parameters are considered to be set separately.

For the parameter setting, refer to CHAPTER 5.

For the connection between the safety CPU module and GX Developer, refer to the "GX Developer Version 8 Operating Manual (Safety Programmable Controller)".



*1: Even when safety devices are not connected, wire an external power supply terminal (I/O 24V, I/O 24G).
 When the external power supply terminal (I/O 24V, I/O 24G) is not wired, an error of the external power supply occurs.
 For error details, refer to Section 9.5.

6 PROCEDURES AND SETTINGS BEFORE SYSTEM OPERATION

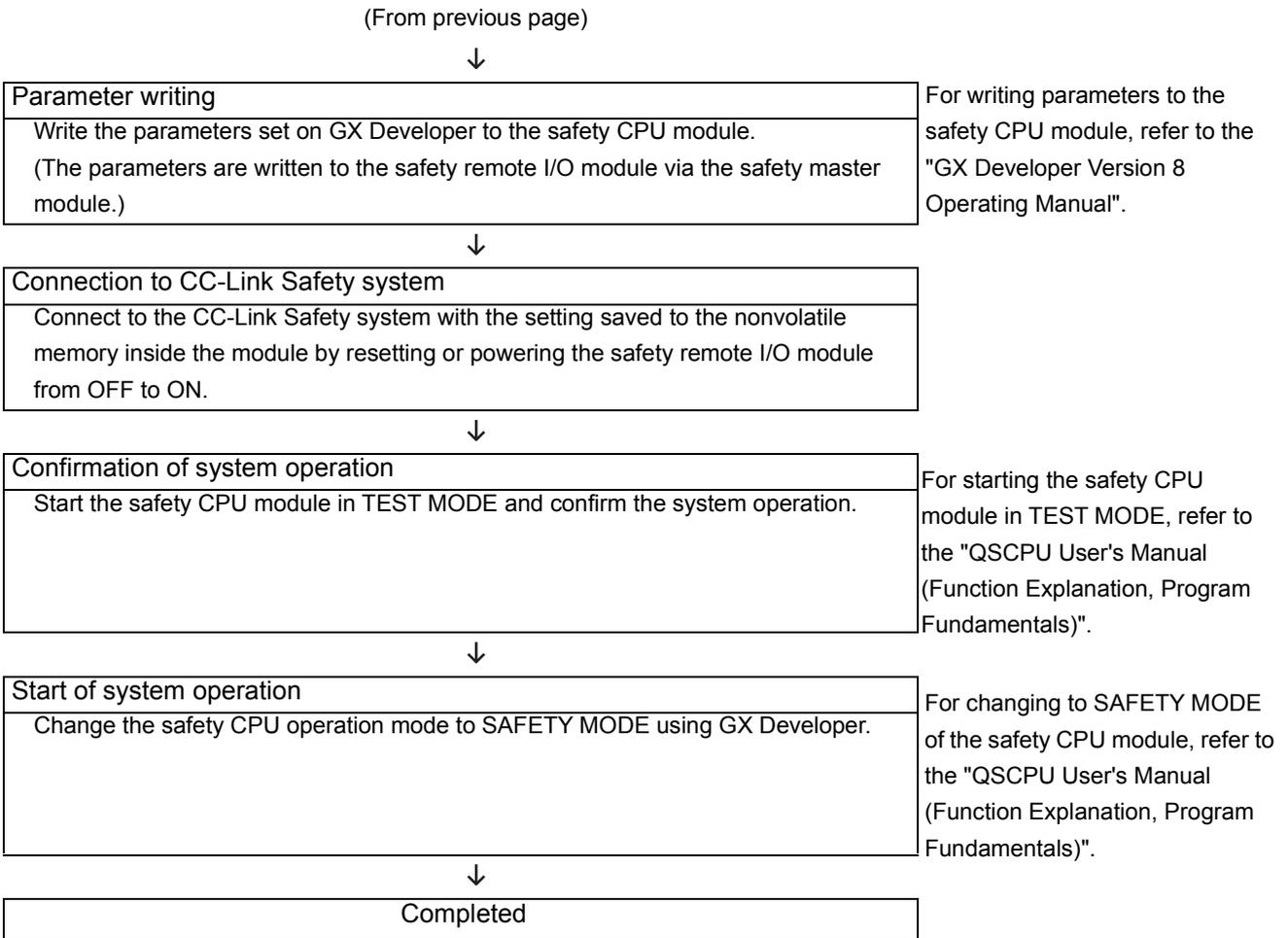


Figure 6.1 Procedure from module installation to system operation

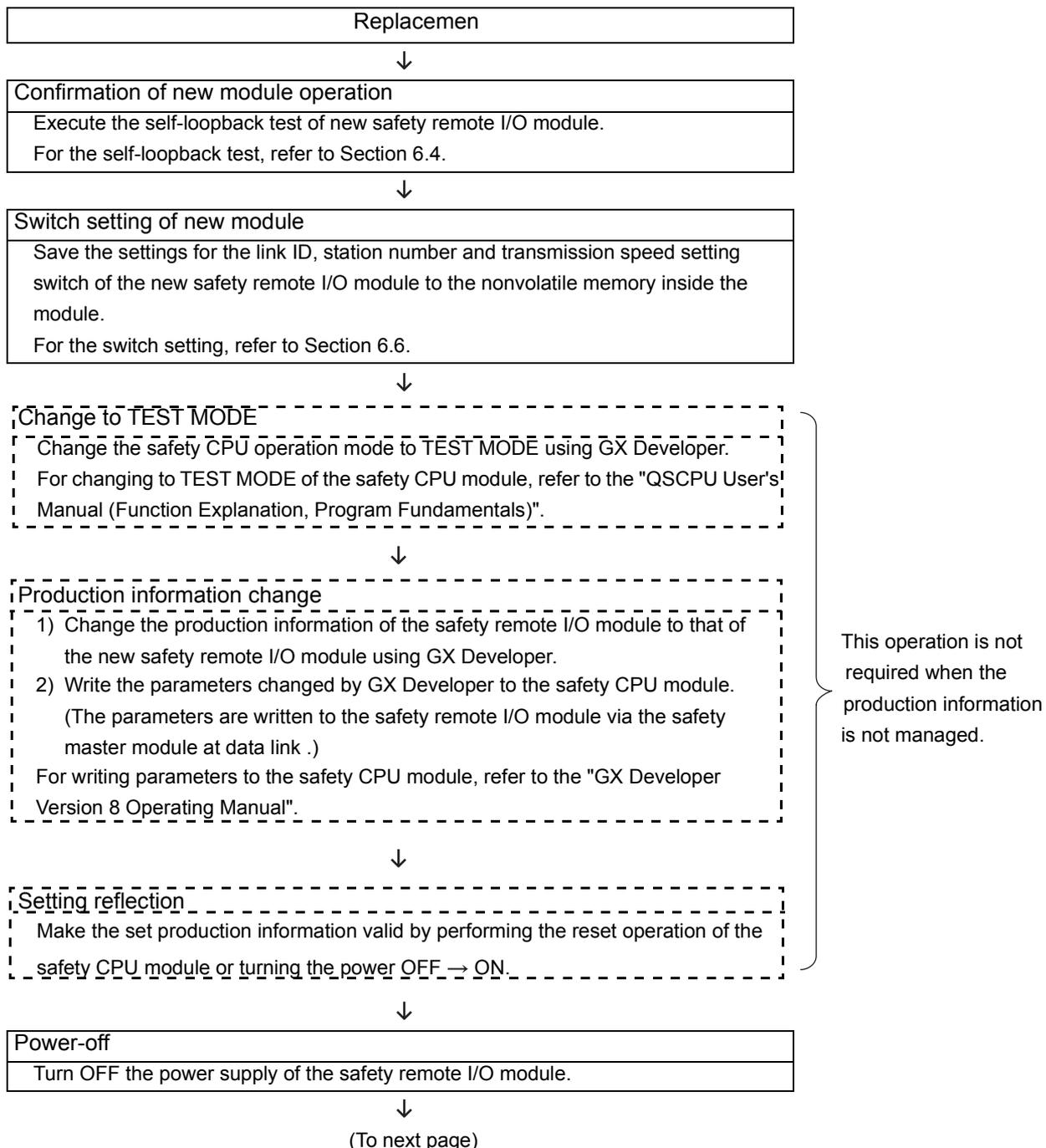
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6.1.2 Replacement procedure of the module

Figure 6.2 shows the replacement procedure of the safety remote I/O module.
 □ □ □ in Figure 6.2 indicates the operation for managing the production information.

For the function differences between managing and not managing the production information, refer to CHAPTER 5(1).

For the connection between the safety CPU module and GX Developer, refer to the "GX Developer Version 8 Operating Manual (Safety Programmable Controller)".



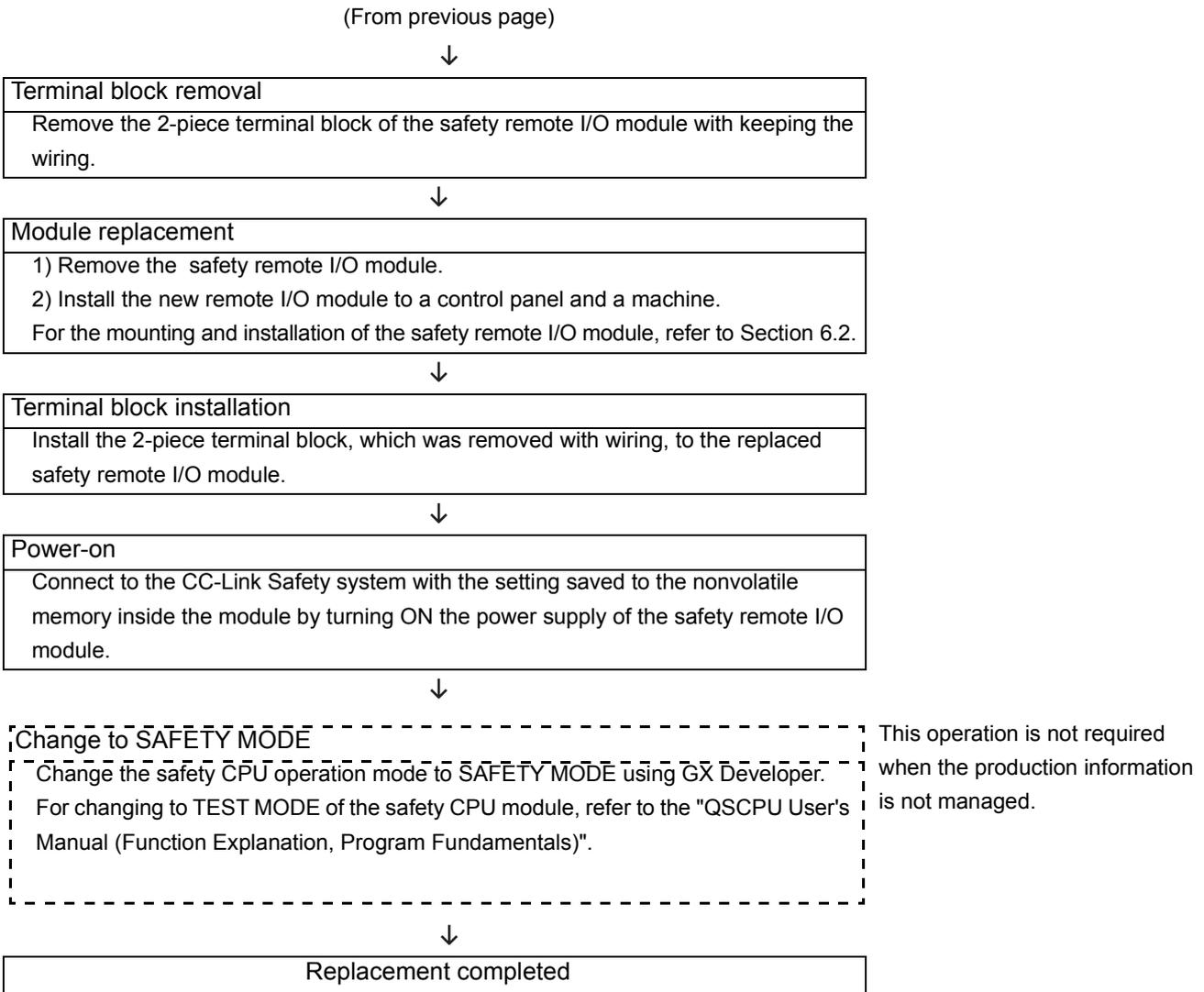


Figure 6.2 Replacement procedure of safety remote I/O module

POINT

- 1) When managing the production information, change the production information to the number of the new safety remote I/O module.
If not doing so, production information mismatch error occurs.
For product information mismatch error, refer to the "CC-Link Safety System Master Module User's Manual".
- 2) When changing the production information, change the safety CPU operation mode to TEST MODE.
In SAFETY MODE, the production information cannot be changed.

6.2 Mounting and Installation

In order to increase the reliability of the system and exploit the maximum performance of its functions, this section describes the methods and precautions for the mounting and installation of the system.

6.2.1 Handling precautions

This section provides handling precautions for use of the safety remote I/O module.

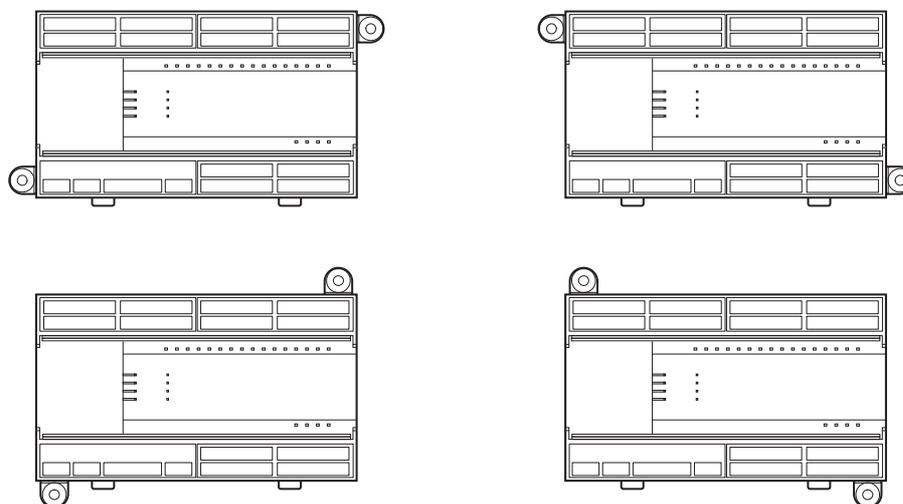
 WARNING	<ul style="list-style-type: none">● Do not touch the terminals while power is on. Doing so could cause shock or erroneous operation.
 CAUTION	<ul style="list-style-type: none">● Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, damage, or erroneous operation.● Do not disassemble or modify the modules. Doing so could cause trouble, erroneous operation, injury, or fire. If the product is repaired or remodeled by other than the specified FA centers or us, the warranty is not covered.● Do not directly touch the module's conductive parts or electronic components. Touching the conductive parts could cause an operation failure or give damage to the module.● Since the module case is made of resin, do not drop or apply any strong impact to the module. Doing so may damage the module.● Tighten a terminal block mounting screw, terminal screw, and module mounting screw within the specified torque range. If the terminal block mounting screw or terminal screw is too loose, it may cause a short circuit, fire, or malfunctions. If too tight, it may damage the screw and/or the module, resulting in a drop of the screw or module, a short circuit or malfunctions. If the module mounting screw is too loose, it may cause a drop of the screw or module. Overtightening the screw may cause a drop due to the damage of the screw or module.● When disposing of this product, treat it as industrial waste.● Make sure to fix a CC-Link Safety remote I/O module with a DIN rail or mounting screws and tighten the screws with the specified torque. If the screws are too loose, it may cause a drop of the screw or module. Overtightening may cause a drop due to the damage of the screw or module.● Completely turn off the externally supplied power used in the system before mounting or removing the module to/from the panel. Not doing so may result in a fault or malfunctions of the module.

- Do not drop the safety remote I/O module or apply any strong impact to it.
- Do not remove the printed circuit board (PCB) of the safety remote I/O module from the case.
Doing so may cause failure.
- Carefully prevent any dust or wiring chips from entering the safety remote I/O module.
Failure to do so may cause a fire, failure, or malfunction.
- When installing the safety remote I/O module to a control panel, provide clearance of at least 60mm between the module's top/bottom and any other structure or component to ensure proper airflow and to make module replacement easy.
- Install the safety remote I/O module to a flat surface.
If it is not flat, an excess force may be applied to the PCB, causing failure.
- Tighten the module mounting screws and terminal screws within the following torque range.
Overtightening may result in damage to the screws or the module case.

Table 6.1 Specified torque range

Screw	Specified torque range
Module mounting screw (M4 screw with plain washer finished round)	0.824 to 1.110N·m
Terminal screw (M3 screw)	0.425 to 0.525N·m
2-piece terminal block mounting screw (M3.5 screw)	0.680 to 0.920N·m

- Attach the holding fixtures to two positions as shown in Figure 6.3.



Note: Do not attach them in any positions other than those above.

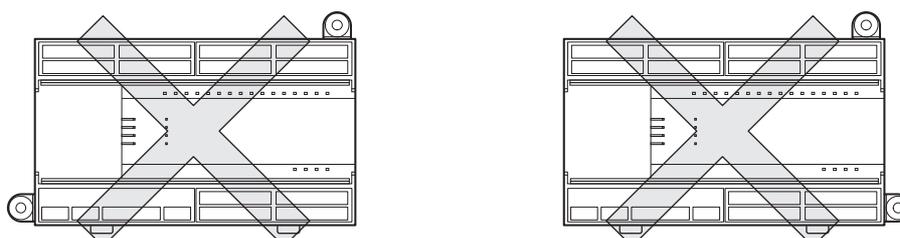
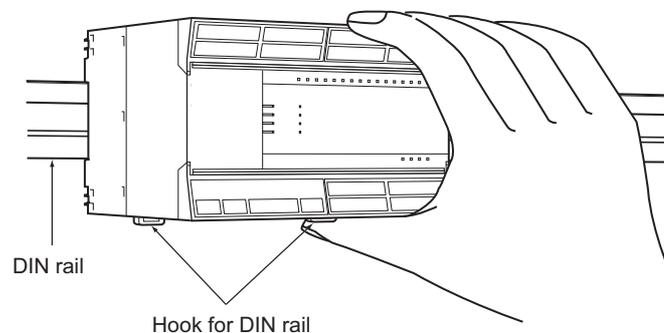


Figure 6.3 Attachment of holding fixtures

- To remove the safety remote I/O module mounted with module mounting screws, remove the screws first and then the holding fixtures from the module. Attempting to remove the module from the holding fixtures with the screws still attached may damage the module and/or holding fixtures.
- When using a DIN rail, pay attention to the following:
 - 1) Applicable DIN rail model (conforming to IEC 60715)
TH35-7.5Fe
TH35-7.5Al
 - 2) Installation screw intervals
Tighten the screws at pitches of 20mm or less.
- When installing the safety remote I/O module to the DIN rail, press the center part of the hook located on the bottom of the module until a click is heard.



Note: Do not press the front face as shown below. Doing so may cause failure.

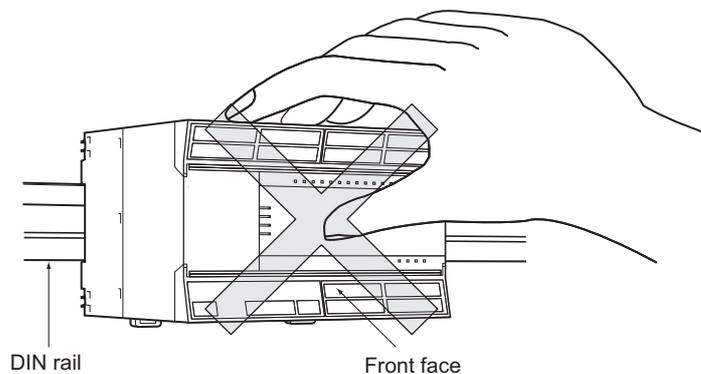


Figure 6.4 Installation to DIN rail

- If the mechanical power supply switch is used for the safety remote I/O module, in rare cases it does not operate, when the excessive chattering is generated at power-on, and safety diagnostic function operates due to the unstable status of the input power supply voltage.
In this case, turn on power supply again.

6.2.2 Installation environment

For installation environment, refer to "3.1 General Specifications".

6.3 Part Names and Settings

This chapter describes the part names and settings of safety remote I/O modules.

(1) QS0J65BTS2-8D

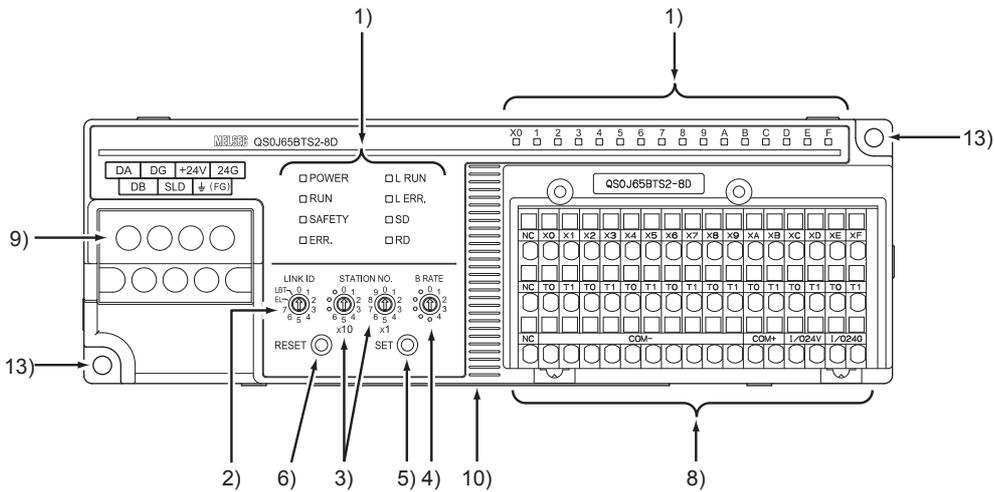


Figure 6.5 QS0J65BTS2-8D

(2) QS0J65BTS2-4T

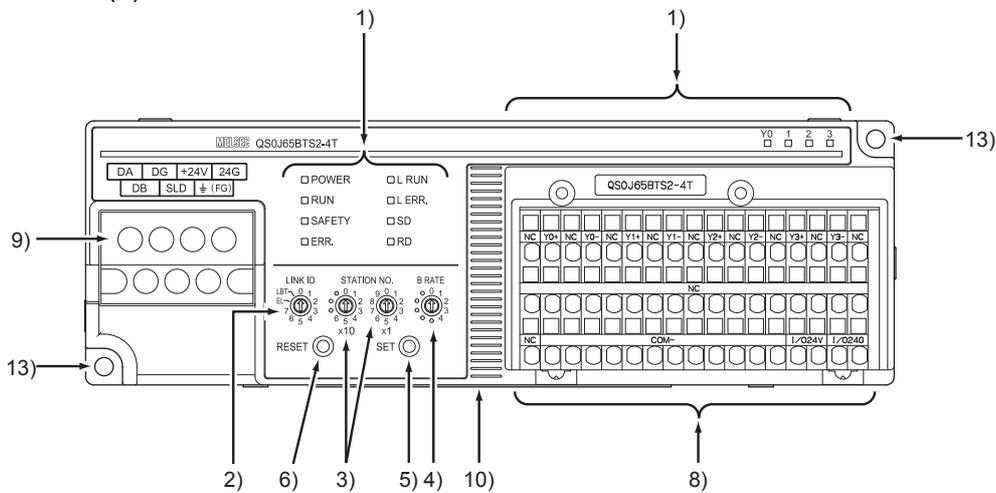
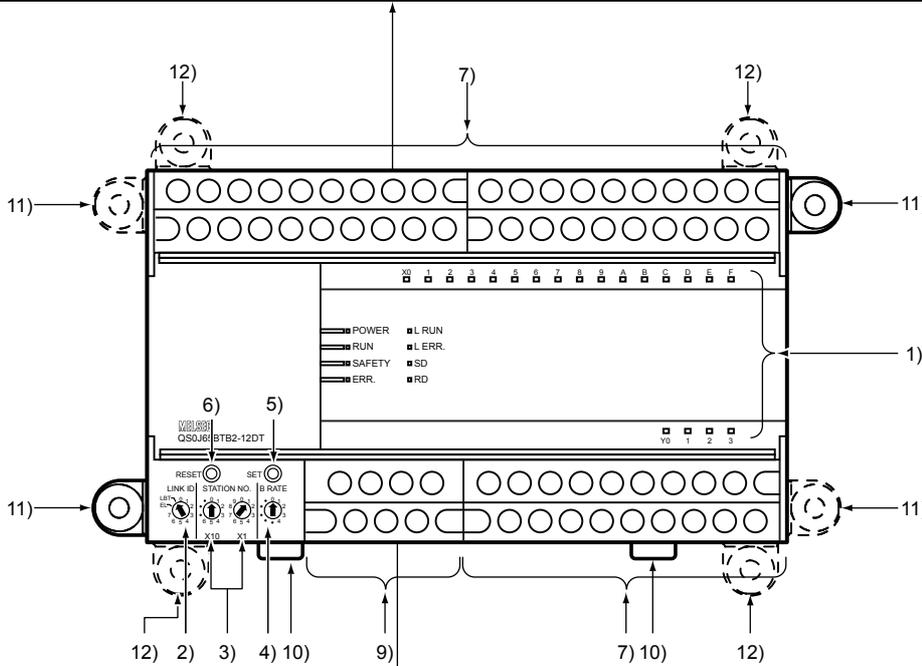


Figure 6.6 QS0J65BTS2-4T

(3) QS0J65BTB2-12DT

[Terminal numbers and signal names]

1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35
COM-	T0	COM-	T1	COM-	T0	COM-	T1	COM+	COM-	T0	COM-	T1	COM-	T0	COM-	T1	COM+
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
X0	X1	X2	X3	X4	X5	X6	X7	COM+	X8	X9	XA	XB	XC	XD	XE	XF	COM+



[Terminal numbers and signal names]

LINK ID		B RATE		37	39	41	43	44	46	48	50	52	54	56	58	60
0~7	LINK ID	0	156K	DA	DG	+24V	24G	Y0+	Y0-	Y1+	Y1-	Y2+	Y2-	Y3+	Y3-	I/O 24V
EL	ERROR LOG	2	2.5M	38	40	42		45	47	49	51	53	55	57	59	61
LBT	SELF LOOP BACK TEST	3	5M	DB	SLD	(FG)		COM-	I/O 24G							
		4	10M													

Figure 6.7 QS0J65BTB2-12DT

6 PROCEDURES AND SETTINGS BEFORE SYSTEM OPERATION

Table6.2 Part names and settings

No.	Name	Description	
1)	Indicator LEDs	LED name	Indication
		"POWER"	Indicates the power status of the safety remote I/O module. On (green) : Normally powered Off : Powered off or error occurred (blown fuse)
		"RUN"*1	Indicates the operating status of the safety remote I/O module. On (green) : Normally operating, or moderate error occurred Flashing at 500ms-intervals (green) normally. : Switch setting has been registered but not fixed yet or reading of error history data have been completed Flashing at 100ms-intervals (green) : Setting has been registered normally. Off : Major error occurred
		"SAFETY"*1	Indicates the CC-Link Safety System connection status of the safety remote I/O module. On (green) : Connected to CC-Link Safety System*2, or self-loopback test completed normally Flash (green) : Self-loopback test in execution Off : Not connected to CC-Link Safety System, or self-loopback test completed in error
		"ERR."*1	Indicates failure or error status of the safety remote I/O module. On (red) : Major error occurred, or self-loopback test completed in error "RUN" LED off: Major error occurred Flashing at 500ms-intervals (red) : Moderate error occurred or reading of error history data have been completed abnormally. Flashing at 100ms-intervals (red) : The registered switch setting differs from the actual switch setting. Off : Normally operating
		"L RUN"	Indicates the communication status of the safety remote I/O module in the CC-Link Safety System. On (green) : Normally communicating in the CC-Link Safety System Off : Communication failure in the CC-Link Safety System (Timeout error)
		"L ERR."	Indicates the communication error status of the safety remote I/O module in the CC-Link Safety System. On (red) : Value set by Link ID, Station number, or Transmission setting switch is out of range Flash regularly (red) : Setting of Link ID, Station number, and/or Transmission setting switch is different from that of the internal nonvolatile memory Flash irregularly (red) : Wrong terminal resistor setting, or noise influence Off : Normally operating

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No.	Name	Description												
1)	Indicator LEDs	"SD" On (green) : Data being sent												
		"RD" On (green) : Data being received												
		"X0" to "XF" "Y0" to "Y3" On (red) : I/O ON Off : I/O OFF												
2)	Link ID setting switch	<table border="1"> <thead> <tr> <th>Setting</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0 to 7</td> <td>Link ID setting</td> </tr> <tr> <td>EL</td> <td>Setting for reading error logs (For error logs, refer to Section 4.5.)</td> </tr> <tr> <td>LBT</td> <td>Setting for self-loopback test (For Setting for self-loopback test, refer to Section 6.4.)</td> </tr> </tbody> </table> <p>To refresh the switch setting, perform the reset operation or turn the power OFF → ON of the safety remote I/O module.</p>	Setting	Description	0 to 7	Link ID setting	EL	Setting for reading error logs (For error logs, refer to Section 4.5.)	LBT	Setting for self-loopback test (For Setting for self-loopback test, refer to Section 6.4.)				
Setting	Description													
0 to 7	Link ID setting													
EL	Setting for reading error logs (For error logs, refer to Section 4.5.)													
LBT	Setting for self-loopback test (For Setting for self-loopback test, refer to Section 6.4.)													
3)	Station No. setting switch	<p>Set station No. of the safety remote I/O module within a range from 0 to 64.^{*3}</p> <ul style="list-style-type: none"> • Tens place of station No. is set by \oplus X10. • Units place of station No. is set by \oplus X1. 												
4)	Transmission speed setting switch	<table border="1"> <thead> <tr> <th>Setting</th> <th>Transmission speed</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>156kbps</td> </tr> <tr> <td>1</td> <td>625kbps</td> </tr> <tr> <td>2</td> <td>2.5Mbps</td> </tr> <tr> <td>3</td> <td>5Mbps</td> </tr> <tr> <td>4</td> <td>10Mbps</td> </tr> </tbody> </table> <p>Always set this switch within a range of 0 to 4.</p>	Setting	Transmission speed	0	156kbps	1	625kbps	2	2.5Mbps	3	5Mbps	4	10Mbps
Setting	Transmission speed													
0	156kbps													
1	625kbps													
2	2.5Mbps													
3	5Mbps													
4	10Mbps													
5)	Setting saving switch	Saves the values set by switches 2) to 4) into the nonvolatile memory inside the safety remote I/O module.												
6)	Reset switch	Resets the hardware of the safety remote I/O module.												
7)	I/O terminal block	Two-piece terminal block for connection of external power supply and I/O signals.												
8)		Two-piece spring clamp terminal block for connection of external power supply and I/O signals.												
9)		Two-piece terminal block for connection of module power supply and transmission signal.												
10)	Hook for DIN rail	Hook used for installing the module to a DIN rail. Press the center part of the hook until a click is heard.												
11)	Holding fixtures for screw installation (Accessories)	Attached to a module when installing it directly to a panel.												
12)		(Available in two ways, 11) and 12).)												
13)	Fixing hole for screw installation	A hole used when installing a module directly to a panel.												

6 PROCEDURES AND SETTINGS BEFORE SYSTEM OPERATION

- *1: Although the "RUN", "SAFETY" and "ERR." LEDs momentarily turn on immediately after power ON or reset, it does not mean any fault.
- *2: The "SAFETY" LED is off when no safety remote I/O station parameters have been received during connection to the CC-Link Safety System.
- *3: Duplicate station number setting is not allowed.

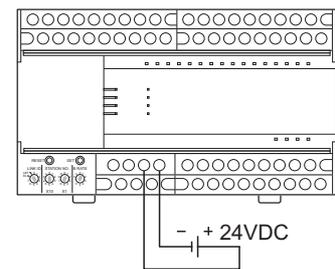
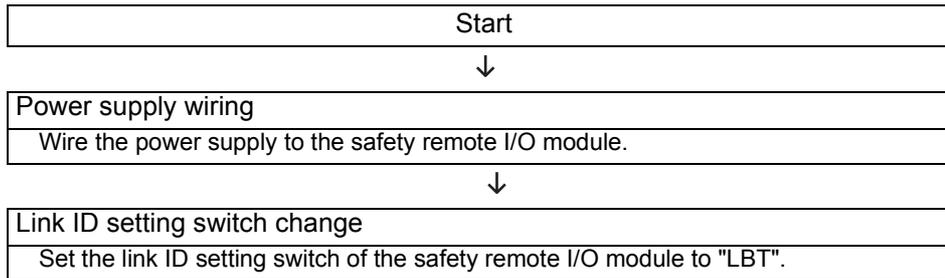
6.4 Checking Module Status (Self-Loopback Test)

The self-loopback test is performed by the safety remote I/O module by itself and checks for normal CC-Link communication.

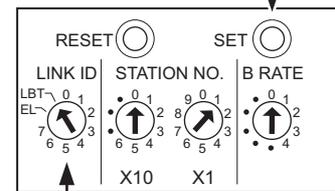
Execute the self-loopback test when CC-Link communication is not available.

The self-loopback test cannot be performed properly in the condition that the communication cables and I/O wires are connected.

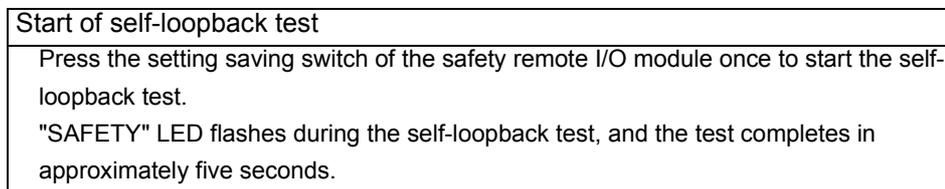
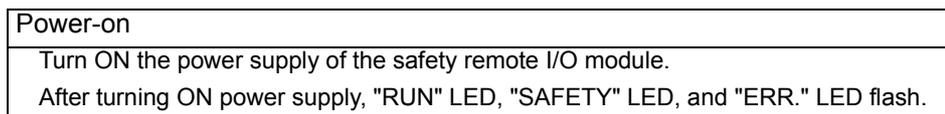
Execute the self-loopback test in the following procedure.



Setting saving switch



Link ID setting switch



(To next page)

(From previous page)



Completion of self-loopback test			
[Normal]	When "SAFETY" LED turns on and "ERR." LED turns off, the self-loopback test is completed normally.	[Normal]	<input type="checkbox"/> POWER <input type="checkbox"/> L RUN <input type="checkbox"/> RUN <input type="checkbox"/> L ERR. Turns ON → <input checked="" type="checkbox"/> SAFETY <input type="checkbox"/> SD Turns OFF → <input type="checkbox"/> ERR. <input type="checkbox"/> RD
[Error]	When "SAFETY" LED turns off and "ERR." LED turns on, the self-loopback test is terminated abnormally. Replace the module for a hardware error of the safety remote I/O module.	[Error]	<input type="checkbox"/> POWER <input type="checkbox"/> L RUN <input type="checkbox"/> RUN <input type="checkbox"/> L ERR. Turns OFF → <input type="checkbox"/> SAFETY <input type="checkbox"/> SD Turns ON → <input checked="" type="checkbox"/> ERR. <input type="checkbox"/> RD

Figure 6.8 Execution procedure of self-loopback test

POINT

When the self-loopback test is not started, reexecute the procedure shown in Figure 6.8 with attention to the following points.

- 1) Is the power supply of the safety remote I/O module turned ON? (Is "POWER" LED on?)
- 2) Is the power supply turned ON after the link ID setting switch of the safety remote I/O module is set to "LBT" (setting at self-loopback test) in the power-off status?
- 3) Is the setting saving switch pressed after 2)?

When the self-loopback test is not started again, replace the module.

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6.5 Wiring

This section describes the wiring precautions and wiring examples of the safety remote I/O module.

6.5.1 Precautions for handling CC-Link dedicated cables

This section explains how to handle CC-Link dedicated cables.

Do not perform any of the following, as each of them will damage CC-Link cables:

- Compressing the cable with a sharp object
- Twisting the cable excessively
- Pulling the cable too hard (exceeding the allowable tension)
- Stepping on the cable
- Placing an object on the cable
- Scratching the cable sheath

6.5.2 Connecting CC-Link dedicated cables

Figure 6.9 shows how safety remote I/O modules are connected with CC-Link dedicated cables.

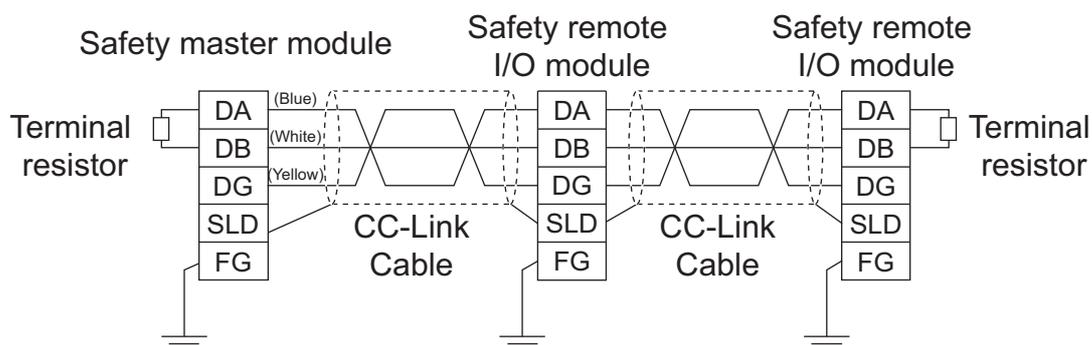


Figure 6.9 Connecting CC-Link dedicated cables

POINT

- 1) Connect the shielded wire of the CC-Link dedicated cable to SLD terminal of each module, and ground both ends to the protective ground connectors via FG terminals.
The SLD and FG terminals are connected inside the module.
- 2) Always connect terminal resistors to the modules located on both ends of the data link network.
Connect a terminating resistor between DA and DB terminals.

6.5.3 Precautions for wiring module power supply

When wiring the module power supply of the safety remote I/O module, note the following.

- Cable length of the module power supply must be within 10m

6.5.4 Handling of spring clamp terminal block

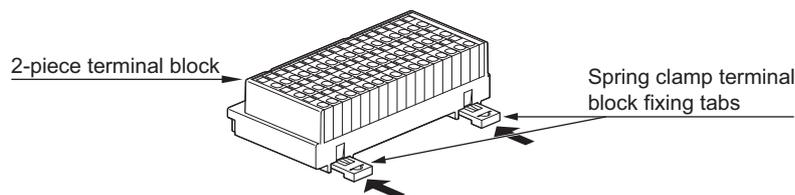
This section describes the wiring procedure of the spring clamp terminal block.

(1) Installing and removing spring clamp terminal block

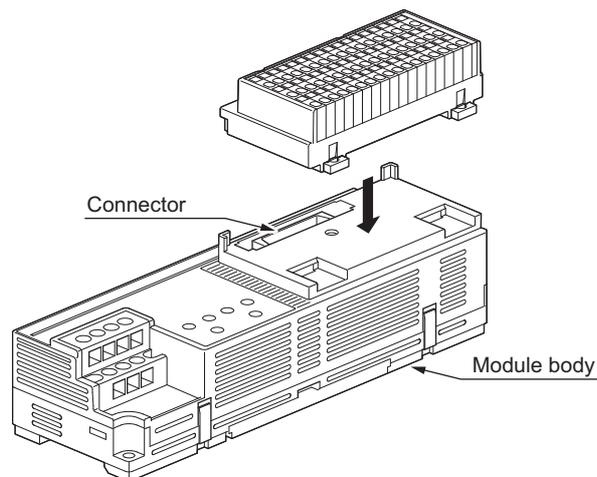
(a) Installing the spring clamp terminal block

A installing method of two-piece spring clamp terminal block is described below. Securely install a terminal block to the module with the method described here. Not doing so may cause a drop, short circuit or malfunction.

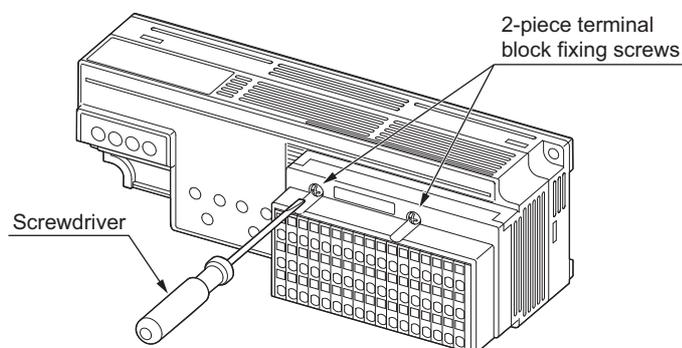
- 1) Push the fixing tabs of the spring clamp terminal block in the direction of an arrow until they click.



- 2) Insert the connector (female) of the two-piece terminal block to the connector (male) of the module until the fixing tabs click. Make sure that both tabs are securely fixed to the module.



- 3) Tighten the fixing screws. (Tightening torque range: 0.34 to 0.46N·m)



(b) Removing the spring clamp terminal block

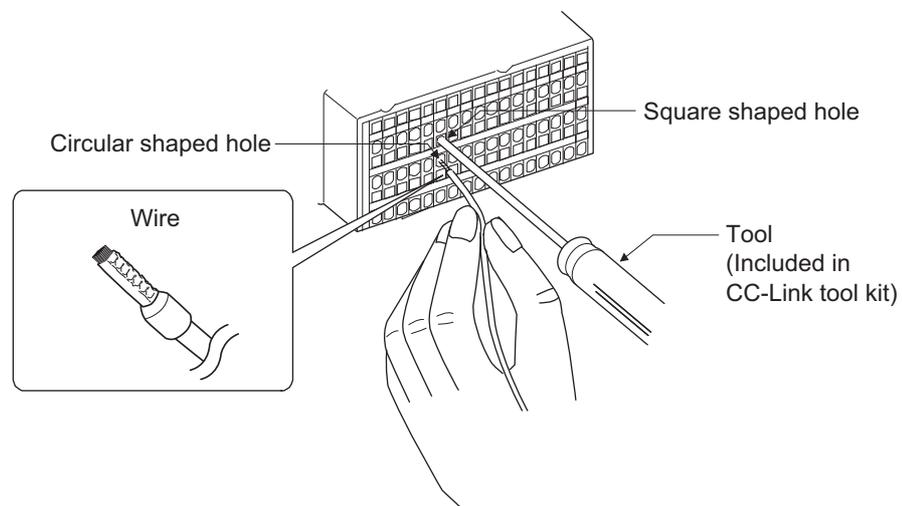
Remove the terminal block in reverse order of the mounting procedure described above.

- 1) Loosen the fixing screws of the two-piece terminal block.
- 2) Pull the fixing tabs of the spring clamp terminal block.
- 3) Lift the two-piece terminal block to remove it from the module.

(2) Wiring the spring clamp terminal block

(a) Connecting cables

Insert the tool into the square shaped hole of the spring clamp terminal block. Insert the wire into the circular shaped hole with the tool inside the hole, and then pull out the tool, taking care not to pull out the wire together. After pulling out the tool, gently pull the wire to confirm that it is securely clamped.



(b) Disconnecting cables

Insert the tool all the way into the corresponding square shaped hole and pull out the tool together with the wire.

POINT

- To connect or disconnect cables, use a dedicated tool for spring clamp terminal block and insert the tool vertically into the hole. Failure to do so may damage the spring clamp terminals or terminal block resin.
 - Do not insert two or more wires into one terminal. Note, however, that up to two wires can be inserted when the bar solderless terminal FA-VTCW125T9 (made by Mitsubishi Electric Engineering Co.,Ltd.) is used. (Refer to Table6.4.)
 - When the bar terminal is not used, strip the wire end 8 to 11mm. If the wire strip length is too long, the conductive part is exposed and it may increase the risk of electric shock or short circuit between the adjacent terminals. If the wire strip length is too short, it may result in insecure connection of the wire.
-

(3) Recommended product list

Table6.3 Applicable solderless terminal (bar type) and dedicated tool

Product	Model	Applicable wire size	Maker
Dedicated tool for spring clamp terminal block	KD-5339	-	Mitsubishi Electric System & Service Co., Ltd.
CC-Link tool kit (Tool kit including dedicated tools for spring clamp terminal block (flathead screwdriver) and bar solderless terminal)	FA-TOL1CC9	-	Mitsubishi Electric Engineering Co., Ltd.
Bar solderless terminal* ¹	FA-VTC125T9* ¹	0.3 to 1.65mm ²	Mitsubishi Electric Engineering Co., Ltd.
	FA-VTCW125T9* ²		
Dedicated tool for bar solderless terminal	FA-NH65A	-	NICHIFU Co., Ltd.
Bar solderless terminal* ¹	TE0.5	0.5mm ²	
	TE0.75	0.75mm ²	
	TE1	0.9 to 1.0mm ²	
	TE1.5	1.25 to 1.5mm ²	
Dedicated tool for bar solderless terminal	NH79	-	

* 1: This type is used when wire is inserted to the terminal after stripping the wire end.

* 2: This type is used when two wires are inserted to the terminal.

6.5.5 Wiring precautions with safety devices

This section describes the precautions for wiring to each safety device.

(1) Wiring of the input terminal section

(a) Combinations of input terminals

Input terminals can be used in the following combinations only.

Using them in any other combination will result in a moderate error.

- X0 and X1
- X2 and X3
- X4 and X5
- X6 and X7
- X8 and X9
- XA and XB
- XC and XD
- XE and XF

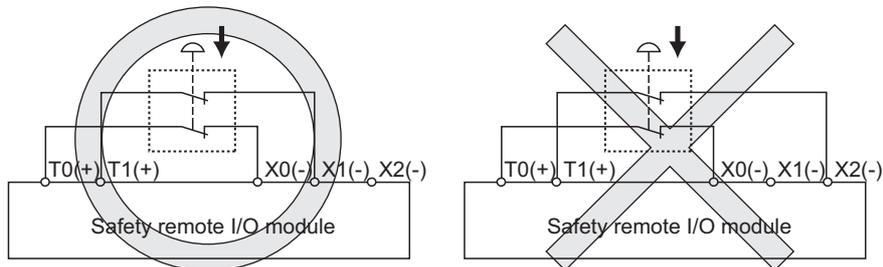


Figure 6.10 Combination example of input terminals

(b) Combinations of the test pulse output terminals

Using the same test pulse for one device is not allowed.

If the same test pulse is used in combinations such as X0 + T0 and X1 + T0, a moderate error will occur.

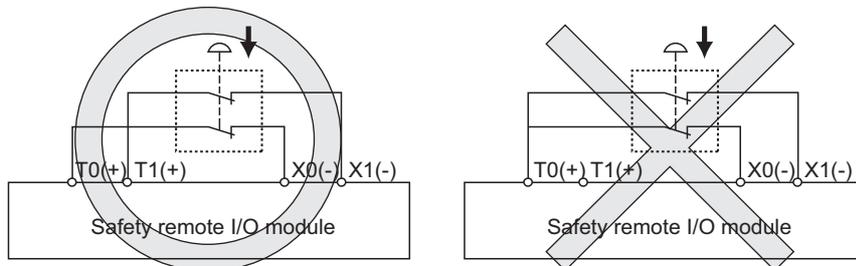


Figure 6.11 Combination example of test pulse terminals

(2) Wiring of the output terminal section

Use a sink output in combination with a source output.

Use of two or one sink output(s) only is not allowed.

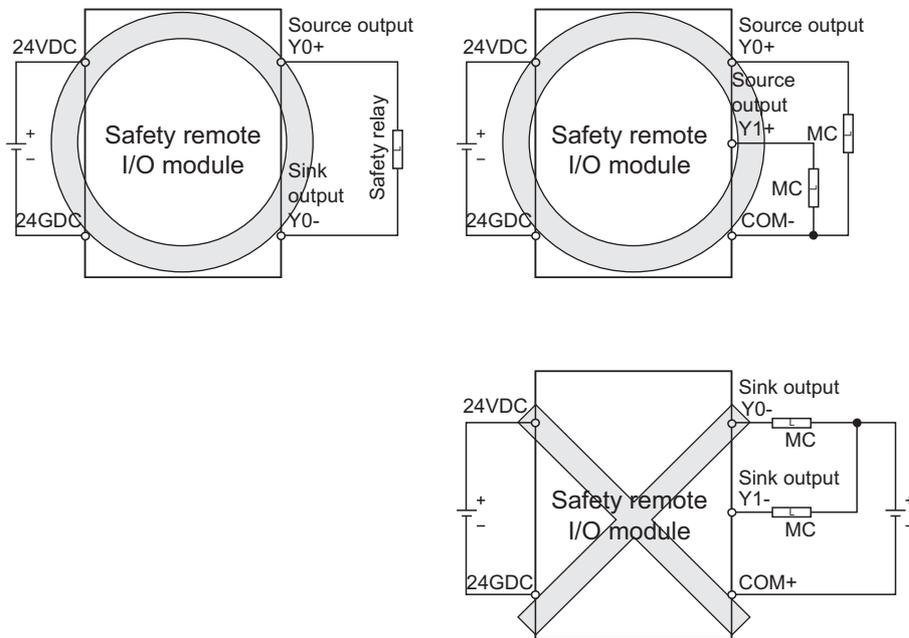


Figure 6.12 Combination example of output terminals

6.5.6 Safety devices and wiring example

This section describes the wiring between the safety remote I/O module and safety devices.

To satisfy the wiring requirements specified in Category 4, the following two points must be executed in the safety remote I/O module.

- Double input/output wiring
- Execution of the self-diagnostic function (dark test)

The following shows an example of wiring between the safety remote I/O module and the safety device to meet the above points.

For details on the wiring with safety devices, refer to the "Safety Application Guide".

(1) Wiring example of the QS0J65BTB2-12DT (input)

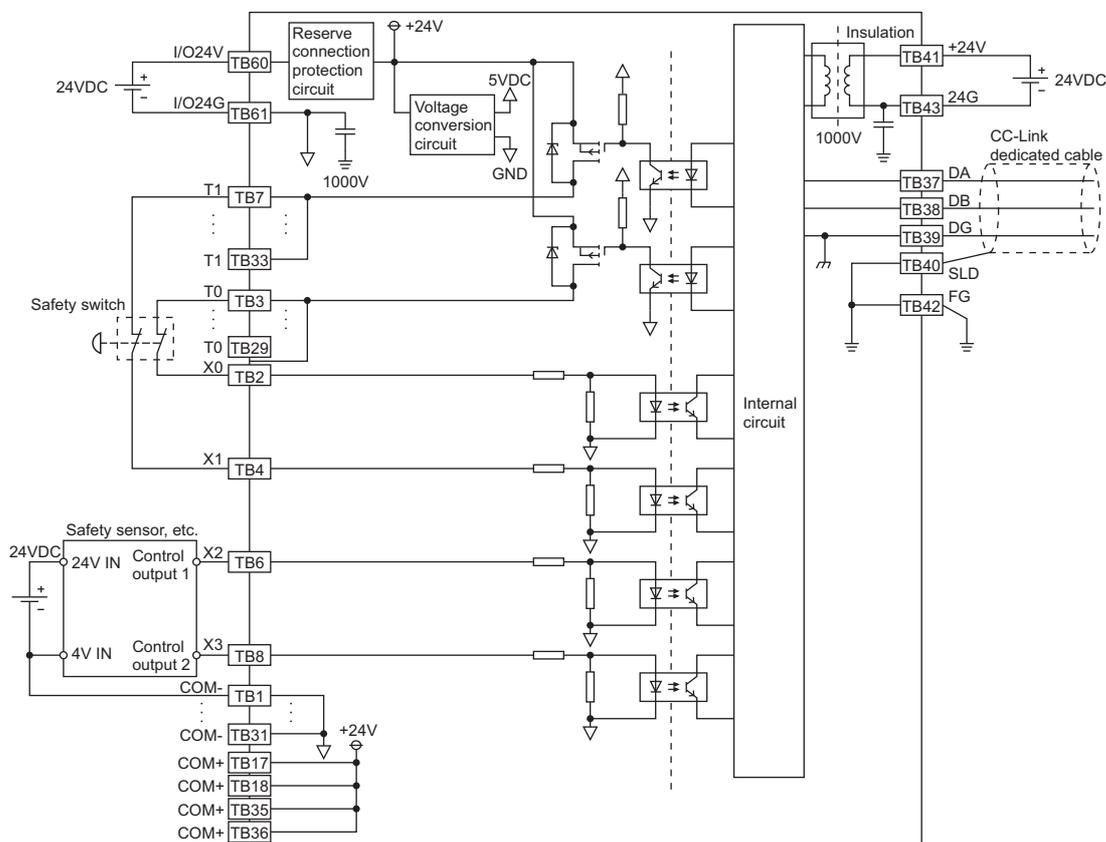


Figure 6.13 Wiring example (with a safety switch (2 NC contacts) and a safety sensor)

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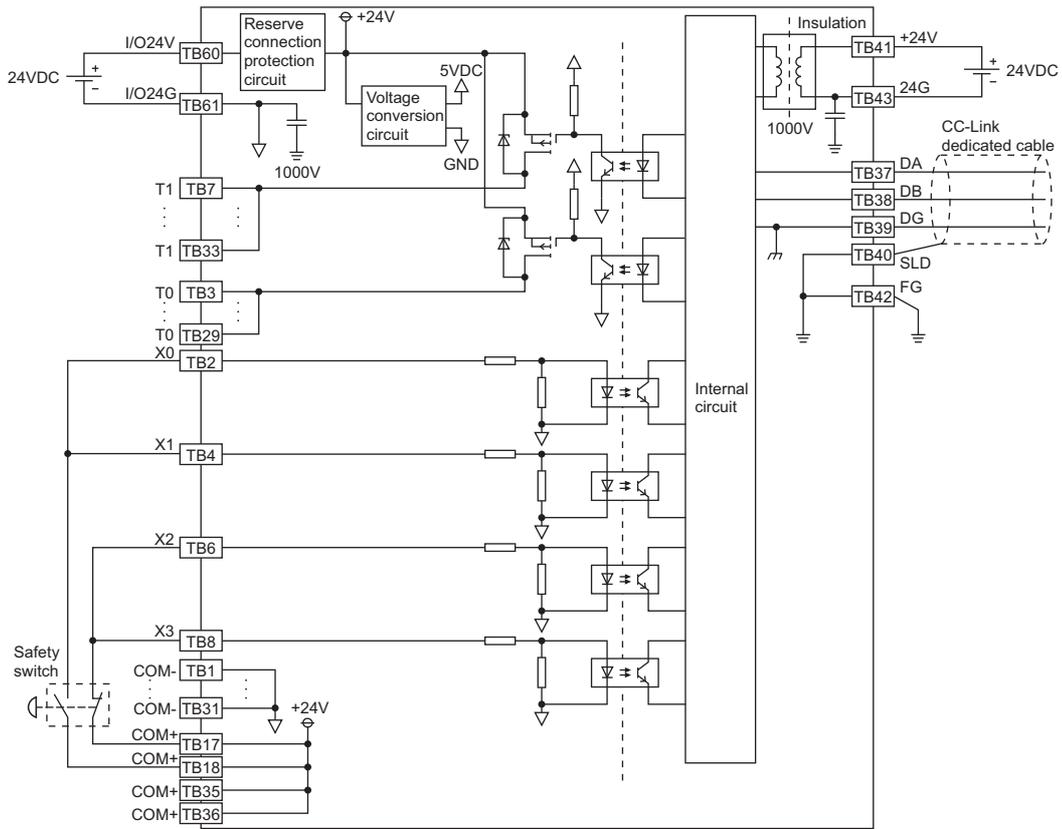


Figure 6.14 Wiring example (with a safety switch (1 NC/1 NO contacts))

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(2) Wiring example of the QS0J65BTB2-12DT (output)

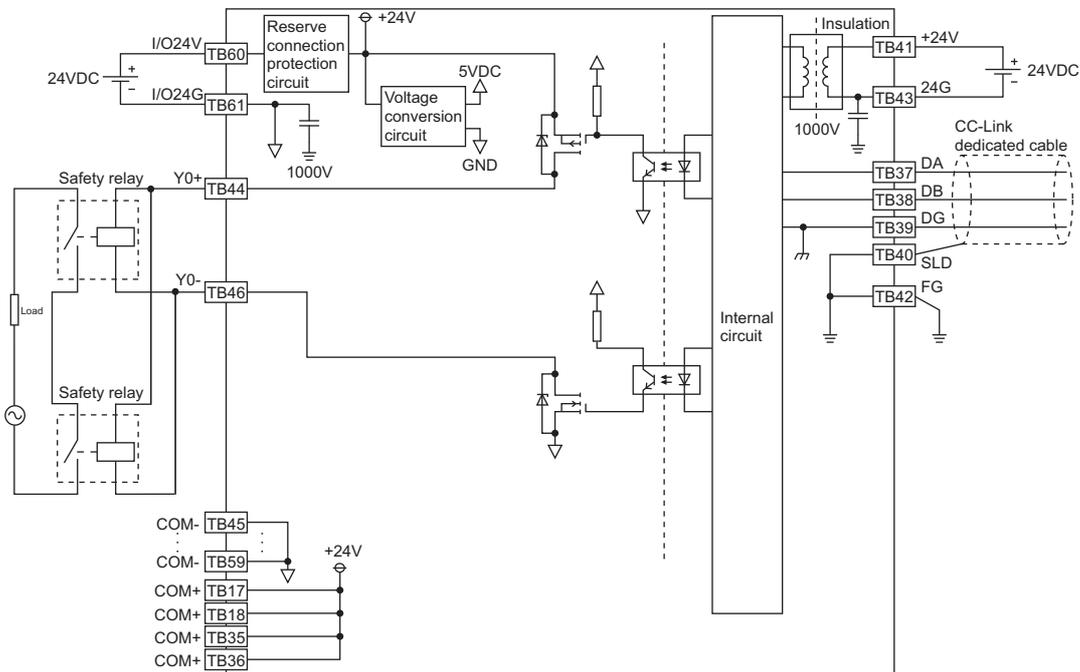


Figure 6.15 Wiring example (sink and source outputs)

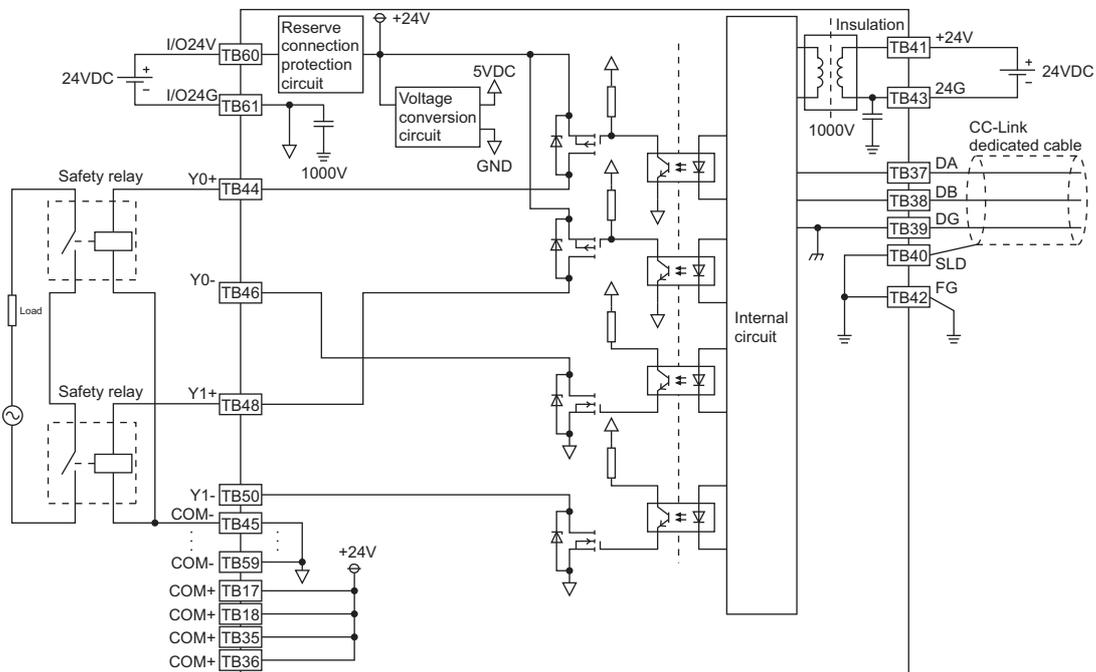


Figure 6.16 Wiring example (source and source outputs)

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(3) Wiring example of the QS0J65BTS2-8D (input)

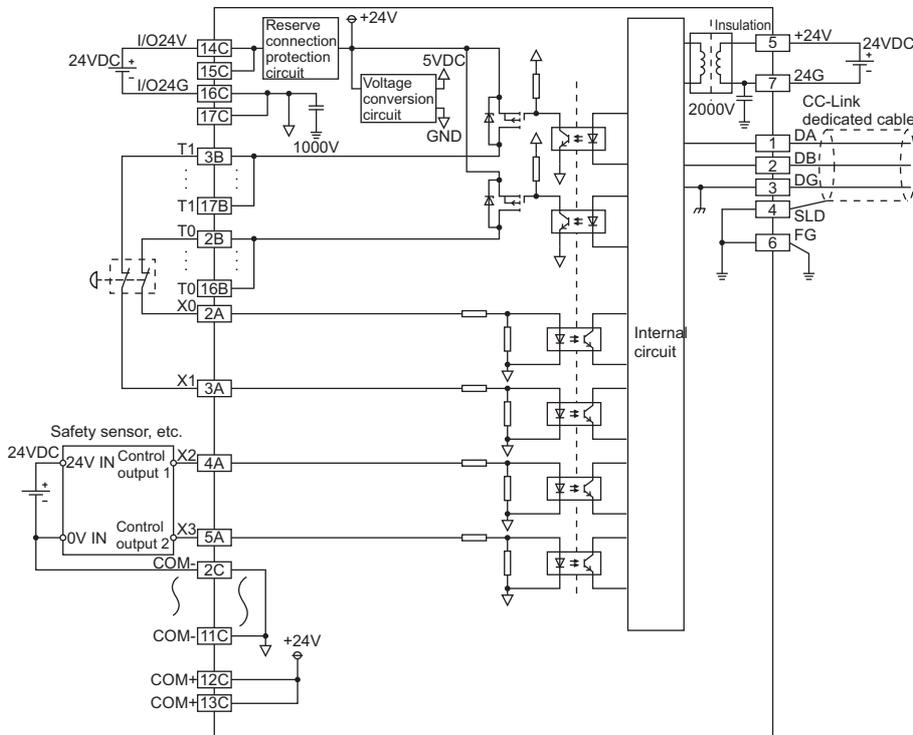


Figure 6.17 Wiring example (with a safety switch (2 NC contacts) and a safety sensor)

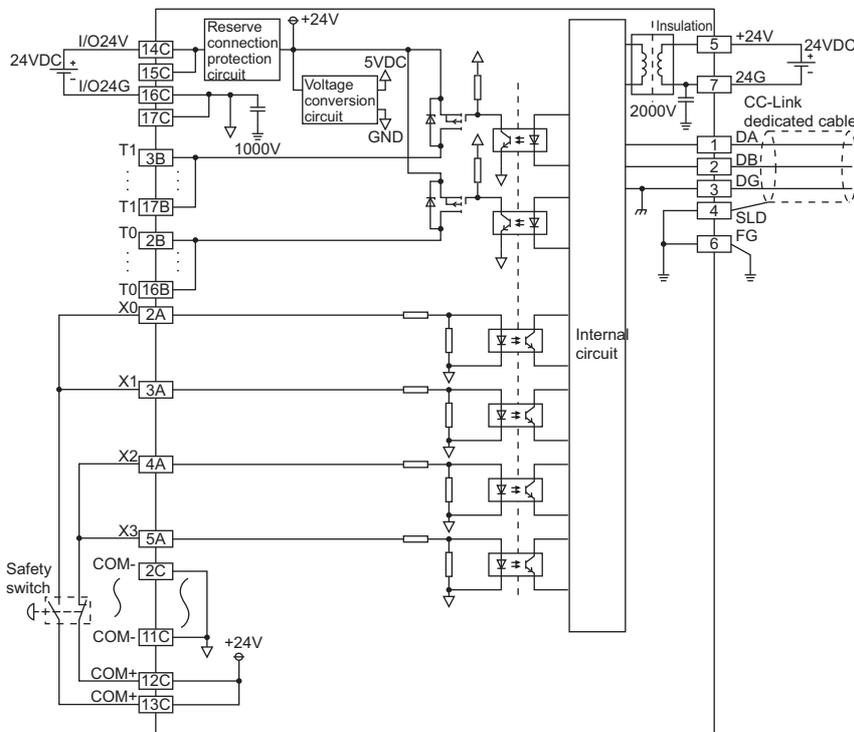
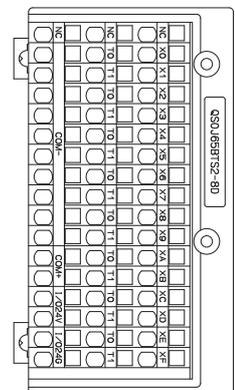


Figure 6.18 Wiring example (with a safety switch (1 NC/1 NO contacts))

CC-Link terminal			
1	3	5	7
DA	DG	+24V	24G
2	4	6	
DB	SLD	FG	

Terminal block			
No.	Line C	Line B	Line A
1	Empty	Empty	Empty
2	COM-	T0	X0
3		T1	X1
4		T0	X2
5		T1	X3
6		T0	X4
7		T1	X5
8		T0	X6
9		T1	X7
10		T0	X8
11		T1	X9
12	COM+	T0	XA
13		T1	XB
14	I/O24V	T0	XC
15		T1	XD
16	I/O24G	T0	XE
17		T1	XF



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(4) Wiring example of the QS0J65BTS2-4T (output)

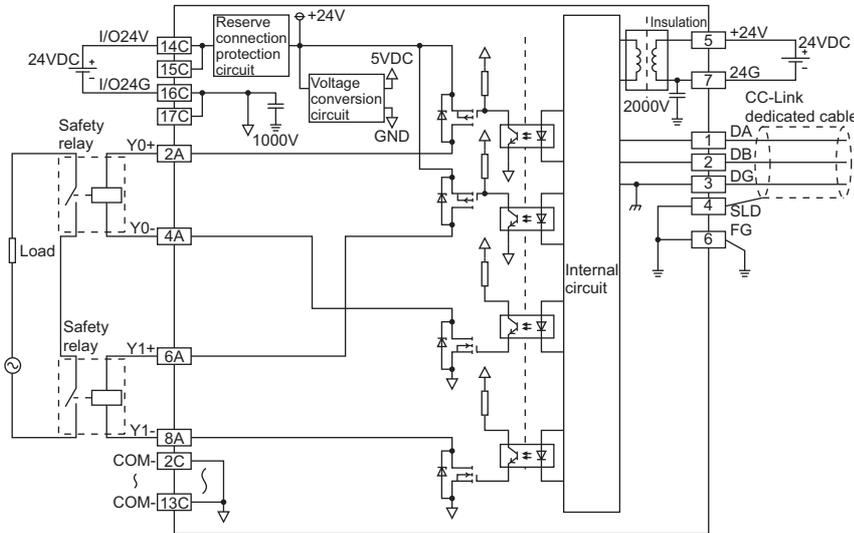


Figure 6.19 Wiring example (sink and source outputs)

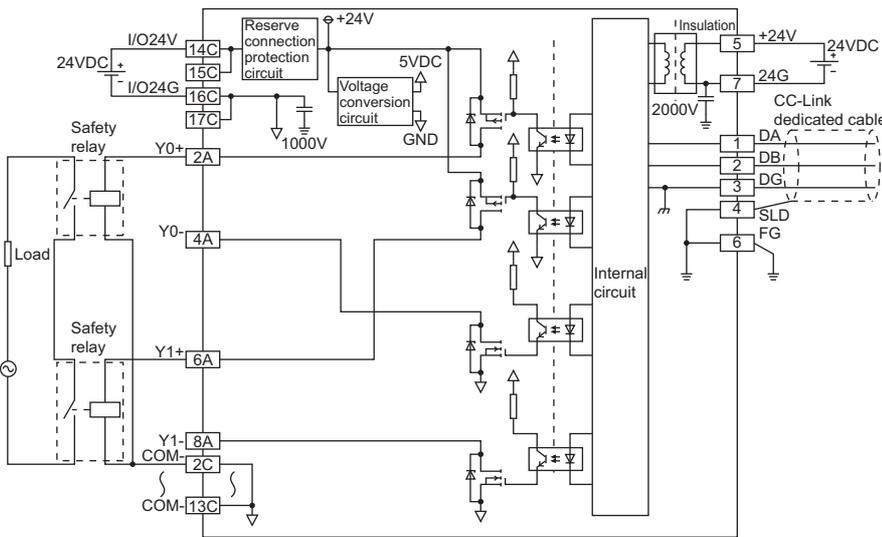


Figure 6.20 Wiring example (source and source outputs)

CC-Link terminal			
1	3	5	7
DA	DG	+24V	24G
2	4	6	
DB	SLD	FG	

Terminal block				
No.	Line C	Line B	Line A	
1	Empty	Empty	Empty	
2	COM-		Y0+	
3			Empty	
4			Y0-	
5			Empty	
6			Y1+	
7			Empty	
8			Y1-	
9			Empty	
10			Y2+	
11			Empty	
12			Y2-	
13			Empty	
14			I/O24V	Y3+
15			I/O24G	Empty
16				Y3-
17			Empty	Empty

☒ POINT

Use T and COM terminals as explained below.

- T terminal : For connection with a safety switch (2 NC contacts). An input dark test can be performed. While the input dark test is not executed, a voltage (+24VDC) is applied between T terminals.
- COM+ terminal : For connection with a safety switch (1 NC/1 NO contacts). An input dark test cannot be performed.
- COM- terminal : For connection with a sensor. An input dark test cannot be performed.

6.6 Switch Setting

This section describes the procedure before starting the data link with the settings of the link ID setting switch, station number setting switch and transmission speed setting switch of the safety remote I/O module.

(1) Switch setting procedure

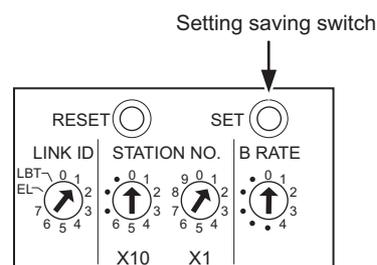
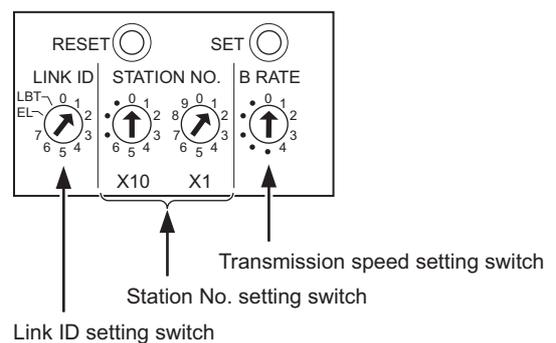
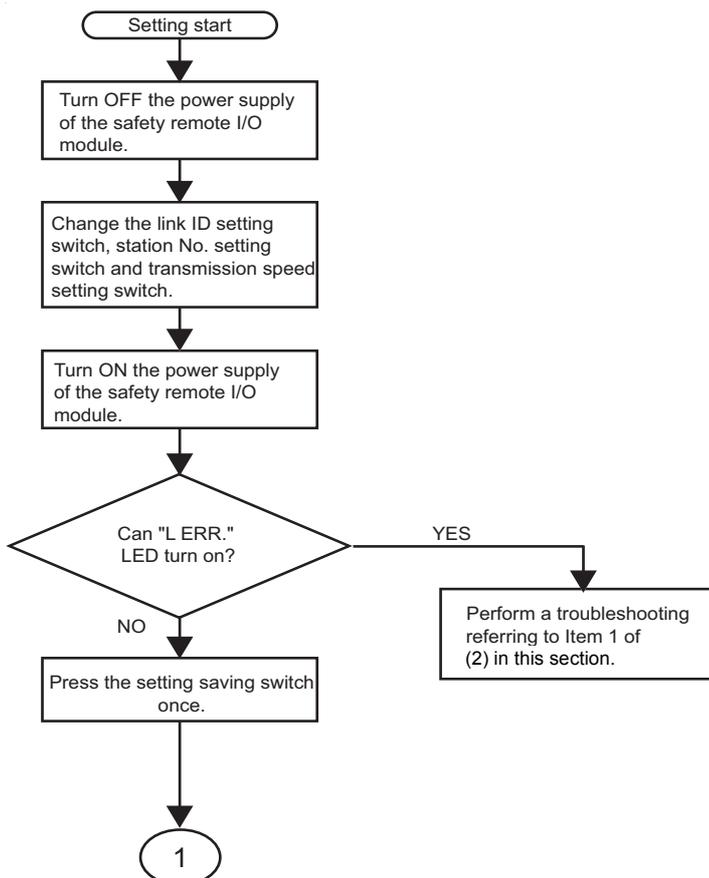
Switch setting must be made in the power-OFF status of the safety remote I/O module.

If the switch setting is made with the module power ON, it may result in incorrect output or malfunction.

Fully confirm the safety of the module when setting the switches with the module power ON.

To return to the CC-Link Safety system with the changed switch setting, the reset operation or power OFF → ON of the safety remote I/O module is required.

After making or canceling the switch setting, be sure to perform the reset operation or turn the power OFF → ON of the safety remote I/O module.



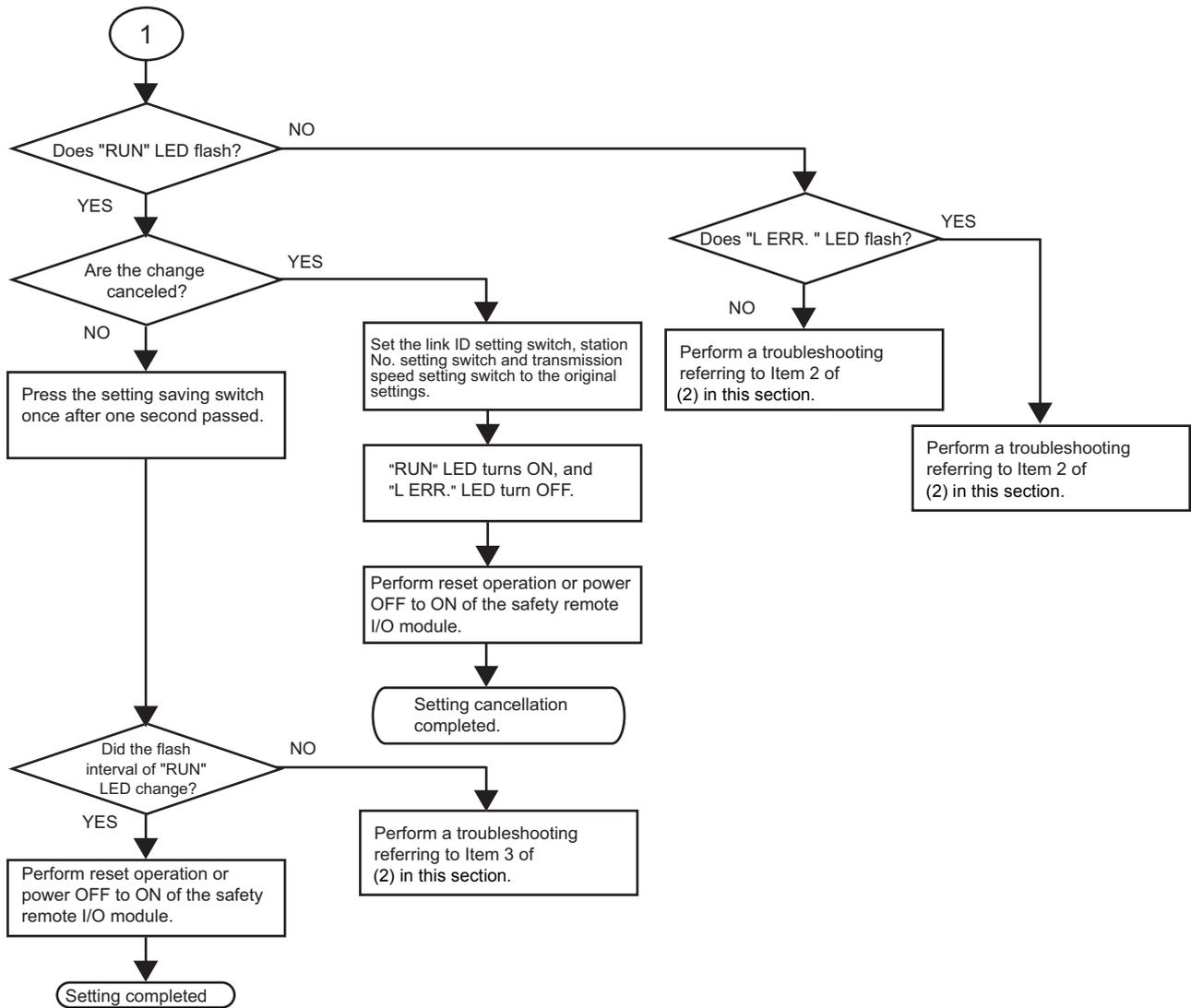


Figure 6.21 Switch setting

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(2) Troubleshooting for switch setting

Table6.4 shows the corrective actions for the invalid LED operation at switch setting.

Table6.4 Troubleshooting for switch setting

Item	LED status	Check description	Corrective action
1	After power-on or during switch setting, "L ERR." LED turns on.	Check if the link ID setting switch, station number setting switch and transmission speed setting switch are pointing positions outside the setting range or not.	<ul style="list-style-type: none"> • Set the positions of the link ID setting switch, station number setting switch and transmission speed setting switch within the setting range. • If the position each setting switch is set is within the setting range, replace the safety remote I/O module.
2	After the first setting saving switch is pressed, "RUN" LED does not flash.	Check if the link ID setting switch, station number setting switch and transmission speed setting switch is changed or not after the setting saving switch is pressed.	<ul style="list-style-type: none"> • Make the switch setting again from the beginning of the procedure. • If each setting switch is not changed after the setting saving switch is pressed, replace the safety remote I/O module.
3	After the second setting saving switch is pressed, the flash interval of "RUN" LED is not changed.	Check if the second setting saving switch is pressed or not within one second after the first one was pressed.	<ul style="list-style-type: none"> • Press the setting saving switch after one or more seconds passed. • If the flash interval of "RUN" LED does not change when the second setting saving switch is pressed after one or more seconds passed, replace the safety remote I/O module.

CHAPTER7 PROGRAMMING

For precautions on creating programs and program examples, refer to the "Safety Application Guide".

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CHAPTER8 MAINTENANCE AND INSPECTION



WARNING

- Do not touch the terminals while power is on. Doing so could cause shock or erroneous operation.
- Turn off all phases of the external supply power used in the system when cleaning the module or retightening the terminal block mounting screws, terminal screws, or module mounting screws. Not doing so could result in electric shock. Tighten a terminal block mounting screw, terminal screw, and module mounting screw within the specified torque range. If the terminal block mounting screw or terminal screw is too loose, it may cause a short circuit, fire, or malfunctions. If too tight, it may damage the screw and/or the module, resulting in a drop of the screw or module, a short circuit or malfunctions. If the module mounting screw is too loose, it may cause a drop of the screw or module. Overtightening the screw may cause a drop due to the damage of the screw or module.



CAUTION

- Do not disassemble or modify the modules. Doing so could cause trouble, erroneous operation, injury, or fire. If the product is repaired or remodeled by other than the specified FA centers or us, the warranty is not covered.
- Restrict the mounting/removal of a module, base unit, and terminal block up to 50 times (IEC61131-2-compliant), after the first use of the product. Failure to do so may cause the module to malfunction due to poor contact of connector.
- Since the module case is made of resin, do not drop or apply any strong impact to the module. Doing so may damage the module.
- Completely turn off the externally supplied power used in the system before mounting or removing the module to/from the panel. Not doing so may result in a fault or malfunctions of the module.

In order that you can use the safety programmable controller in normal and optimal condition at all times, this section describes those items that must be maintained or inspected daily or at regular intervals.

8.1 Daily Inspection

Table8.1 lists the items that must be inspected daily.

Table8.1 Daily inspection

Item	Inspection item	Inspection	Judgment	Remedy	
1	Installation	Installation to DIN rail	Check that the safety remote I/O module is stable.	The safety remote I/O module must be stable.	Reinstall the safety remote I/O module to the DIN rail.
		Looseness and instability of module mounting screws	Try to further tighten screws with a screw driver.	Screws must not be loose.	Retighten the module mounting screws.
		Looseness and instability of 2-piece terminal block mounting screws	Try to further tighten screws with a screw driver.	Screws must not be loose.	Retighten the 2-piece terminal block mounting screws.
		Adhesion of dirt or foreign matter	Check visually.	Dirt and foreign matter must not be present.	Remove and clean.
2	Connection	Looseness of terminal screws	Try to further tighten screws with a screw driver.	Screws must not be loose.	Retighten the terminal screws.
		Proximity of solderless terminals to each other	Check visually.	Solderless terminals must be positioned at proper intervals.	Correct.
3	Module indication LED at power-on/reset	"POWER" LED	Check that the LED is on.	The LED must be on (green). (Abnormal if the LED is off.)	 Section 9.2.
		"RUN" LED	Check that the LED is momentarily on.	The LED must be on (green). (Abnormal if the LED is off.)	Replace the module.
		"SAFETY" LED	Check that the LED is momentarily on.	The LED must be on (green). (Abnormal if the LED is off.)	
		"ERR." LED	Check that the LED is momentarily on.	The LED must be on (red). (Abnormal if the LED is off.)	

Table8.1 Daily inspection (Continued)

Item	Inspection item	Inspection	Judgment	Remedy	
4	Module indication LED during operation	"POWER" LED	Check that the LED is on.	The LED must be on (green). (Abnormal if the LED is off.)	Section 9.2.
		"RUN" LED	Check that the LED is on.	The LED must be on (green). (Abnormal if the LED is off.)	
		"SAFETY" LED	Check that the LED is on.	The LED must be on (green). (Abnormal if the LED is off.)	
		"ERR." LED	Check that the LED is OFF.	The LED must be OFF. (Abnormal if the LED is on or flashing (red).)	
		"L RUN" LED	Check that the LED is on.	The LED must be on (green). (Abnormal if the LED is off.)	
		"L ERR." LED	Check that the LED is OFF.	The LED must be off. (Abnormal if the LED is on or flashing (red).)	
		"SD" LED	Check that the LED is dimly on.	The LED must be dimly on (green). (Abnormal if the LED is off.)	
		"RD" LED	Check that the LED is dimly on.	The LED must be dimly on (green). (Abnormal if the LED is off.)	
		Input LED	Check that the LED turns on and OFF.	The LED must be on (red) when the input is turned ON. The LED must be off when the input is turned OFF. (Abnormal if the LED status is other than indicated above.)	Replace the module.
		Output LED	Check that the LED turns on and OFF.	The LED must be on (red) when the output is turned ON. The LED must be off when the output is turned OFF. (Abnormal if the LED status is other than indicated above.)	

8.2 Periodic Inspection

Table8.2 lists the items that must be inspected once or twice every 6 months to 1 year. When the equipment is moved or modified, or layout of the wiring is changed, also perform this inspection.

Table8.2 Periodic inspection

Item	Inspection item	Inspection	Judgment	Remedy	
1	Ambient environment *1	Ambient temperature	Measure with a temperature and a hygrometer.	0 to 55 °C	Change the ambient environment according to the judgment.
		Ambient humidity		5 to 95%RH	
		Atmosphere	Measure corrosive gasses.	Corrosive gasses must not be present.	
2	Line voltage check	Measure a voltage across the terminals of 24VDC.	19.2 to 28.8VDC	Change the supply power according to the judgment.	
3	Installation	Looseness and instability of module mounting screws	Try to further tighten screws with a screw driver.	Screws must not be loose.	Retighten the module mounting screws.
		Looseness and instability of 2-piece terminal block mounting screws	Try to further tighten screws with a screw driver.	Screws must not be loose.	Retighten the 2-piece terminal block mounting screws.
		Adhesion of dirt or foreign matter	Check visually.	Dirt and foreign matter must not be present.	Remove and clean.
4	Connection	Looseness of terminal screws	Try to further tighten screws with a screw driver.	Screws must not be loose.	Retighten the terminal screws.
		Proximity of solderless terminals to each other	Check visually.	Solderless terminals must be positioned at proper intervals.	Correct.

*1: When the programmable controller is used in the board, the environment in the board becomes the ambient environment.

CHAPTER9 TROUBLESHOOTING

This section describes the various types of trouble that occur when the the safety remote I/O module is operated, and causes and remedies of these troubles.

9.1 Troubleshooting Basics

In order to increase the reliability of the system, not only highly reliable devices are used but also the speedy startup of the system after the occurrence of trouble becomes an important factor.

To start up the system speedily, the cause of the trouble must be located and eliminated correctly. The basic three points that must be followed in the troubleshooting are as follows.

(1) Visual inspection

Visually check the following.

- 1) Movement of programmable controller (stop status and operation status)
- 2) Power supply status of the safety remote I/O module
- 3) Status of external devices
- 4) Installation condition of the safety power supply module, safety CPU module and safety master module
- 5) Status of wiring (I/O wires, power cables, CC-Link dedicated cables)
- 6) Display status of various types of indicators ("POWER" LED, "RUN" LED, "ERR." LED, etc.)
- 7) Status of setting of various types of set switches

After checking items 1) to 7), connect GX Developer to the safety CPU module, and conduct PLC diagnostics or monitor the operating condition and program contents of the safety CPU module.

(2) Checking malfunctions

Check how the malfunction of the programmable controller changes when the following operations are performed.

- 1) Set the RUN/STOP/RESET switch of the safety CPU module to "STOP".
- 2) Perform the reset operation with the RUN/STOP/RESET switch of the safety CPU module.
- 3) Turn ON and OFF the power supply of the safety remote I/O module.
- 4) Perform the reset operation with the reset switch of the safety remote I/O module.

(3) Narrowing down the range of trouble occurrence causes

Estimate the failure location in accordance with items (1) and (2) above.

- 1) Safety remote I/O module or external devices
- 2) Safety master module or others
- 3) Safety CPU module
- 4) Sequence program

9.1.1 Precautions for troubleshooting

The safety remote I/O module is designed to detect errors with various diagnostics circuits. When an error occurs, the module stops operation due to the error detected first. Then, the error code of the error detected first will be stored.

9.2 Troubleshooting with LEDs

This section classifies the error definitions by the LED status and describes them.

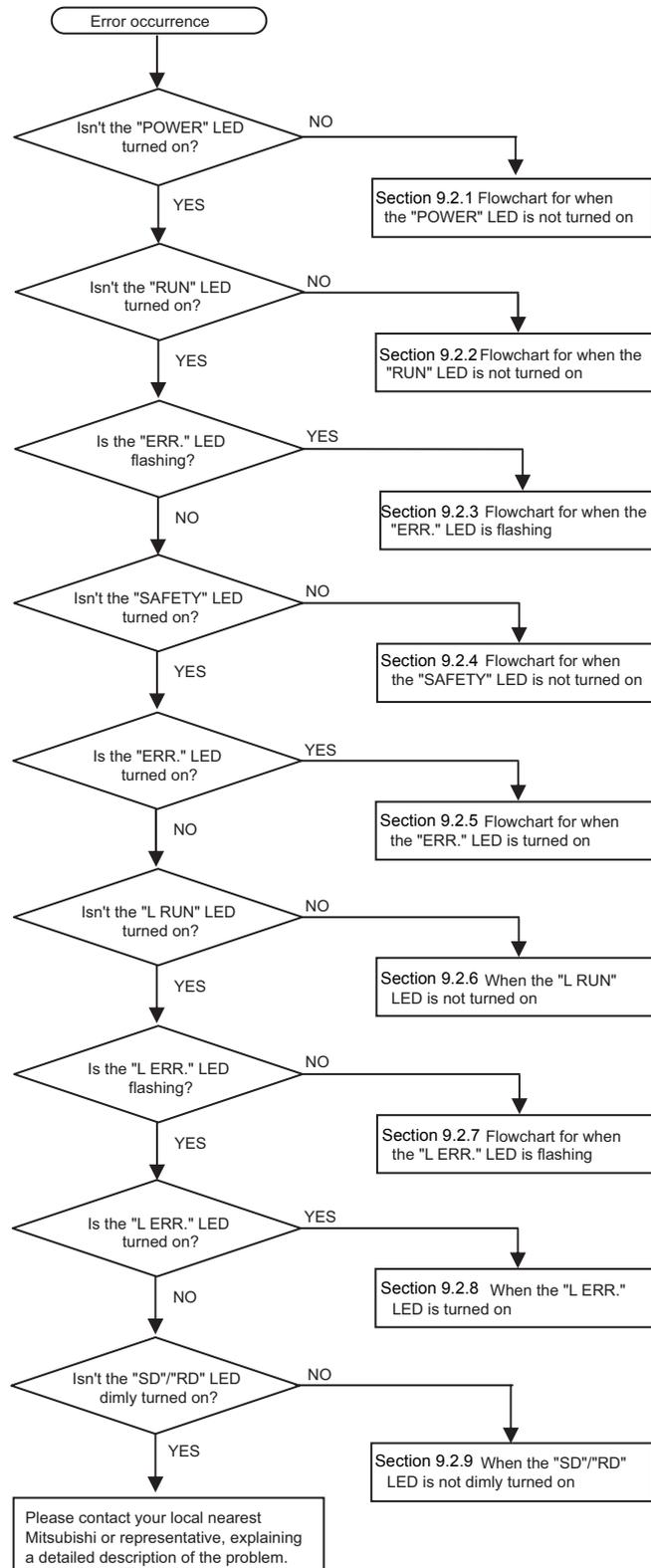


Figure 9.1 Troubleshooting flowchart

9.2.1 Flowchart for when the "POWER" LED does not turn on

The following shows the flowchart for when the "POWER" LED does not turn on at power ON of the safety remote I/O module or during operation of the programmable controller.

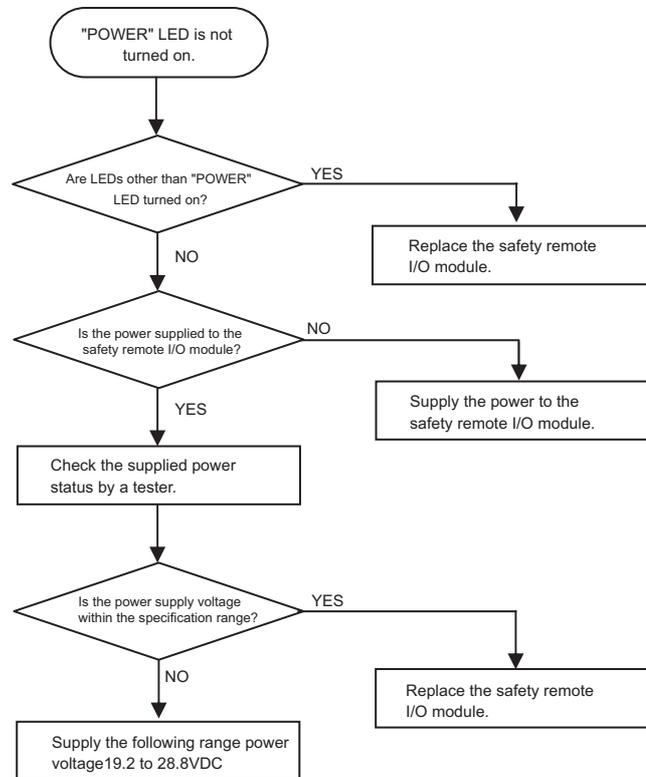


Figure 9.2 Flowchart for when the "POWER" LED does not turn on

9.2.2 Flowchart for when the "RUN" LED does not turn on

The following shows the flowchart for when the "RUN" LED does not turn on at power ON of the safety remote I/O module or during operation of the programmable controller.

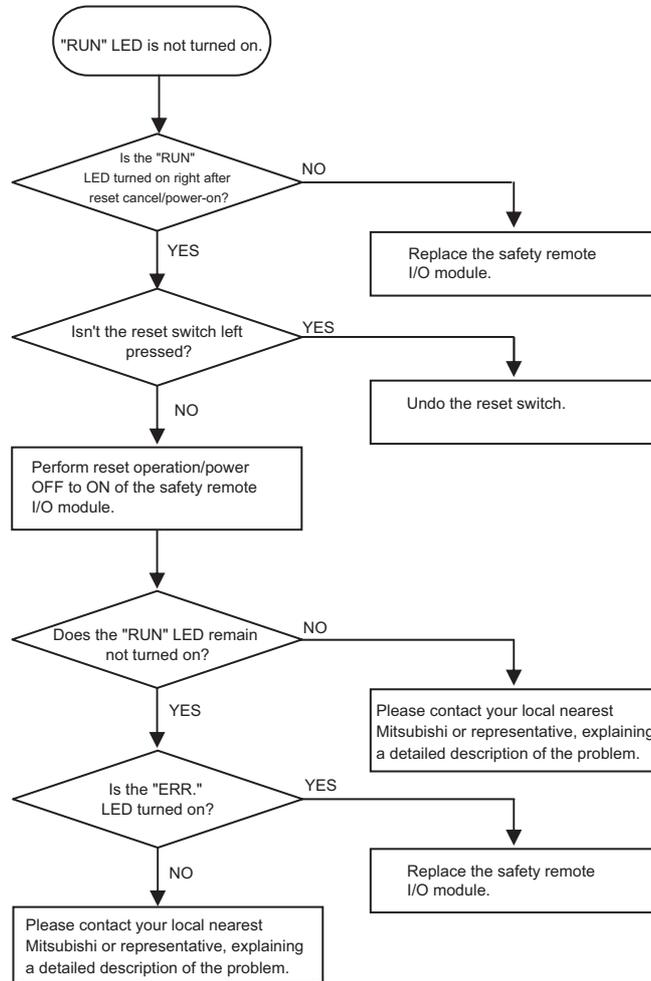


Figure 9.3 Flowchart for when the "RUN" LED does not turn on

9.2.3 Flowchart for when the "ERR." LED flashes

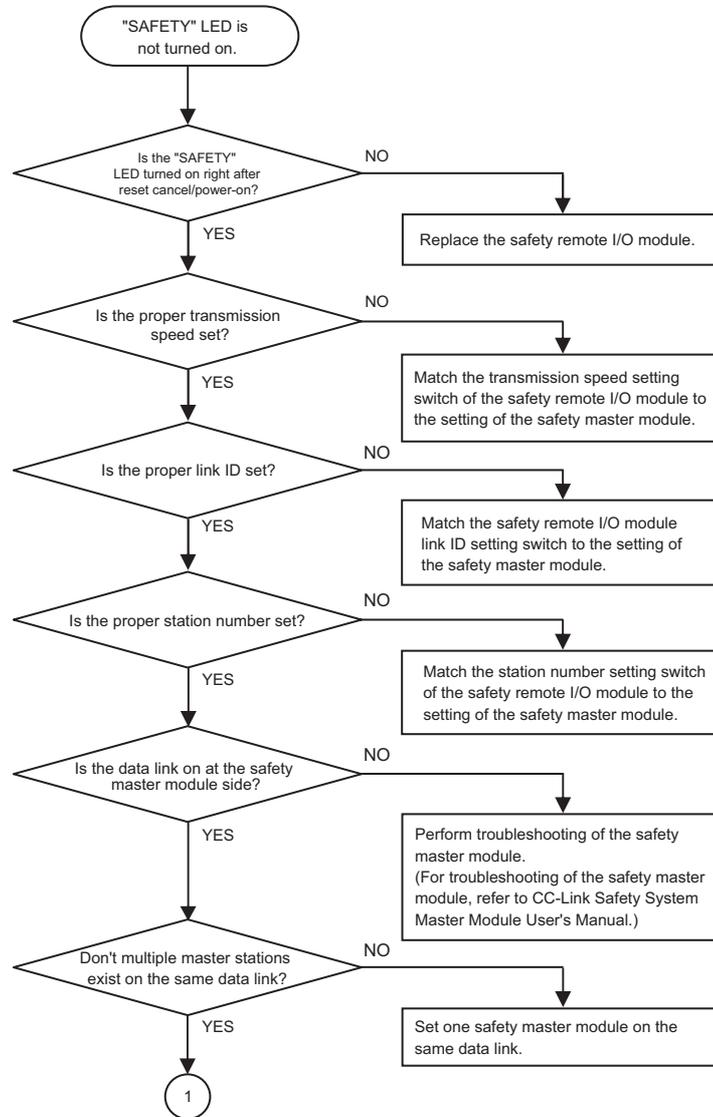
The following shows the flowchart for when the "ERR." LED flashes at power ON of the safety remote I/O module or during operation of the programmable controller.



Figure 9.4 Flowchart for when the "ERR." LED flashes

9.2.4 Flowchart for when the "SAFETY" LED does not turn on

The following shows the flowchart for when the "SAFETY" LED does not turn on at power ON of the safety remote I/O module or during operation of the programmable controller.



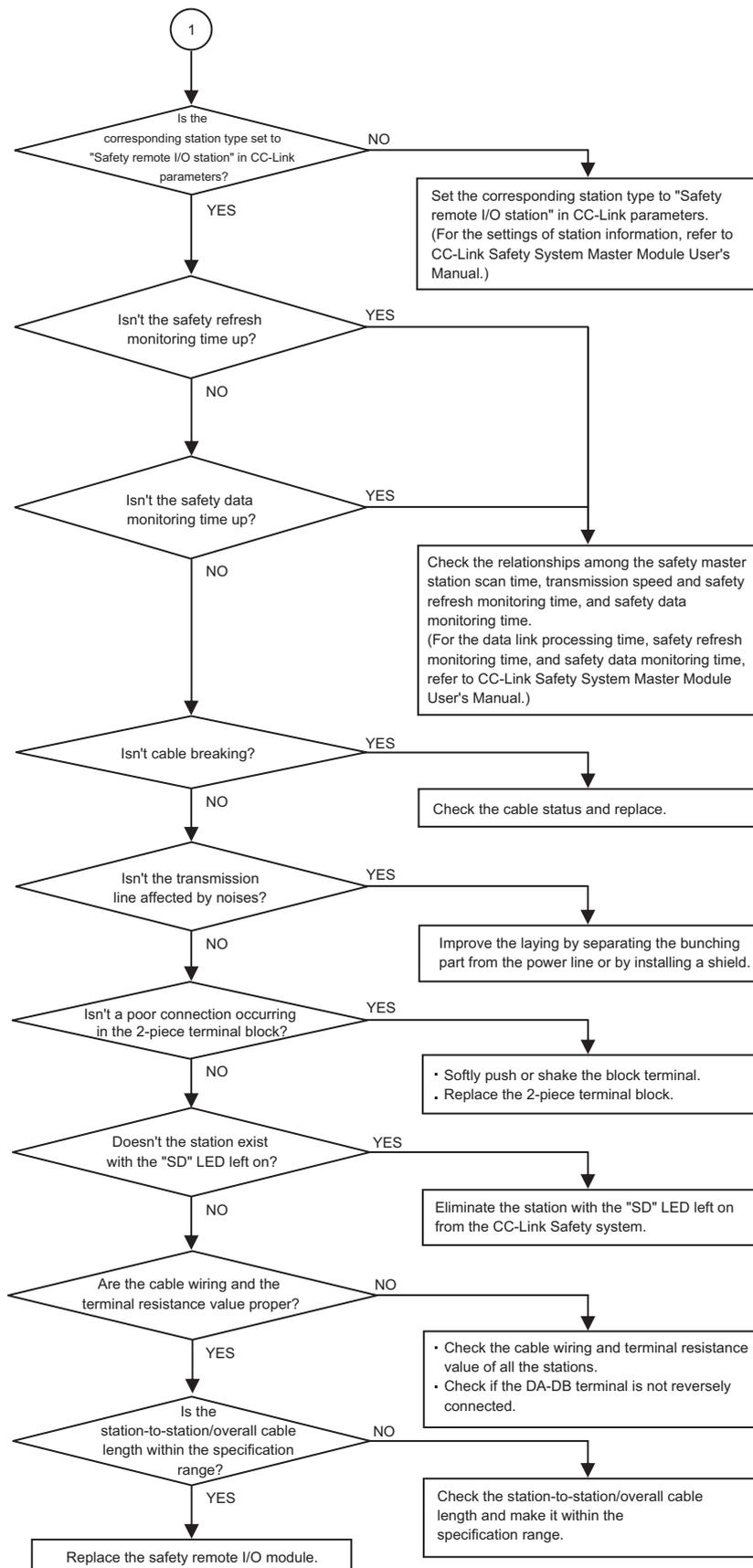


Figure 9.5 Flowchart for when the "SAFETY" LED does not turn on

9.2.5 Flowchart for when the "ERR." LED turns on

The following shows the flowchart for when the "ERR." LED turns on at power ON of the safety remote I/O module or during operation of the programmable controller.

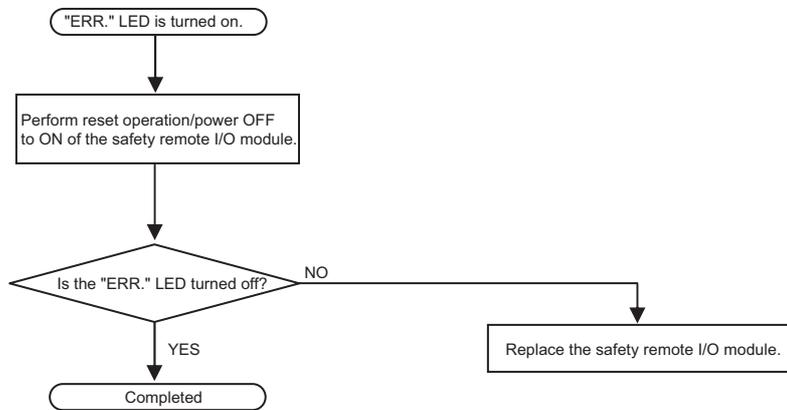


Figure 9.6 Flowchart for when the "ERR." LED turns on

9.2.6 When the "L RUN" LED does not turn on

The following shows the case when the "L RUN" LED does not turn on at power ON of the safety remote I/O module or during operation of the programmable controller.

If the "L RUN" LED does not turn on when the "SAFETY" LED is on, replace the safety remote I/O module.

When the "SAFETY" LED is not on, refer to the flowchart in Section 9.2.4.

9.2.7 Flowchart for when the "L ERR." LED flashes

The following shows the flowchart for when the "L ERR." LED flashes at power ON of the safety remote I/O module or during operation of the programmable controller.

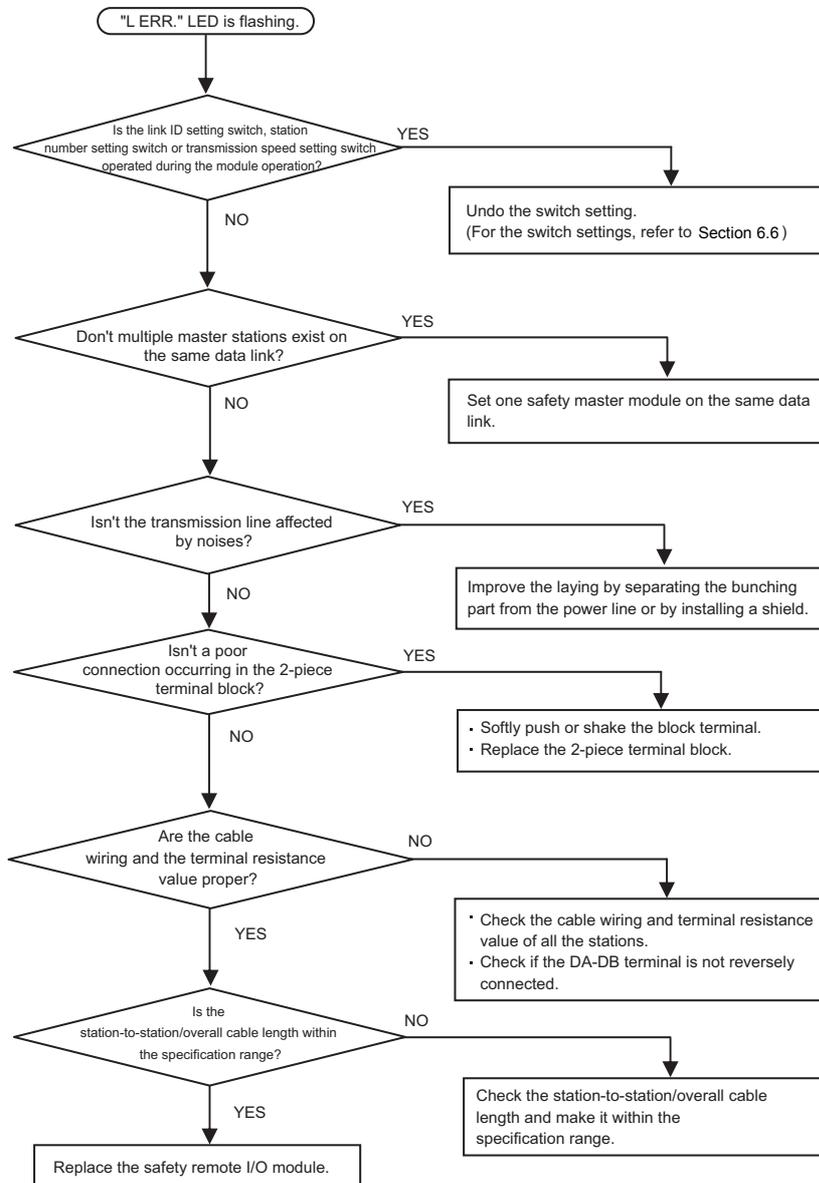


Figure 9.7 Flowchart for when the "L ERR." LED flashes

9.2.8 When the "L ERR." LED turns on

The following explains the case when the "L ERR." LED turns on at power ON of the safety remote I/O module or during operation of the programmable controller.

If the "L ERR." LED turns on when the "ERR." LED is off, replace the safety remote I/O module.

When the "ERR." LED is flashing, refer to the flowchart in Section 9.2.3.

When the "ERR." LED is on, refer to the flowchart in Section 9.2.5.

9.2.9 When the "SD"/"RD" LED does not turn on dimly

The following explains the case when the "SD"/"RD" LED does not turn on dimly at power ON of the safety remote I/O module or during operation of the programmable controller.

If the "SD"/"RD" LED does not turn on dimly when the "SAFETY" LED is on, replace the safety remote I/O module.

When the "SAFETY" LED is not on, refer to the flowchart in Section 9.2.4.

9.3 Verifying Errors from LED Status

The following table lists causes and corrective actions for errors indicated by LEDs on the safety remote I/O module when the network parameters are properly set and also the "MST" LED of the safety master module is on (i.e. under data link control) in the system configuration example shown below.

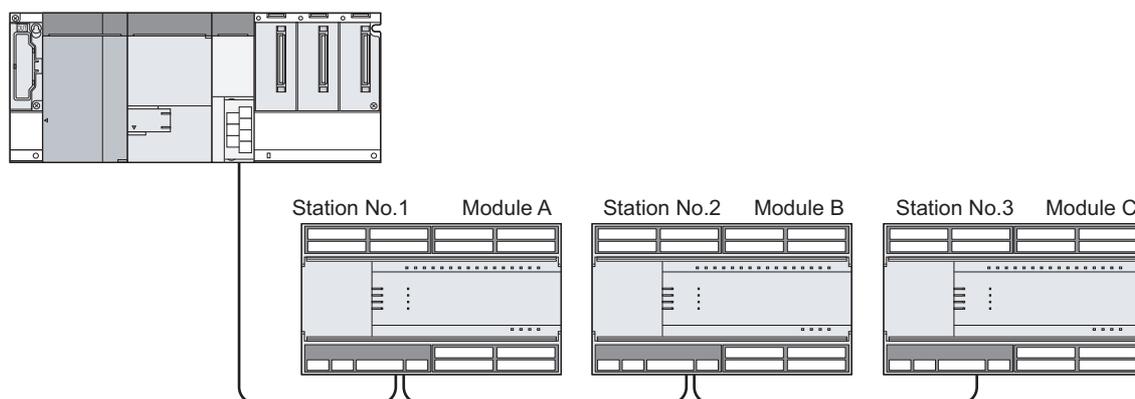


Figure 9.8 Configuration example for error verification

Table9.1 Verifying errors from LED status

Safety master module	LED status			Cause	Corrective action
	Safety remote I/O module				
	A	B	C		
ERR. ○ or ERR. ●	POWER ●	POWER ●	POWER ●	Normal	-
	L RUN ●	L RUN ●	L RUN ●		
	L ERR. ○	L ERR. ○	L ERR. ○		
	POWER ○	POWER ●	POWER ●	Since the LEDs on the safety remote I/O module are all off, the 24V power is not supplied or voltage is low.	Check the voltage of the 24V power supply, and supply the proper power to the safety remote I/O module.
	L RUN ○	L RUN ●	L RUN ●	The safety remote I/O module A is malfunctioning and the LEDs are unstable(all lights are off, in many cases).	Replace the safety remote I/O module.
	L ERR. ○	L ERR. ○	L ERR. ○		
	POWER *	POWER ●	POWER ●		
L RUN *	L RUN ●	L RUN ●	The transmission cable is shorted.	Find the shorted cable among the three transmission cables and repair it.	
L ERR. *	L ERR. ○	L ERR. ○			
POWER ●	POWER ●	POWER ●			
L RUN ○	L RUN ○	L RUN ○	The transmission cable is wired incorrectly.	Verify wiring in the terminal box of the safety remote I/O module and correct.	
L ERR. *	L ERR. *	L ERR. *			

● : On, ○ : Off, * : On, flashing, or off

Table9.2 Verifying errors from LED status (When the "L RUN" LED does not turn on)

Safety master module	LED status			Cause	Corrective action
	Safety remote I/O module				
	A	B	C		
ERR. ○ or ERR. ●	POWER ● L RUN ● L ERR. ○	POWER ● L RUN ○ L ERR. ○	POWER ● L RUN ○ L ERR. ○	<ul style="list-style-type: none"> A line failure such as a cable failure/terminal resistor failure/cable or terminal block poor connection is occurring between the safety remote I/O modules A and B. The line failure (terminal block poor connection, cable disconnection, etc.) is occurring between the safety remote I/O module B and C. The safety remote I/O modules B and C are affected by noise. 	<ul style="list-style-type: none"> Check the SLD grounding status of the transmission cable. Confirm that cables are laid out as far as possible from the power line (100mm or more). Narrow down the line failure part using bisection algorithm or a tester.
	POWER ● L RUN ○ L ERR. ○	POWER ● L RUN ● L ERR. ○	POWER ● L RUN ○ L ERR. ○	The "L RUN" LEDs on the safety remote I/O modules A and C are off, indicating the station numbers for A and C are overlapping.	Restart the power supply after the overlapped station numbers for the safety remote I/O modules are corrected.
	POWER ● L RUN ● L ERR. ○	POWER ● L RUN ○ L ERR. ○	POWER ● L RUN ● L ERR. ○	The "L RUN" LED on the safety remote I/O modules B is off, indicating the transmission speed setting for module B is invalid within the setting range (0 to 4).	Restart the power supply after the transmission speed is set correctly.

● : On, ○ : Off, * : On, flashing, or off

Table9.3 Verifying errors from LED status (When the "L ERR." LED turns on)

Safety master module	LED status			Cause	Corrective action
	Safety remote I/O module				
	A	B	C		
ERR. ○ or ERR. ●	POWER ● L RUN ● L ERR. ○	POWER ● L RUN ● L ERR. ●	POWER ● L RUN ● L ERR. ○	The "L ERR." LED of the safety remote I/O module B is on, indicating that the module B is being affected by noise. (The "L RUN" LED may turn off.)	Correctly perform grounding of the FGs for the master module and all safety remote I/O modules.
	POWER ● L RUN ● L ERR. ○	POWER ● L RUN ● L ERR. ●	POWER ● L RUN ● L ERR. ●	<ul style="list-style-type: none"> A line failure such as a cable failure/terminal resistor failure/cable or terminal block poor connection is occurring. The line failure (terminal block poor connection, cable disconnection, etc.) is occurring between the safety remote I/O modules B and C. The safety remote I/O modules B and C are affected by noise. 	<ul style="list-style-type: none"> Check the SLD grounding status of the transmission cable. Confirm that cables are laid out as far as possible from the power line (100mm or more). Narrow down the line failure part using bisection algorithm or a tester.
	POWER ● L RUN ● L ERR. ○	POWER ● L RUN ● L ERR. ○	POWER ● L RUN ● L ERR. ●	A terminal resistor is not attached. (The "L RUN" LED may turn off.)	Check if a terminal resistor is attached.

● : On, ○ : Off, * : On, flashing, or off

9.4 Troubleshooting with GX Developer

Errors which occur in the safety remote I/O module can be verified on the PLC diagnostics screen in GX Developer.

(1) Reading an error code

When an error occurs, its error code, error message, etc. can be read using the PLC diagnostic function of GX Developer.

Errors of the safety remote I/O module are registered as remote I/O station error information in "Operation/error history".

The error history of the safety remote I/O module must be read to the safety CPU module beforehand.

For reading the error history of the safety remote I/O module, refer to Section 4.5.

The following shows the procedure for reading the error code using GX Developer.

- 1) Start GX Developer.
- 2) Connect the safety CPU module and personal computer.
- 3) Read projects from the safety CPU module by selecting [Online] → [Read from PLC] in GX Developer.
- 4) Select [Diagnostic] → [PLC diagnostic] from the menu.
- 5) If the error display part in "Present error" or "Operation/error log" is double-clicked, the error details dialog box appears.

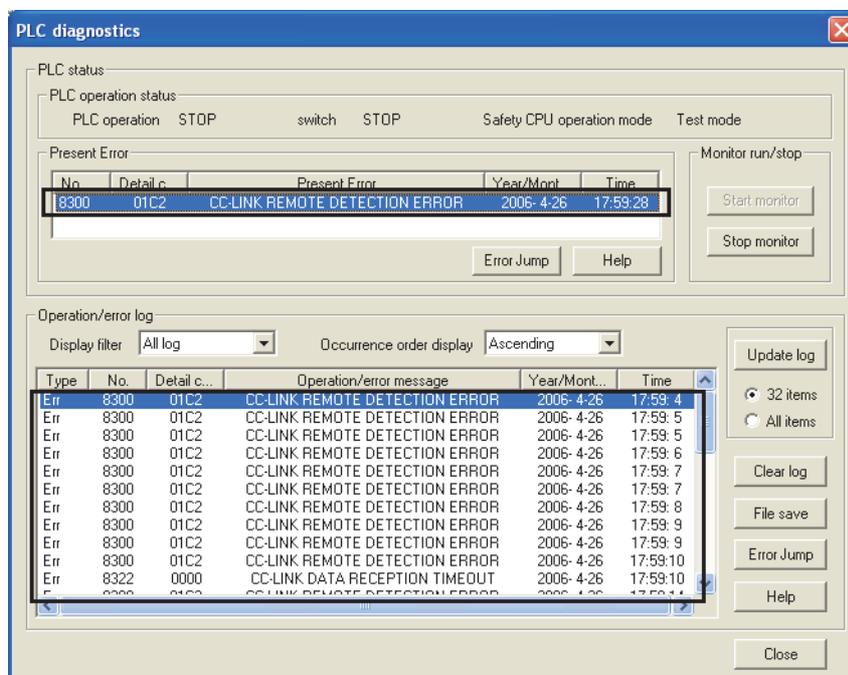


Figure 9.9 PLC diagnostics screen

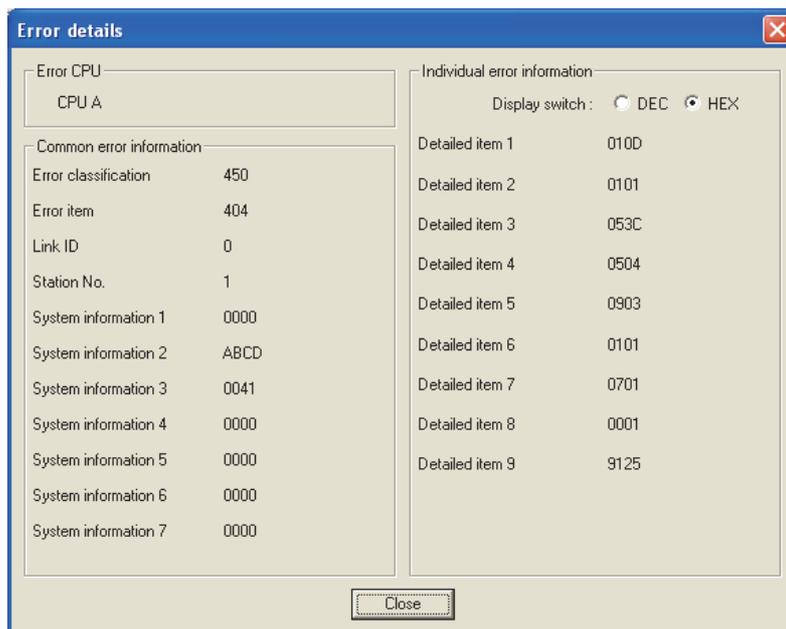


Figure 9.10 Error details screen

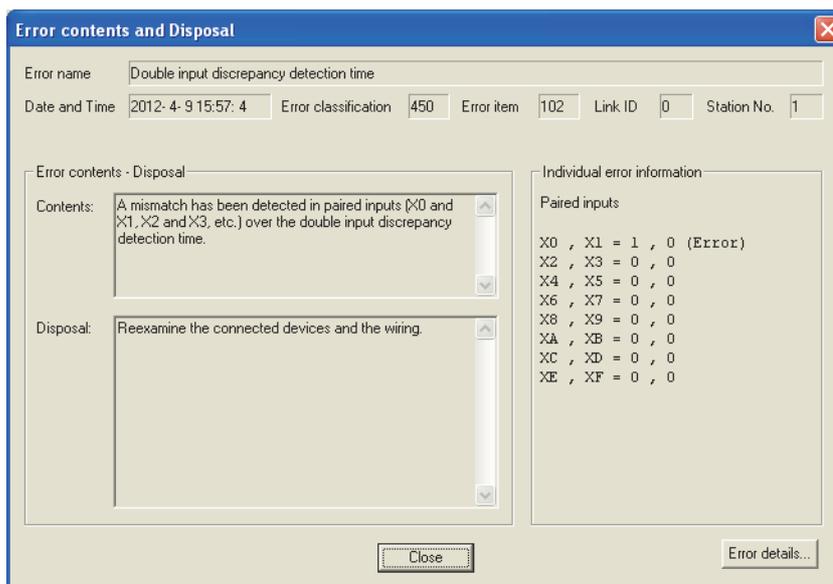


Figure 9.11 Error details screen (GX Developer with Version 8.98C or later)

For details of the PLC diagnostics, refer to the "GX Developer Version 8 Operating Manual (Safety Programmable Controller)".

For error details, refer to Section 9.5.

POINT

When the error code 450-102 is displayed on GX Developer with the module technical versions below, the input signal status of when an error has occurred is displayed. (ERROR) is also displayed next to paired inputs where an error has been actually detected.

- QS0J65BTB2-12DT : module technical version D or later
- QS0J65BTS2-8D : module technical version B or later
- QS0J65BTS2-4T : module technical version B or later

(2) Reading error history of the safety remote I/O module

The following describes how to check the error history read to the safety CPU module from the safety remote I/O module.

(a) Checking the read error history

The error history read to the safety CPU module is stored into [Operation/error log] of [PLC diagnostics]. (The error code No. of the error history is 8300.)

Also, time displayed at [Operation/error log] is the time when the error history is read to the safety CPU module. (The error occurrence time can be checked on the Error details screen.)

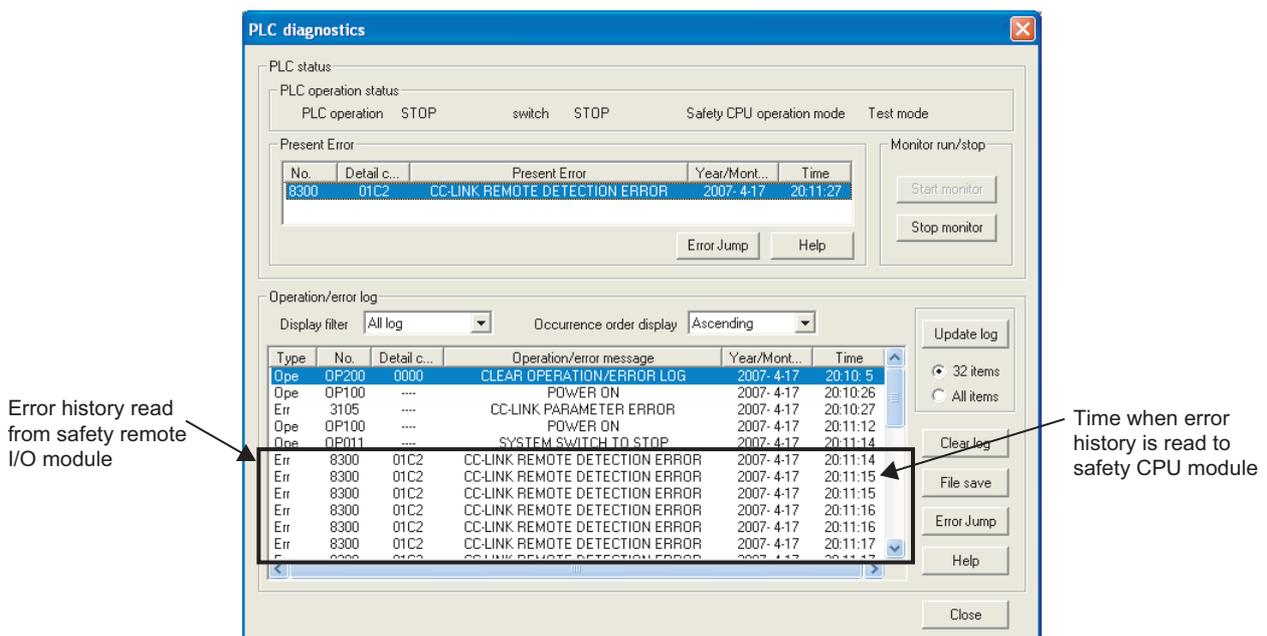
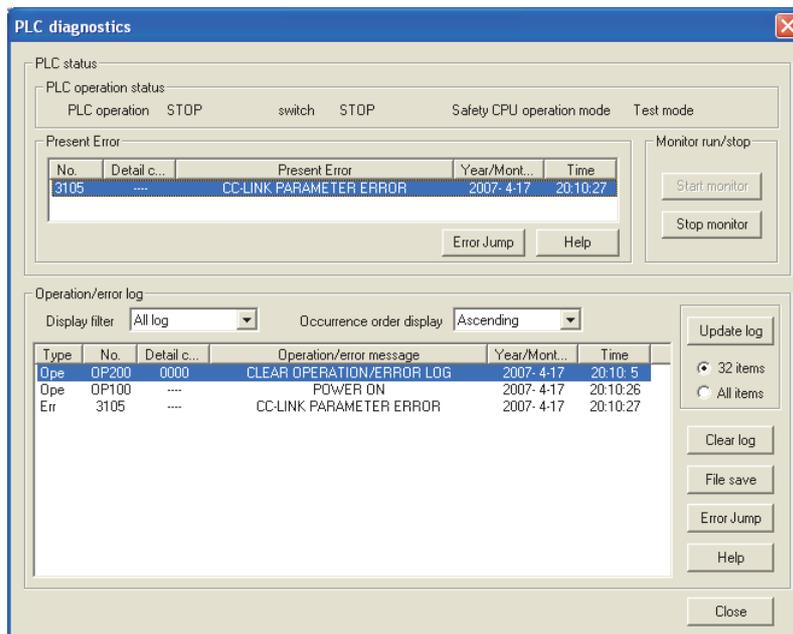


Figure 9.12 Error history display

- (b) Checking error occurrence time
 The error occurrence time displayed in the error history can be checked by [System information] on the Error details screen.

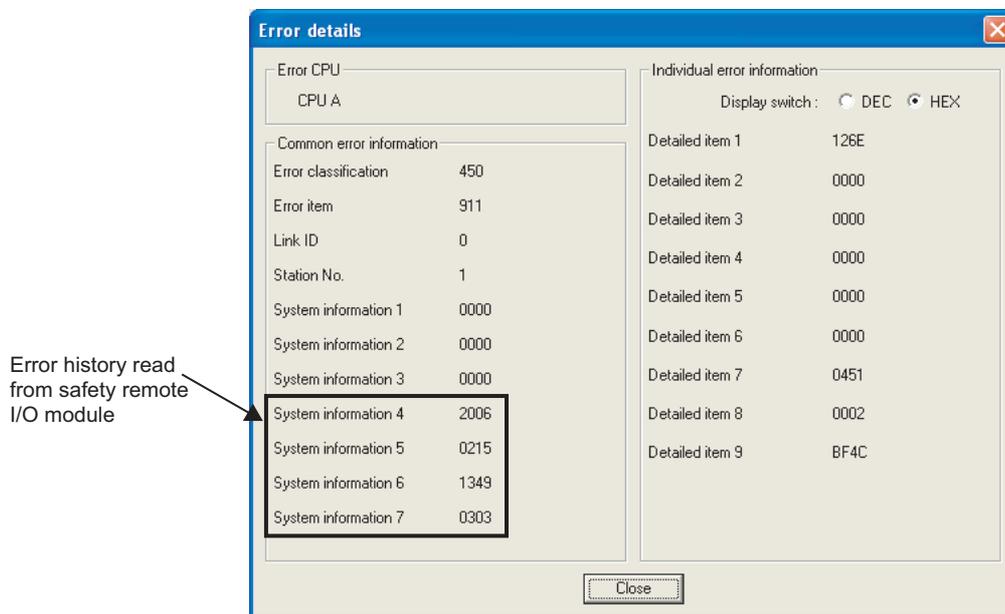


Figure 9.13 Error details screen

Table 9.4 Checking error occurrence time

Name	Meaning	Explanation																															
System information 4	First two digits of year and last two digits of year	<table border="0"> <tr> <td>b15 ~ b12</td> <td>b11 ~ b8</td> <td>b7 ~ b4</td> <td>b3 ~ b0</td> <td>Example: 2006 2006H</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td></td> </tr> <tr> <td colspan="2">First two digits of year</td> <td colspan="2">Last two digits of year</td> <td></td> </tr> </table>	b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: 2006 2006H						First two digits of year		Last two digits of year																		
b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: 2006 2006H																													
First two digits of year		Last two digits of year																															
System information 5	Month and day	<table border="0"> <tr> <td>b15 ~ b12</td> <td>b11 ~ b8</td> <td>b7 ~ b4</td> <td>b3 ~ b0</td> <td>Example: February, 15th 0215H</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td></td> </tr> <tr> <td colspan="2">Month</td> <td colspan="2">Day</td> <td></td> </tr> </table>	b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: February, 15th 0215H						Month		Day																		
b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: February, 15th 0215H																													
Month		Day																															
System information 6	Hour and minute	<table border="0"> <tr> <td>b15 ~ b12</td> <td>b11 ~ b8</td> <td>b7 ~ b4</td> <td>b3 ~ b0</td> <td>Example: 01 p.m., 49min 1349H</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td></td> </tr> <tr> <td colspan="2">Hour</td> <td colspan="2">Minute</td> <td></td> </tr> </table>	b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: 01 p.m., 49min 1349H						Hour		Minute																		
b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: 01 p.m., 49min 1349H																													
Hour		Minute																															
System information 7	Second and day of week	<table border="0"> <tr> <td>b15 ~ b12</td> <td>b11 ~ b8</td> <td>b7 ~ b4</td> <td>b3 ~ b0</td> <td>Example: 03s, Wednesday 0303H</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td></td> </tr> <tr> <td colspan="2">Second</td> <td colspan="2"></td> <td></td> </tr> </table> <table border="1" style="margin-left: 20px;"> <tr> <th colspan="2">Day of the week</th> </tr> <tr> <td>0</td> <td>Sunday</td> </tr> <tr> <td>1</td> <td>Monday</td> </tr> <tr> <td>2</td> <td>Tuesday</td> </tr> <tr> <td>3</td> <td>Wednesday</td> </tr> <tr> <td>4</td> <td>Thursday</td> </tr> <tr> <td>5</td> <td>Friday</td> </tr> <tr> <td>6</td> <td>Saturday</td> </tr> </table>	b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: 03s, Wednesday 0303H						Second					Day of the week		0	Sunday	1	Monday	2	Tuesday	3	Wednesday	4	Thursday	5	Friday	6	Saturday
b15 ~ b12	b11 ~ b8	b7 ~ b4	b3 ~ b0	Example: 03s, Wednesday 0303H																													
Second																																	
Day of the week																																	
0	Sunday																																
1	Monday																																
2	Tuesday																																
3	Wednesday																																
4	Thursday																																
5	Friday																																
6	Saturday																																

9.5 Error Code List

The safety remote I/O module sends the error information to the safety CPU module via a safety master module when the moderate error*1 occurs at power ON or during operation of the programmable controller.

The error codes that the safety remote I/O module sends are listed in Table 9.6.

For reading an error code, refer to Section 9.4.

*1 Safety remote I/O module error codes are classified into minor, moderate, and major errors as shown below.

However, minor error is not applied to the safety remote I/O module status.

- Minor error: Errors that may allow the safety remote I/O module to maintain the safety functions.
- Moderate error: Errors that may cause the safety remote I/O module to stop the safety functions with error detection enabled.
- Major error: Errors that may cause the safety remote I/O module to stop the safety functions with error detection disabled.

All output points will be OFF when moderate errors or major errors occur.

POINT

If an error 450 not described in Table 9.6 Error code list occurs, the following items may have a problem:

- Operating ambient environment
- Power supply voltage
- Installing or wiring condition
- Module

Refer to Table 9.5 below to check if there are problems with the items above.

Table 9.5 Checking the error cause

Item to check	Description
Operating ambient environment	Check if the operating ambient environment meets the general specifications. (☞ Section 3.1)
Power supply voltage	Check if the power supply voltage supplied for the safety remote I/O module is within the range described in the module power supply voltage in the performance specifications. (☞ Section 3.2)
Installing or wiring condition	Check if: <ul style="list-style-type: none"> • the module mounting screws are not loosen. • the two-piece terminal block mounting screws are not loosen. • there is no dust or foreign matter in the terminal block. • the terminal screws are not loosen. • the solderless terminals are not positioned too close.
Module	If the same error persists even after the troubleshooting, the safety remote I/O module may be in failure. Replace the module. (☞ Section 9.1, Section 9.2)

Follow the troubleshooting instructions above according to the error cause. If the module is in failure or the cause is not clear, consult your local Mitsubishi service center or representative, explaining a detailed description of the problem.

Table9.6 Error code list

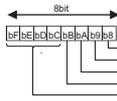
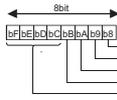
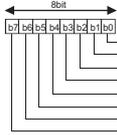
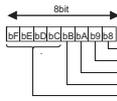
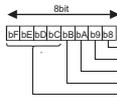
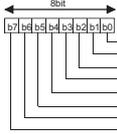
Error classification	Error item	Name	Error definition	Corrective action
302	0000	CC-Link Safety protocol (Out of receive command range)	An unexpected protocol occurred.	
304	0000	CC-Link Safety protocol division number error (Product information)	The continuity of division numbers collapsed in the send/receive processing of product information.	Please consult your local Mitsubishi representative.
	0001	CC-Link Safety protocol division number error (Safety slave station parameters)	The continuity of division numbers collapsed in the send/receive processing of the safety slave station parameters.	
	0002	CC-Link Safety protocol division number error (Error information)	The continuity of division numbers collapsed in the send/receive processing of error information.	
	0003	CC-Link Safety protocol division number error (Safety slave station internal information)	The continuity of division numbers collapsed in the safety slave station internal information access processing.	

Error classification	Error item	Name	Error definition	Corrective action
305	0000	CC-Link Safety protocol product mismatch (Link ID mismatch)	The link ID received from the safety master station and that of the host station are different.	(1) Check the link ID. (2) Check the parameter settings. (This error code may not be output due to error check on the master station.)
	0001	CC-Link Safety protocol product mismatch (Manufacturer code mismatch)	The manufacturer code received from the safety master station and that of the host station mismatched in the product information verification processing.	(1) Check the parameter settings. (This error codes may not be output due to error check on the master station.)
	0002	CC-Link Safety protocol product mismatch (Module inherent code mismatch)	The inherent code received from the safety master station and that of the host station mismatched in the product information verification processing.	
	0003	CC-Link Safety protocol product mismatch (Module technical version mismatch)	The module technical version received from the safety master station and that of the host station mismatched in the product information verification processing.	
	0004	CC-Link Safety protocol product mismatch (Production information mismatch)	The production information received from the safety master station and that of the host station mismatched in the product information verification processing. Host information 1, 2: Lowest 16 bits of production information Host information 7, 8: Highest 16 bits of production information	(1) Check the production information set as parameter. (This error code may not be output due to error check on the master station.)
	0005	CC-Link Safety protocol product mismatch (Model name information mismatch)	The model name information received from the safety master station and that of the host station mismatched in the product information verification processing. Details 1 to 9 Detailed item 1: 'QS' Detailed item 2: '0J' Detailed item 3: '65' Detailed item 4: 'BT' Detailed item 5: 'B2' Detailed item 6: '-1' Detailed item 7: '2D' Detailed item 8: 'T ' Detailed item 9: 0x0020	(1) Check the parameter settings. (This error code may not be output due to error check on the master station.)

Error classification	Error item	Name	Error definition	Corrective action
306	0001	CC-Link Safety protocol safety slave station parameter error (Verification request acceptance disabled)	The verification request for the safety slave station parameters is accepted from the safety master station. However, it is not supported by the local station.	Please consult your local Mitsubishi representative.
	0002	Safety slave station parameters Out of parameter number range	The number of the safety slave station parameters is out of range.	
	0003	Safety slave station parameters Same parameter number setting	The same number is set for the safety slave station parameters.	
	0004	Safety slave station parameter Out of setting range	The settings of the safety slave station parameters are out of range.	
	0005	CC-Link Safety protocol safety slave station parameter error (CRC32 mismatch)	For the safety slave station parameters received from the safety master station, the CRC32 calculated from the overall parameters and the received one mismatch.	
307	0000	Protocol version notification error	No protocol version notification was received from the safety master station. Or, the protocol version notification from the safety master station is abnormal.	
	0001	Safety data monitoring timer notification error	No safety data monitoring timer notification was received from the safety master station.	
	0002	Safety refresh response processing time request error	No safety refresh response processing time request was received from the safety master station.	
	0015	Unsupported function notification	Unsupported function data were sent from the safety master station.	
350	0719	CC-Link Safety protocol safety slave station parameter number error	The received numbers of safety slave station parameters are out of range.	<ul style="list-style-type: none"> After checking that the CSP file is not damaged and that the latest CSP file is registered, set the safety remote I/O module parameters again.

Error classification	Error item	Name	Error definition	Corrective action
350	0917	Safety slave station parameter mismatch	<p>Safety slave station parameter mismatch. <Detailed item 2></p> <p>201: "Time of noise removal filter" mismatch ('Input dark test pulse OFF time' is greater than "Time of noise removal filter X0,1")</p> <p>401: "Input dark test selection" mismatch (When "Double input" is selected for the double input/single input selection, the dark test implementation status for two input is not same. Example: "Xn: Execute, Xn+1: Not execute")</p> <p>601: "Method of wiring of output" mismatch (When "Source+Source" is selected as a method of wiring of output, the setting of the paired method of wiring of output is not the same.)</p> <p>701: "Output dark test selection" mismatch (When "Source+Source" is selected as a method of wiring of output, the setting of output dark test selection is not the same.)</p>	<ul style="list-style-type: none"> • Determine the mismatch according to the detailed item 2 on the left and correct parameters. • After checking that the CSP file is not damaged and that the latest CSP file is registered, set the safety remote I/O module parameters again.

Error classification	Error item	Name	Error definition	Corrective action
450	0102	Double input discrepancy detection error	<p>A discrepancy between two input signals (such as X0 and X1, X2 and X3) continues longer than the preset double input discrepancy detection time.</p> <p><Detailed item 2></p> <pre> bit0: 1:X0 ON 0:X0 OFF bit1: 1:X1 ON 0:X1 OFF } bitE: 1:XE ON 0:XE OFF bitF: 1:XF ON 0:XF OFF </pre> <p><Detailed item 3></p> <p>Module technical version C or earlier: fixed to 0</p> <p>Module technical version D or later: the double input discrepancy status</p> <pre> X0, X1 mismatch: bit0 is 1 X0, X1 match: bit0 is 0 } XE, XF mismatch: bit7 is 1 XE, XF match: bit7 is 0 </pre>	<p>Reexamine the connected devices and the wiring.</p> <p>Check whether the double input discrepancy detection time is properly set.</p>
	0203	Output overload error (Diagnostics before Safety LED turns on)	<p>The overcurrent protection or overheat protection has been activated in the output circuit transistor.</p>	<p>(1) Reexamine the connected devices and the wiring.</p> <p>(2) Replace the safety remote I/O module.</p>

Error classification	Error item	Name	Error definition	Corrective action
450	0204	Output read-back error (Diagnostics before Safety LED turns on)	<p>The read-back value and the output value do not match.</p> <p><Detailed item 2></p> <p>Upper 8 bits</p> <p>When [Detailed item 8] is 1(MPU A)</p>  <p>bit8: Y0- 0: Output read-back value ON, 1: Output read-back value OFF bit9: Y1+ 0: Output read-back value ON, 1: Output read-back value OFF bitA: Y2- 0: Output read-back value ON, 1: Output read-back value OFF bitB: Y3+ 0: Output read-back value ON, 1: Output read-back value OFF Fixed to 0</p> <p>When [Detailed item 8] is 2(MPU B)</p>  <p>bit8: Y0+ 0: Output read-back value ON, 1: Output read-back value OFF bit9: Y1- 0: Output read-back value ON, 1: Output read-back value OFF bitA: Y2+ 0: Output read-back value ON, 1: Output read-back value OFF bitB: Y3- 0: Output read-back value ON, 1: Output read-back value OFF Fixed to 0</p> <p>Lower 8 bits</p>  <p>bit0: Y0+ 0: Output value ON, 1: Output value OFF bit1: Y1- 0: Output value ON, 1: Output value OFF bit2: Y2+ 0: Output value ON, 1: Output value OFF bit3: Y3- 0: Output value ON, 1: Output value OFF bit4: Y0- 0: Output value ON, 1: Output value OFF bit5: Y1+ 0: Output value ON, 1: Output value OFF bit6: Y2- 0: Output value ON, 1: Output value OFF bit7: Y3+ 0: Output value ON, 1: Output value OFF</p> <p>Because of restrictions on hardware, the sink side output read-back always reads ON regardless of ON/OFF of the output.</p>	(1) Reexamine the connected devices and the wiring.
	0209	Output overload error (Diagnostics while Safety LED is on)	<p>The overcurrent protection or overvoltage protection has been activated in the output circuit transistor.</p>	
	0210	Output read-back error (Diagnostics while Safety LED is on)	<p>The read-back value and the output value do not match.</p> <p><Detailed item 2></p> <p>Upper 8 bits</p> <p>When [Detailed item 8] is 1(MPU A)</p>  <p>bit8: Y0- 0: Output read-back value ON, 1: Output read-back value OFF bit9: Y1+ 0: Output read-back value ON, 1: Output read-back value OFF bitA: Y2- 0: Output read-back value ON, 1: Output read-back value OFF bitB: Y3+ 0: Output read-back value ON, 1: Output read-back value OFF Fixed to 0</p> <p>When [Detailed item 8] is 2(MPU B)</p>  <p>bit8: Y0+ 0: Output read-back value ON, 1: Output read-back value OFF bit9: Y1- 0: Output read-back value ON, 1: Output read-back value OFF bitA: Y2+ 0: Output read-back value ON, 1: Output read-back value OFF bitB: Y3- 0: Output read-back value ON, 1: Output read-back value OFF Fixed to 0</p> <p>Lower 8 bits</p>  <p>bit0: Y0+ 0: Output value ON, 1: Output value OFF bit1: Y1- 0: Output value ON, 1: Output value OFF bit2: Y2+ 0: Output value ON, 1: Output value OFF bit3: Y3- 0: Output value ON, 1: Output value OFF bit4: Y0- 0: Output value ON, 1: Output value OFF bit5: Y1+ 0: Output value ON, 1: Output value OFF bit6: Y2- 0: Output value ON, 1: Output value OFF bit7: Y3+ 0: Output value ON, 1: Output value OFF</p> <p>Because of restrictions on hardware, the sink side output read-back always reads ON regardless of ON/OFF of the output.</p>	(2) Replace the safety remote I/O module.

Error classification	Error item	Name	Error definition	Corrective action
450	0304	Input dark test error	<p>The test pulse could not be detected during the input dark test.</p> <p><Detailed item 6></p> <p>Upper 8 bits</p> <p>When [Detailed item 8] is 1(MPU A)</p> <p>When [Detailed item 8] is 2(MPU B)</p>	<p>(1) Reexamine the connected devices and the wiring.</p> <p>(2) Replace the safety remote I/O module.</p>
	0305	Output dark test error	<p>The test pulse could not be detected during the output dark test.</p> <p><Detailed item 6></p> <p>Upper 8 bits</p> <p>When [Detailed item 8] is 1(MPU A)</p> <p>When [Detailed item 8] is 2(MPU B)</p>	
	0402	External power supply voltage error	<p>Voltage error or hardware failure of external power supply.</p>	

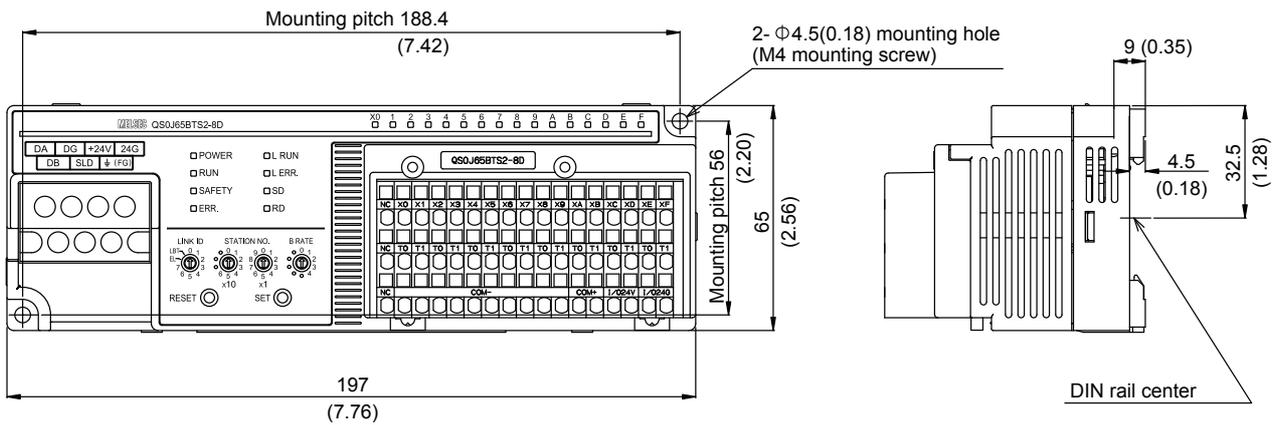
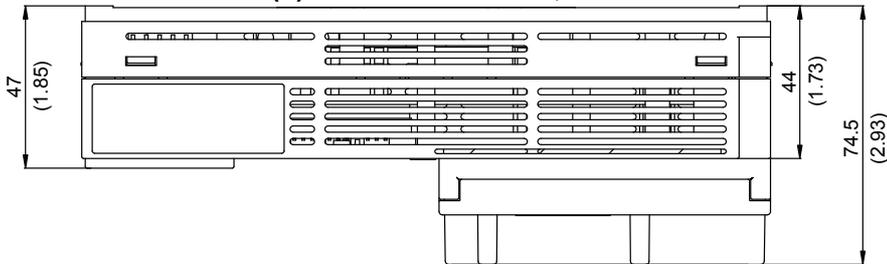
Error classification	Error item	Name	Error definition	Corrective action
450	0404	External power supply error	Voltage error or hardware failure of external power supply.	(1) Check the connected devices, wiring, and voltage. (2) Replace the safety remote I/O module.
	0427	Output drive power supply status error	The output driver power supply is in the invalid shutdown/supply status.	(1) Reexamine the connecting devices and wiring. (2) Adjust the timing of the external power supply ON to the timing of module power supply ON.
	0735	Module technical version combination invalid	The module technical version set by a parameter cannot be used in combination with that of the module.	(1) Change the parameter setting to the original module technical version.
	0908	Error history reading status record	Record of error history reading status. The error history reading was attempted in the status where no error history exists. Once a new error code is stored, this error code will not be read from the history. There are two error histories for MPU A and MPU B, and this code is output when either of them has no error history data. When both of them have no error history data, two codes are output.	Use the module as is, since it is normal.
	0911	Module forced stop control	The operation of the safety remote I/O module has stopped by receiving a forced stop command from the master module. Module forced stop control. However, errors received after an error is sent are eliminated. However, errors received after an error is sent or errors received at the time of reading error history are eliminated.	Refer to the error history of the safety CPU module/safety master module.

Error classification	Error item	Name	Error definition	Corrective action
450	1011	External power supply voltage drop	Voltage drop has occurred.	<p>(1) Check the connected devices and wiring.</p> <p>(2) Adjust the timing of the external power supply ON to the timing of module power supply ON.</p> <p>(3) Replace the safety remote I/O module.</p>
	1213	Setting registration switch status error at power-on	The ON status of the setting registration switch is detected at power-on.	<p>(1) Do not turn ON power supply or reset with pressing the setting registration switch.</p> <p>(2) If this error occurs at power-on or reset operation without pressing the setting registration switch, the failure is due to the setting registration switch. Replace the module.</p>

APPENDICES

Appendix 1 External Dimensions

(1) QS0J65BTS2-8D, QS0J65BTS2-4T



Appendix 2 Functions Added or Changed Due to Version Upgrade

The safety remote I/O module has been upgraded with new functions and specifications. The functions and specifications that can be used with the safety remote I/O module vary depending on the module technical version.

Appendix 2.1 QS0J65BTS2-8D upgrade

Additional functions and availability of the functions according to the module technical version are described below.

TableApp.1 Available functions depending on module technical version

Function added	Module technical version
Double input/single input selection parameter (☞ Section 5.2.1)	B or later
A setting item of the double input discrepancy detection time parameter (An item, "Do not detect", is added.) (☞ Section 5.2.1)	
Auto recovery after double input discrepancy error (☞ Section 5.2.1)	
Setting items of the input dark test selection parameter (The input dark test implementation status can be set for each input point.) (☞ Section 5.2.1)	

Appendix 2.2 QS0J65BTB2-12DT upgrade

(1) Specification comparison

TableApp.2 Specification comparison

Specifications		Module technical version	
		A	B or later
Safety refresh response processing time		38ms	9.6ms
Safety remote station input response time		32ms	11.2ms
Safety remote station output response time	ON → OFF	32ms	10.4ms
	OFF → ON	32ms	11.2ms

(2) Functional comparison

Additional functions and availability of the functions according to the module technical version are described below.

TableApp.3 Available functions depending on module technical version

Function added	Module technical version
Safety data monitoring time setting (☞ CC-Link Safety System Master Module User's Manual)* ¹	B or later
Setting items of the double input discrepancy detection time parameter (The detection time can be set from 20ms to 60s.) (☞ Section 5.2.1)	C or later
Double input/single input selection parameter (☞ Section 5.2.1)	D or later
A setting item of the double input discrepancy detection time parameter (An item, "Do not detect", is added.) (☞ Section 5.2.1)	
Auto recovery after double input discrepancy error (☞ Section 5.2.1)	
Setting items of the input dark test selection parameter (The input dark test implementation status can be set for each input point.) (☞ Section 5.2.1)	

* 1: This function cannot be used on a safety CPU module and a safety master module whose first five digits of the serial number is "10031" or earlier.

Appendix 2.3 When not using functions added to version upgrade module

The module can be changed without changing the safety remote station setting of GX Developer if the requirements listed below are satisfied. When the module is changed, performance specifications are those of a new module.

TableApp.4 Conditions under which the module can be changed without changing the safety remote station setting

Serial number of the safety CPU module (first five digits)	Before module change	After module change
"10032" or later	A	B or later
	B	C or later
	C	D or later

To use the functions added to version upgrade module, the safety remote station setting of GX Developer needs to be set again.

☒ POINT

If the "Specify production information to find module" checkbox is checked in parameter setting, production information setting need to be changed.

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