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Mitsubishi Electric Programmable Controller
MELSEC iQ-F Series

Quick Connection Guide

Predefined Protocol Support For Positioning Function Block Library

(IAI Corporation)

MELSEC iQ-F series × IAI Quality and Innovation

INTRODUCTION

Thank you for purchasing the MELSEC iQ-F series.
This manual describes Predefined Protocol Support Tool For Positioning and FBs for Predefined Protocol Support for Positioning, which enable positioning operation of the IAI ROBO Cylinder easier than before. Positioning operation is performed by connecting the FX5U CPU module or FX5UC CPU module and the IAI controller.
Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the specifications to handle the product correctly.
When applying the program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

Regarding use of this product

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
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Note

- If in doubt at any stage during the installation of the product, always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use, please contact your local Mitsubishi Electric representative.
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■The installation file for Windows® can be downloaded from the following website.
www.mitsubishielectric.com/fa/ref/ref.html?k=plceng&software=emaviewer_en

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RELEVANT MANUALS

The following relevant manuals can be downloaded from the Mitsubishi Electric FA site.
www.mitsubishielectric.co.jp/fa/ref/ref.html?kisyu=plcf&manual=download_all
[○: Available, —: Not available]

Manual name <manual number>	Available form	
	e-Manual	PDF
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware) <SH-082452ENG>	○	○
MELSEC iQ-F FX5 User's Manual (Application) <JY997D55401>	○	○
MELSEC iQ-F FX5 User's Manual (Serial Communication) <JY997D55901>	○	○
MELSEC iQ-F FX5 User's Manual (MODBUS Communication) <JY997D56101>	○	○
MELSEC iQ-F FX5 Predefined Protocol Support for Positioning Function Block Reference (for IAI) <SH-082262ENG>	○	○
GX Works3 Operating Manual <SH-081215ENG>	○	○
Predefined Protocol Support Tool For Positioning Operating Manual <SH-082176ENG>	○	○
PCON, ACON, SCON, RCP6 (PLC Unit) ERC2, ERC3 Serial Communication [Modbus Version] Operation Manual <ME0162-10>	—	—
PCON-CB Series Controller Instruction Manual <ME0342-4B>	—	—

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

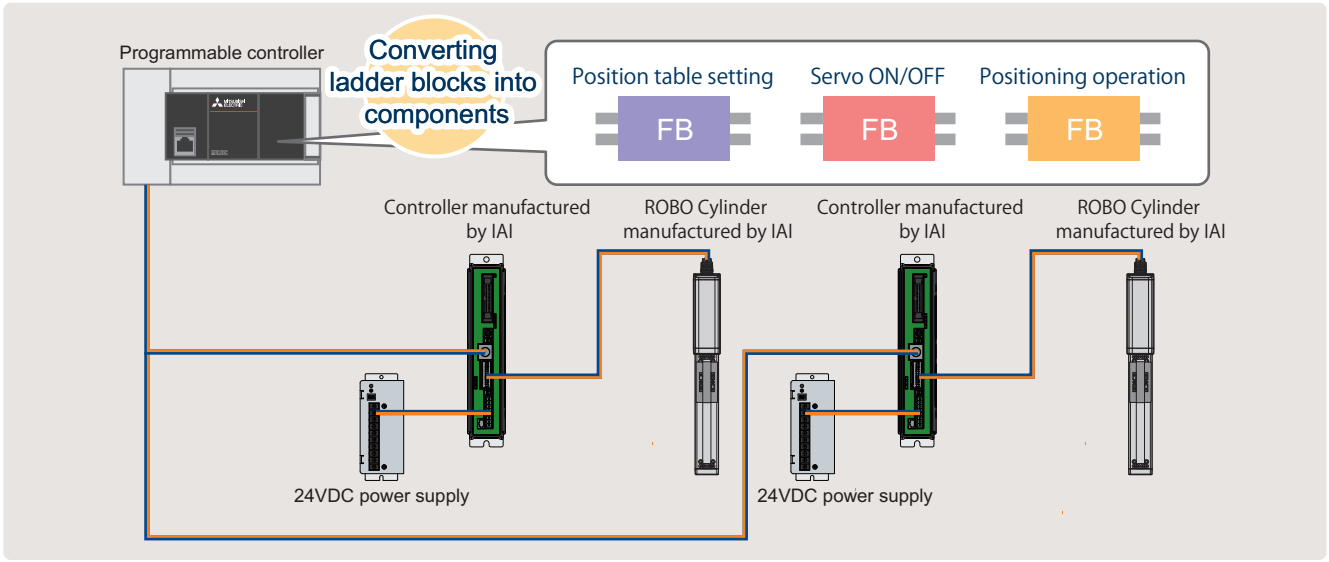
Generic term/abbreviation	Description
FB	An abbreviation for Function Block. The FB is a ladder block that is repeatedly used in a sequence program and designed to be diverted in the sequence program. This improves the efficiency of the program development and reduces the programming errors, resulting in the improvement in the program quality.
IAI	An abbreviation for IAI CORPORATION

KEY FEATURES

Point1

Easy programming using the FB library for Predefined Protocol Support for Positioning*1

FB (function block) library is a collection of FBs that are used in GX Works3. Various settings (position table settings, servo ON/OFF, positioning operation) required to operate the IAI controller or ROBO Cylinder can be configured easily by dragging and dropping FBs from the FB library to a program editor and inputting devices. This can reduce programming cost and time.



*1 FB libraries can be downloaded for free from the Mitsubishi Electric FA website.
www.mitsubishielectric.co.jp/fa/ref/ref.html?kisyu=plcf&samplelibrary=download_all

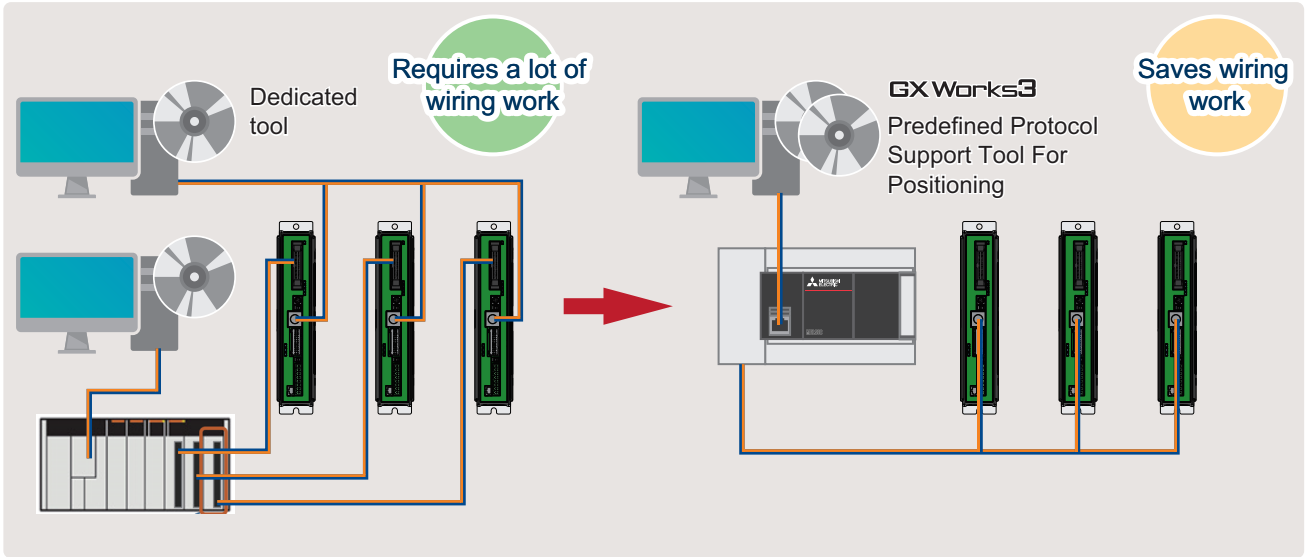
Point2

Easy settings with Predefined Protocol Support Tool For Positioning

Writing positioning data and wiring were required for each controller.

Predefined Protocol Support Tool For Positioning enables a system construction only by wiring the programmable controller to each controller (it is also possible to wire one programmable controller to multiple controllers). This feature reduces the cost and time required for wiring each controller.

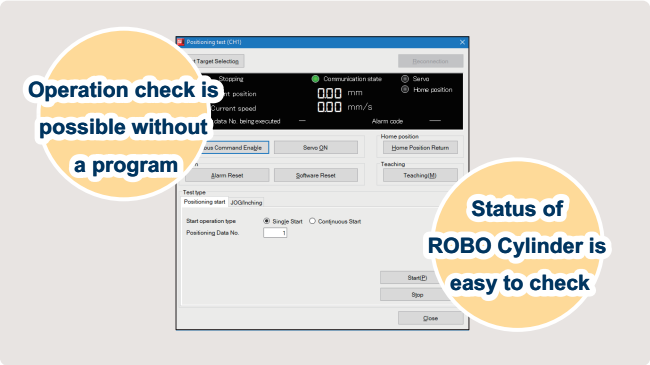
Additionally, communication protocols can be set automatically just with simple settings related to the system configuration. This reduces the cost and time for the protocol specifications of each controller.



Point3

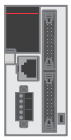
Reduced debugging time thanks to no need for a program

The status of positioning control, alarms occurred, and other information can be checked in a window of Predefined Protocol Support Tool For Positioning without a dedicated HMI (Human Machine Interface) or a program. Therefore, debugging efficiency is dramatically improved.



1 APPLICABLE MODELS

The following models can be used for a series of operations described in this manual.

Programmable controller		IAI controller
 FX5U CPU module	 FX5UC CPU module	 The model shown in the figure is of the PCON-CB/CGB/CBP/CGBP type. ■PCON series C/CA/CB/CFA/CFB/CF/CY/CYB/SE ■ACON series C/CA/CB/CY/CYB/SE ■SCON series C/CA/CAL/CB (not including servo press specifications) ■DCON series CA/CB/CYB ■RCP6S RCP6S*1 ■ERC2 series Controller-integrated ROBO Cylinder ■ERC3 series*2 Controller-integrated ROBO Cylinder

*1 For the RCP6S series, the specifications do not allow the MODBUS RTU to read or write the position table information register (positioning data). Therefore, positioning data cannot be read or written. When using the RCP6S, use a Teaching Pendant or computer software manufactured by IAI Corporation.

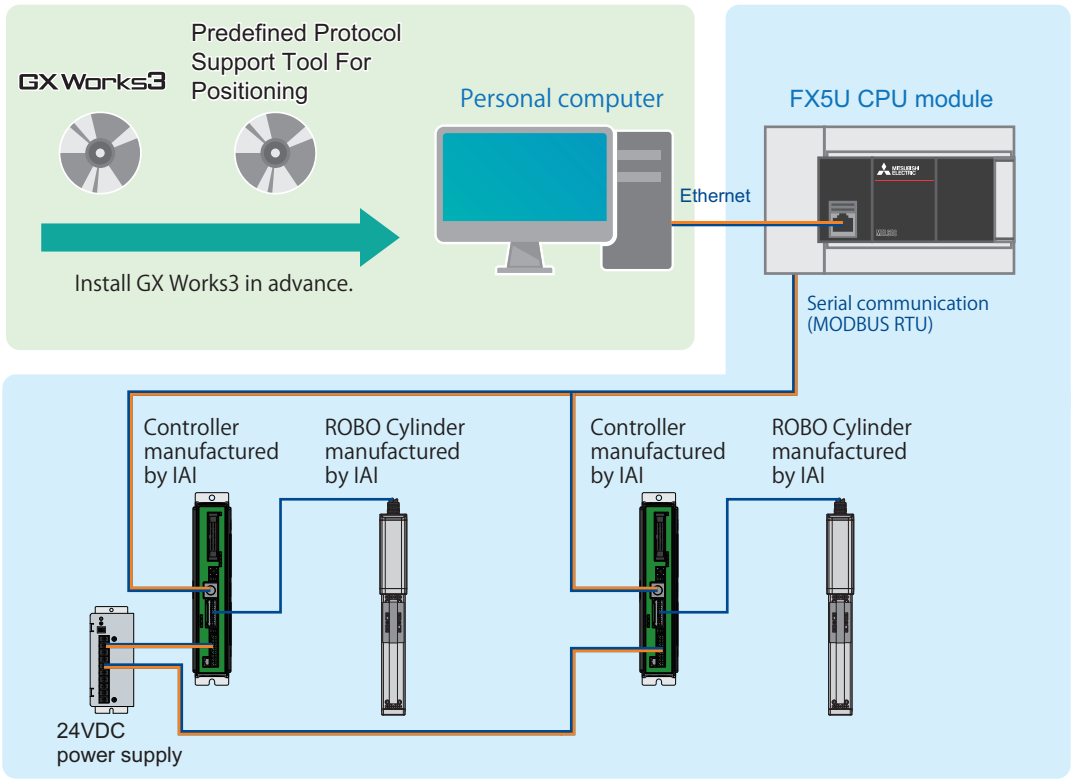
*2 For the ERC3 series with the controller type set to the MEC mode, connection is not available.

MEMO

2 PREPARATION

2.1 System Configuration

This section describes the system configuration in which two IAI controllers are connected to one programmable controller.



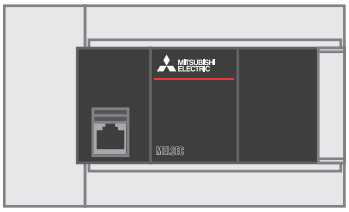
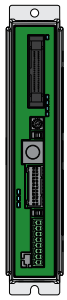
2.2 Required Products

This manual describes the system configuration for positioning operation performed by connecting two IAI controllers (PCON-CB) to a programmable controller (FX5U CPU module).

To use applicable products other than the above, refer to the following manuals.

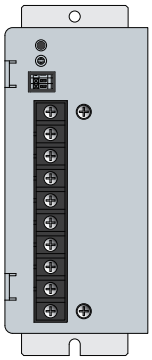
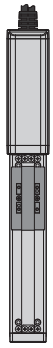
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

Manuals for the IAI controller and ROBO Cylinder being used

One programmable controller*1	Two IAI controllers	Personal computer and software
		
Use an FX5U CPU module that meets the following conditions. • Serial number: 17X**** or later • Firmware version: 1.200 or later Set the termination resistor selector switch to 110Ω.	■IAI controller (PCON) model list • PCON-CB	GX Works3*2 • Applicable software version: 1.065T or later Predefined Protocol Support Tool For Positioning*2 • Applicable software version: 1.002C or later

*1 To perform serial communication (MODBUS RTU) using a communication board (FX5-485-BD) or communication adapter (FX5-485ADP), settings different from the parameter settings described in this manual are required. Refer to the following for details.
MELSEC iQ-F FX5 User's Manual (Serial Communication), Section 7.5 Communication Settings

*2 To obtain the latest version, please contact your local Mitsubishi Electric representative.

24VDC power supply	Two IAI ROBO Cylinders	One Ethernet cable
		
Used for supplying power to the IAI controllers.	■Motor straight type (coupling type) model list • RCP2 series • RCP3 series • RCP4 series • RCP5 series • RCP6 series	Used for connecting a personal computer and the programmable controller. Use an Ethernet cable compliant with the following standards. • Category 5 or higher, straight cable (double shielded / STP) • IEEE 802.3 (100BASE-TX) • ANSI/TIA/EIA-568-B (Category 5)

Four e-CON connectors	One terminating resistor	One branch adapter	Two connection cables
Used for connecting the programmable controller and IAI controllers.	Used for the e-CON connector. ☞ Page 13 Wiring the IAI controllers	Used for wiring multiple IAI controllers.	A cable that connects to the PIO connector of an IAI controller. • CB-RCB-CTL002

Software

GX Works3 must import the following.

Item	File name	Reference
FB library	PositioningSupportIAI_F.mslm	Page 17 PROGRAMMABLE CONTROLLER SETTINGS

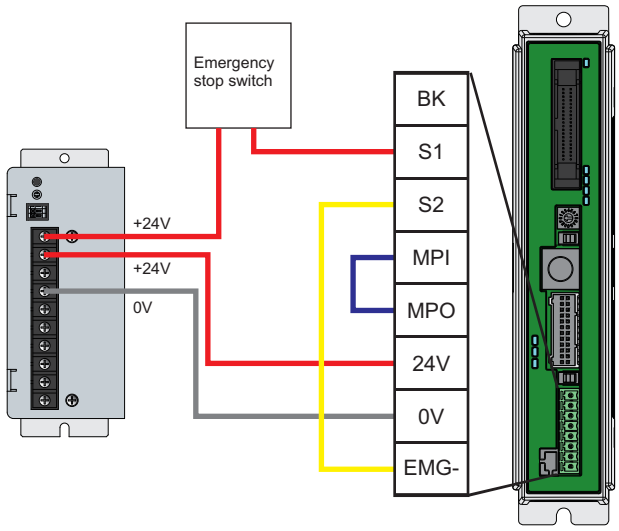
2.3 Wiring

Wiring an IAI controller

This section shows how to wire an IAI controller.

Wiring the power connector

Wire the power connector.



1. Check that the MPI terminal and MPO terminal of the power connector have been short-circuited, and insert the connector into the IAI controller.
2. Connect the S1 terminal of the power connector and the +24V terminal of the 24VDC power supply.

Point

The emergency stop state occurs when +24V power supplied to the S1 terminal is cut.
To wire the emergency stop switch, add a dry contact (b contact) to the wired part of the S1 terminal. (24VDC, 10mA or less)

3. Connect (short-circuit) the S2 terminal and EMG- terminal of the power connector.
4. Connect the 24V terminal of the power connector and the +24V terminal of the 24VDC power supply.
5. Connect the 0V terminal of the power connector and the 0V terminal of the 24VDC power supply.

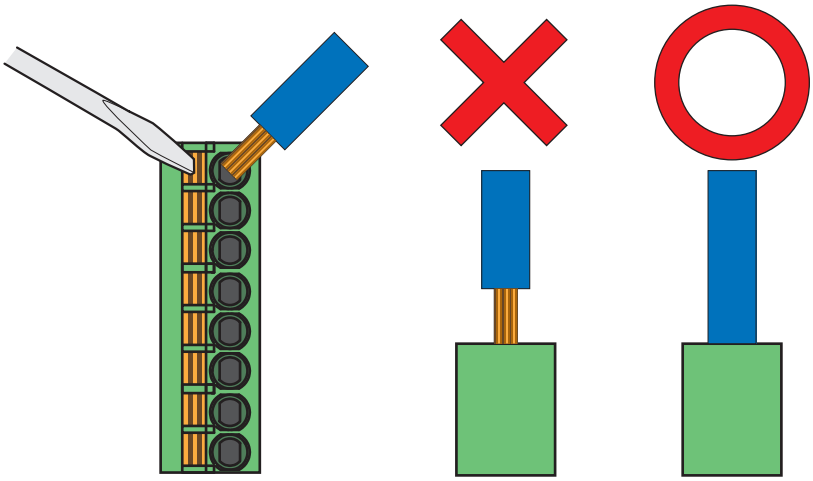
■Installing cables

Treat the sheath of the cable as follows.

- Stripped wire length: 10mm

Insert a cable whose end has been processed fully into the insertion slot.

If the wire cannot be inserted by this method, insert the wire fully while pressing the orange retaining pin using a screwdriver with a 2.0mm to 2.5mm wide flat blade. When the wire is inserted fully, remove the flathead screwdriver.

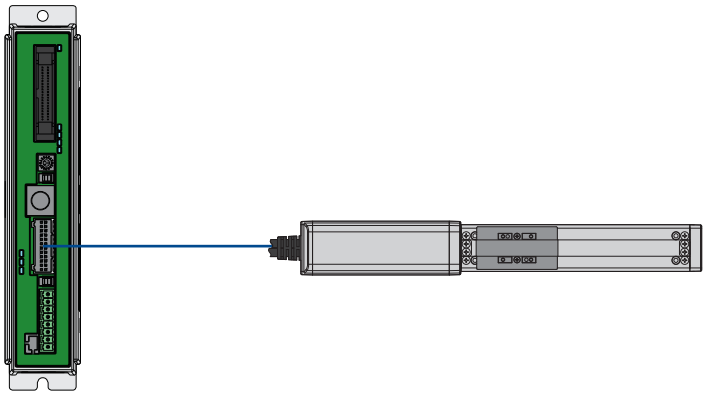


Point

Pull the wire or bar solderless terminal lightly to check that the wire is securely clamped.

Wiring the IAI ROBO Cylinder

Wire the IAI ROBO Cylinder.



1. Check the direction of each connector of the motor encoder cable, and push the corresponding connectors into the IAI controller and the IAI ROBO Cylinder until the connectors click.

Point

When wiring a ROBO Cylinder, check that the combination of the controller and the ROBO Cylinder is compatible.

ROBO Cylinder types that can be connected are written on the serial number label on the left side of the controller.

Wiring the programmable controller

For the power supply wiring of the programmable controller, refer to the following.

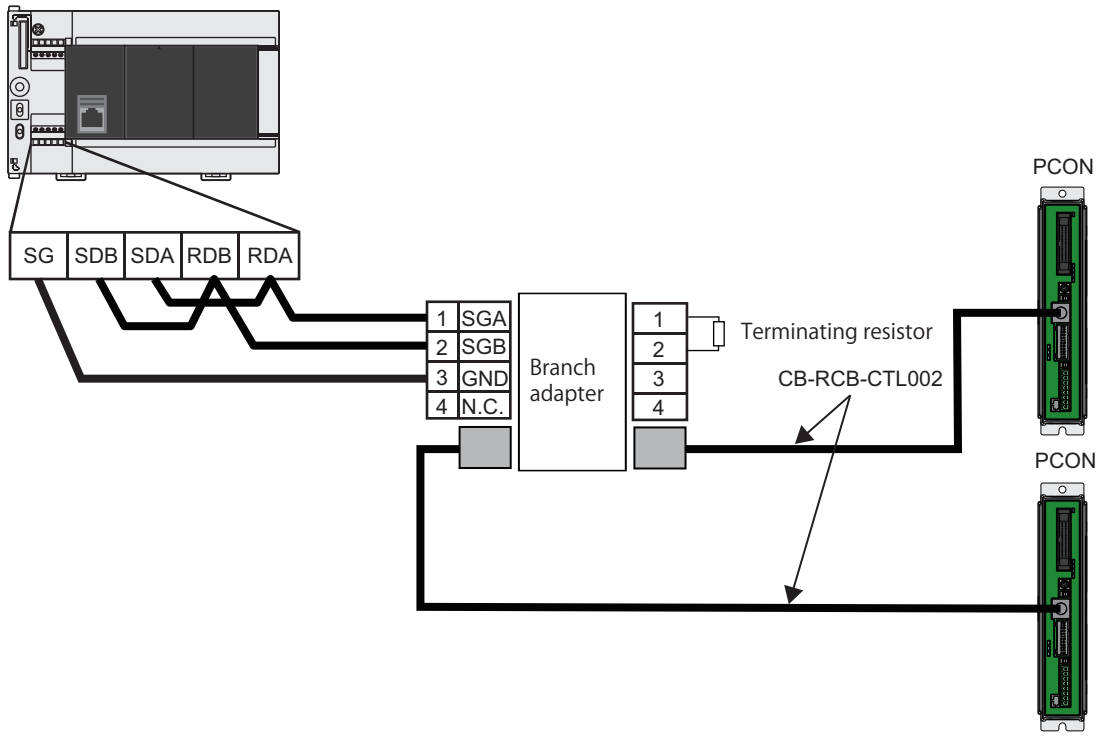
📖MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware), Section 13.4 Power Supply Wiring

Point

Set the terminating resistor by using the programmable controller. Set 110Ω with the termination resistor selector switch of the programmable controller.

Wiring the IAI controllers

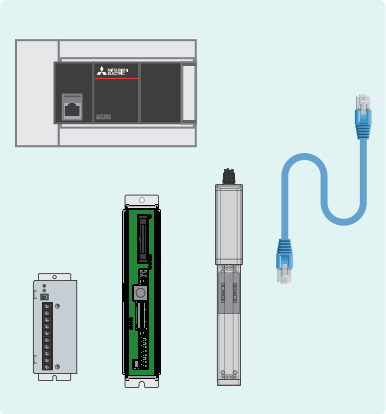
Wire the IAI controllers.



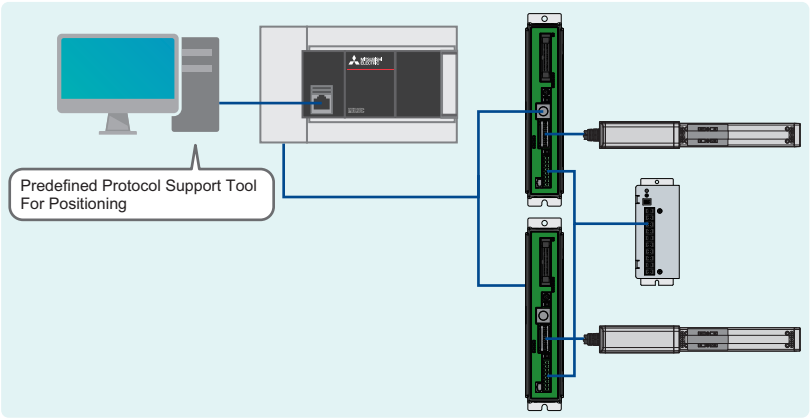
1. Wire e-CON connectors to the programmable controller. Wire two sets of e-CON connectors on the external device communication cable side in the same manner.
2. Connect a cable for communicating with an external device to the SIO connector of each IAI controller. (2 sets)
3. Using the branch adapter, connect the programmable controller and two IAI controllers.

2.4 Operation Flow Diagram

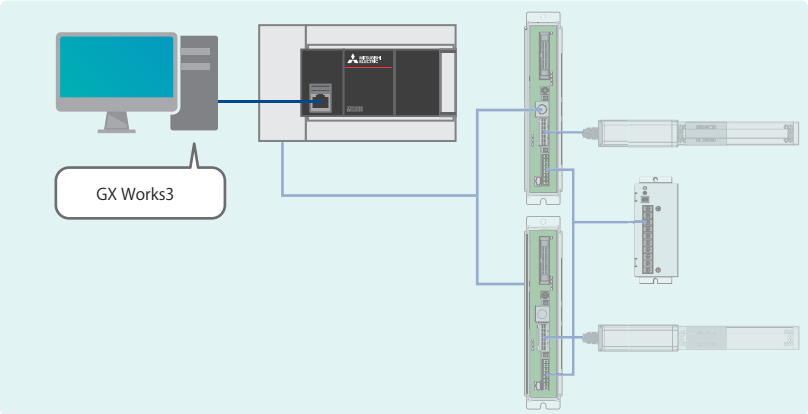
1. Preparing the required products (wiring)



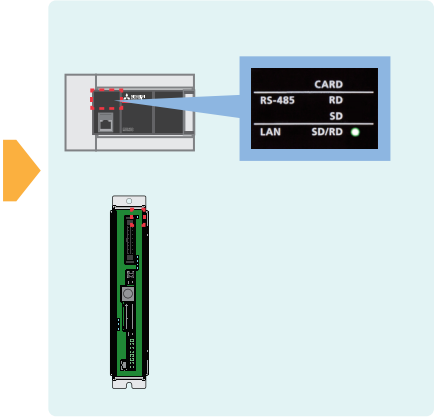
2. Setting the IAI controllers



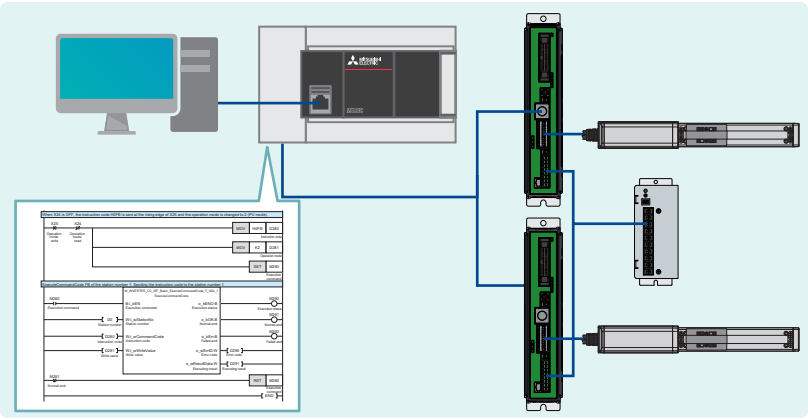
3. Setting the programmable controller



4. Checking the communication status



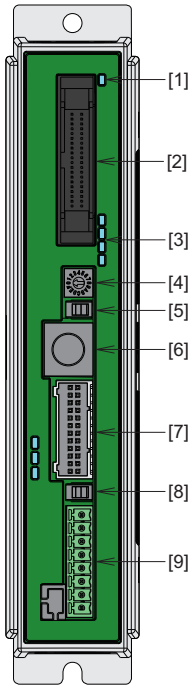
5. Program examples and checking the operation



3 IAI CONTROLLER SETTINGS

3.1 Part Names

This section shows the part names of an IAI controller (PCON-CB).



No.	Name	Description
[1]	Controller status LED	Shows the operating status of the controller. SV on (green): Servo ON SV flashing (green): Automatic Servo OFF ALM on (red): Alarm (operation release level or higher), motor driving power supply OFF, emergency stop Both SV and ALM on (orange): Initialization at power-on in progress Off: Control power supply OFF, Servo OFF
[2]	PIO connector/Field network connector	Connector for I/O signal connections for control in the PIO specifications. Connector for each field network in the field network specifications.
[3]	Current/alarm monitoring LED	Normally indicates the command current ratio. When an alarm occurs, the alarm code will be indicated. For details on the command current ratio (ratio against the rated value) according to each LED combination, refer to the following. 📖Manual for the IAI controller being used
[4]	Axis number setting switch	Switch for setting an axis number when operating multiple axes through serial communication or when performing gateway operations. When an SIO converter is used, multiple axes can be controlled without removing/reinserting the communication cable connector from/into the teaching tool. Settings for a maximum of 16 axes can be made using hexadecimal numbers from 0 to F. To change the axis number, rotate the arrow by using a flathead screwdriver. The setting of the axis number setting switch is loaded when the controller is powered on. Switching the setting at other times is invalid.
[5]	Operation mode setting switch	Switch for interlocking. • AUTO: Automatic operation by the PIO signal becomes possible. Only monitoring operation is possible from the teaching tool. • MANU: Operation from the teaching tool is possible.
[6]	SIO connector	Connector for connecting a communication cable for a teaching tool, gateway unit, etc. Used for connecting to a programmable controller.
[7]	Motor encoder connector	Connector for connecting a motor encoder cable for a ROBO Cylinder.
[8]	Brake release switch*1	Switch for forcibly releasing the brakes of a ROBO Cylinder with brakes. • BK RLS: Forcibly release brakes. • NOM: Normal operation (brakes enabled)

No.	Name	Description
[9]	Power connector	Connector for supplying each type of power (controller control power, Robo Cylinder power, brake control power) and inputting emergency stop status signals.

*1 For normal operation, make sure to set the brake release switch to the NOM side. (Set the switch to the BK RLS side only when necessary, such as adjustment at start-up.)
If the switch remains set to the BK RLS side, even when the Servo OFF state arises, the brakes do not activate.
In vertical installations, a workpiece may drop, causing injury or damage to the workpiece.

Point

For details on IAI controllers other than the PCON-CB, refer to the following.
📖Manual for the IAI controller being used

3.2 Setting Switches

The following table shows the switches of IAI controllers that are required to be set.

Name	Setting details
Axis number setting switch	Set this switch to any axis number.
Operation mode setting switch	Set this switch to the AUTO side.
Brake release switch	Set this switch to the NOM side.

3.3 Parameter Settings

Set the parameters for IAI controllers with Predefined Protocol Support Tool For Positioning.
Refer to the following for details.
☞ Page 21 Parameter settings of Predefined Protocol Support Tool For Positioning

4 PROGRAMMABLE CONTROLLER SETTINGS

4.1 Part Names

For the part names of the programmable controller, refer to the following.

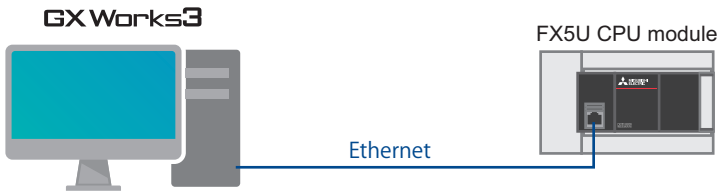
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware), Chapter 3 PART NAMES

4.2 Parameter Settings

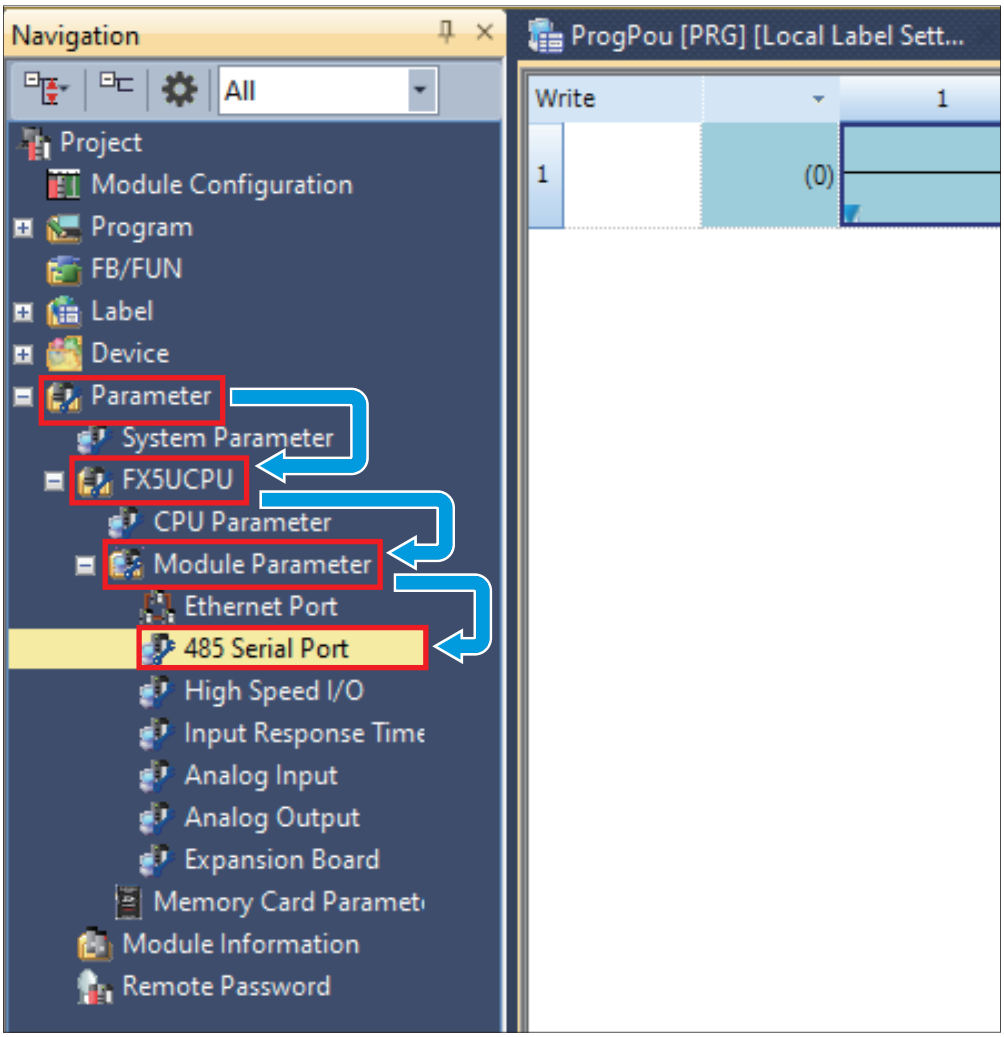
This section describes how to set parameters required for the programmable controller using GX Works3 and Predefined Protocol Support Tool For Positioning.

GX Works3 parameter settings

This section describes how to set parameters required for the programmable controller using GX Works3. Connect the personal computer and the programmable controller with an Ethernet cable.



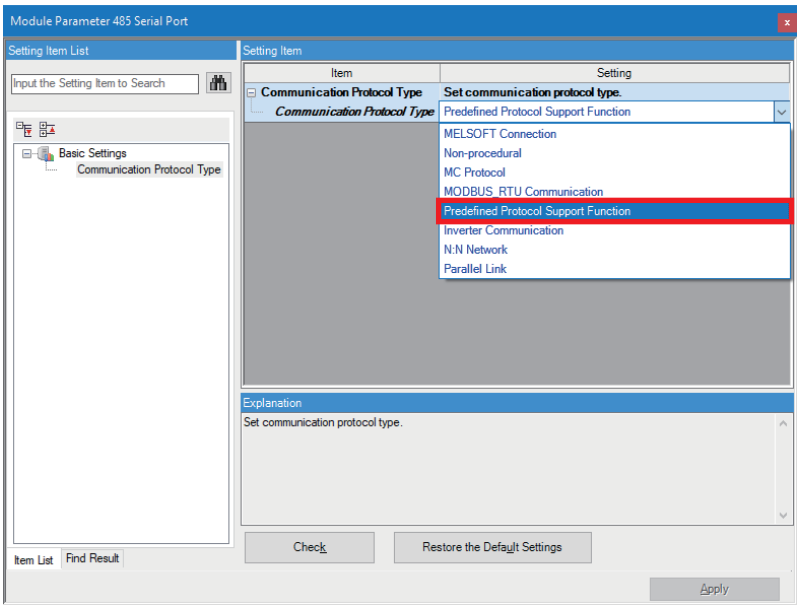
1. In the "Navigation" window of GX Works3, select [Parameter] ⇨ [FX5UCPU] ⇨ [Module Parameter] ⇨ [485 Serial Port].



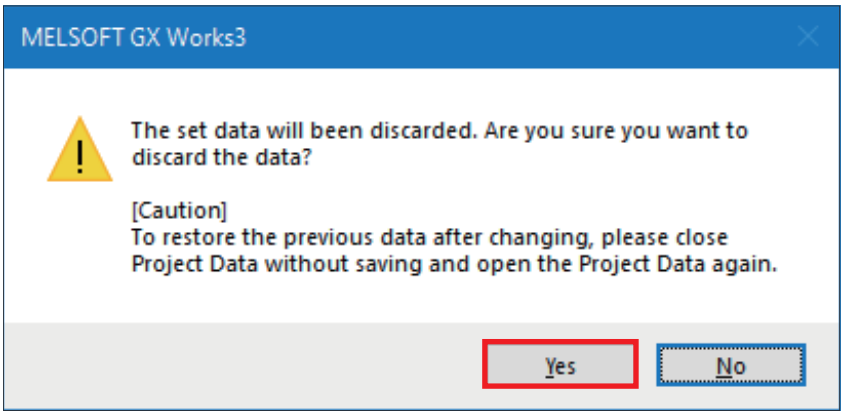
Point

If the "Navigation" window is not displayed, select [View] on the toolbar ⇨ [Docking Window] ⇨ [Navigation] to open the window.

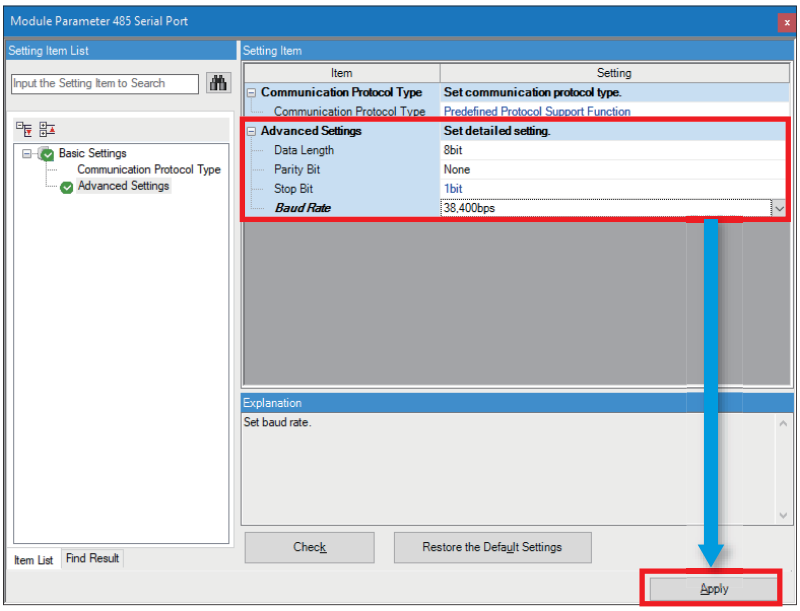
2. In "Communication Protocol Type", select "Predefined Protocol Support Function".



3. When the confirmation window appears, click the [Yes] button.



4. Set "Advanced Settings" as follows, and click the [Apply] button.



Item	Setting value
Data Length	8 (Default value: 7)
Parity Bit	None (Default value: Odd)
Stop Bit	1bit (Default value: 1bit)
Baud Rate	38400bps (Default value: 115200bps)

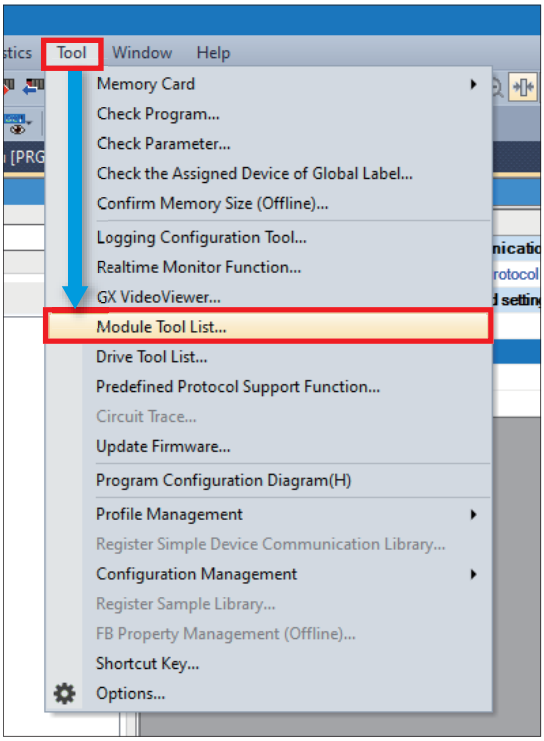
Point

For the settings in "Advanced Settings" except "Baud Rate", be sure to set the above values.

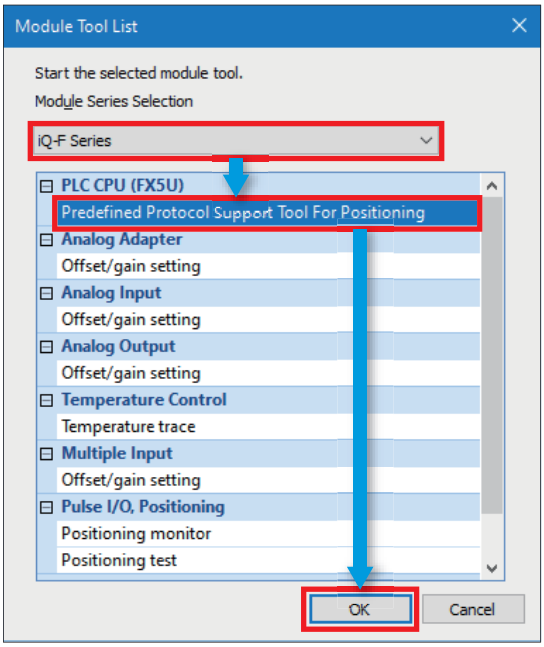
Parameter settings of Predefined Protocol Support Tool For Positioning

This section describes how to set parameters required for the programmable controller using Predefined Protocol Support Tool For Positioning.

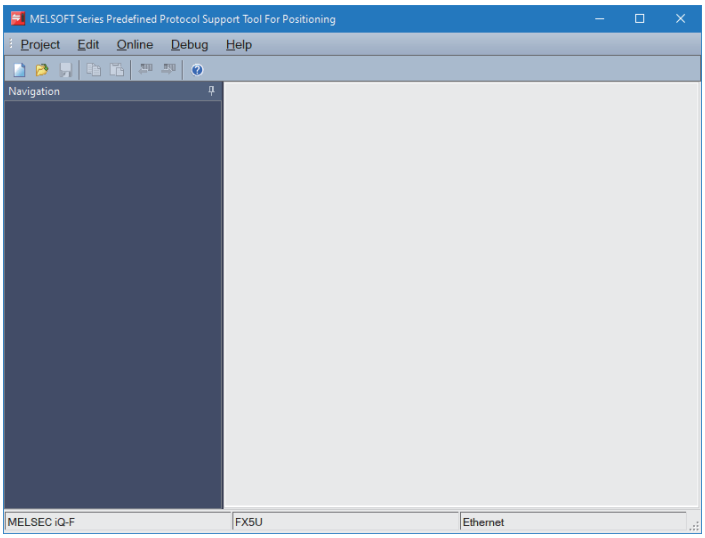
1. Select [Tool] ⇨ [Module Tool List] from the menu of GX Works3.



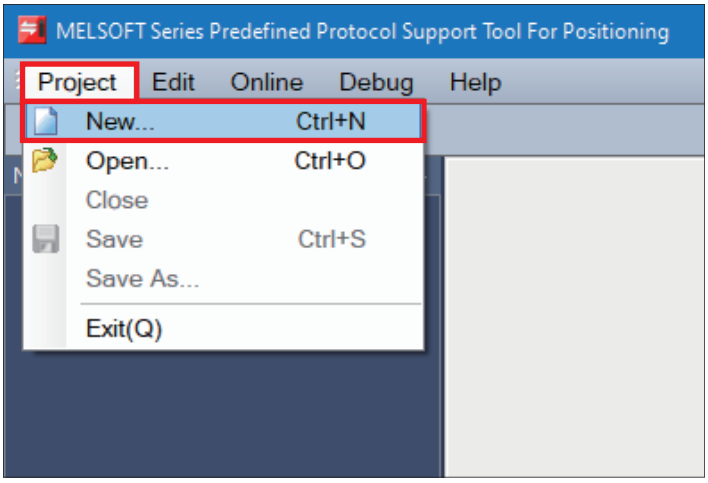
2. For "Module Series Selection" in the "Module Tool List" window, select "iQ-F Series" and "Predefined Protocol Support Tool For Positioning", and click the [OK] button.



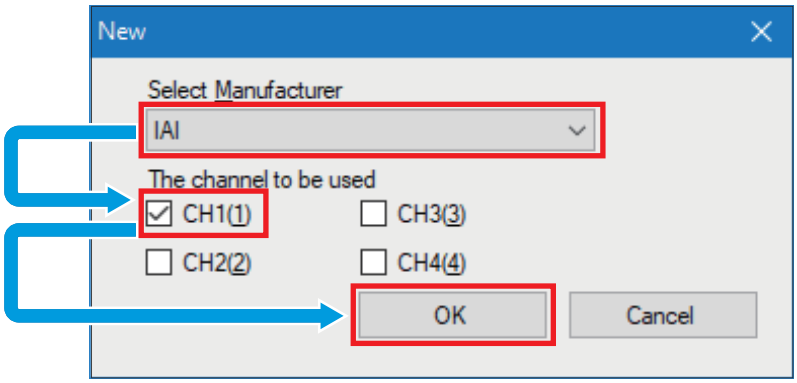
3. The "Predefined Protocol Support Tool For Positioning" window opens.



4. Select [Project] on the toolbar ⇨ [New].



5. Select "IAI" under "Select Manufacturer", select the checkbox of "CH1" under "The channel to be used", then click the [OK] button.

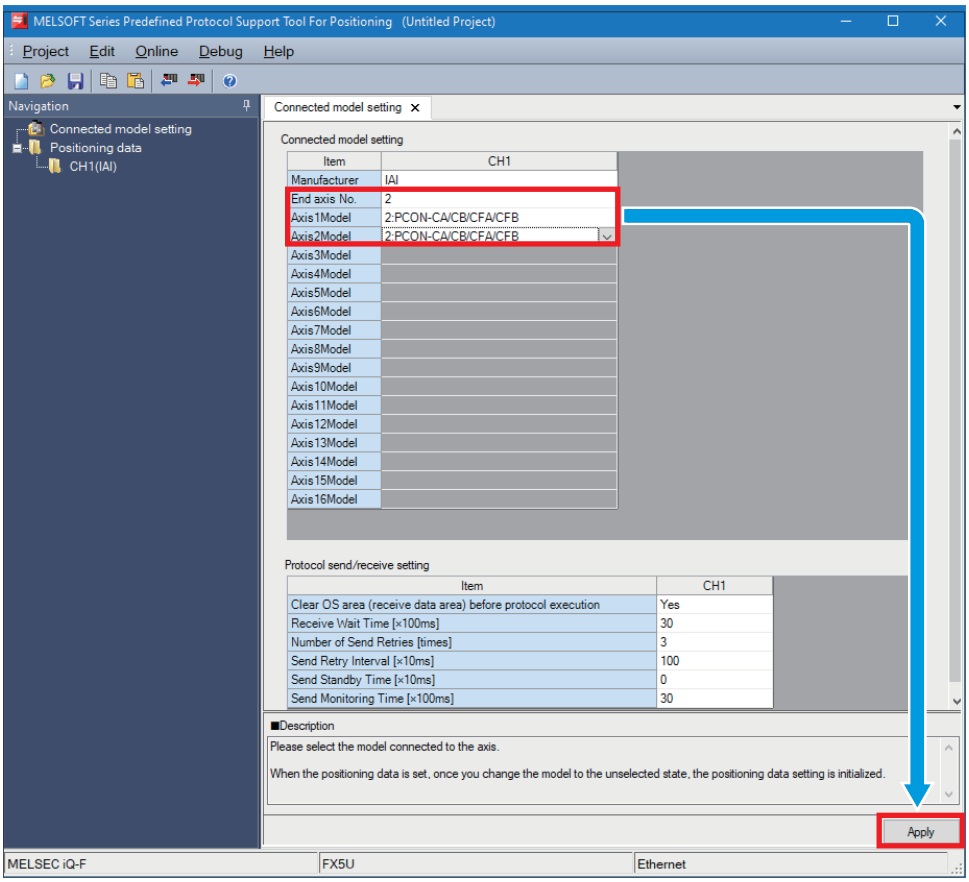


Point

The channel used is determined as follows.

- Built-in RS-485 communication terminal block of the CPU module: CH1
- Expansion board: CH2
- Expansion adapter: CH3, CH4

6. Configure settings as shown in the following window, and click the [Apply] button.



7. To save the protocol setting data, select [Project] ⇨ [Save As], and save it using any name.

8. Select [Project] ⇨ [Exit] to close the window.

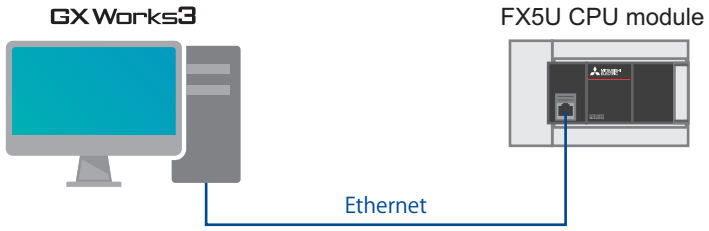
Precautions

The following devices are used to write predefined protocol information. Make sure not to overlap with the devices used for other controls.

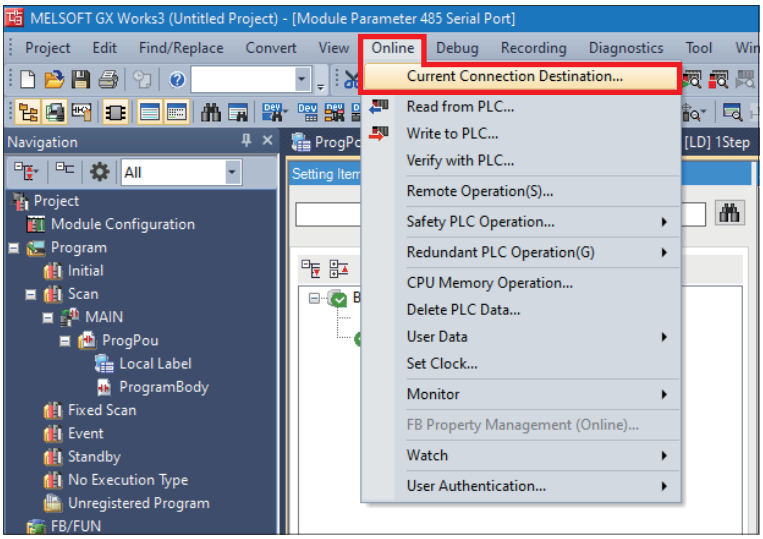
Device type	Device number
File register	R0 to R1801

4.3 Communication Test for the Programmable Controller

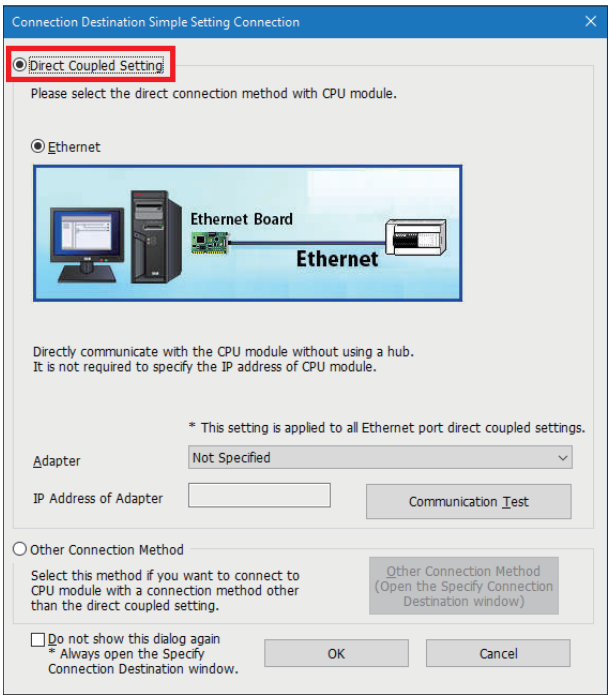
Directly connect the Ethernet ports as shown below.



1. Select [Online] ⇨ [Current Connection Destination].

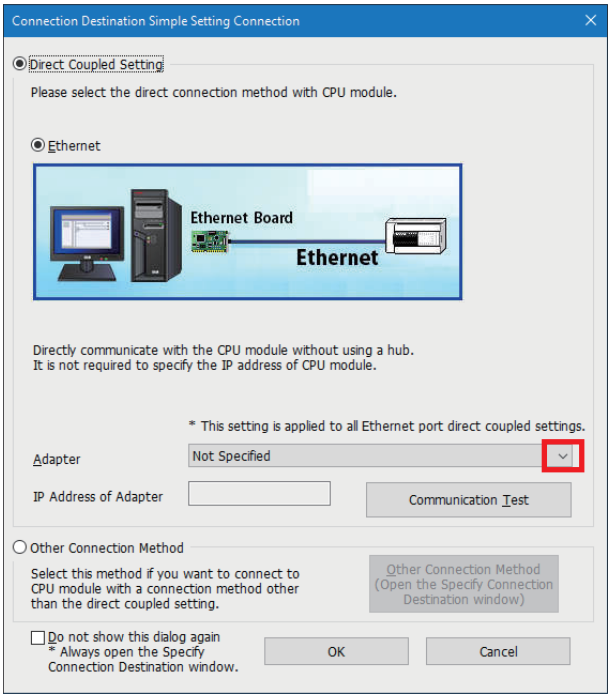


2. Select "Direct Coupled Setting".

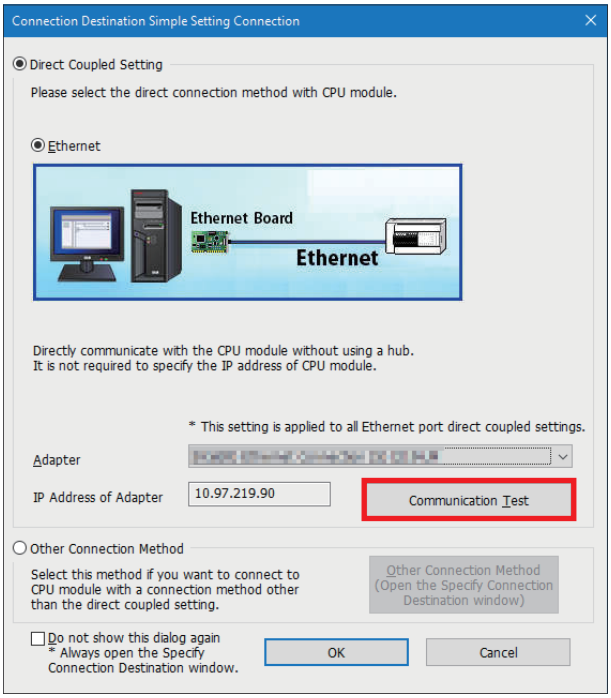


3. Specify an Ethernet adapter of the personal computer which is used when the personal computer is directly connected to the CPU module.

When "Not Specified" is set, select an adapter to be used from the drop-down list.



4. After the adapter is selected, click the [Communication Test] button.



For the connection via a hub, refer to the following.

MELSEC iQ-F FX5 User's Manual (Ethernet Communication), Section 4.2 Connection Via a Hub

4.4 Writing Data to the Programmable Controller

This section describes how to write each parameter setting and program to the programmable controller.

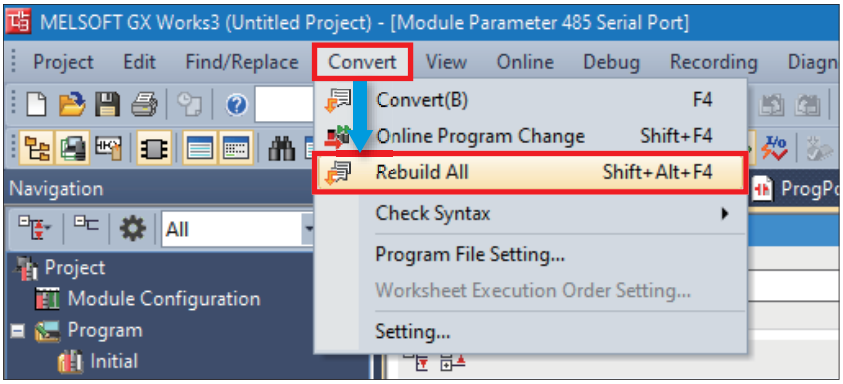
For details on programs, refer to the following.

☞ Page 33 PROGRAM EXAMPLE

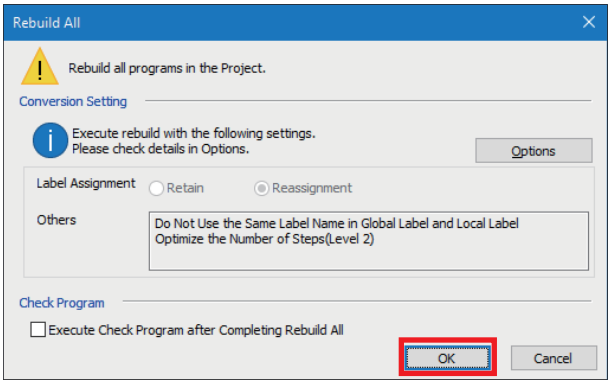
Writing GX Works3 parameter settings

1. Perform the operation to determine the programs and the parameters before writing them to the programmable controller.

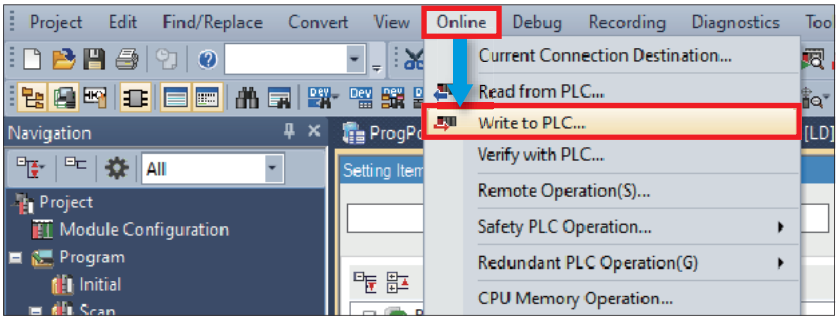
Select [Convert] ⇨ [Rebuild All].



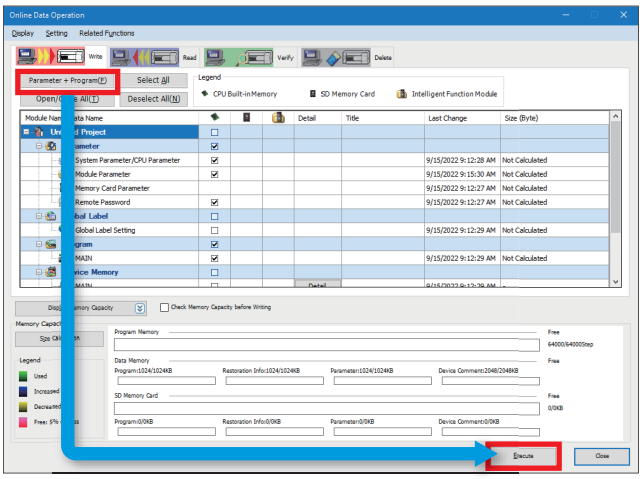
2. Click the [OK] button.



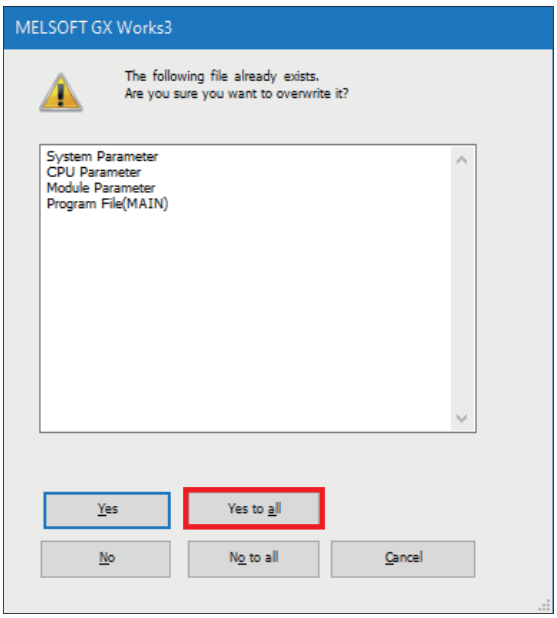
3. Select [Online] ⇨ [Write to PLC].



4. Click "Parameter + Program", and click [Execute].



5. When the following window appears, click [Yes to all].

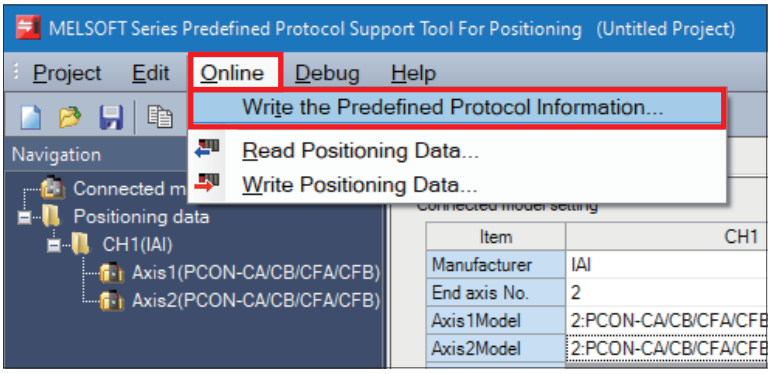


6. After the writing is complete, reset or power off and on the programmable controller.

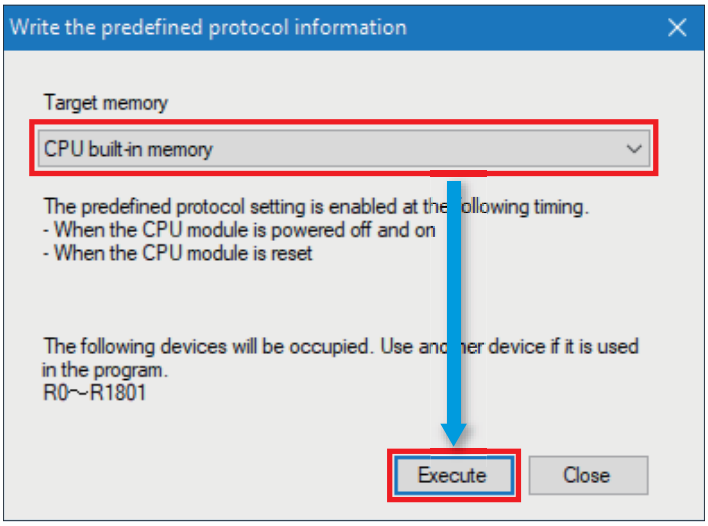
Writing the parameter settings of Predefined Protocol Support Tool For Positioning

1. Write protocol setting data to the CPU module.

Select [Online] on the toolbar ⇨ [Write the Predefined Protocol Information].



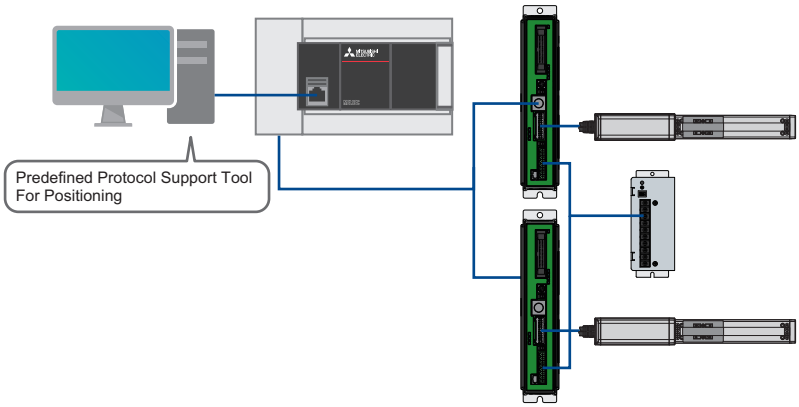
2. Select "CPU built-in memory" under "Target memory", and click the [Execute] button.



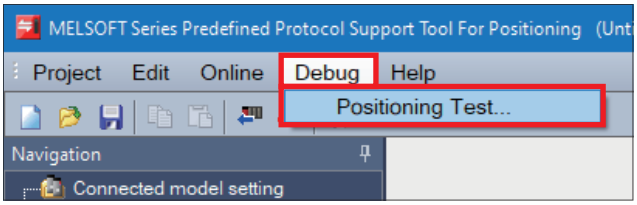
3. Reset or power off and on the programmable controller to reflect the settings.

4.5 Positioning Test

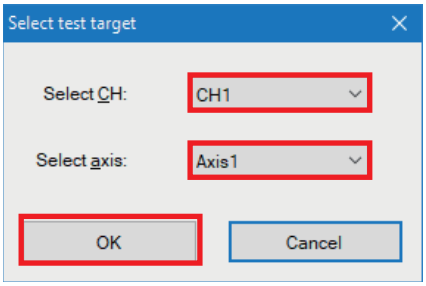
After the writing process, perform a test for communication with the IAI controllers.



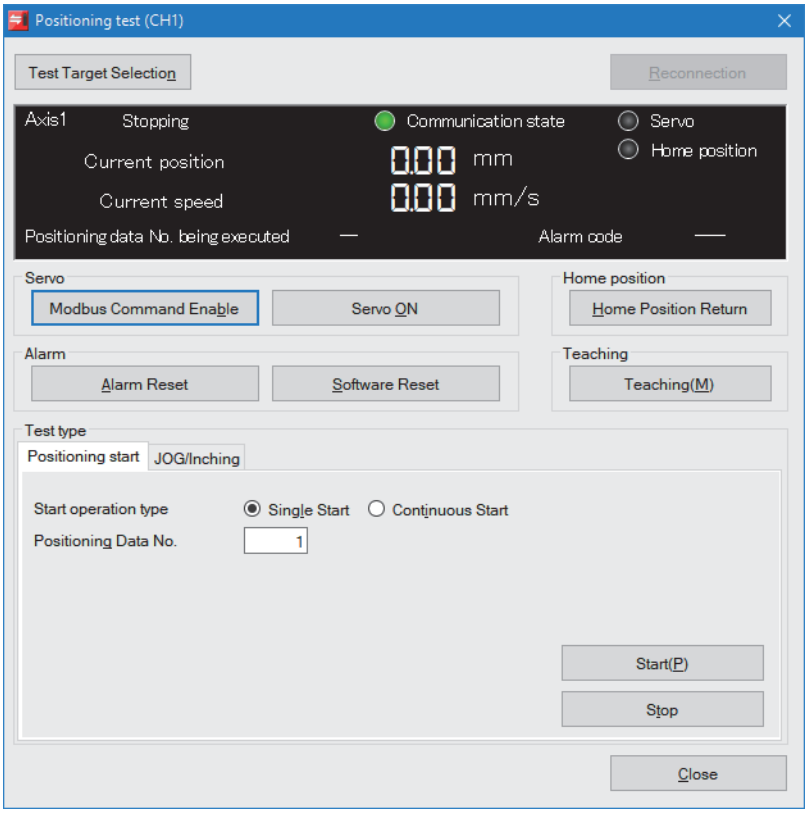
1. In the menu bar of "Predefined Protocol Support Tool For Positioning", select [Debug] ⇨ [Positioning Test].



2. Select a channel number and an axis number for the test target in the "Select test target" window, and click the [OK] button.

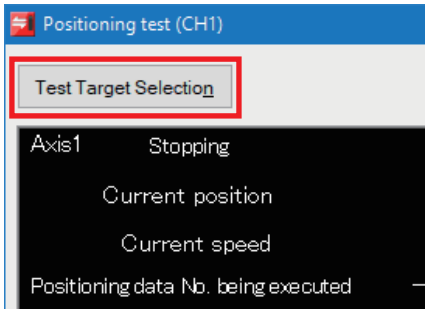


3. The "Positioning test" window appears.



Point

To change the test target, use the [Test Target Selection] button.



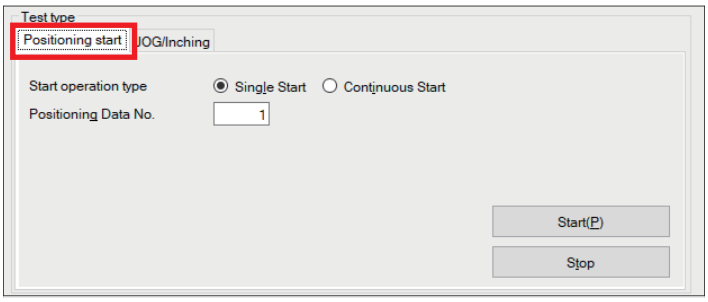
4. When the [Modbus Command Enable] button is displayed, click the button.
5. When the [Servo ON] button is displayed, click the button.
6. Click the [Home Position Return] button.

7. When the preparation is completed, both lamps of "Servo" and "Home position" are ON in the monitor area.

Positioning start

Specify a number and execute positioning data.

1. Select the [Positioning start] tab.



2. Enter a positioning data number to be executed in "Positioning Data No.".

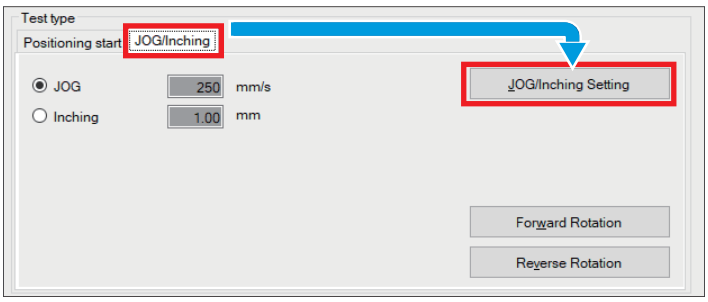
3. Click the [Start] button.

4. By clicking the [Stop] button, the positioning control being performed is decelerated and stopped.

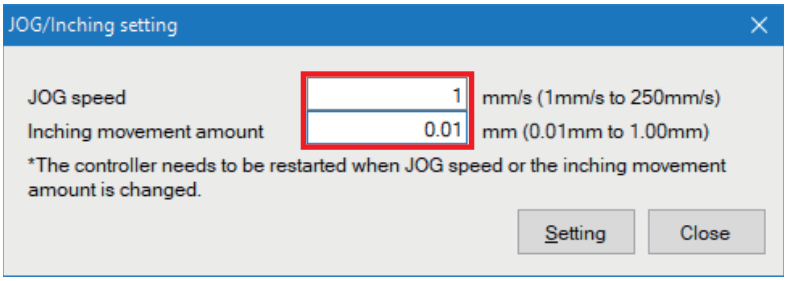
JOG/Inching

Set the speed or movement amount, and move the current position of the axis.

1. Select the [JOG/Inching] tab, then click the [JOG/Inching Setting] button.



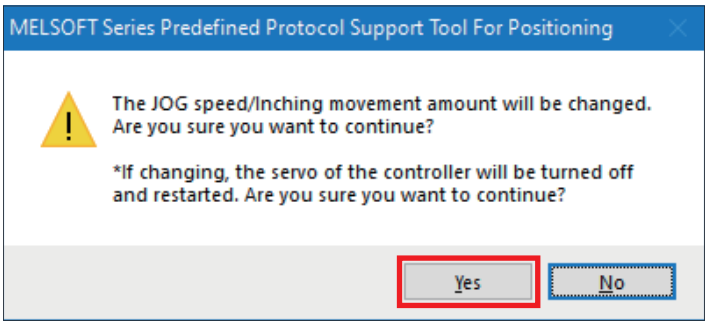
2. Enter the JOG operation speed or the amount of movement at inching operation in the "JOG/Inching setting" window.



Item	Description
JOG speed	Enter the JOG operation speed.
Inching movement amount	Enter the travel distance of inching operation per time.

3. Click the [Setting] button in the "JOG/Inching setting" window.

4. When the confirmation window appears, click the [Yes] button.



5. Click the [Servo ON] button.

6. Select "JOG" or "Inching" in the [JOG/Inching] tab.

- JOG: The current position moves at the set speed while the [Forward Rotation] or [Reverse Rotation] button is being pressed.
- Inching: The current position moves by the set movement amount each time the [Forward Rotation] or [Reverse Rotation] button is clicked.

7. Click the [Forward Rotation] or [Reverse Rotation] button.

- Forward Rotation: The current position moves in the positive direction.
- Reverse Rotation: The current position moves in the negative direction.

Point

When "Inching" is selected, an inching is performed by the following key input.

- Forward Rotation: W
- Reverse Rotation: V

When "JOG" is selected, JOG operation is not performed even if the W and V keys are pressed.

5 PROGRAM EXAMPLE

5.1 Operation

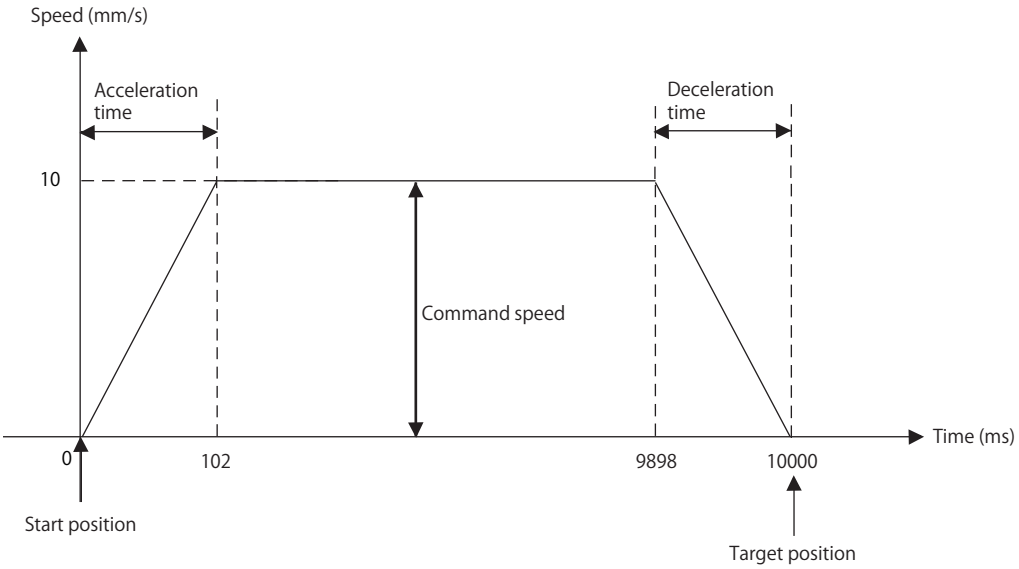
The following shows an example of using this FB library for configuring the position table setting and performing the home position return and positioning operation for the IAI controller. The following FBs are used in this example.

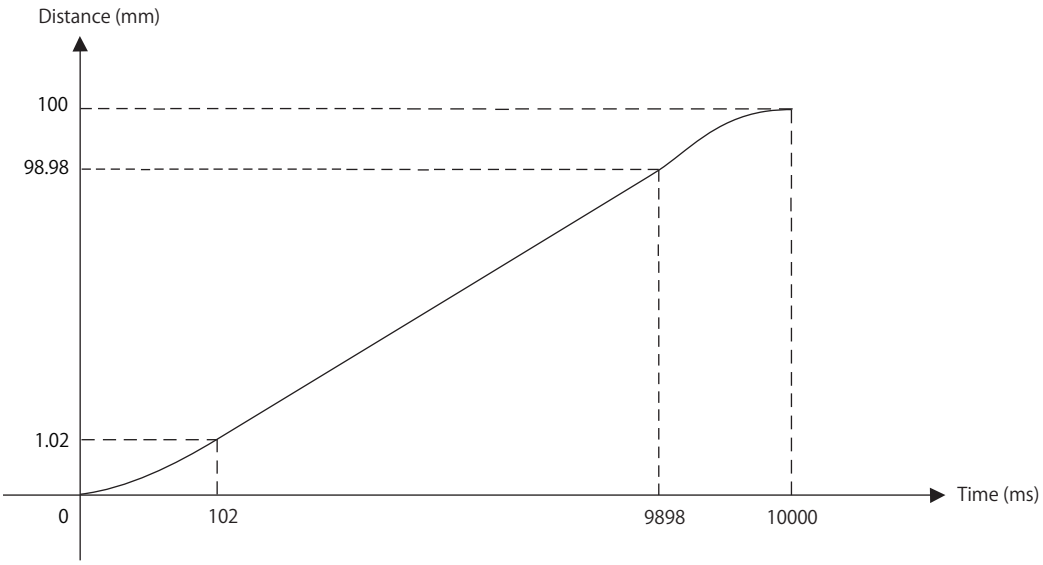
- M+IAIMonitoring_F (Operation monitor)
- M+IAIWritePositioningTable_F (Position table setting)
- M+IAIStartHomePositioning_F (Home position return)
- M+IAIStartPositioning_F (Positioning operation)
- M+IAIServoContorol_F (Servo ON/OFF)

Overview of program example

Perform monitoring to check the status of the IAI controller. Then, write the position table information to the position table No.0 of axis 1 and the position table No.0 of axis 2 of the IAI controller with the following settings. After writing information, perform a home position return, and move the ROBO Cylinder to the position which is 100mm away from the home position. If the error code 203H occurs during the operation, reset the alarm that has occurred in the IAI controller.

- Target position: 100mm (0.01mm × 10000)
- Positioning width: 1mm (0.01mm × 100)
- Acceleration: 0.01G
- Command speed: 10mm/s
- Deceleration: 0.01G





5.2 FB Library

Downloading the FB library

In this manual, the Predefined Protocol Support for Positioning Function Block Reference (for IAI) is used.
To obtain the FB library, please contact your local Mitsubishi Electric representative.

Importing the FB library

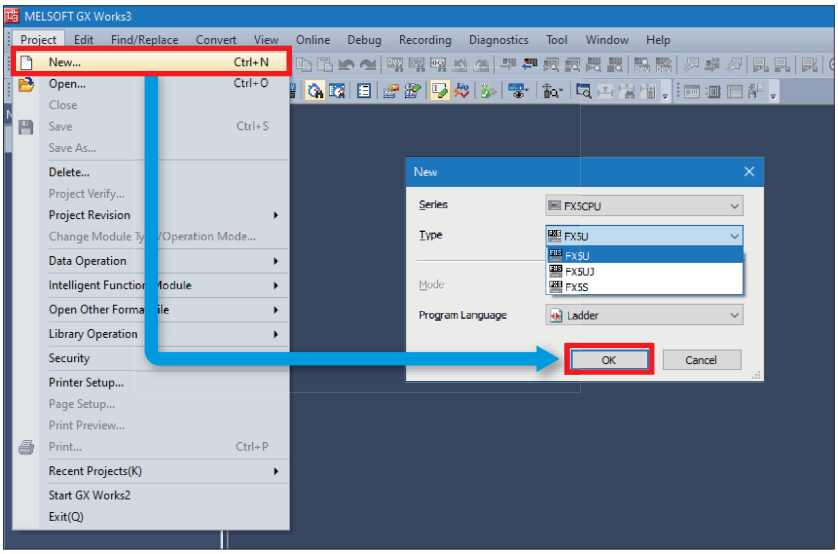
This section describes how to register the obtained FB library to GX Works3.

Decompress the FB library folder (zip file) before registering the FB library.

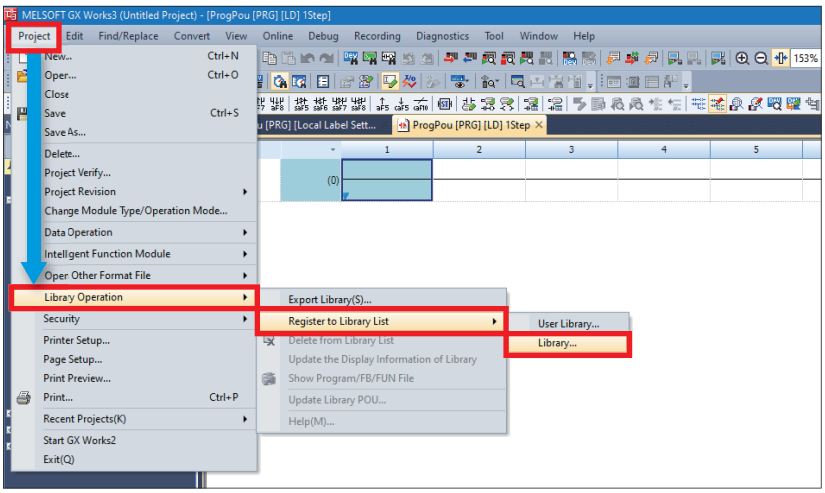
1. Start GX Works3, and select [Project] on the toolbar ⇨ [New].

In this manual, the following settings are used.

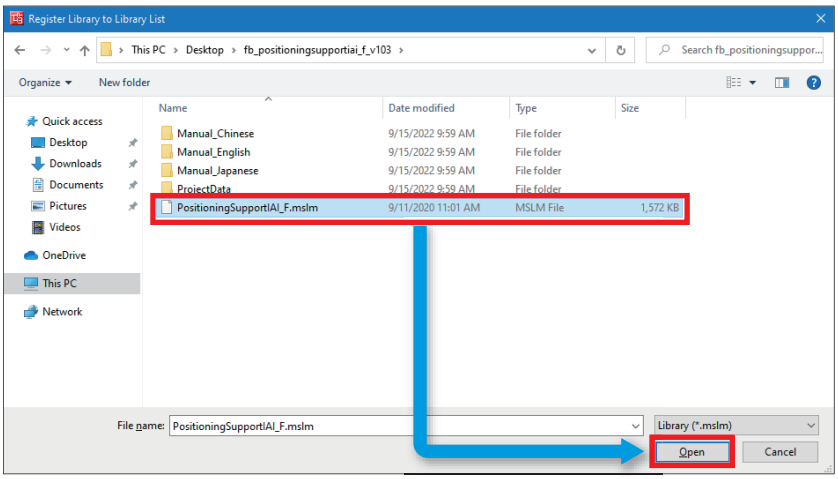
Item	Description
Series	FX5CPU
Type	FX5U
Program Language	Ladder



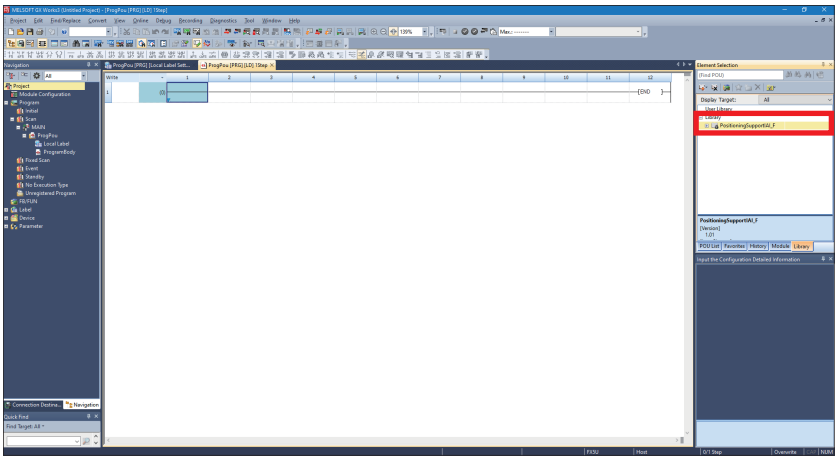
2. Select [Project] on the toolbar ⇨ [Library Operation] ⇨ [Register to Library List] ⇨ [Library].



3. Select the "PositioningSupportIAI_F.mslm" file in the decompressed FB library folder, and click [Open].



4. The selected file is added to [Library] in the "Element Selection" window.



Point

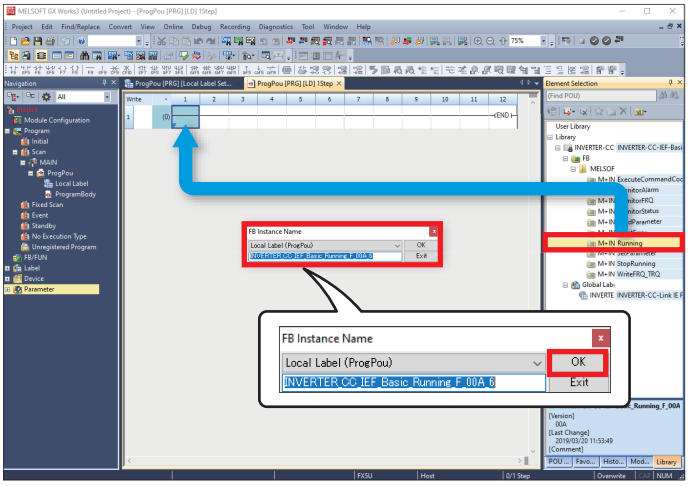
If the "Element Selection" window is not displayed, select [View] on the toolbar ⇨ [Docking Window] ⇨ [Element Selection] to open the window.

How to use the FB library

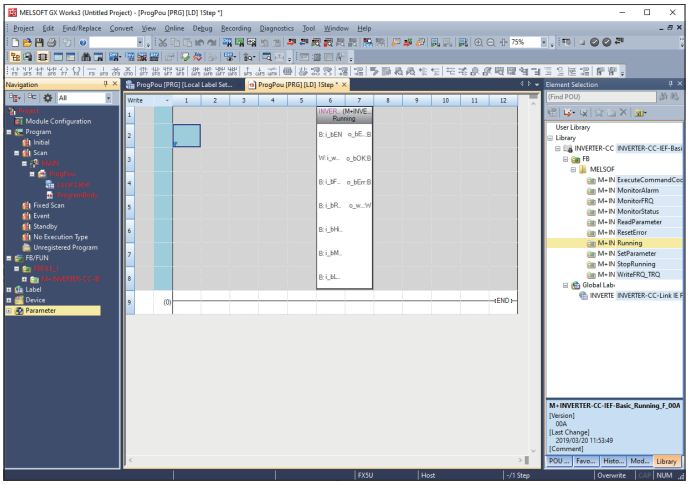
Select an FB registered in the library from the "Element Selection" window, and drag and drop it to the program editor. Create an input ladder and an output ladder of the pasted FB to create a program.

Arrange the FB input ladder to the left side, and output ladder to the right side of the window in the same manner as standard ladder programs.

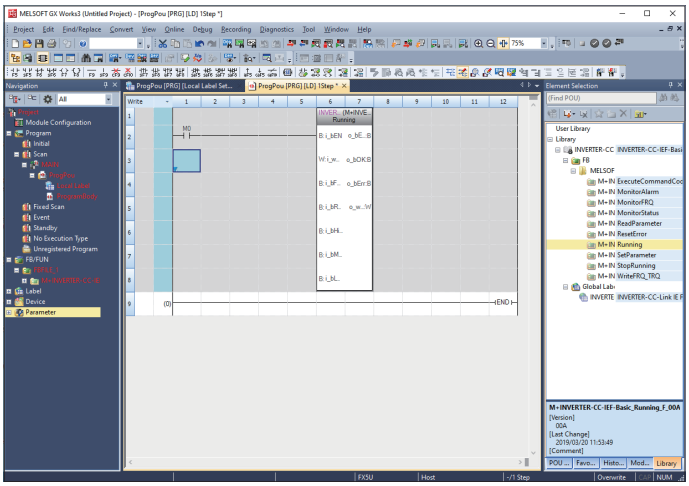
1. Go to the "Element Selection" window ⇨ the [Library] tab ⇨ [Library]. Then, select an FB to be used and drop it in the program editor. When the "FB Instance Name" window appears, click the [OK] button.



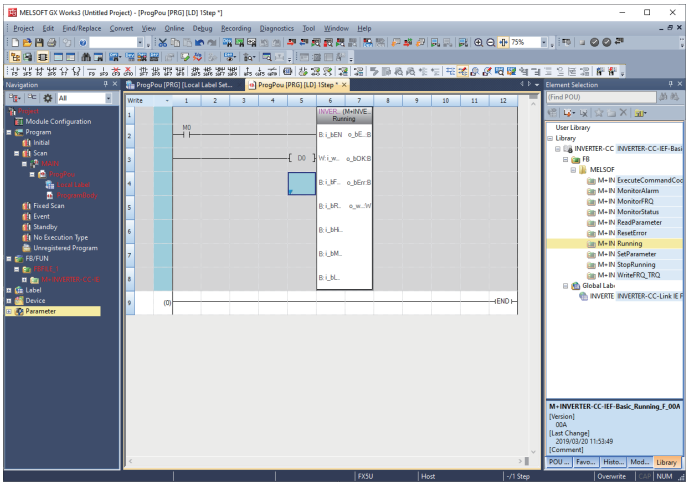
2. The FB is pasted to the program editor.



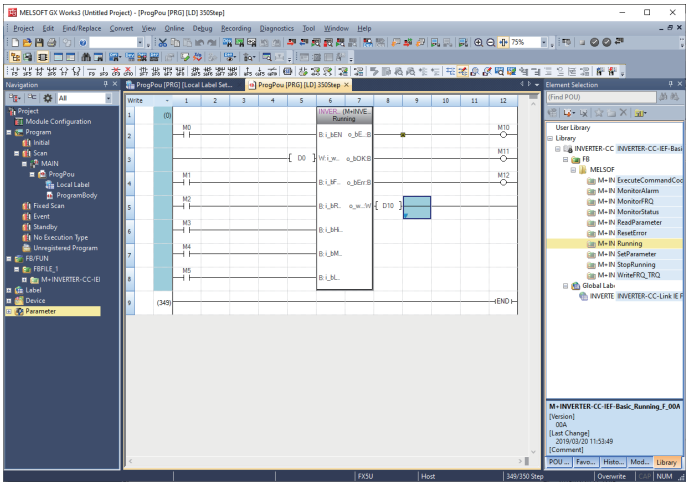
3. Insert a contact and input to B:i_bEN.



4. Insert an FB Word device input to the left side of the FB. Insert an FB Word device output to the right side of the FB.



5. Repeat these steps to create the ladder.



5.3 Program Details

When using e-Manual Viewer, the program copy function is available to perform programming. For details, refer to the following.

☞ Page 57 How to Use the Program Copy Function of e-Manual

Target channel setting

Sets the target channel to 1

Target axis setting

Sets the target axes to 1 and 2

Position table No. setting

Sets the position table Nos. to 0 (axis 1) and 0 (axis 2)

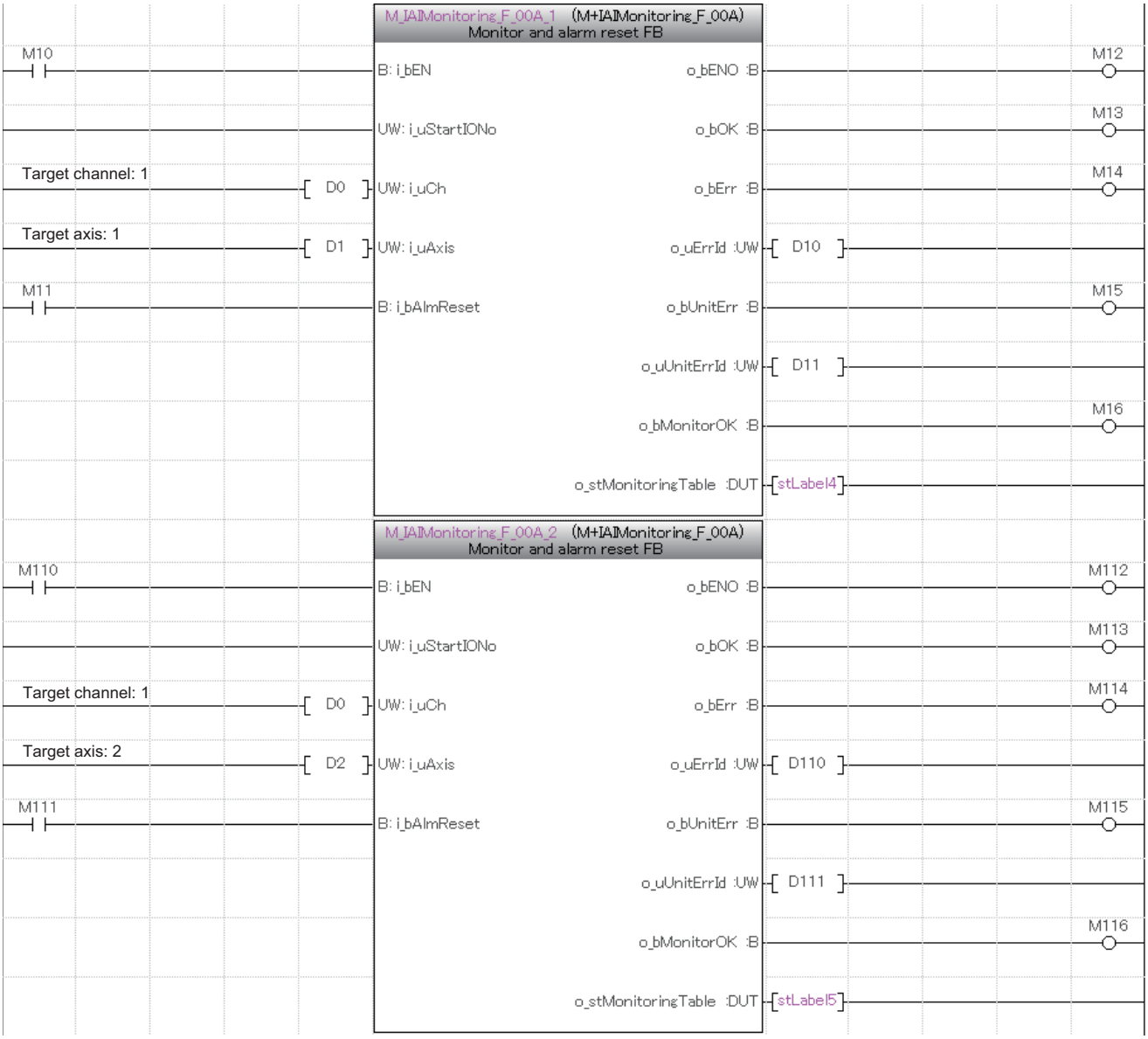
IAI controller monitoring

By turning on i_bEN (Execution command), the status of the IAI controller is monitored by M+IAIMonitoring_F (Operation monitoring).

When o_bMonitorOK (Monitoring status) is on, the monitoring table information of the IAI controller is stored in o_stMonitoringTable (Monitoring table).

For details on how to access stLabel4 and stLabel5, which are local labels of the structure type (stMonitoringTable), refer to the following.

☞ Page 50 Acquiring the alarm that has occurred in the IAI controller



For details on o_stMonitoringTable (Monitoring table), refer to the following.

MELSEC iQ-F FX5 Predefined Protocol Support for Positioning Function Block Reference (for IAI), Section 2.1 Common Specifications

■Redefining local labels

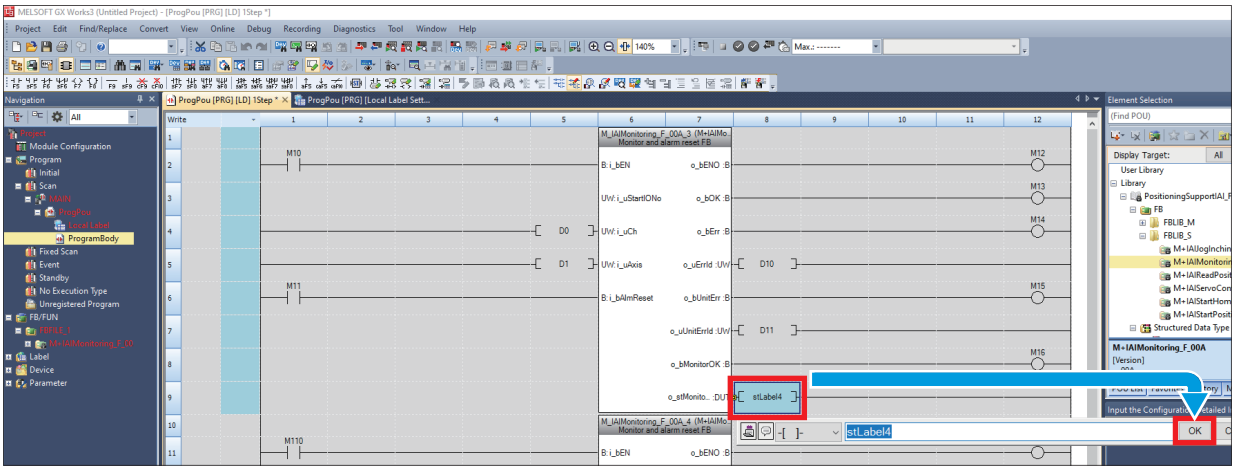
When the above program examples are copied and pasted, the function blocks and local labels stLabel4 and stLabel5 become undefined.

For details on how to redefine function blocks, refer to the following.

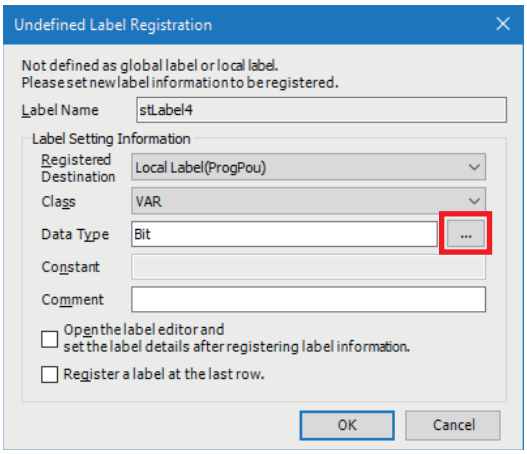
☞ Page 57 How to Use the Program Copy Function of e-Manual

The method for redefining local labels stLabel4 and stLabel5 is explained in the following.

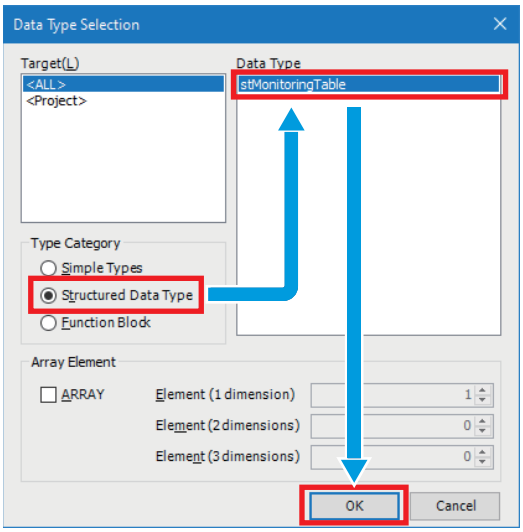
1. Double-click the undefined local label stLabel4, and click the [OK] button.



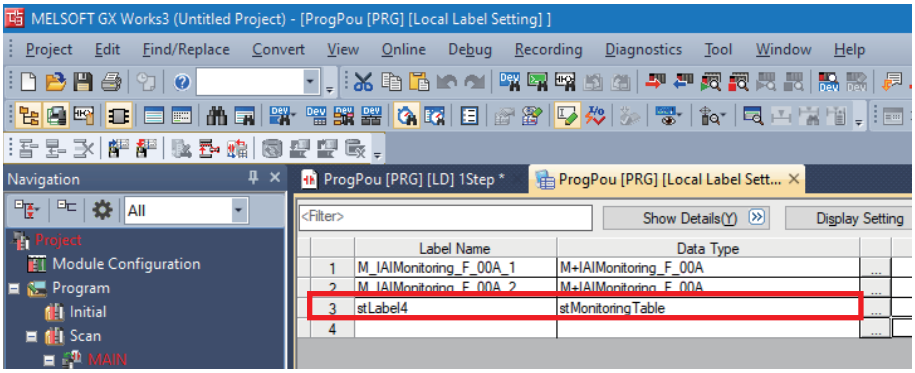
2. Click the See More button for "Data Type".



3. Go to "Type Category" ⇨ select "Structured Data Type" and "stMonitoringTable", then click the [OK] button.



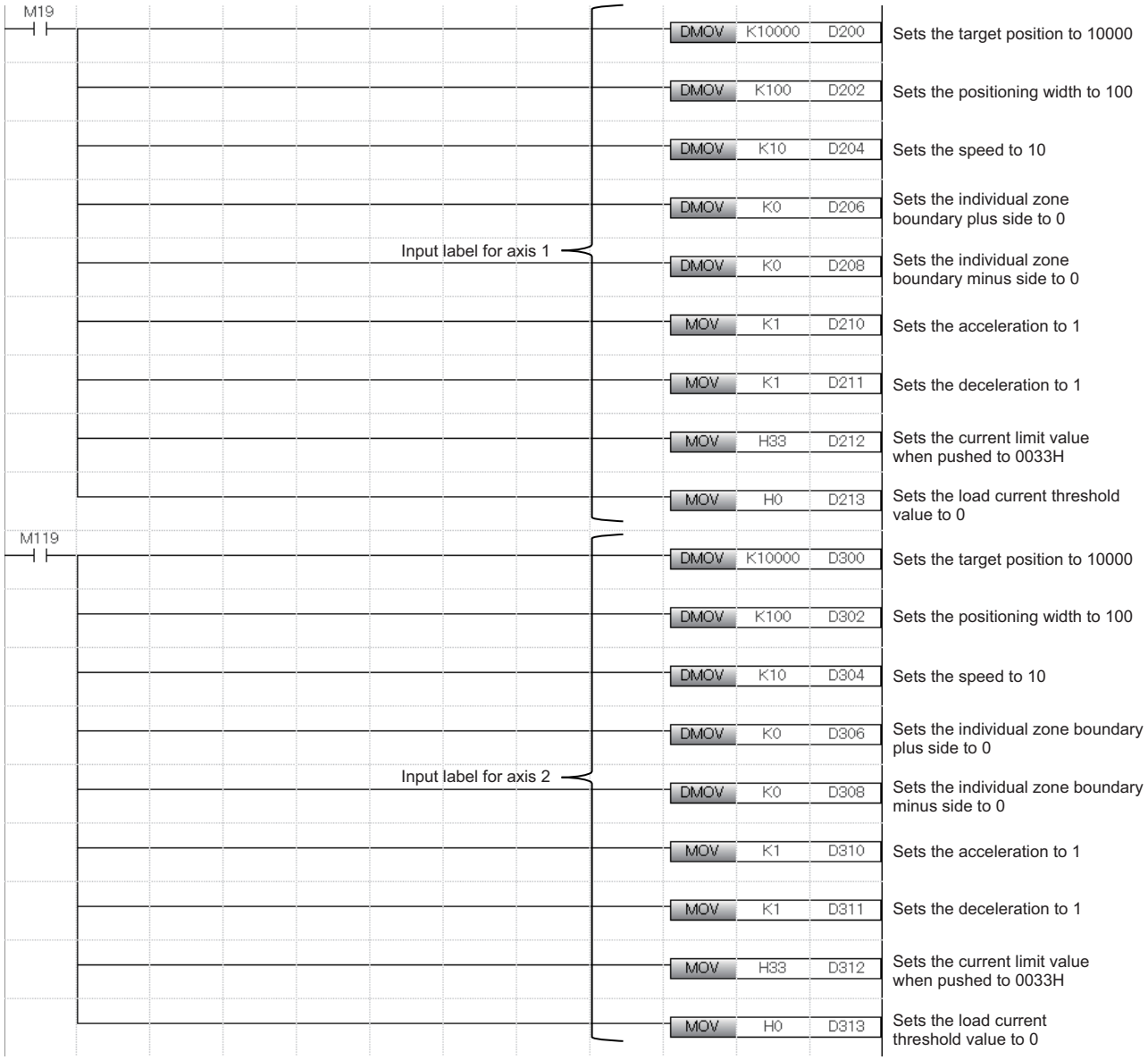
4. Select the [Navigation] window ⇨ "Program" ⇨ "Scan" ⇨ "MAIN" ⇨ "ProgPou" ⇨ "Local Label", and check that local label stLabel4 is defined.



5. Define local label stLabel5 in the same way.

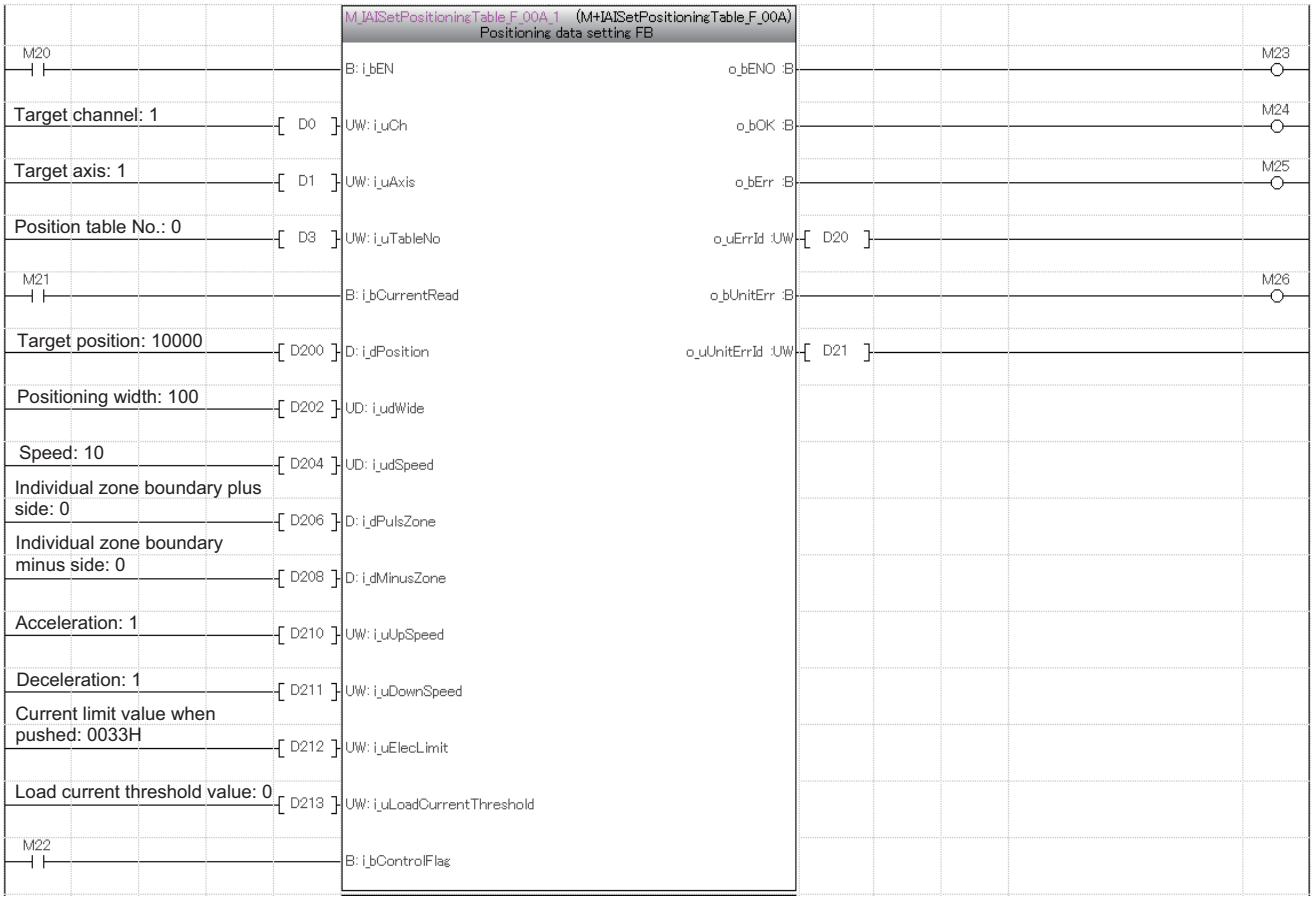
Position table (input label) setting

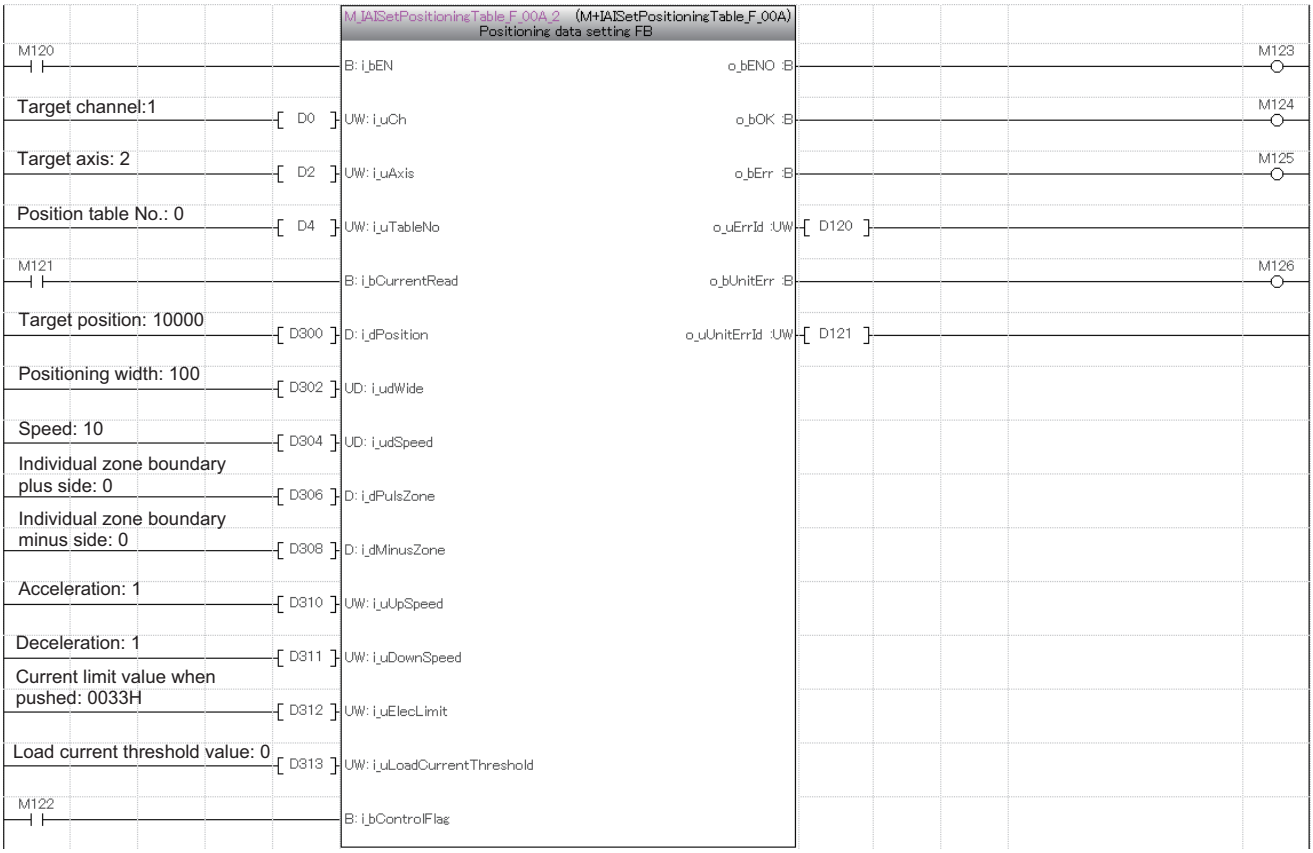
The following shows an example of setting the input labels for axes 1 and 2 of M+IAISetPositioningTable_F (Position table setting) by turning on M19 and M119.



Setting the position table

By turning on i_bEN (Execution command), the information on the positioning operation is set in the positioning table of the target axis by M+IAISetPositioningTable_F (Position table setting).





Point

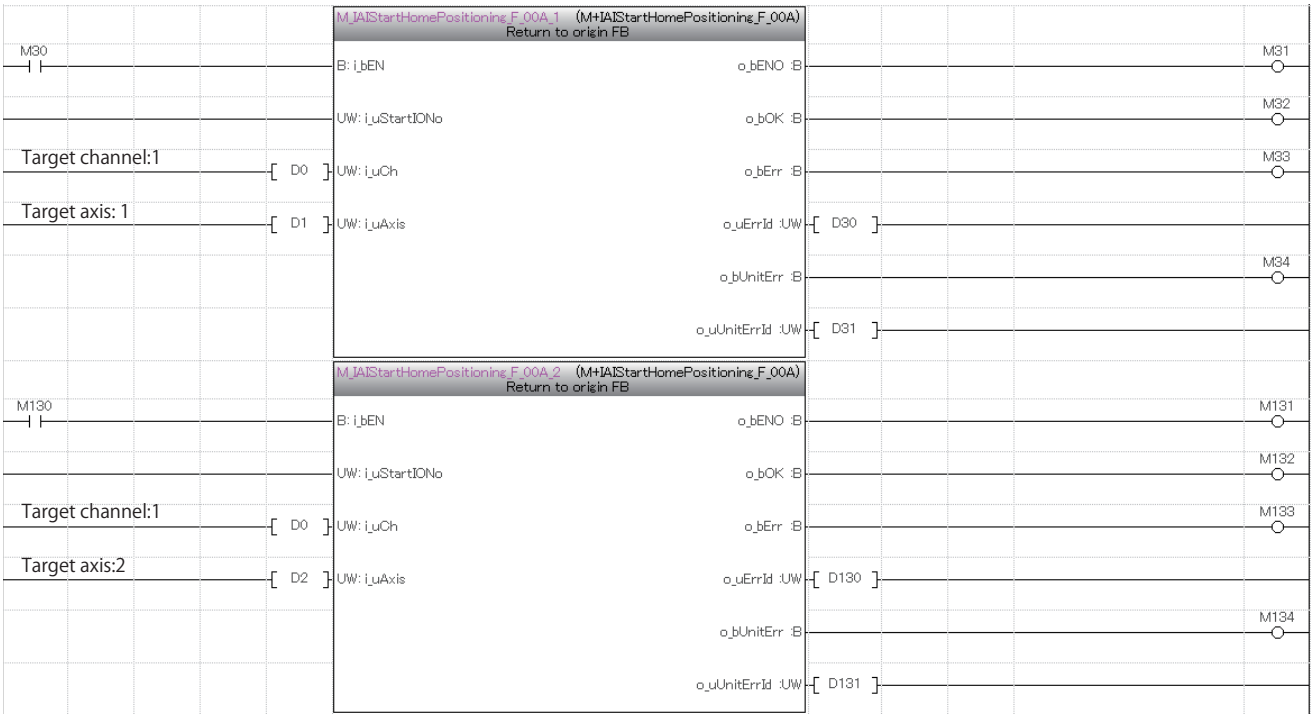
The positioning table can be configured by using Predefined Protocol Support Tool For Positioning as well. In that case, setting by M+IAISetPositioningTable_F (Position table setting) is not required.

For details on the settings by tools, refer to the following.

Predefined Protocol Support Tool For Positioning Operating Manual, Section 7.2 Setting and Editing Positioning Data

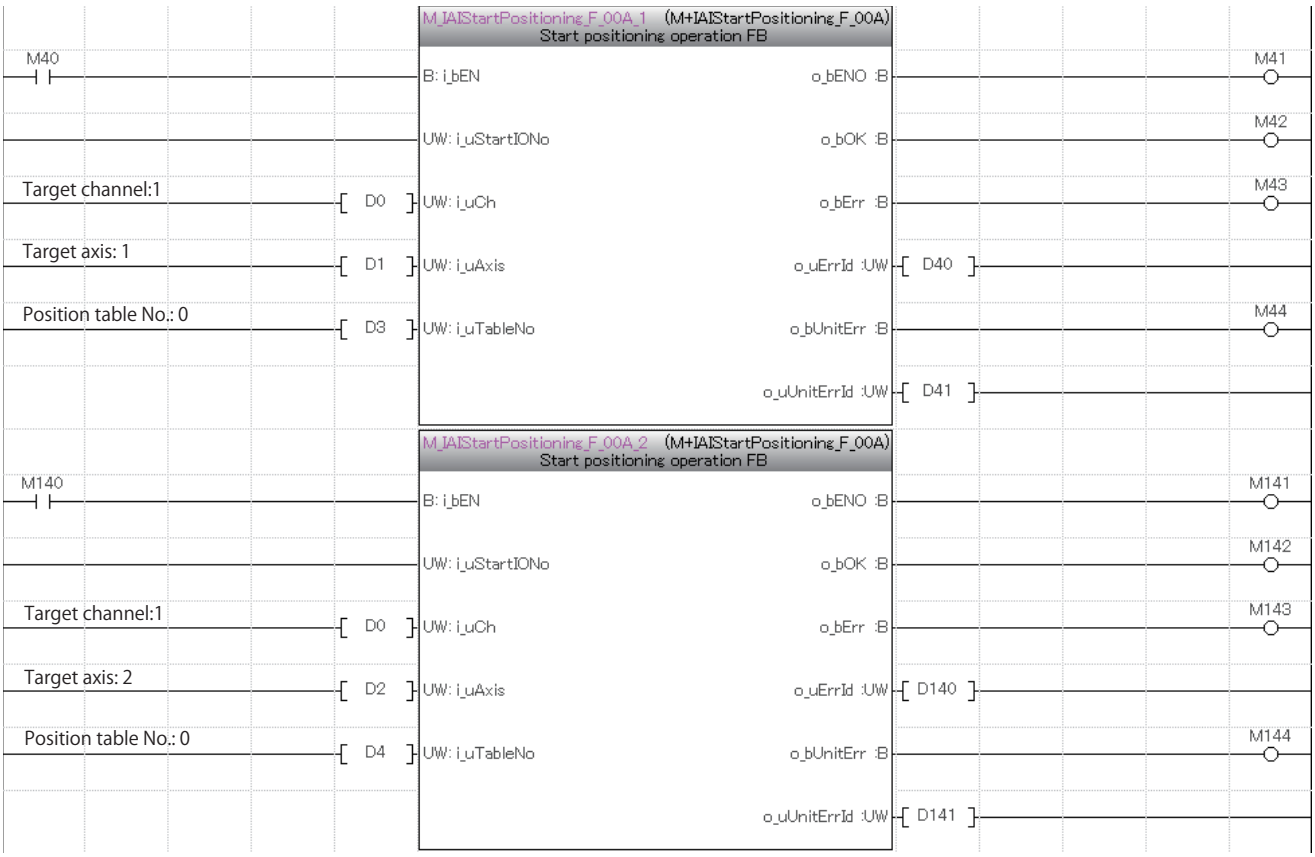
Performing the home position return

By turning on i_bEN (Execution command), the home position return is performed by M+IAIStartHomePositioning_F (Home position return). When the home position return is performed, the servo is automatically turned on.



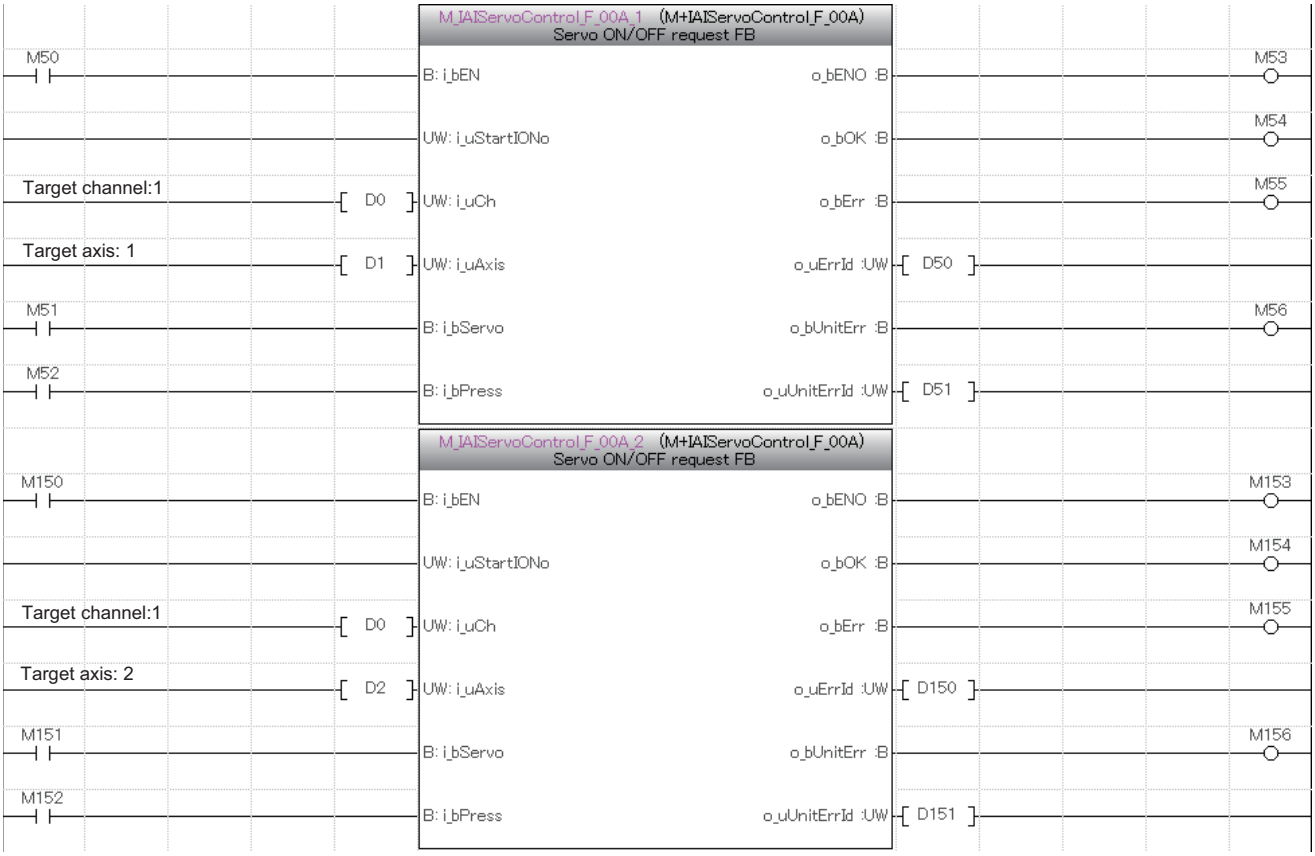
Performing the positioning operation

By turning on i_bEN (Execution command), the positioning operation of the set position table No. is performed by M+IAIStartPositioning_F (Positioning operation). When the positioning operation is performed, the servo is automatically turned on.



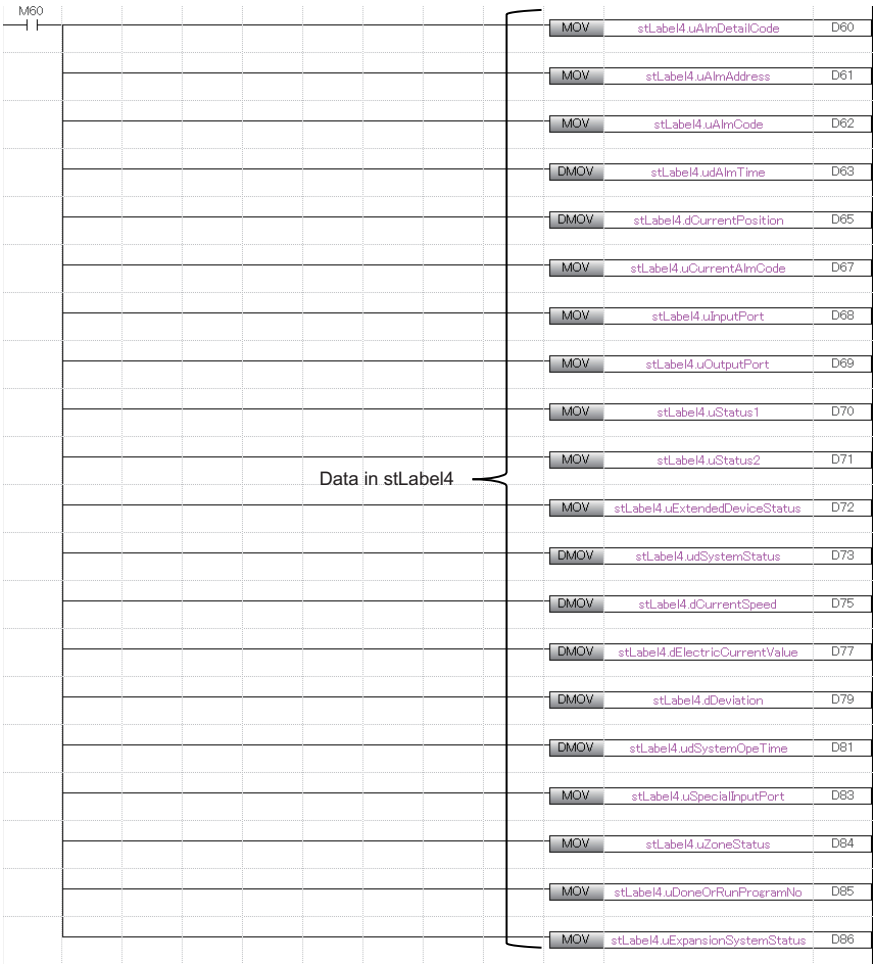
Servo OFF

When performing maintenance of the target axis, turn off the servo by M+IAIServoControl_F (Servo ON/OFF).
After normal completion, turn off i_bEN (Execution command).



Acquiring the alarm that has occurred in the IAI controller

If the 203H error occurs in the home position return or positioning operation, an alarm has occurred in the IAI controller. The following shows an example of storing the data in the local labels stLabel4 and stLabel5 of the structure type (stMonitoringTable) in the data register (D) by turning on M60 and M160.



Stores the alarm detail code in D60

Stores the alarm address in D61

Stores the alarm code in D62

Stores the alarm occurrence time in D63

Stores the current position monitor in D65

Stores the currently occurring alarm code in D67

Stores the input port in D68

Stores the output port in D69

Stores the device status 1 in D70

Stores the device status 2 in D71

Stores the extended device status in D72

Stores the system status in D73

Stores the current speed in D75

Stores the current value in D77

Stores the deviation in D79

Stores the system operation time in D81

Stores the special input port in D83

Stores the zone status in D84

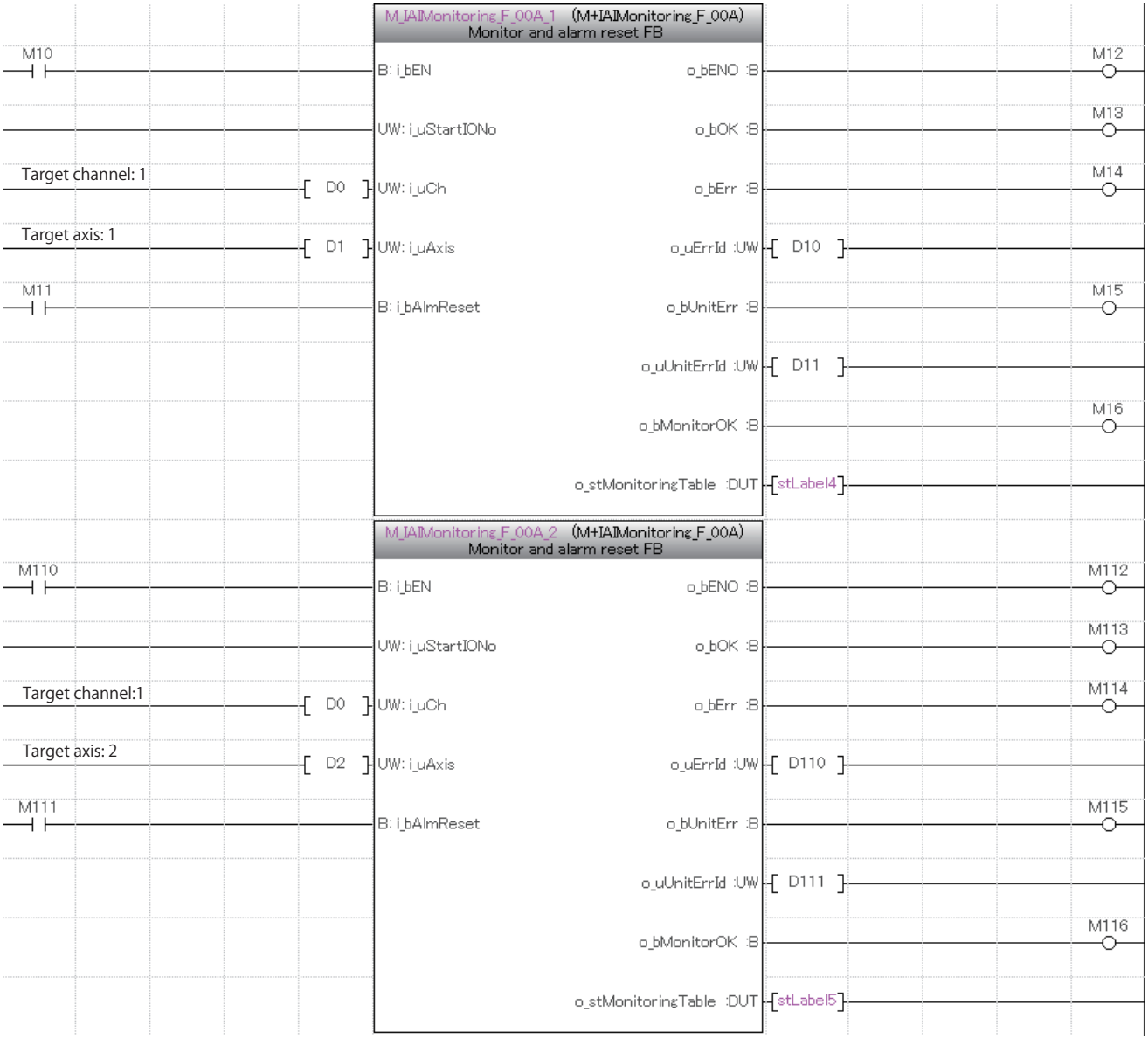
Stores the positioning complete position No. status/ Running program No. in D85

Stores the expansion system status in D86


M160
MOV stLabel5.uAlmDetailCode D160
MOV stLabel5.uAlmAddress D161
MOV stLabel5.uAlmCode D162
DMOV stLabel5.udAlmTime D163
DMOV stLabel5.dCurrentPosition D165
MOV stLabel5.uCurrentAlmCode D167
MOV stLabel5.uInputPort D168
MOV stLabel5.uOutputPort D169
MOV stLabel5.uStatus1 D170
MOV stLabel5.uStatus2 D171
Data in stLabel5
MOV stLabel5.uExtendedDeviceStatus D172
DMOV stLabel5.udSystemStatus D173
DMOV stLabel5.dCurrentSpeed D175
DMOV stLabel5.dElectricCurrentValue D177
DMOV stLabel5.dDeviation D179
DMOV stLabel5.udSystemOpeTime D181
MOV stLabel5.uSpecialInputPort D183
MOV stLabel5.uZoneStatus D184
MOV stLabel5.uDoneOrRunProgramNo D185
MOV stLabel5.uExpansionSystemStatus D186
Stores the alarm detail code in D160
Stores the alarm address in D161
Stores the alarm code in D162
Stores the alarm occurrence time in D163
Stores the current position monitor in D165
Stores the currently occurring alarm code in D167
Stores the input port in D168
Stores the output port in D169
Stores the device status 1 in D170
Stores the device status 2 in D171
Stores the extended device status in D172
Stores the system status in D173
Stores the current speed in D175
Stores the current value in D177
Stores the deviation in D179
Stores the system operation time in D181
Stores the special input port in D183
Stores the zone status in D184
Stores the positioning complete position No. status/ Running program No. in D185
Stores the expansion system status in D186

Resetting the alarm that has occurred in the IAI controller

When an alarm code is stored in D62 or D162, the alarm that has occurred in the IAI controller is reset by M+IAIMonitoring_F (Operation monitor) by turning on i_bAlmReset (Alarm reset).



■Redefining local labels

When the above program examples are copied and pasted, the function blocks and local labels stLabel4 and stLabel5 become undefined.

For details on how to redefine function blocks, refer to the following.

☞ Page 57 How to Use the Program Copy Function of e-Manual

The method for redefining local labels stLabel4 and stLabel5 is explained in the following.

☞ Page 42 Redefining local labels

6 TROUBLESHOOTING

6.1 Checking Procedure

This section describes how to check the status of the programmable controller and the IAI controller.

Checking the LED status

Check the communication status with the LEDs of the programmable controller and IAI controller.

Item	Reference
Programmable controller	Page 54 Checking the LED status
IAI controller	Page 55 Checking the LED status

Checking the error code

Check the following depending on the error code of the error that has occurred in the programmable controller or the IAI controller.

Item	Reference
Programmable controller	Page 54 Checking the error details
IAI controller	📖Manual for the IAI controller being used

■Checking the wiring

Check that the Ethernet cables are fully inserted.

☞ Page 9 System Configuration

■Checking the communication settings

Check the content of the parameter settings on GX Works3 against the parameter settings of the IAI controller.

Item	Reference
Programmable controller	Page 18 Parameter Settings
IAI controller	Page 16 Parameter Settings

■Checking the programs

Check that the programs are created as shown in the program examples.

☞ Page 33 PROGRAM EXAMPLE

6.2 Checking the Programmable Controller

Checking the LED status

Check the programmable controller status with the LED.

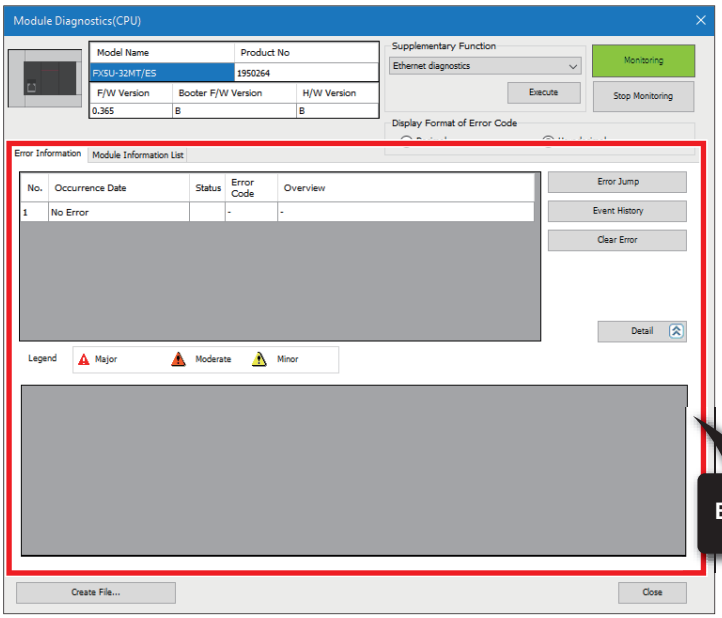
Normal communications: Flashes at high speed.

Faulty communications: ON (Flicks at regular interval.)

Disconnection of Ethernet cable of the programmable controller: OFF

Checking the error details

On the toolbar of GX Works3, select [Diagnostics] ⇨ [Module Diagnostics (CPU Diagnostics)]. The error details of the programmable controller can be checked.



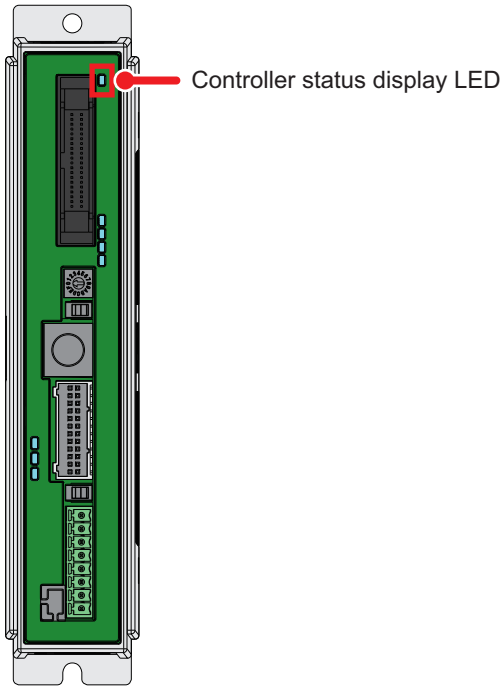
For details on troubleshooting and error codes, refer to the following.

📖MELSEC iQ-F FX5 User's Manual (Application), Appendix 3 Error Code

6.3 Checking the IAI Controller

Checking the LED status

Check the LED status of the IAI controller.



For the LED indications of the IAI controller, refer to the following.

☞ Page 15 Part Names

For details on error codes, refer to the following.

📖Manual for the IAI controller being used

APPENDIX

Appendix 1 List of FBs for Predefined Protocol Support for Positioning

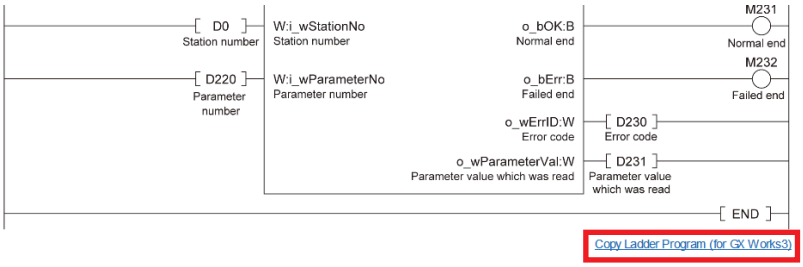
The following table lists the FBs included in the FB library for Predefined Protocol Support for Positioning. Programs are created by combining FBs according to each application.

Name	Description
M+IAIStartHomePositioning_F	Executes the home position return.
M+IAIJogInching_F	Performs the JOG operation or inching operation.
M+IAIReadPositioningTable_F	Reads the specified position table data.
M+IAISetPositioningTable_F	Sets the specified position table data.
M+IAIStartPositioning_F	Starts the positioning operation.
M+IAIMonitoring_F	Monitors the current position and alarms, and performs the alarm reset.
M+IAIServoContorol_F	Controls the servo ON/OFF.

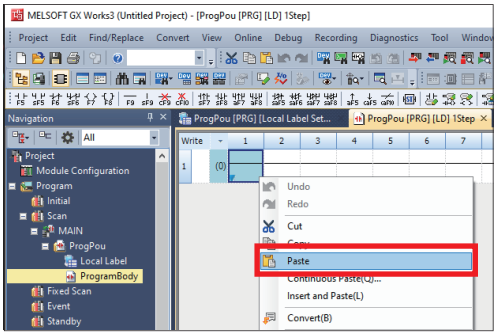
Appendix 2 How to Use the Program Copy Function of e-Manual

Program examples in e-Manual can be copied and pasted to GX Works3.

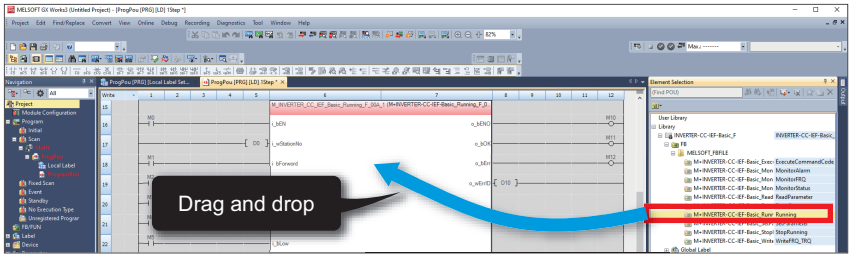
1. Click "Copy Ladder Program (for GX Works3)" in e-Manual.



2. Right-click the mouse on the ladder editor of GX Works3, and select [Paste].



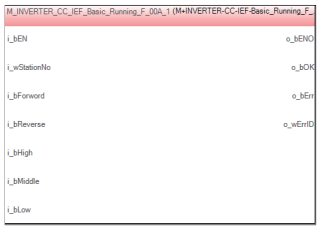
3. The copied program is pasted in undefined state. Select the FB used in the program example from [Library] on the "Element Selection" window, and drag and drop it to the FB area on the ladder editor.



Point

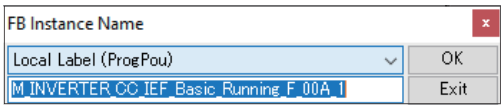
When an FB is used in the program example, the definition of the FB will be unclear immediately after the program is pasted to the ladder editor. Drag and drop the FB from the "Element Selection" window to define the FB properly.

Unclear definition of FB

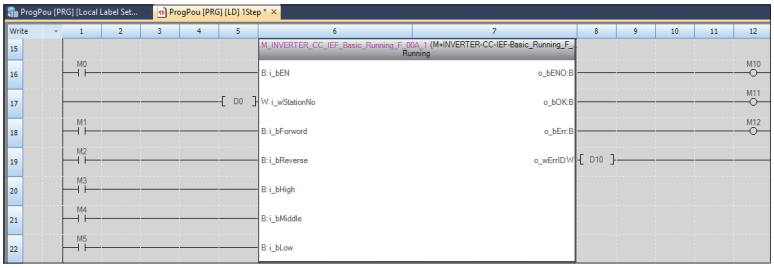


Properly defined FB

4. Click the [OK] button on the "FB Instance Name" window.

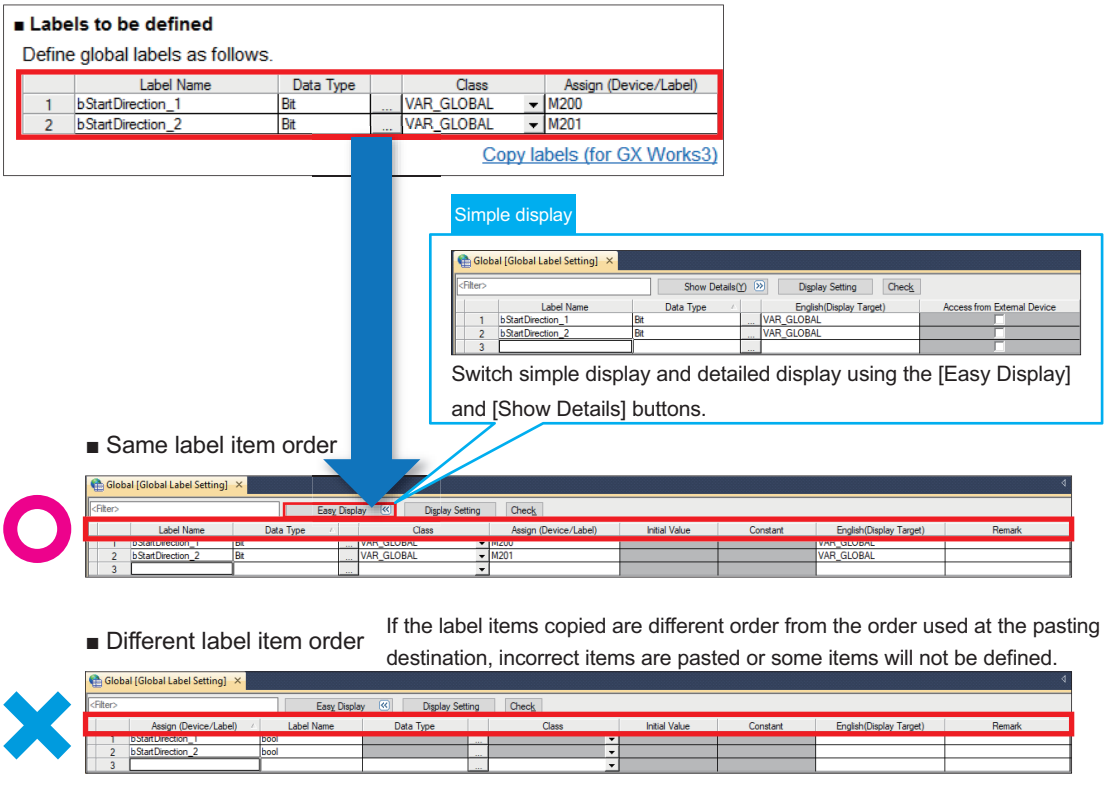


5. When the FB is properly defined, the FB instance name is highlighted in gray.



Point

Label items (label name, data type, and others) are copied in the order defined as an example in this manual. Therefore, define label items in the same order as shown on the label editor of the engineering tool.



A

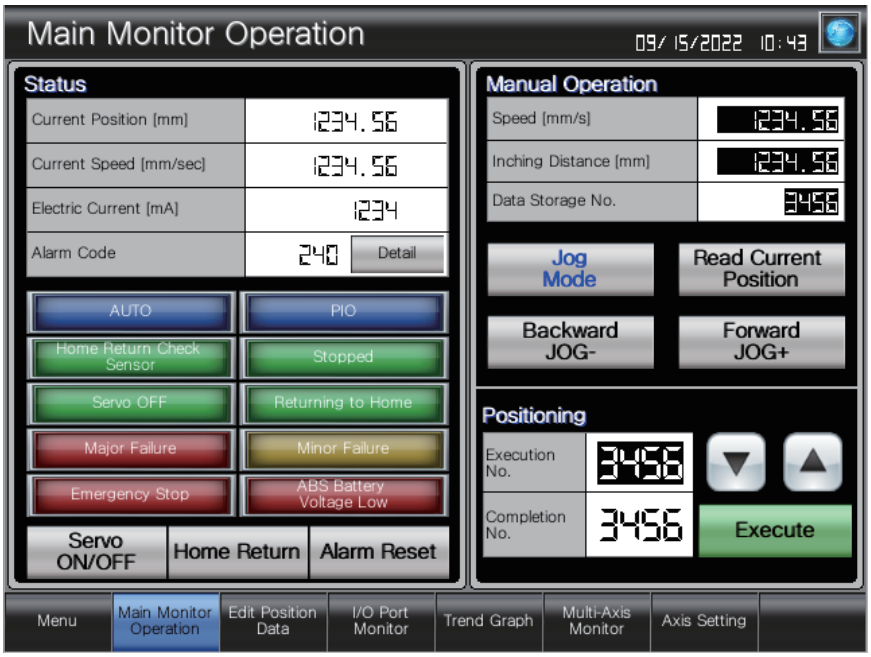
Appendix 3 GOT2000 Series Connection Sample Windows

Making a direct connection with GOT and using a sample window for monitoring and changing the current values or setting values of an IAI controller reduces the working hours for creating a GOT display window and contributes to the connection with an IAI controller.

The applicable models are as follows.

- PCON series
- ACON series
- SCON series

For information on sample windows for connecting GOT2000 and each controller, please contact your local Mitsubishi Electric representative.



MEMO

REVISIONS

Revision date	Version	Description
October 2022	A	First edition

WARRANTY

Please confirm the following product warranty details before using this product.

MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware), WARRANTY

Manuals for the IAI controller and ROBO Cylinder being used, Warranty

SAFETY PRECAUTIONS

- Before using the product introduced in this manual, please read the manuals for the product carefully to handle the product correctly.
- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, please contact Mitsubishi Electric sales office.
- The product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions into the system.
- For design, wiring, and other precautions, read "SAFETY PRECAUTIONS" in the relevant manuals.

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