

ETHERNET/IP CONFIGURATION ROBOT AS ADAPTER SUPPLEMENT

FOR CONTROLLOGIX/COMPACTLOGIC PLC, YRC1000micro

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

YRC1000micro READ FIRST SAFETY REQUIREMENTS
YRC1000micro INSTRUCTIONS
YRC1000micro OPERATOR'S MANUAL (for each purpose)
YRC1000micro MAINTENANCE MANUAL
YRC1000micro ETHERNET/IP COMMUNICATION, STD LAN PORT MANUAL

The YRC1000micro operator's manual above corresponds to a specific usage. Make sure to use the appropriate manual.

Part Number: 185733-1CD
Revision: 0

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Safety



WARNING

- Read and understand Chapter 1 “Safety” of the Controller manual before reading this manual.

The Safety chapter of the controller manual is intended to review general items relating to safety. Not reading and understanding the Safety chapter of the controller manual may result in death or serious injury.

- Read and understand this supplement completely before installing and operating.

This supplement is intended to explain this application. Not understanding this supplement may result in death or serious injury.

Summary of Warning Information

This supplement is provided to help users establish safe conditions for operating the equipment. Specific considerations and precautions are also described in the supplement, but appear in the form of Danger, Warning, Caution, and Notice.

It is important that users operate the equipment in accordance with this supplement and any additional information provided by Yaskawa. Address any questions regarding the safe and proper operation of the equipment to Customer Support.

Notes for Safe Operation

Read this supplement carefully before installing, operating, maintenance, or inspections.

In this supplement, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, or “NOTICE”.



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.



CAUTION

Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

NOTICE

NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol is used to indicate a message not related to personal injury.

“CAUTION(s)” may result in a serious accident in some situations.



WARNING

- Do not remove the motor, and do not release the brake.

Failure to observe these safety precautions may result in death or serious injury from unexpected turning of the manipulator's arm.



WARNING

- Before operating the Manipulator, make sure servo power is OFF by pressing the EMERGENCY STOP button.
When servo power is OFF, the SERVO ON LED on the Programming Pendant is OFF.

Injury or damage may result if the emergency stop circuit cannot stop the Manipulator during an emergency. The Manipulator should not be used if the EMERGENCY STOP button(s) do not function.

Fig. : EMERGENCY STOP Button



- Once releasing the EMERGENCY STOP button, clear the cell of all items which could interfere with the operation.
Then turn the servo power ON.

Injury may result from unintentional or unexpected Manipulator motion.

Fig. : Release of EMERGENCY STOP Button



- Observe the following precautions when performing a teaching operation within the manipulator's operating range:
 - Be sure to perform lockout by putting a lockout device on the safety fence when going into the area enclosed by the safety fence. In addition, the operator of the teaching operation must display the sign that the operation is being performed so that no other person closes the safety fence.
 - View the Manipulator from the front whenever possible.
 - Always follow the predetermined operating procedure.
 - Always keep in mind emergency response measures against the manipulator's unexpected movement toward a person.
 - Ensure a safe place to retreat in case of emergency.

Failure to observe this instruction may cause improper or unintended movement of the Manipulator, which may result in personal injury.

- Confirm that no person is present in the manipulator's operating range and that the operator is in a safe location before:
 - Turning ON Controller power
 - Moving the manipulator using the programming pendant
 - Running the system in the TEACH mode
 - Performing automatic operations

Personal injury may result if a person enters the manipulator's operating range during operation. Immediately press an EMERGENCY STOP button whenever there is a problem.

- Read and understand the Explanation of the Warning Labels before operating the manipulator.



WARNING

- Maintenance and inspection must be performed by specified personnel.
Failure to observe this caution may result in electric shock or injury.
- For disassembly or repair, contact Customer Support



CAUTION

- Read and understand the Explanation of Warning Labels in all included instructions before operating.
 - Some drawings in this manual, protective covers or shields are removed to show details. Make sure all covers and shields are installed properly before operating. The drawings and photos in this supplement are representative examples and differences may exist between them and the delivered product.
- Yaskawa is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modifications will void the product warranty.
- Perform the following inspection procedures prior to conducting Manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
 - Check for problems with Manipulator movement.
 - Check for damage to insulation and sheathing of external wires.

CAUTION

- Always return the Programming Pendant to the hook on the cabinet of the controller after use.
- The Programming Pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

NOTICE

- The drawings and photos in this supplement are representative examples and differences may exist between them and the delivered product.
- Yaskawa may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the part number will also be revised.
- If your copy of the supplement is damaged or lost, contact Customer Support to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the part number listed on the front cover.
- To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” or “CAUTION”.

Programming, Operation, and Maintenance Safety



CAUTION

- Anyone working near the system must become familiar with the operation of this equipment.

Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this equipment should be permitted to program, or maintain the system. All personnel involved with the operation of the equipment must understand potential dangers of operation.

- Inspect the equipment to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place. Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Check the EMERGENCY STOP button(s) for proper operation before programming. The equipment must be in emergency stop (E-Stop) mode whenever it is not in use.
- Back up all programs and jobs onto suitable media before program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- Any modifications to the controller unit can cause severe personal injury or death, as well as damage to the robot. Do not make any modifications to the controller unit. Making any changes without the written permission from Yaskawa will void the warranty.
- Some operations require a standard passwords and some require special passwords.
- The equipment allows modifications to the software for maximum performance. Care must be taken when making modifications. All modifications made to the software will change equipment operations and can cause severe personal injury or death, as well as damage parts of the system. Double check all modifications under every mode of operation to ensure that the changes have not created hazards or dangerous situations.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections.
- Do not perform any maintenance before reading and understanding the proper procedures in the appropriate instructions.
- Use proper replacement parts.
- Improper connections can damage the equipment. All connections must be made within the standard voltage and current ratings of the equipment.

Safeguarding Tips



CAUTION

All operators, programmers, maintenance personnel, supervisors, and anyone working near the system must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this equipment, the operator's instructions, the system equipment, and options and accessories should be permitted to operate this equipment.

- Improper connections can damage the equipment. All connections must be made within the standard voltage and current ratings of the equipment.
- The system must be placed in Emergency Stop (E-Stop) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06-2012, section 4.2.5, Sources of Energy, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

Mechanical Safety Devices



CAUTION

The safe operation of this equipment is ultimately the users responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06-2012 safety standards, and other local codes that may pertain to the installation and use of this equipment.

Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety equipment is provided as standard:

Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety equipment is provided as standard:

- Safety barriers
- Door interlocks
- EMERGENCY STOP button

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

Maintenance Safety



WARNING

- Turn the power OFF, disconnect and lockout/tagout all electrical circuits before making any modifications or connections.

Perform only the maintenance described in this manual. Maintenance other than specified in this manual should be performed only by Yaskawa-trained, qualified personnel.

National Safety Standard

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012). You can obtain this document from the Robotic Industries Association (RIA) at the following address:

Robotic Industries Association
900 Victors Way
P.O. Box 3724
Ann Arbor, Michigan 48106
TEL: (734) 994-6088
FAX: (734) 994-3338
www.roboticsonline.com

Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment.

NEVER ALLOW UNTRAINED PERSONNEL TO OPERATE, PROGRAM, OR REPAIR THE EQUIPMENT!

We recommend approved Yaskawa training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Definition of Terms Used Often in This Manual




The MOTOMAN is the Yaskawa industrial robot product.

The MOTOMAN usually consists of the Manipulator, Controller, Programming Pendant, and supply cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
YRC1000micro controller	Controller
YRC1000micro programming pendant	Programming pendant
Robot	Manipulator
Cable between the manipulator and the controller	Manipulator cable
Rockwell CompactLogix PLC or Rockwell ControlLogix PLC	PLC

Descriptions of the Programming Pendant keys, buttons, and displays are shown as follows:

Equipment	Manual Designation
Programming Pendant	Character Keys The keys which have characters printed on them are denoted with []. ex. [ENTER]
	Symbol Keys The keys which have a symbol printed on them are not denoted with [] but depicted with a small picture. ex. PAGE key  The Cursor is an exception, and a picture is not shown.
	Axis Keys Numeric Keys “Axis Keys” and “Numeric Keys” are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them. ex. SHIFT key  +COORD key 
	Mode Key Three kinds of modes that can be selected by the mode key are denoted as follows: REMOTE, PLAY, or TEACH
	Button Three buttons on the upper side of the programming pendant are denoted as follows: HOLD button START button EMERGENCY STOP button
	Displays The menu displayed in the programming pendant is denoted with { }. ex. {JOB}
PC Keyboard	The name of the key is denoted ex. Ctrl key on the keyboard

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.

Customer Support Information

If assistance is needed with any aspect of the system, please contact Customer Support at the following 24-hour telephone number:

(937) 847-3200

Customer Support also has an e-mail address for **routine** technical inquiries, to contact Customer Support through e-mail use the following address:

techsupport@motoman.com

When using e-mail to contact Customer Support, please provide a detailed description of the issue, along with complete contact information. Please allow approximately 24 to 36 hours for a response to the inquiry.



DANGER

- Maintenance and inspection must be performed by specified personnel.

Failure to observe this caution may result in electric shock or injury.

- For disassembly or repair, contact Customer Support.
- Do not remove the motor, and do not release the brake.

Failure to observe these safety precautions may result in death or serious injury from unexpected turning of the Manipulator's arm.

NOTICE

Use e-mail for **routine** inquiries only. If there is an urgent or emergency need for service, replacement parts, or information, contact Customer Support at the telephone number shown above.

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1 Introduction

This supplement guides the user on how to establish EtherNet/IP communication between the Controller and a PLC. The Controller is the adapter in this EtherNet/IP network. The PLC will be the scanner in the network configuration. The Controller and PLC software screen captures provide a guide to the user for a successful configuration. This guide does not address other PLC manufacturers although applying their concepts are similar.

1.1 How to Enable EtherNet/IP?

There are no special hardware requirements when using EtherNet/IP software. The following Yaskawa Motoman part number must be purchased before being able to use the EtherNet/IP software:

Part Number	Description
185230-1	ACCESSORY, ETHERNET/IP, STANDARD LAN PORT, MASTER/SLAVE, YRC1000micro
Varies by package	This option may be included by default with other integrated solutions such as EtherNet/IP enabled.

NOTICE

Yaskawa must enable this accessory. After having the accessory enabled the user is free to do any configuration that is included in this supplement.

1.2 Controller Software

Any software version of the Controller firmware supports the EtherNet/IP communication option after purchasing and having the option enabled.

1.3 Manual References

The following table provides a list of manuals that may be required for reference when configuring the EtherNet/IP communication option.

Part Number	Description
183441-1CD	YRC1000micro Read First Safety Requirements
181274-1CD	YRC1000micro Instructions
181257-1CD	YRC1000micro Operator's Manual
181272-1CD	YRC1000micro Maintenance Manual
181260-1CD	YRC1000micro EtherNet/IP Communication for a Standard LAN Port.

2 Configure Controller in Maintenance Mode

2.1 How to Place Controller in Maintenance Mode

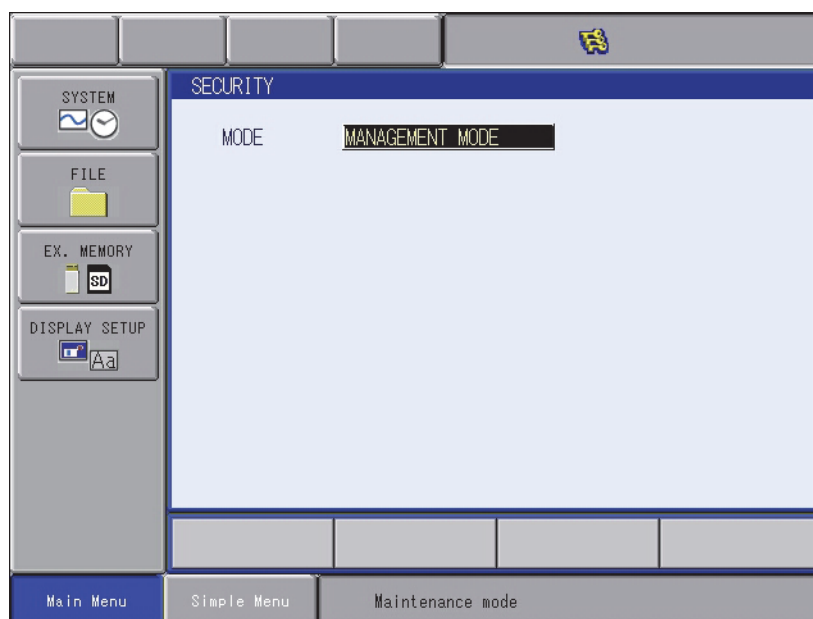
1. Turn the power switch on the Controller to [OFF] and wait five seconds.
2. Press and hold the [MAIN MENU] button on the Programming Pendant while switching the Controller Main Power switch to [ON].
 - a) Release the [MAIN MENU] button once the Programming Pendant beeps, which occurs after the Controller boot screen displays a picture of a robot. (Approximately five seconds)
 - b) Wait for the Controller to boot up and the Programming Pendant to display the "Main Menu".

2.2 Logging into Management Mode while in Maintenance Mode

1. Complete *section 2.1 "How to Place Controller in Maintenance Mode"*
2. Select {SYSTEM} → {SECURITY}
3. Select {MODE} and change to "MANAGEMENT MODE"
4. Enter the "MANAGEMENT MODE" password.

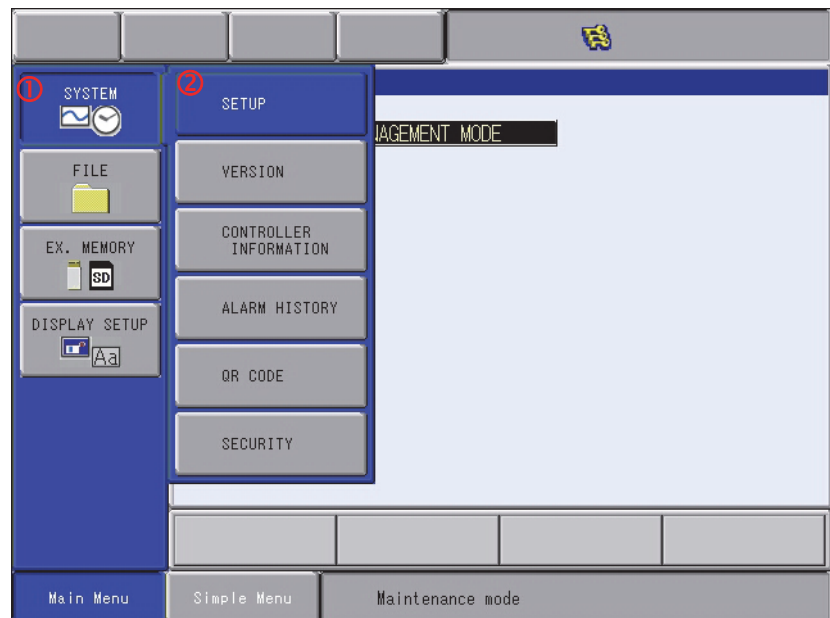
NOTICE

"MANAGEMENT MODE" password is sixteen 9's if the password is still set to the default password from the factory.

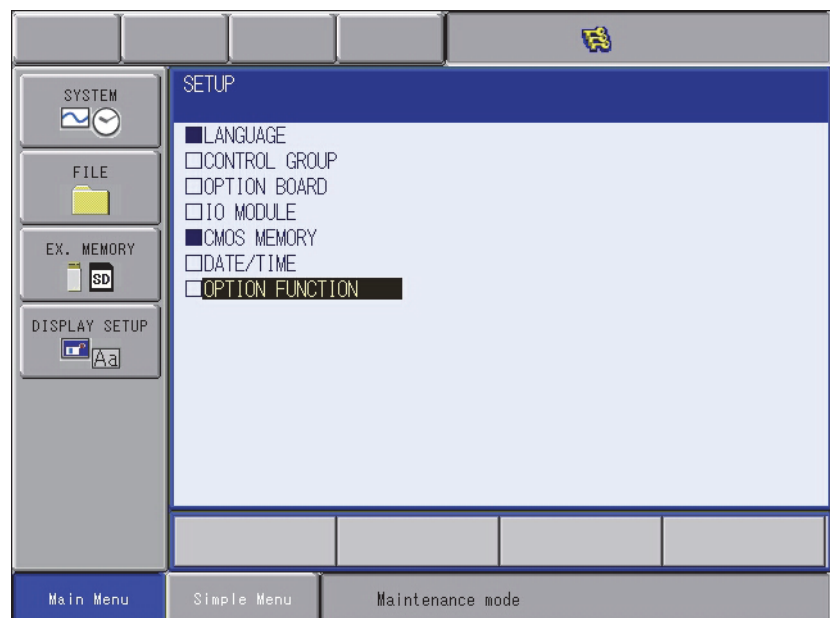


2.3 How to View LAN Interface Settings

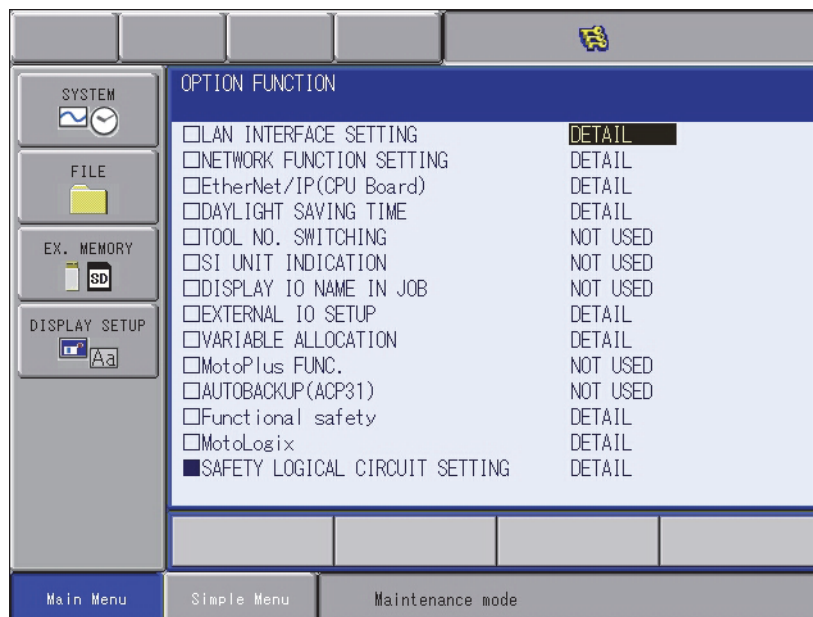
1. Complete section 2.2 “Logging into Management Mode while in Maintenance Mode”.
2. Select: {SYSTEM} → {SETUP} on the Programming Pendant.



3. Select “OPTION FUNCTION” and press [SELECT] on the Programming Pendant.

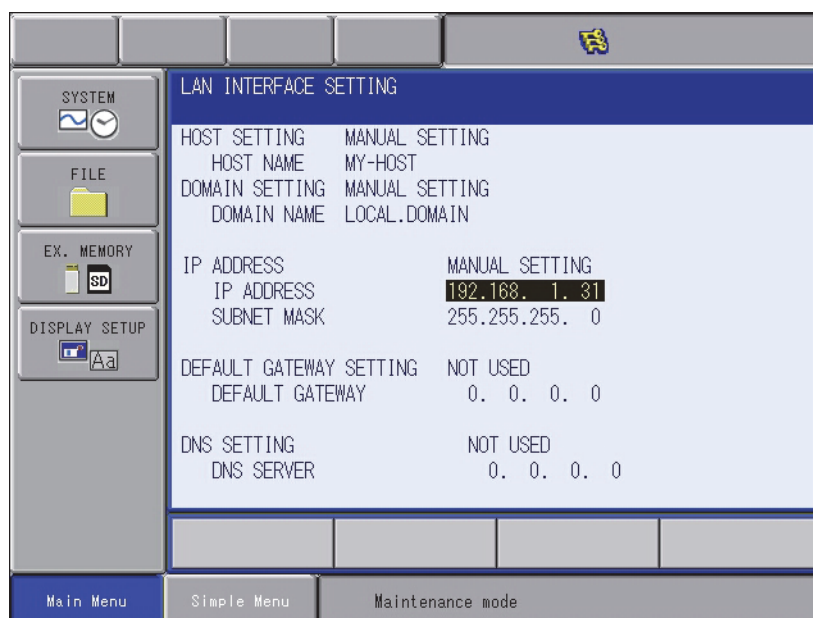


4. Highlight “DETAIL” for “LAN INTERFACE SETTING” and press [SELECT] on the Programming Pendant.



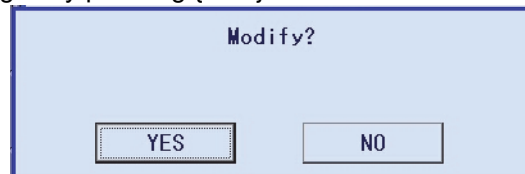
5. Review the following information on the “LAN INTERFACE SETTING” screen:

- Host Settings
- Domain Settings
- Domain Name System (DNS) Setting
- IP Address Settings
- Default Gateway Settings



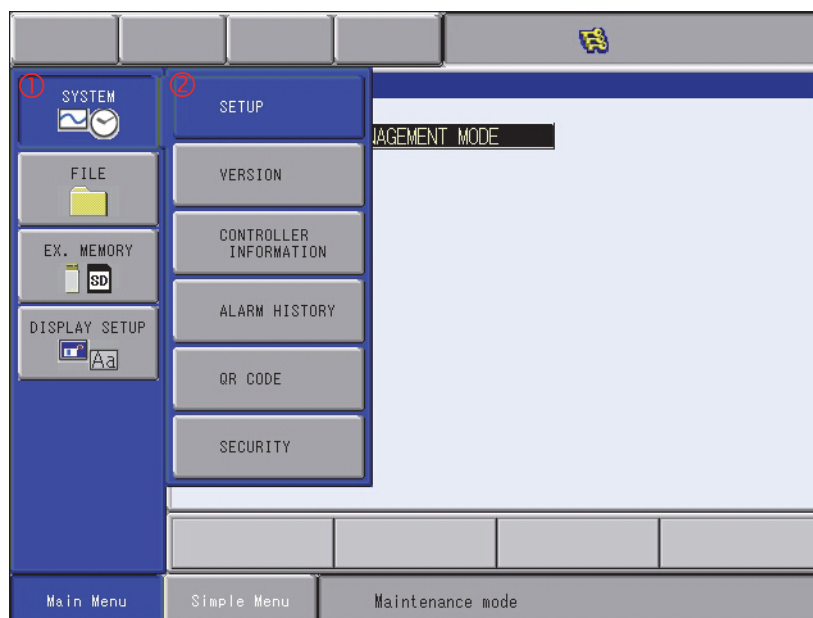
NOTICE

- IP address 192.168.1.31 is the default for the Controller.
- Setting up connections between the Controller and the Program Logic Controller (PLC) requires the IP address.
- EtherNet/IP communications use IP ADDRESS SETTING (LAN2).
- If changing the IP address highlight the IP address, press [SELECT], enter the new value and press [ENTER]. Once changing the IP address a Modify prompt screen will display for confirming the changes by pressing {YES}.

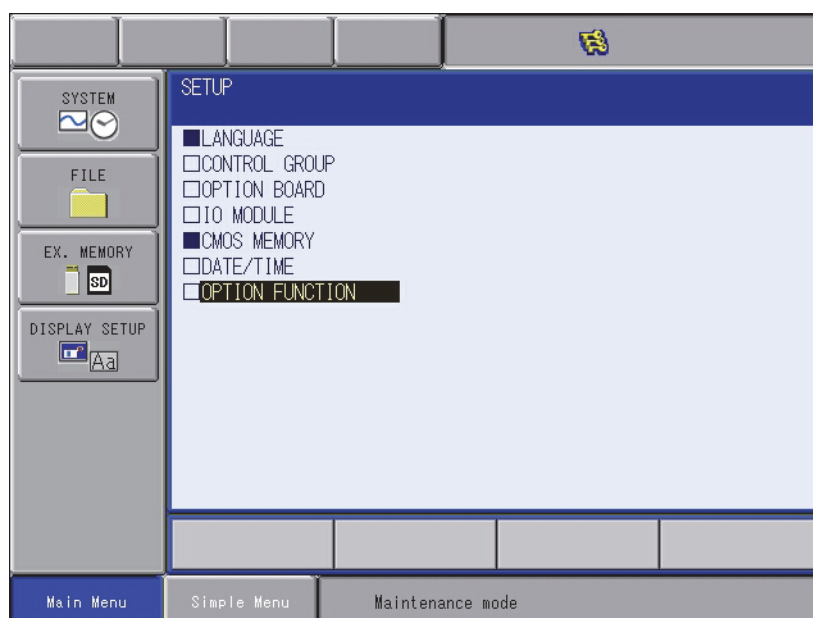


2.4 How to View EtherNet/IP (CPU Board) Settings

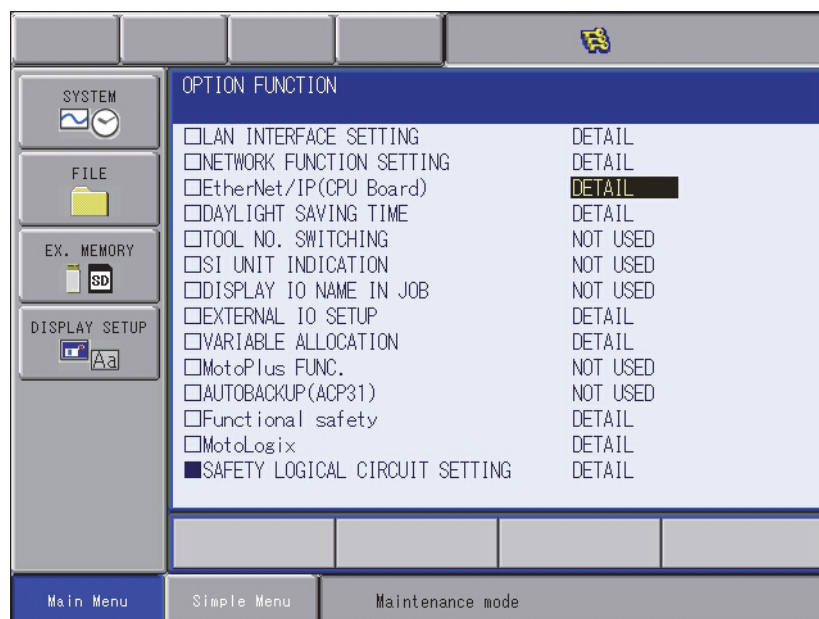
1. Complete section 2.2 “Logging into Management Mode while in Maintenance Mode”.
2. Select: SYSTEM → SETUP using the touchscreen on the Programming Pendant.



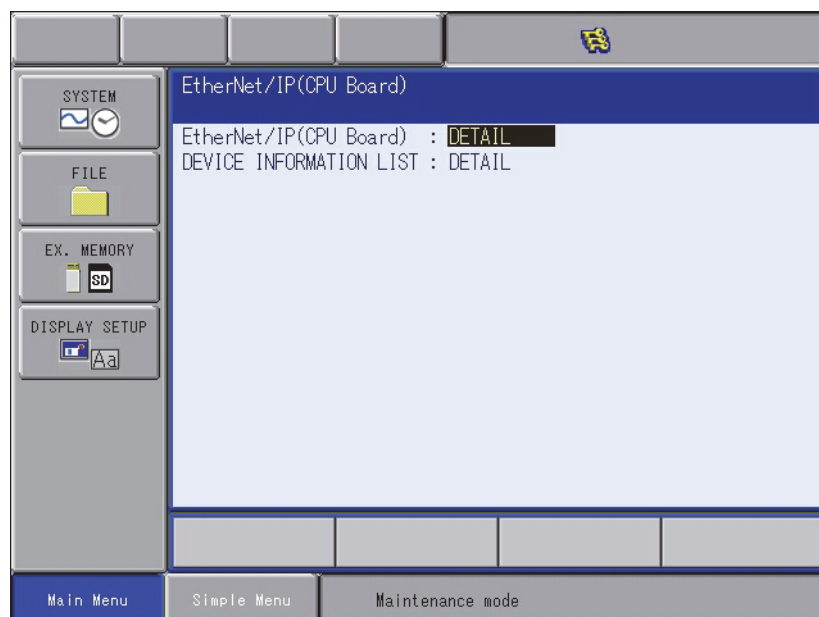
3. Select “OPTION FUNCTION” and press the [SELECT] on the Programming Pendant.



4. While In the “OPTION FUNCTION” menu, select “EtherNet/IP (CPU Board)” and press [SELECT].

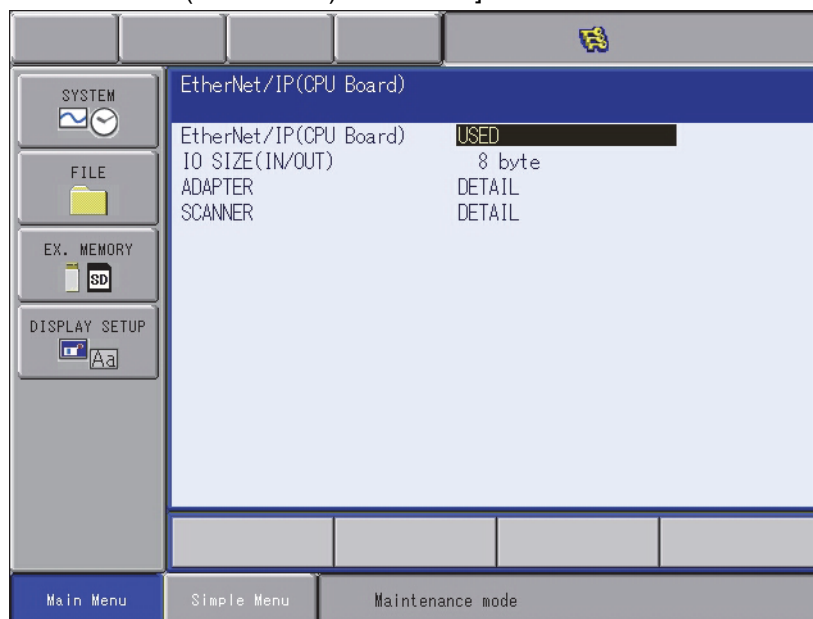


5. With “DETAIL” of “EtherNet/IP(CPU Board)” highlighted, press [SELECT].



6. Confirm the EtherNet/IP(CPU Board) setting:

- EtherNet/IP(CPU Board) → = USED]



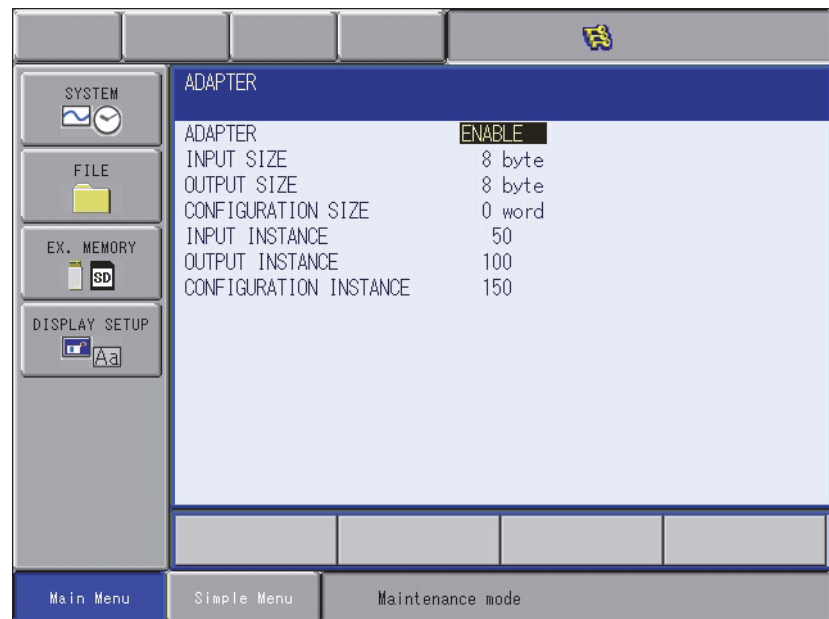
NOTICE

The settings are recommended defaults and normally are set when the system arrives.

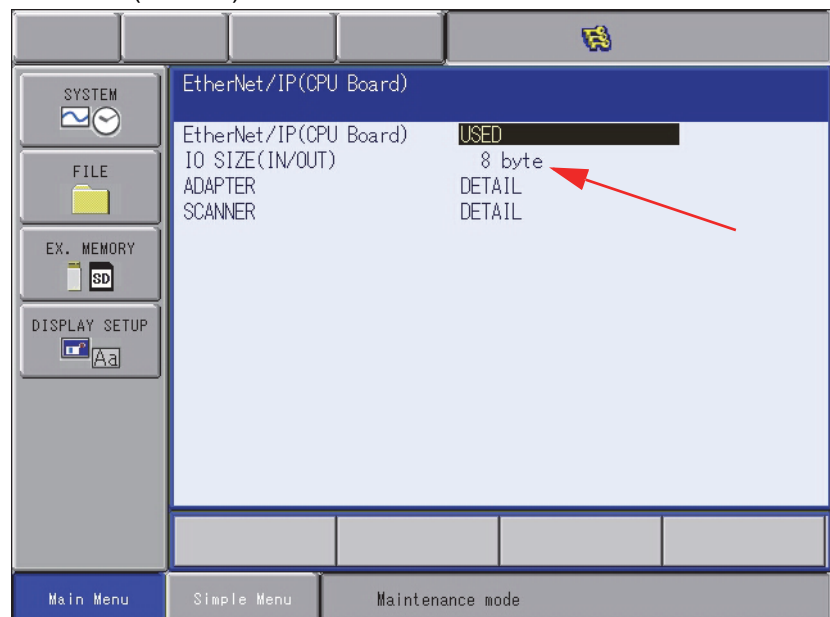
7. Confirm the ADAPTER settings. Highlight “DETAIL” next to ADAPTER and press the [SELECT] key.

Suggested Default Settings:

- ADAPTER = ENABLE
- INPUT SIZE = 8 byte
- OUTPUT SIZE = 8 byte
- CONFIGURATION SIZE = 0 word
- INPUT INSTANCE = 50
- OUTPUT INSTANCE = 100
- CONFIGURATION INSTANCE = 150



8. Press [ENTER] to register the changes and return to the previous screen.
9. Confirm that the EtherNet/IP (CPU Board) screen shows "8 byte" for "IO SIZE(IN/OUT)".

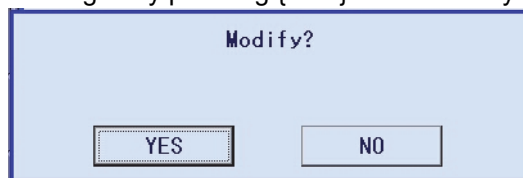


NOTICE

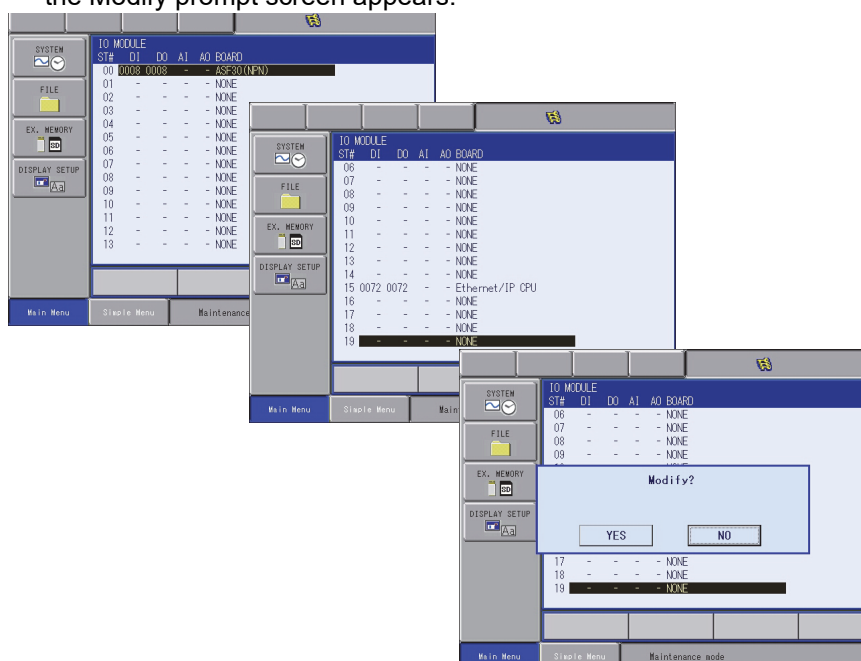
If the Controller is also configured with a SCANNER setting, the "IO SIZE (IN/OUT)" may show more than 8 bytes. This supplement does not cover details concerning the SCANNER settings, it is intended to achieve basic functionality between the Controller and PLC.

2.4.1 How to Modify EtherNet/IP (CPU Board) Settings

1. Refer to section 2.4 “How to View EtherNet/IP (CPU Board) Settings”.
2. Select the item needing changed and press [SELECT].
3. Enter the new value and press [ENTER].
4. Confirm the changes by pressing {YES} on the Modify prompt screen.

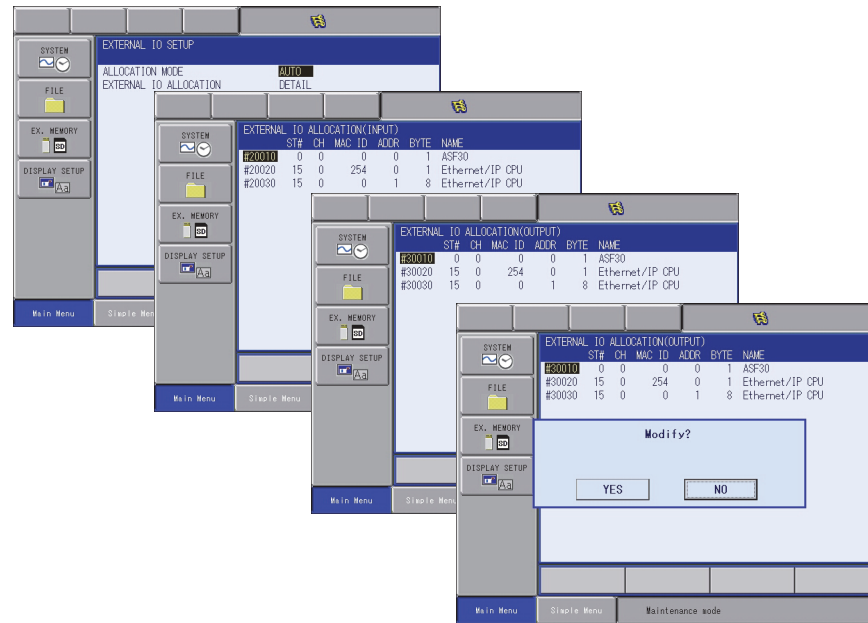


5. Press the [ENTER] button observing the “IO MODULE” screens until the Modify prompt screen appears.



6. Confirm the changes by pressing {YES} on the Modify? prompt screen.

7. Press and release the [ENTER] button on the Programming Pendant observing the “EXTERNAL IO” scenes until the Modify? prompt screen appears.



8. Confirm the changes by pressing {YES} on the Modify prompt screen.

NOTICE

EtherNet/IP communication will not operate in Maintenance Mode and must be restarted in normal Operation Mode.

2.5 Restarting Controller in Normal Operation Mode

Restart the Controller in Normal Operation Mode.

2.5.1 Power Reset

1. Cycle the Main Disconnect from OFF to ON

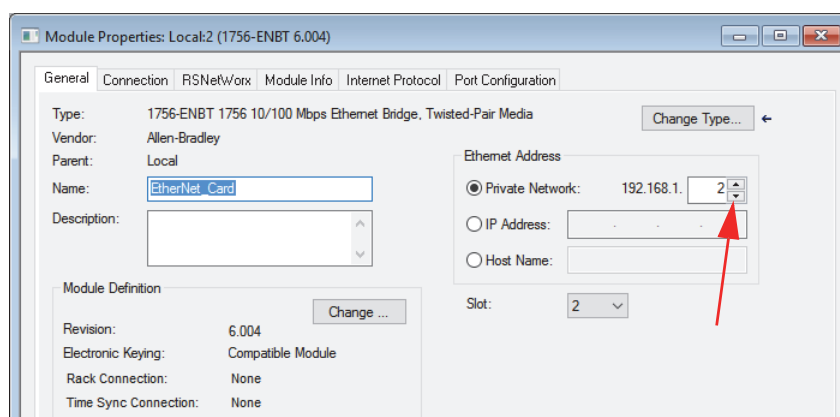
3 Configuring the PLC

Before beginning to configure the PLC complete *Chapter 2 “Configure Controller in Maintenance Mode”*

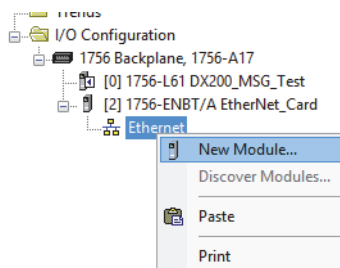
1. Add an EtherNet card to the PLC by right clicking on the card and selecting “Properties.”
2. Set the Private Network Ethernet Address to the IP Address as the Controller. See *section 2.4 “How to View EtherNet/IP (CPU Board) Settings” on page 2-5*

NOTICE

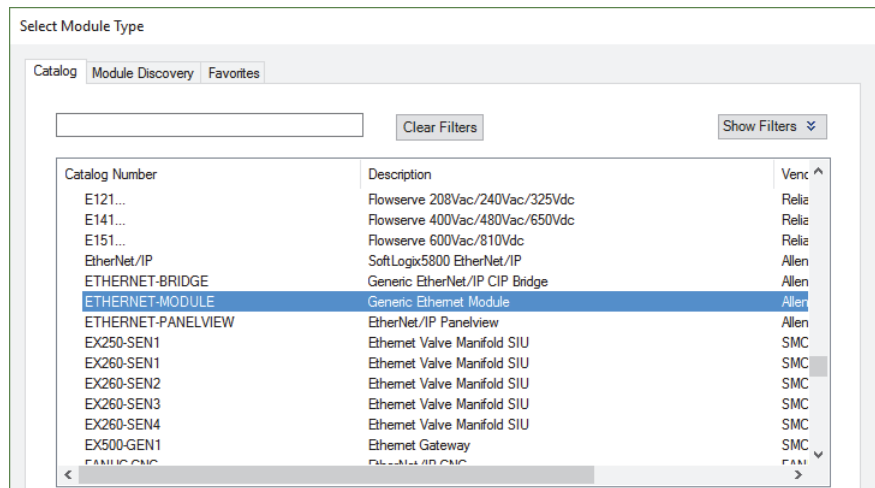
This configuration uses the 1756-ENBT card and has the network set to 192.168.1.2.



3. Add the Module to the EtherNet network.
 - a) Through Project Explorer on the left hand side right click on the EtherNet card to see the menu below, then select “New Module...”. For example:



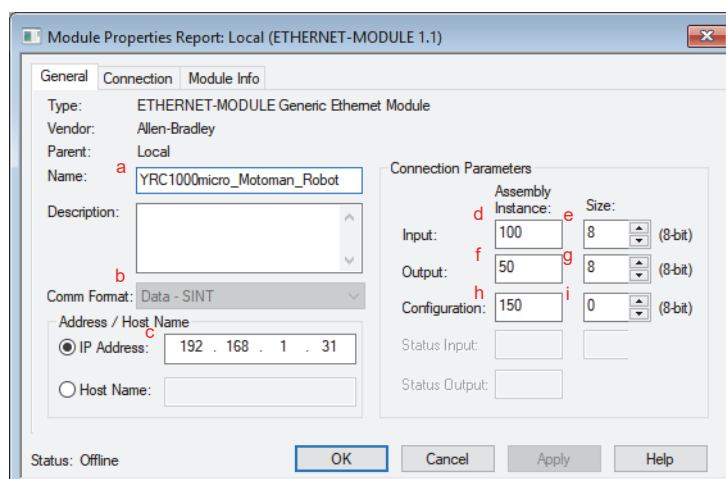
- b) Select the {ETHERNET-MODULE} from the module list.



4. Set up the PLC module properties to match corresponding values already set in the Controller.
- Enter a name for the PLC module being created. In this example "YRC1000micro_Motoman_Robot" is used.
 - Set the "Comm Format" to "Data - SINT" - this will result in an 8 bit (1 byte) data size. (This is the data size the Controller uses.)
 - Set the "Address" to the IP address of the controller. See *section 2.3 "How to View LAN Interface Settings" on page 2-2*.
 - Set the "Input Assembly Instance" equal to "OUTPUT INSTANCE" in the Controller.
 - Set the "Input Size" equal to the "OUTPUT SIZE" of the Controller.
 - Set the "Output Assembly Instance" equal to "INPUT INSTANCE" in the Controller.
 - Set the "Output Size" equal to the "INPUT SIZE" of the Controller.
 - Set the "Configuration Assembly Instance" equal to the "CONFIGURATION INSTANCE" in the Controller.
 - Set the "Configuration Size" to 0.

NOTICE

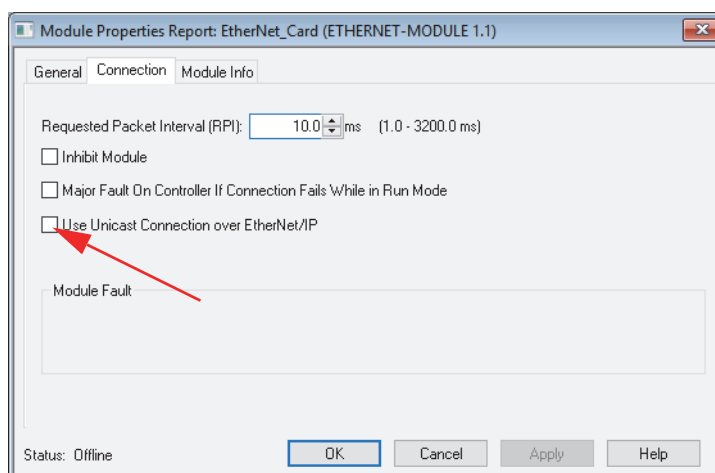
- Selecting something other than "Data - SINT" is a common error when setting up this connection.
- Refer to *section 2.4 "How to View EtherNet/IP (CPU Board) Settings" on page 2-5* for more details concerning *step d* through *step h*.
- The "Configuration Assembly Instance" must be greater than 0, even though the "Configuration Size" is 0.



5. Uncheck [Use Unicast Connection over EtherNet/IP] if using RSLogix Version 18.00.00 or greater. If using Studio 5000 always uncheck this option.

NOTICE

RSLogix Versions earlier than 18.00.00 does not have “Unicast Connection over the EtherNet/IP” and can be ignored.



6. Save all settings by selecting Save from the File Menu on the PLC software.
7. Download the project to the Controller.
8. Go online and verify that communication is occurring.

9. The data exchange will occur in the data structure “YRC1000micro_Motoman_Robot” - which is the name defined in *step 4*. The input and output will be defined as arrays of eight elements of SINTs.

	Name	Value	Force Mask	Style	Data Type
	YRC1000micro_Motoman_Robot.C	{...}	{...}		AB.ETHERNET_MODULE.C:0
	YRC1000micro_Motoman_Robot.I	{...}	{...}		AB.ETHERNET_MODULE_SINT_8Bytes.I:0
	YRC1000micro_Motoman_Robot.I.Data	{...}	{...}	Decimal	SINT[8]
INPUTS	YRC1000micro_Motoman_Robot.I.Data[0]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.I.Data[1]	2		Decimal	SINT
	YRC1000micro_Motoman_Robot.I.Data[2]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.I.Data[3]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.I.Data[4]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.I.Data[5]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.I.Data[6]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.I.Data[7]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O	{...}	{...}		AB.ETHERNET_MODULE_SINT_8Bytes.O:0
	YRC1000micro_Motoman_Robot.O.Data	{...}	{...}	Decimal	SINT[8]
OUTPUTS	YRC1000micro_Motoman_Robot.O.Data[0]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O.Data[1]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O.Data[2]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O.Data[3]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O.Data[4]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O.Data[5]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O.Data[6]	0		Decimal	SINT
	YRC1000micro_Motoman_Robot.O.Data[7]	0		Decimal	SINT

10. The next section will help with testing the Manipulator and PLC communication.

4 Configuration Testing

Before beginning to test the configurations make sure to complete *Chapter 3 “Configuring the PLC”*.

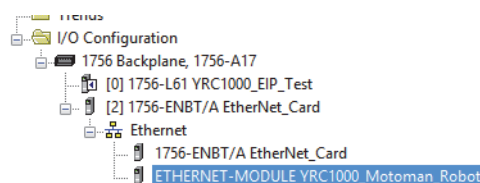
4.1 Checking PLC Software Functional Communication

■ OK

- The status light is solid. All devices and EtherNet/IP communication is functioning per the definition in the project. This is a view from the “Online” module within the PLC: (There will also be an I/O LED on the PLC CPU hardware)



- No warning in the device tree.

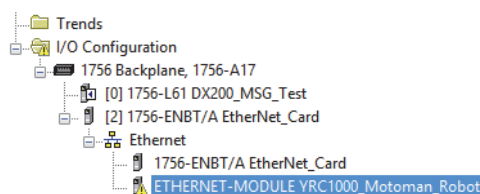


■ No Good

- If the status light is blinking, then something is not working, it could be the Manipulator communication or it could be some other equipment. This indicator is for overall status, but will not necessarily identify issues with EtherNet/IP. Below is a view from the “Online” module within the PLC: (There will also be an I/O LED on the PLC CPU hardware)



- The device tree shows warning triangles.



4.2 Checking Controller for Status Byte Communication Errors

1. Select: "IN/OUT" → "EXTERNAL INPUT" on the Programming Pendant.

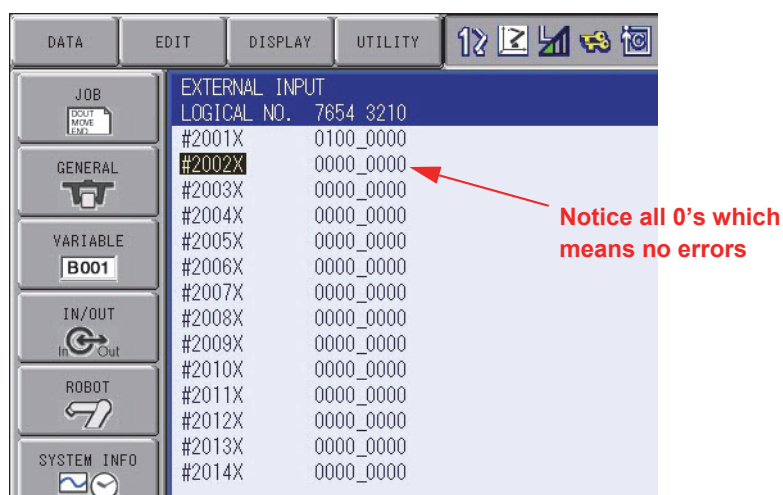
- #20020 is the start of a status byte.

–0 = OK

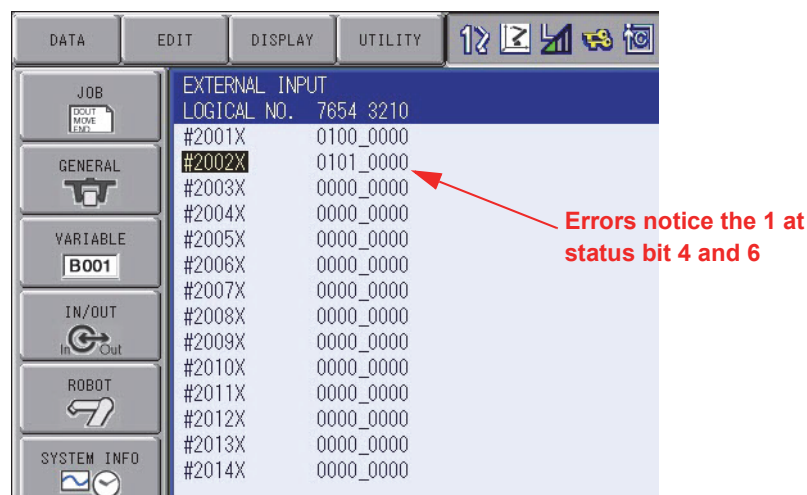
–1 = Error

Bit	Description
#20024	Error in Adapter Communication
#20025	Error in Scanner Communication
#20026	Communication Status Failed
#20027	Board Status

- Communication OK. All zeros in status byte = success



- In this example the EtherNet cable is disconnected between the PLC and the Controller to show a communication failure.



- #20024 = 1 = Error in Adapter Communication
- #20026 = 1 = Communication Status Failed

4.3 EtherNet/IP Only Communication Standard Addresses

When EtherNet/IP is the only communication option installed (no other boards), it is known that the standard addresses correspond as follows:

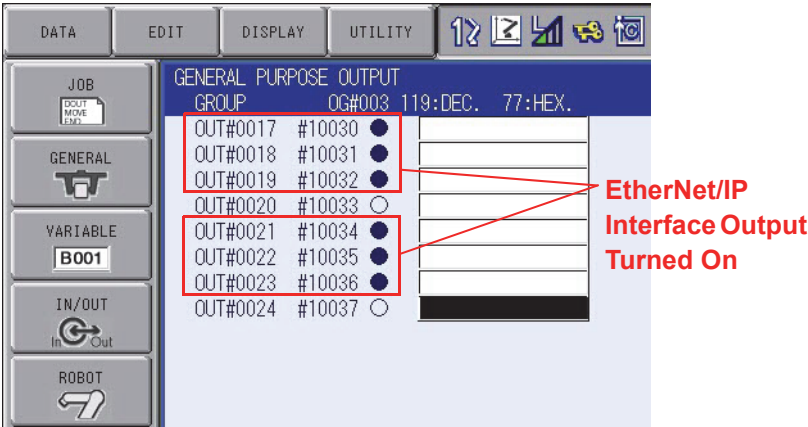
Usage	Size (Bytes)	External Input or Output Starting Address	External Input or Output Ending Address	User I/O Starting	User I/O Ending
Status Byte	1	#20020	#20027	IN 9	IN 16
Reserved	1	#30020	#30027	OUT 9	OUT 16
Inputs	8	#20030	#20107	IN 17	IN 80
Outputs	8	#30030	#30107	OUT 17	OUT 80

4.4 Verifying Robot Controller Outputs with PLC Inputs

1. Select: “IN/OUT” → “GENERAL PURPOSE INPUT” on the Programming Pendant.

Controller Outputs

Observe the first four outputs for the EtherNet/IP interface are turned on.
(The addresses and output numbers correspond to the table in *section 4.3 “EtherNet/IP Only Communication Standard Addresses”*.)



PLC Inputs

Verify the first four inputs on the PLC are on.

- ON = 1 under “Value”
- OFF = 0 under “Value”

Name	Value	Force Mask	Style	Data Type
YRC1000micro_Motoman_Robot.I	{...}	{...}		AB:ETHERNET_MODULE_SINT_8Bytes:1:0
YRC1000micro_Motoman_Robot.I.Data	{...}	{...}	Decimal	SINT[8]
YRC1000micro_Motoman_Robot.I.Data[0]	119		Decimal	SINT
YRC1000micro_Motoman_Robot.I.Data[0].0	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[0].1	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[0].2	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[0].3	0		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[0].4	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[0].5	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[0].6	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[0].7	0		Decimal	BOOL
YRC1000micro_Motoman_Robot.I.Data[1]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.I.Data[2]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.I.Data[3]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.I.Data[4]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.I.Data[5]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.I.Data[6]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.I.Data[7]	0		Decimal	SINT

NOTICE

Confirm the outputs on the Controller are equal to the inputs on the PLC.

4.5 Verifying PLC Outputs with Controller Inputs

■ PLC Outputs

Set the first two outputs to off and the next four outputs on for the EtherNet/IP interface.

Name	Value	Force Mask	Style	Data Type
YRC1000micro_Motoman_Robot.O	{...}	{...}		AB:ETHERNET_MODULE_SINT_8Bytes.O:0
YRC1000micro_Motoman_Robot.O.Data	{...}	{...}	Decimal	SINT[8]
YRC1000micro_Motoman_Robot.O.Data[0]	51		Decimal	SINT
YRC1000micro_Motoman_Robot.O.Data[0].0	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[0].1	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[0].2	0		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[0].3	0		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[0].4	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[0].5	1		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[0].6	0		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[0].7	0		Decimal	BOOL
YRC1000micro_Motoman_Robot.O.Data[1]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.O.Data[2]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.O.Data[3]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.O.Data[4]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.O.Data[5]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.O.Data[6]	0		Decimal	SINT
YRC1000micro_Motoman_Robot.O.Data[7]	0		Decimal	SINT

EtherNet/IP
Output Interface
Turned On

EtherNet/IP
Output Interface
Turned Off

■ Controller Inputs

- Select: "IN/OUT" → "GENERAL PURPOSE INPUT" on the Programming Pendant.

- Verify the first two inputs on the Controller are off and the next four inputs are on.

GENERAL PURPOSE INPUT			
GROUP	IG#003	51:DEC.	33:HEX.
IN#0017	#00030	<input checked="" type="checkbox"/>	
IN#0018	#00031	<input checked="" type="checkbox"/>	
IN#0019	#00032	<input type="checkbox"/>	
IN#0020	#00033	<input type="checkbox"/>	
IN#0021	#00034	<input checked="" type="checkbox"/>	
IN#0022	#00035	<input checked="" type="checkbox"/>	
IN#0023	#00036	<input type="checkbox"/>	
IN#0024	#00037	<input type="checkbox"/>	

EtherNet/IP Input
Interface Turned Off

EtherNet/IP Input
Interface Turned On

NOTICE

Confirm the inputs on the Controller are equal to the outputs on the PLC.

Appendix A

A.1 Notes on Configurations

- (1) The steps and parameters in this supplement are for a successful EtherNet/IP integration and communication solution.
- (2) This supplement shows 8 bytes of input data and 8 bytes of output as a starting point for data exchange. Some configurations require smaller or larger quantities of input and output data. For those circumstances make the appropriate adjustments to both the PLC and Controller steps.
- (3) When requiring an IP address outside the subnet 192.168.1.*** make the appropriate changes on the PLC, Controller, or other networking equipment.
- (4) In addition to the status byte on the Controller, it is typical to add a “heart beat” between the Controller and PLC to detect when communication has failed. This logic is left to the end user.
- (5) After establishing communication, it is often desirable to “map” some specific input and output signals from the Controllers Concurrent I/O (ladder) to the PLC. This guide does not cover these operations, but various support groups at YASKAWA can assist.

ETHERNET/IP CONFIGURATION ROBOT AS ADAPTER SUPPLEMENT

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