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MELSEC iQ-R
Simple CPU Communication Connection Guide

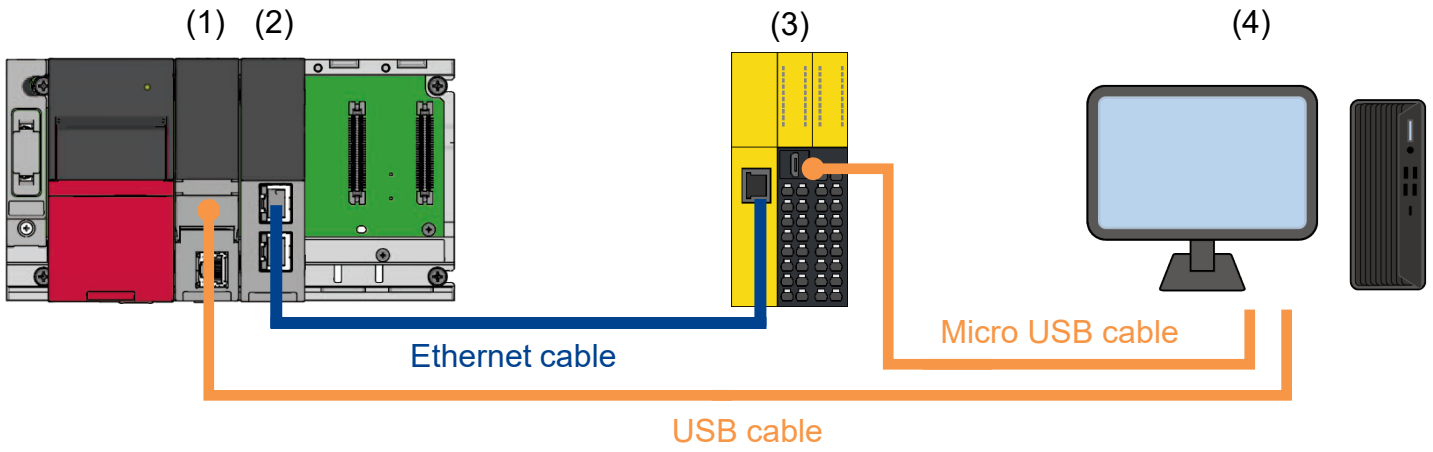
(Connection Between RJ71EN71 and SICK Flexi Compact)

CONTENTS

1. OVERVIEW

This document describes the setting procedure for connecting the MELSEC iQ-R series Ethernet module RJ71EN71 and SICK Flexi Compact via Ethernet (using the simple CPU communication function).
The simple CPU communication function allows word devices to be read from and written to devices connected via Ethernet simply by setting parameters.

This document describes the system using the configuration shown below.

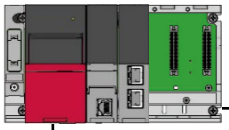


Device/Software			Model name	Firmware version Function version	IP address
(1)	CPU module		R04CPU	66	-
(2)	Ethernet module		RJ71EN71	75	192.168.0.40
(3)	CPU module		Flexi Compact FLX3-CPUC200	-	192.168.0.10
(4)	Computer for setup	GX Works3*1	-	-	-
		Safety Designer*2			

*1 This document uses version 1.120A.

*2 This document uses version 1.19.1891.

In the previous section, "System Configuration", the procedure for configuring connections using simple CPU communication is described.
Follow the steps below to perform the settings and operation checks.
Set the MELSEC iQ-R series product using GX Works3 and Flexi Compact using Safety Designer.

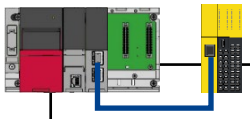


SETTINGS FOR THE MELSEC iQ-R SERIES PRODUCT

Use GX Works3 to configure the CPU module parameters, the IP addresses on the RJ71EN71, and the settings for the connected devices.

SETTINGS FOR Flexi Compact

Use Safety Designer to configure the settings for connecting Flexi Compact to the RJ71EN71, such as IP addresses and parameters.



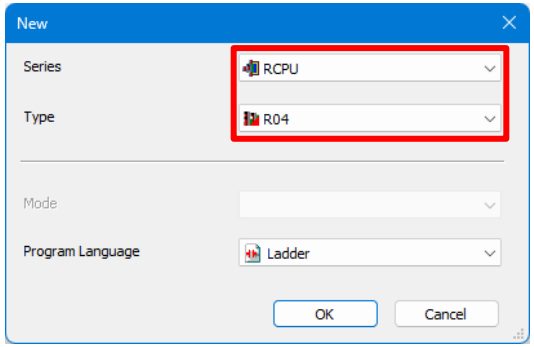
Operation Check

Perform operation checks to verify whether the Flexi Compact device values can be read from and written to the RJ71EN71.

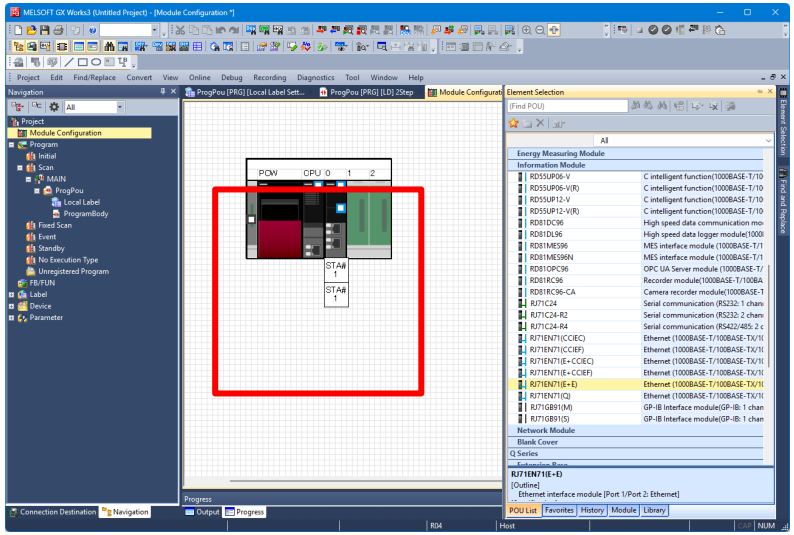
2. SETTINGS FOR THE MELSEC iQ-R SERIES PRODUCT

Create a project for the MELSEC iQ-R series using GX Works3.

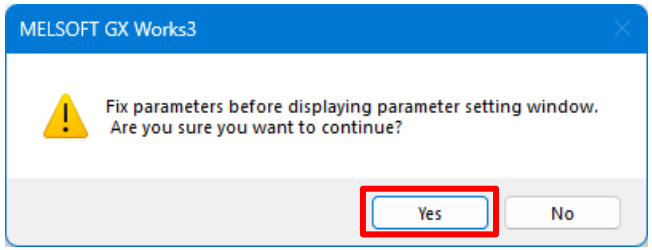
1. **Create a new project.**
   Series: RCPU
   Type: R04
   (Set the items according to the system configuration.)



2. **Select [Navigation] → [Module Configuration] and set the module configuration diagram.**
   Set the required modules (base unit, power supply module, CPU module, information module "RJ71EN71 ") according to the system configuration.



3. **Double-click "RJ71EN71" in the module configuration diagram, then click the [Yes] button to confirm the parameters.**

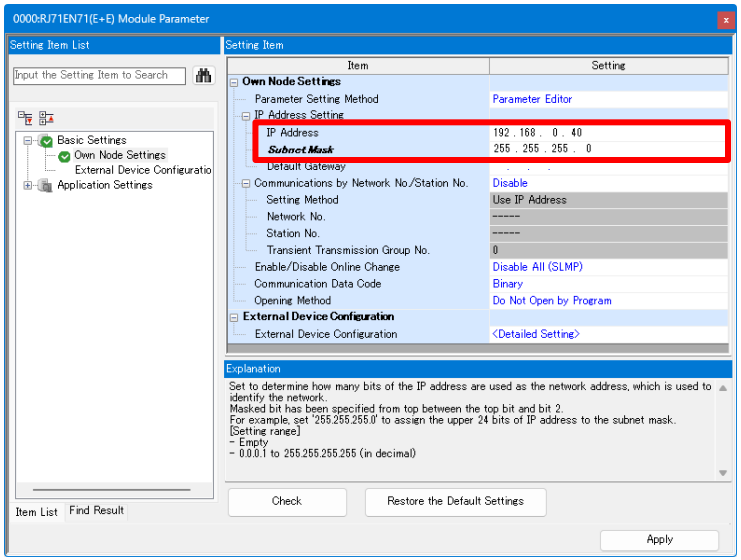


Set the parameters for the host station in "Basic Settings" of the module parameters (Ethernet) for Port 1 of the RJ71EN71.

1. **Set the IP address for the RJ71EN71.**

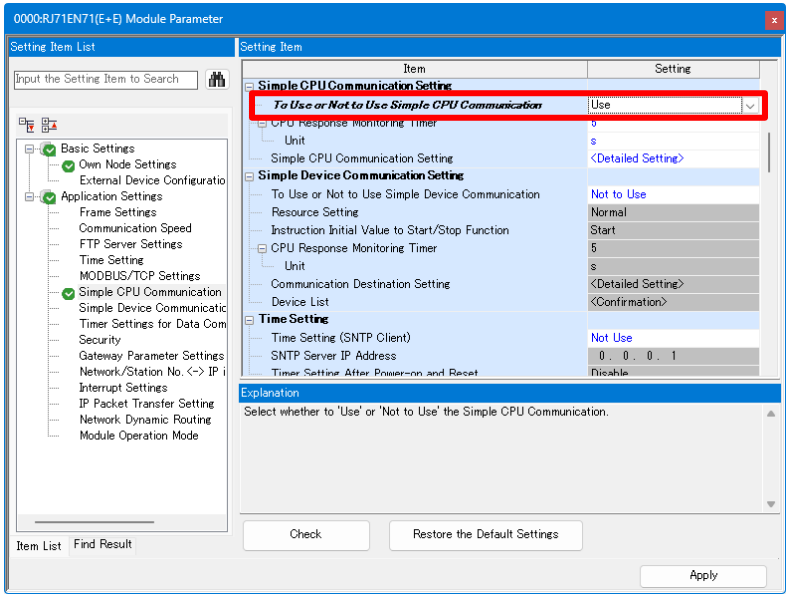
   IP Address: 192.168.0.40

   Subnet Mask: 255.255.255.0

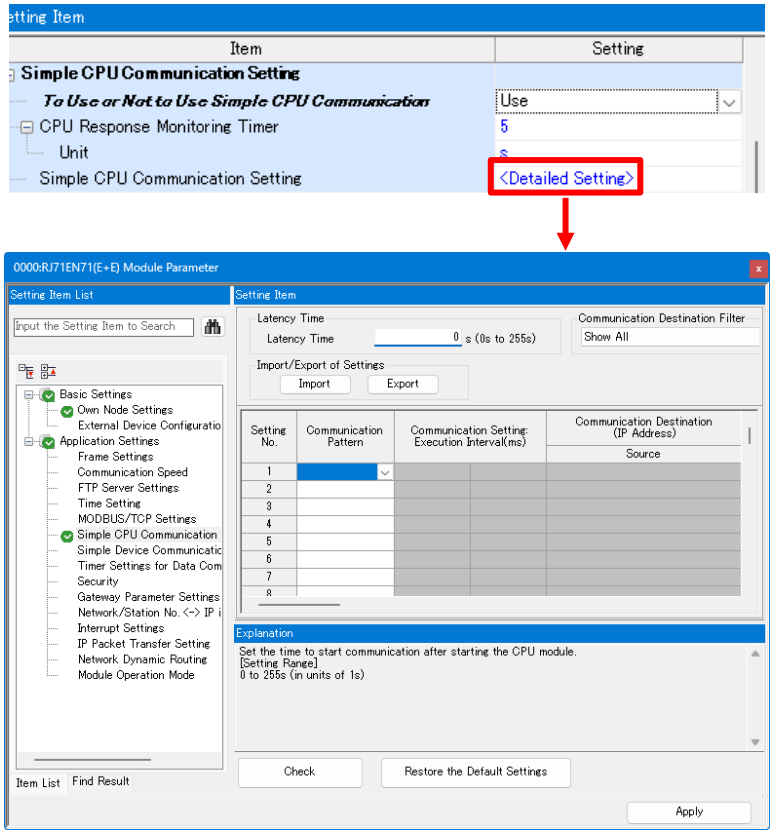


Configure the settings for the simple CPU communication in "Application Settings" of the module parameters (Ethernet) for Port 1 of the RJ71EN71.

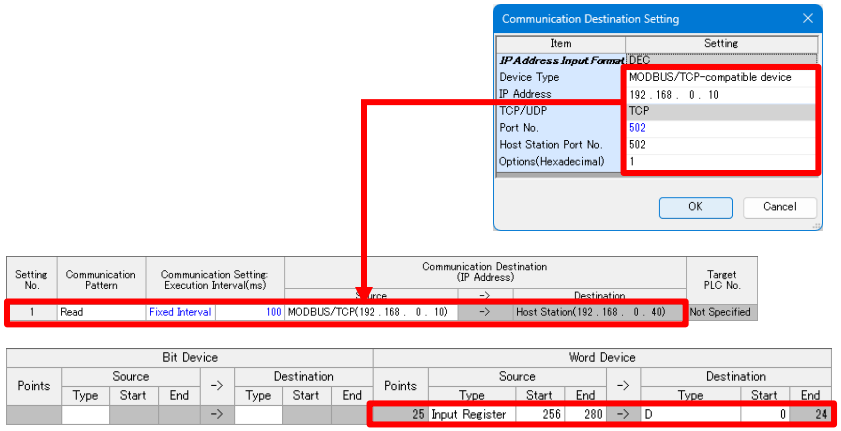
1. **In "Simple CPU Communication Setting", select "Use" for "To Use or Not to Use Simple CPU Communication".**



2. **Configure the target device for reading and writing data using simple CPU communication. Double-click "<Detailed Setting>" in "Simple CPU Communication Setting".**

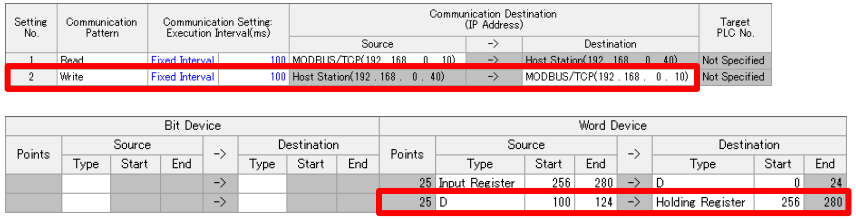


3. **To read word data from Flexi Compact, set the following items for Setting No. 1.**



Item			Settings
Communication Pattern			Read
Communication Destination	Source	Device Type	MODBUS/TCP-compatible device
		IP Address	192.168.0.10
		TCP/UDP	TCP
		Port No.	502
		Host Station Port No.	502
		Option (Hexadecimal)	1
Word Device	Source		Type: Input Register, Start 256 to End 280
	Destination		Type: D, Start 0

4. **To write bit data/word data to Flexi Compact, set the following items for Setting No. 2.**



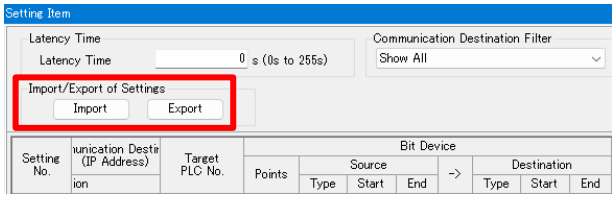
Item			Settings
Communication Pattern			Write
Communication Destination	Destination	Device Type	MODBUS/TCP-compatible device
		IP Address	192.168.0.10
		TCP/UDP	TCP
		Port No.	502
		Host Station Port No.	502
		Option (Hexadecimal)	1
Word Device	Source		Type: D, Start 100 to End 124
	Destination		Type: Holding Register, Start 256

Point

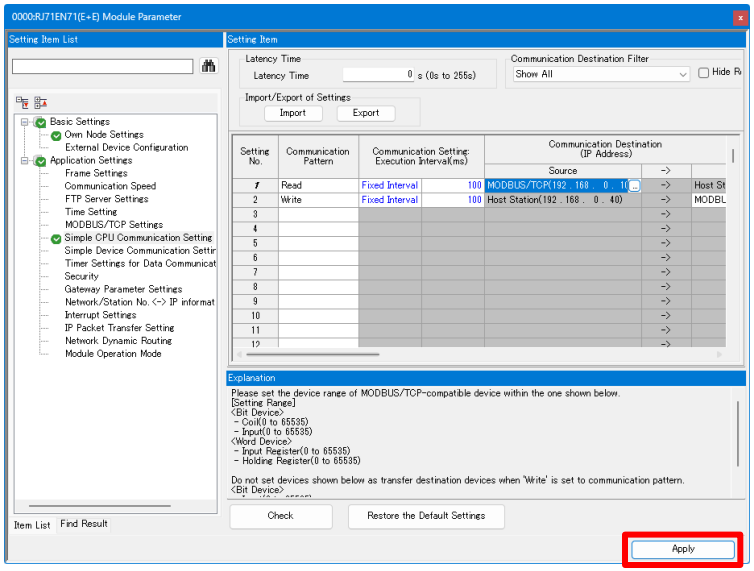
Set "Option (Hexadecimal)" in "Communication Destination" to 1.
Otherwise, a transmission timeout error occurs, and communication cannot be established.

Point

Simple CPU Communication Setting can be imported/exported from "Import/Export of Settings".



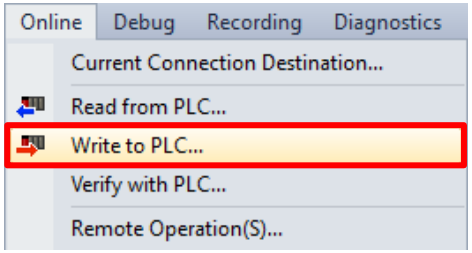
5. **Click the [Apply] button to complete the module parameter settings.**



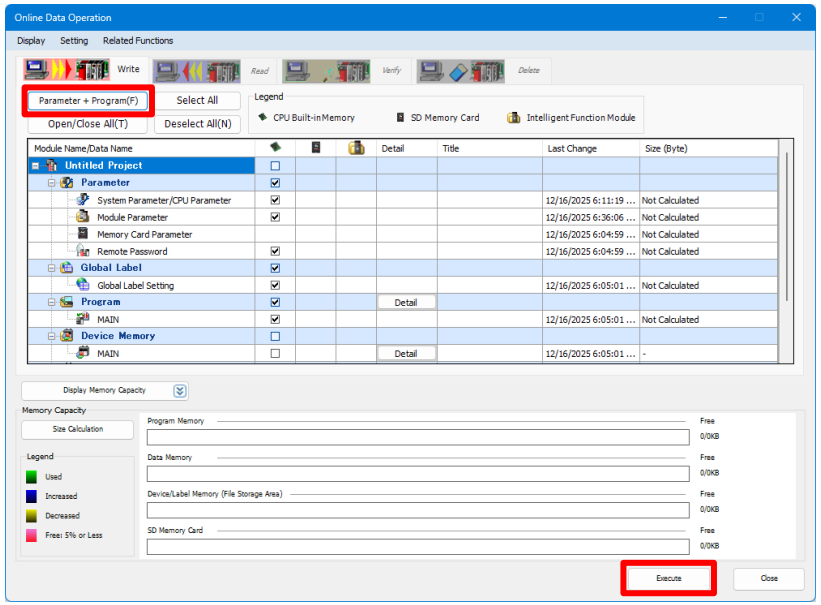
Point

Parameters will not be applied unless you click the [Apply] button.

6. **Click [Online] → [Write to PLC] from the menu bar.**



7. Click the [Parameter + Program] button, then click the [Execute] button to write the parameters.



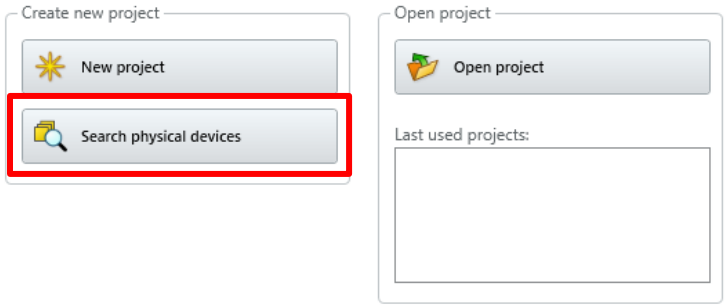
Point

Once writing is complete, reset the CPU module or turn the CPU module power off and back on.

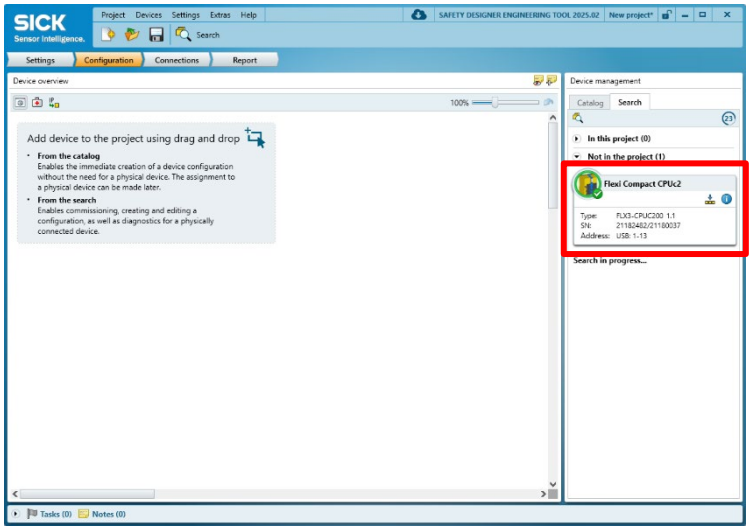
3. SETTINGS FOR Flexi Compact

Use Safety Designer to create a project for the Flexi Compact series and write the module setting information.

1. **Click [Search physical devices] in "Create new project".**



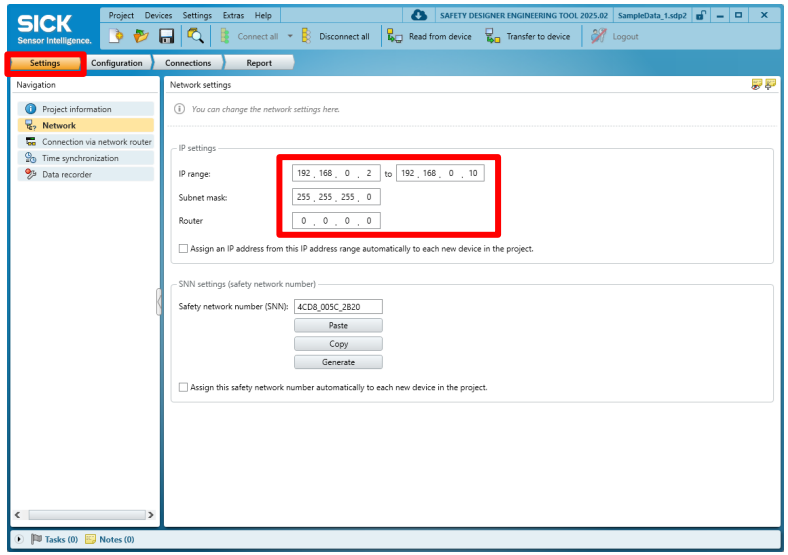
2. **Drag and drop [Flexi Compact CPUc2] displayed in the "Device management" search results into the "Device overview" field to add it to the project.**



Point

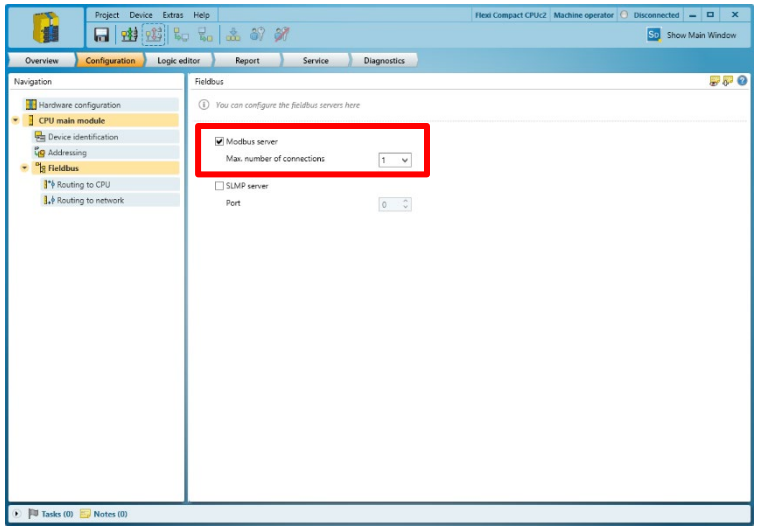
When searching for physical devices, connect the computer for setup to Flexi Compact beforehand.

3. Select [Settings] → [Network], then set the IP address, subnet mask, and router.
   IP range: 192.168.0.10
   Subnet mask: 255.255.255.0
   Router: 0.0.0.0



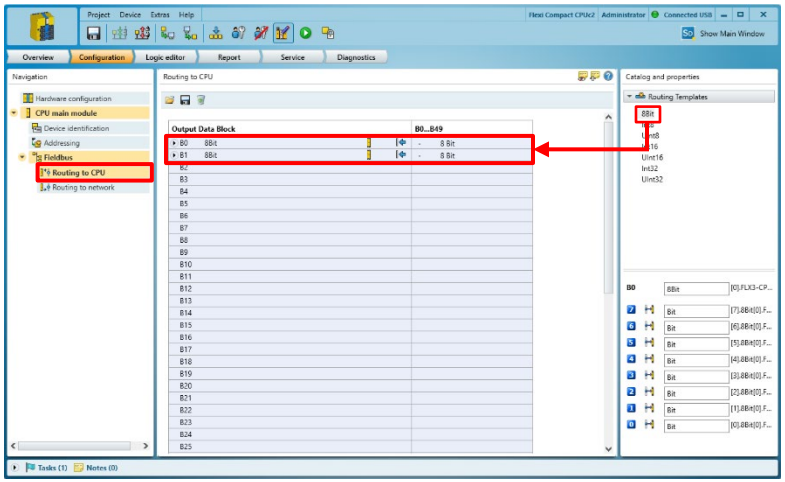
Configure the Fieldbus settings in the Flexi Compact device window.

1. **Click [Fieldbus] under "Configuration", then select the Modbus server check box.**
   Set [Max, number of connections] to 1.



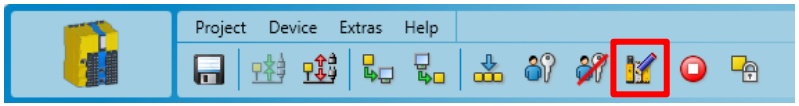
Configure the routing settings in the Flexi Compact device window.

1. **Open [Routing to CPU] under "Configuration", then drag and drop the data of the desired data type from "Routing Templates" under "Catalog and properties".**

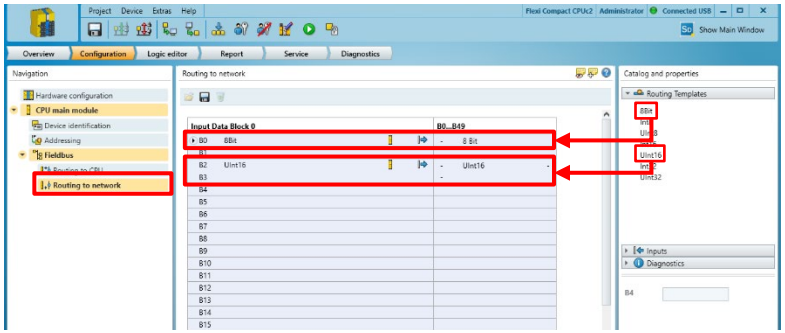


Point

- **When configuring this setting, you must first connect the computer for setup to Flexi Compact and set it to "Enable Online Edit Mode".**

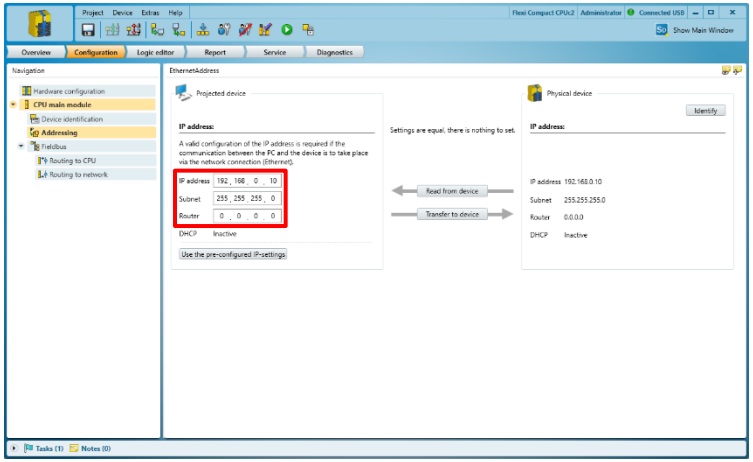


- **Flexi Compact exchanges data with Fieldbus-connected devices in 1-byte (8-Bit) units. Therefore, one byte of memory is used for each dataset. For example, when 8-Bit and Uint16 data are configured, the dataset memory is used as shown below.**



Write the settings in the Flexi Compact device window.

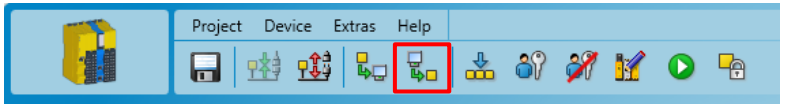
1. **In the Navigation section under [Configuration], select [CPU main module] → [Addressing], then set the IP address, subnet, and router.**
   IP address: 192.168.0.10
   Subnet: 255.255.255.0
   Router: 0.0.0.0

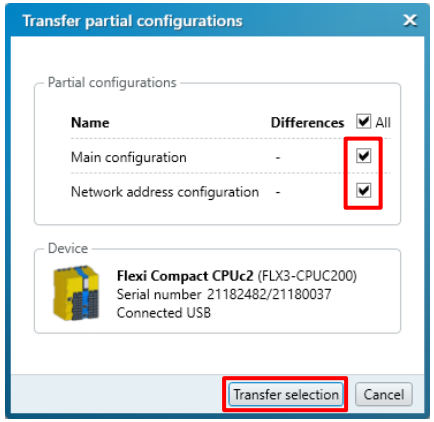


Point

Ensure that these values match the addresses configured in the main window.

2. **Click [Transfer to device] to write the settings to Flexi Compact.**

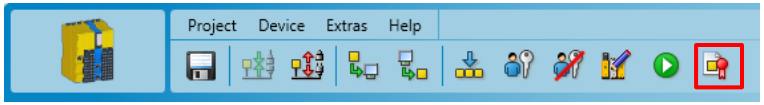


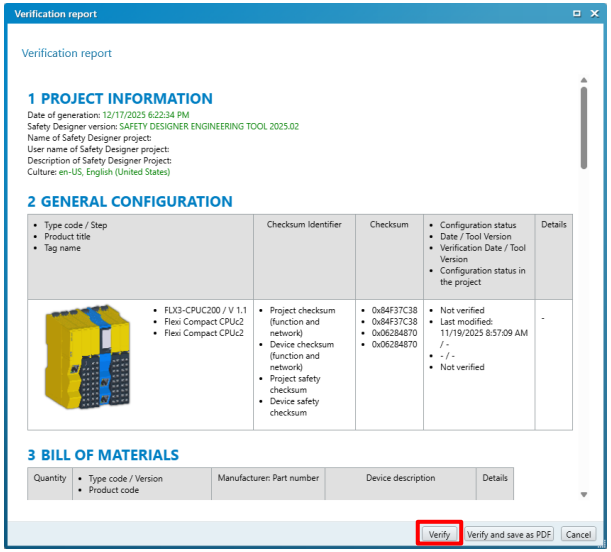


Point

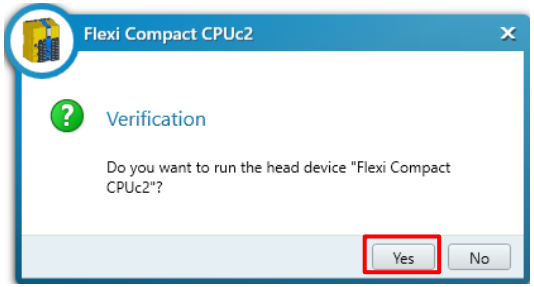
You must log in as an administrator when connecting the device.

3. Click [Verity].





4. After verification, set Flexi Compact to RUN mode.

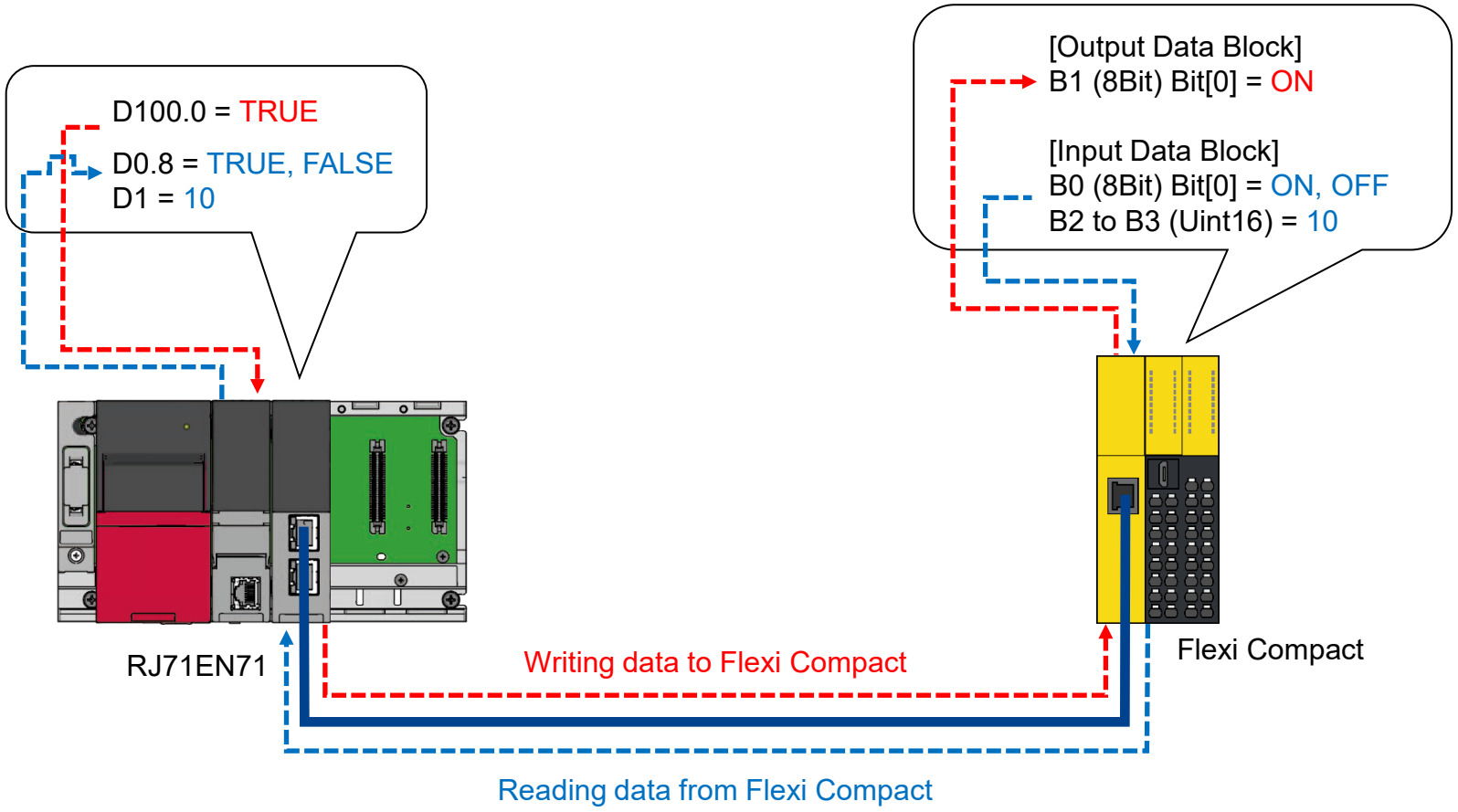


Point

If the RJ71EN71 is reset or disconnected, Flexi Compact must be restarted.

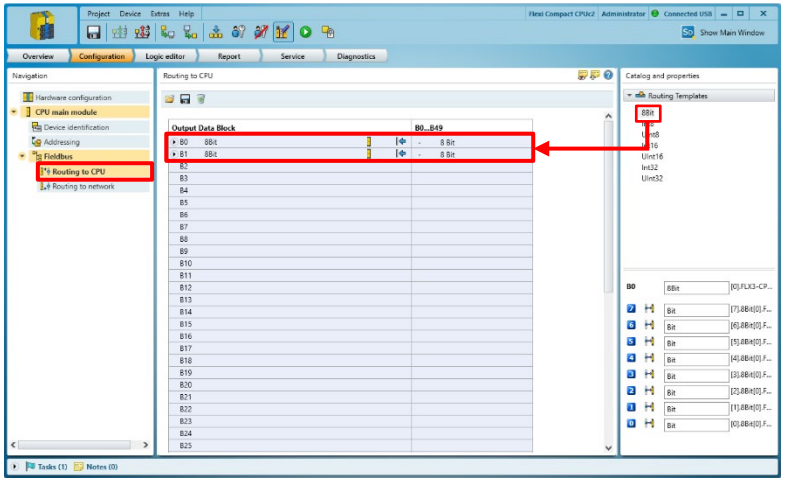
4. OPERATION CHECK

Check that the RJ71EN71 and Flexi Compact can communicate properly using simple CPU communication.
When the power is turned on after writing the parameters, data is automatically read and written as shown below. Use the watch window in GX Works3 and the logic editor in Safety Designer to check that data is being read and written.

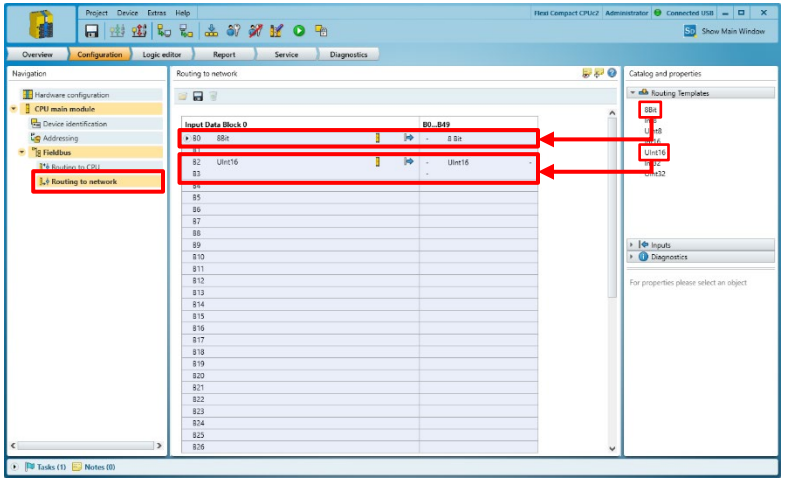


Use the logic editor of Safety Designer to configure data reading/writing.

1. **Open [Routing to CPU] under "Configuration", then drag "8Bit" and drop it onto "B0" and "B1", respectively, in [Output Data Block] from "Routing Templates" under "Catalog and properties".**



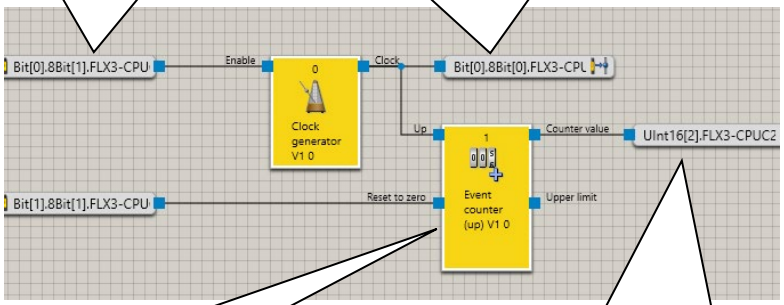
2. **Open [Routing to network], then drag "8Bit" and "Unit16" and drop them onto "B0" and "B2(B3)", respectively, in [Input Data Block] from "Routing Templates" under "Catalog and properties".**



3. **Use the logic editor of Safety Designer to set programs for reading and writing data.**
   By turning ON D100.0, the Clock generator toggles the ON/OFF state of "Bit[1].8Bit[1].FLX3-CPUC2[0]", which also toggles ON/OFF state of D0.8 on the MELSEC iQ-R side.
   The number of ON/OFF transitions of "Bit[1].8Bit[1].FLX3-CPUC2[0]" is incremented and written to D1 on the MELSEC iQ-R side via "UInt16[2].FLX3-CPUC2[0]".

1) Turn on D100.0 of the MELSEC iQ-R series product.

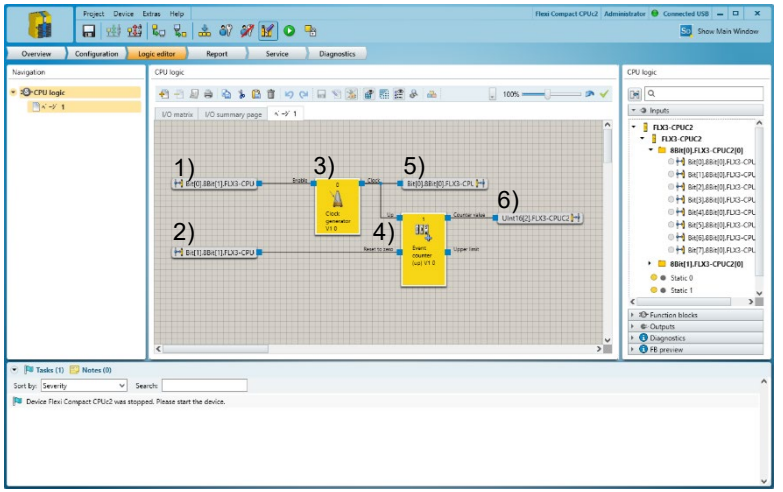
2) Toggle the ON/OFF state of D0 in the MELSEC iQ-R series product.



3) Count the number of times D0 is turned ON/OFF.

4) Write the incremented value to D1 in the MELSEC iQ-R series product.

4. **Open [Logic editor] from the device window and configure the program under "CPU logic" as follows.**



Inputs > FLX3-CPUC2 > 8Bit[1].FLX3-CPUC2[0]

1) Bit[0].8Bit[1].FLX3-CPUC2[0]

2) Bit[1].8Bit[1].FLX3-CPUC2[0]

Function blocks > Counter, Delay and Timer

3) Clock generator

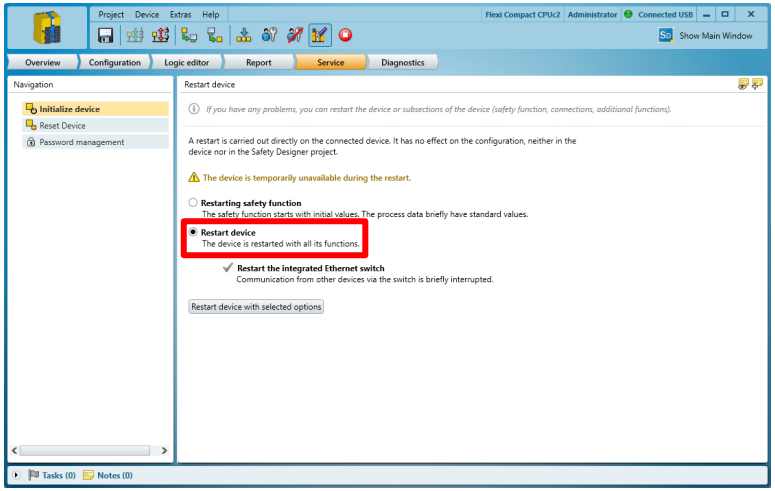
4) Event counter (up)

Outputs > FLX3-CPUC2 > 8Bit[0].FLX3-CPUC2[0]

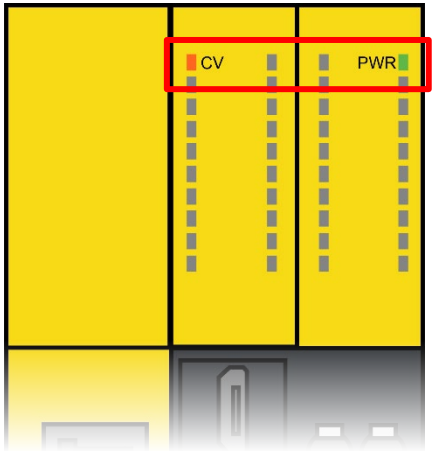
5) Bit[0].8Bit[1].FLX3-CPUC2[0]

6) UInt16[2].FLX3-CPUC2[0]

5. After writing the settings to Flexi Compact, select [Initialize device] → [Restart device] in the Navigation section under Service to restart Flexi Compact.



6. Set Flexi Compact to RUN mode and check that it is operating normally.
   Check that the "CV" LED is lit yellow and the "PWR" LED is lit green on the status display.

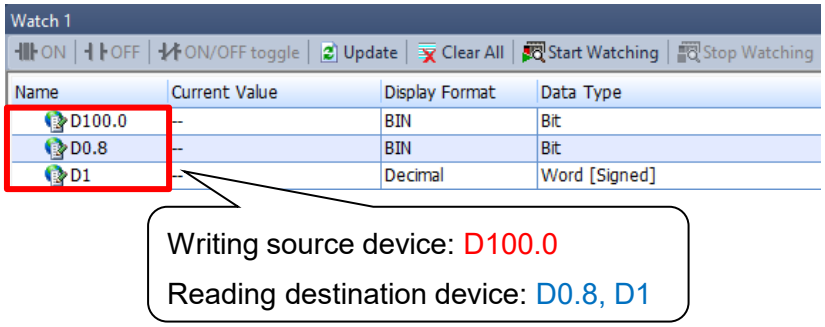


Point

Start Flexi Compact first, then turn on the power to the MELSEC iQ-R series product.
If the MELSEC iQ-R series product starts before Flexi Compact, data may not be transmitted or received correctly.

Use the watch window in GX Works3 and Fieldbus in Safety Designer to verify data reading/writing.

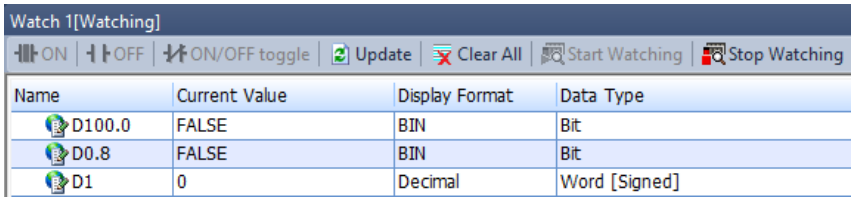
1. **Start GX Works3 and open the MELSEC iQ-R project. Select [View] → [Docking Window] → [Watch 1] to display the watch window, then register the device to be read from or written to.**



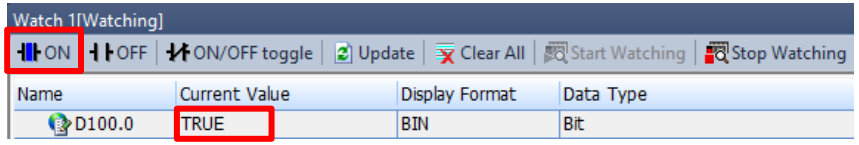
Point

Modbus TCP transfers data in big-endian format while SICK's main module processes data in little-endian format. Therefore, when assigning data in bytes, the order must be reversed.

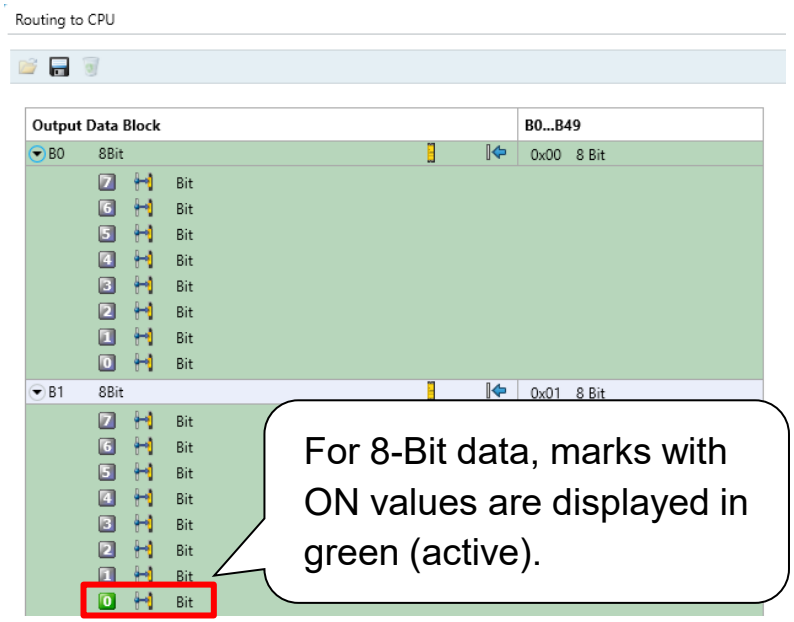
2. **Select [Online] → [Monitor] → [Start Monitoring (All Windows)] to start monitoring of GX Works3.**



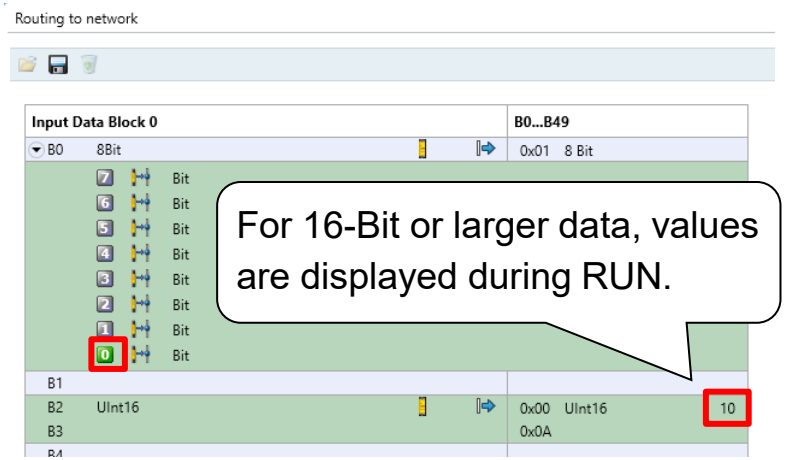
3. **With "D100.0" selected, click [ON] in the watch window to set the current value to TRUE.**



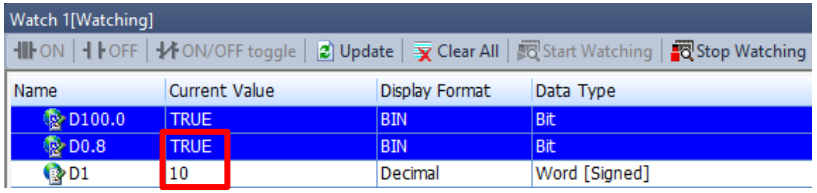
4. **Monitor the values from [Routing to CPU] under "Configuration" in Safety Designer. Check that 0 in B1 is in use.**



5. **Under [Routing to network], check that 0 in B0 is in use, and that the values in B2 and B3 are incremented by one each via the counter.**



6. **In the GX Works3 watch window, check that data is being written/read. If the following conditions are met, data writing and reading are functioning correctly.**
   D0.8: Alternates between "TRUE" and "FALSE" every second
   D1: Increases by 1 each time



For Safe Use

- For precautions related to machine design and wiring, please read the safety instructions in the manual for your machine.
- For details regarding the product warranty, please read the warranty information in the manual for your machine.

Disclaimer

- The examples described in this document are provided for reference only and do not guarantee functionality. When implementing them, please verify the functionality and safety of the equipment or devices yourself before use.
- Available features and settings may vary depending on the product version you are using. Depending on the product version, settings, procedures, and screens may differ from those described in this document. In such cases, refer to your product manual or the software's built-in help.
- Please note that the contents of this manual, including specifications, are subject to change without notice for improvement purposes.
- For information on connecting the software used in this manual to devices, refer to the manuals for each software and device.
- For more detailed information on the contents of this manual, please refer to the relevant manuals.

Relevant Manuals

The latest manual PDFs can be downloaded from the manufacturer's website.

• MITSUBISHI ELECTRIC Factory Automation Global website: www.mitsubishielectric.com/fa

Manual name	Manual number
MELSEC iQ-R Ethernet User's Manual (Application)	SH-081257
GX Works3 Operating Manual	SH-081215

• SICK AG: www.sick.com/jp/en/

Manual name	Manual number
Safety Designer Configuration software OPERATING INSTRUCTIONS	8018180
Flexi Compact Safety controller OPERATING INSTRUCTIONS	8024589

Sales office

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www.MitsubishiElectric.com/fa/about-us/overseas/

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⚠ For safe use

- To use the products given in this publication properly, always read the relevant manuals before use.

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