

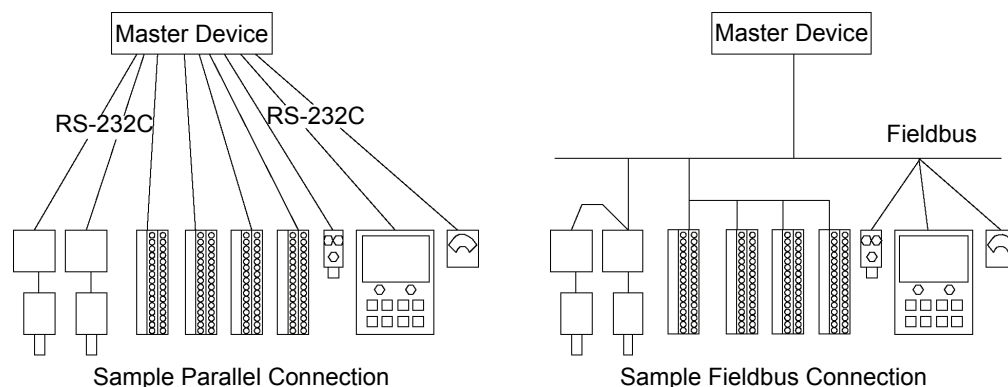
12.3 Fieldbus I/O Board

12.3.1 Overview of Fieldbus I/O

The Fieldbus I/O option is an option to add fieldbus slave function (DeviceNet, PROFIBUS-DP, CC-Link, EtherNet/IP) to the robot Controller.

A fieldbus is a standard of signal communications between field devices operating in a factory (sensor, actuator, robot controller, etc.) and controller (PLC or robot controller) using serial communications. Compared to signal communications using analog signals, a fieldbus has the following features:

- Access to signals from multiple devices and multiple data from each device using one cable.
- Precise signal transmission since there is no need for A/D conversion and D/A conversion.
- Less wiring costs, including signal relay board costs and installation area due to several dozen (or a hundred) devices connected on one fieldbus.
- More flexible modification and expansion of a system because multiple devices are simply added to one fieldbus without additional wiring.
- Slave devices can transmit self-diagnostics information.



Fieldbus slave function can be added to the RC170 / RC180 Controller. For each fieldbus on the controller, there is one board installed. You cannot use more than one fieldbus type on the same controller.

For master device transmission, up to 256 inputs and 256 outputs are available with Fieldbus I/O.



Response times for Fieldbus I/O can vary and depend on several factors, including baud rate, scan rate, number and types of devices, number of SPEL+ tasks, etc.

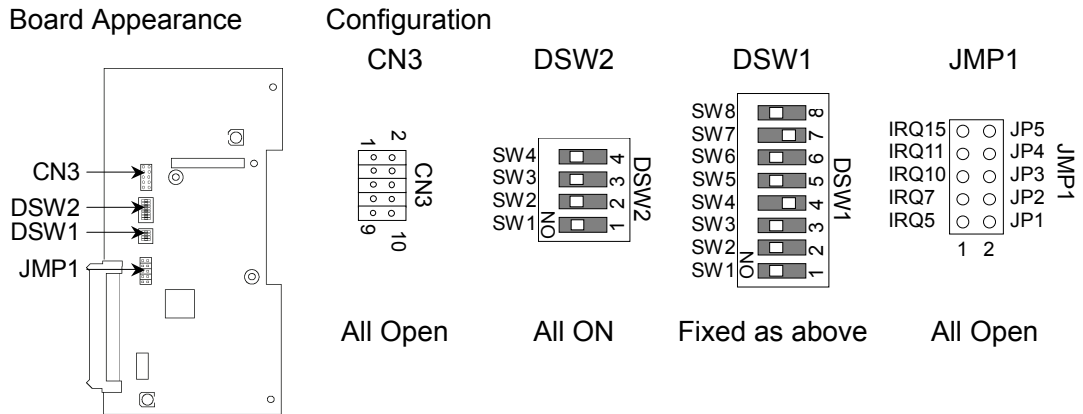
12.3.2 Response Speed of Fieldbus I/O

Fieldbus I/O communicates the I/O status using serial communication. I/O status exchange lag occurs according to the serial communication speed. This exchange lag is also influenced by scan cycle, amount and type of the device, and existence of communication error.

In the RC170 / RC180 Controller, status of the Fieldbus I/O is updated approximately every 30 mS. Although the fieldbus communication speed is fast, response is not available for pulses less than or equal to 30 mS.

12.3.3 Fieldbus I/O Board Configuration

The Fieldbus I/O board is configured as follows at shipment.

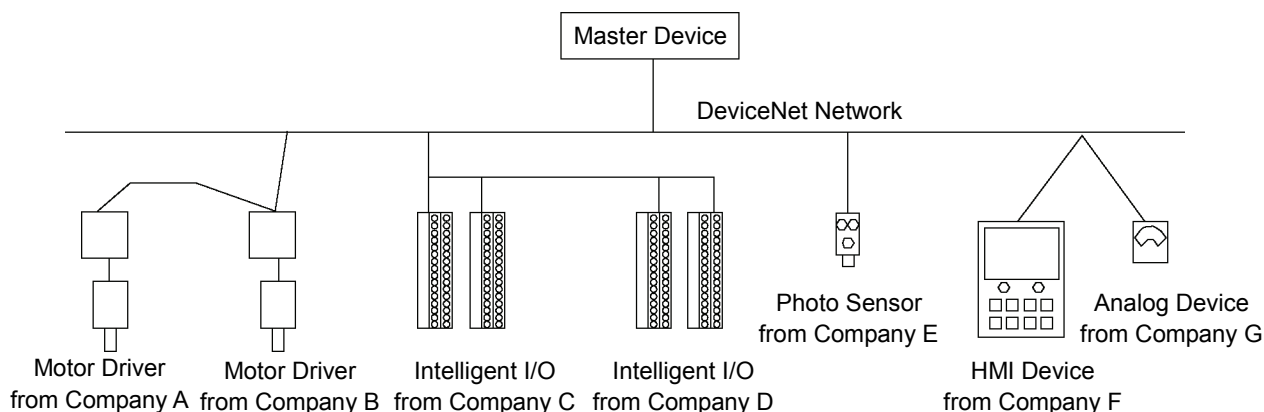


12.3.4 DeviceNet

Overview of DeviceNet

DeviceNet is a fieldbus network that provides easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

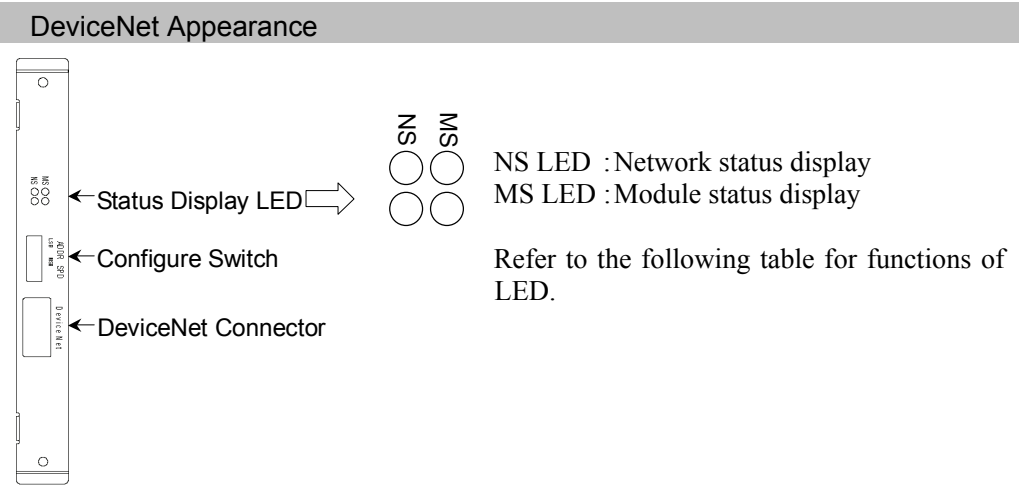
DeviceNet was developed by Allen-Bradley as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, DeviceNet users can easily construct a multi-vendor system with various devices developed around the world.



DeviceNet Communication Specifications

Item	Specification			
Name	DeviceNet board			
Code	R12B040706			
Supported Connection	I/O messaging connection (Polling) DeviceNet communication protocol			
Baud Rates	125 K / 250 K / 500 K (bps)			
Transfer Distance	Baud Rates	Max. Network Length	Drop Length	Total Drop Line Length
	500 K (bps)	100 m	6 m or under	39 m or under
	250 K (bps)	250 m *	6 m or under	78 m or under
	125 K (bps)	500 m *	6 m or under	156 m or under
Cable	5-wire cable dedicated to DeviceNet (2 wires for signal, 2 wires for power supply, 1 shield wire)			
Communications Power Supply Voltage	24 V DC (supplied from a connector)			
Communication Power Supply Current Consumption	Maximum 30 mA			
Mode	Slave			
Interface	1 DeviceNet port			
Connection type	Polling			
Explicit messaging	Not supported			
Input data size	256 bits (32 bytes)			
Output data size	256 bits (32 bytes)			

* When thin cable is used for trunk line, the maximum network length is 100 m.




LED Description of DeviceNet

LED status represents the status of the fieldbus board.

LED status		NS	MS
OFF		Communication power supply OFF Disconnected	Device power supply OFF
GRN	ON	Link OK Online connected	Device operating
	Blinking	Online disconnected	Data size error
RED	ON	Link error	Critical error
	Blinking	Communication time out	Error

Board Installation of DeviceNet

 WARNING	<ul style="list-style-type: none"> Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment.
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Set the baud rates between the MAC address of the device and the master by setting the DeviceNet board configure switch.

- Set the MAC address for DeviceNet board by setting the configure switch. Make sure that the MAC address is different from the other devices in the network. Refer to the following table for the configuration.

MAC address	Switch					
	sw3 (MSB)	sw4	sw5	sw6	sw7	sw8 (LSB)
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	ON	ON
⋮	OFF	OFF	OFF	OFF	OFF	OFF
62	ON	ON	ON	ON	ON	OFF
63 (at shipment)	ON	ON	ON	ON	ON	ON

- (2) Set the DeviceNet baud rate. Check the master configuration and set the same baud rate. Refer to the following table for configuration settings.

Baud Rate	Switch	
	sw1	sw2
125 K	OFF	OFF
250 K	OFF	ON
500 K	ON	OFF
Configuration prohibited	ON	ON

Wiring (DeviceNet)

The DeviceNet connector is a 5 pin open connector. Use the connector attached to the board for wiring.

Terminal name for each pin

Terminal No	Terminal Name
1	V-
2	CAN L
3	SHELD
4	CAN H
5	V+

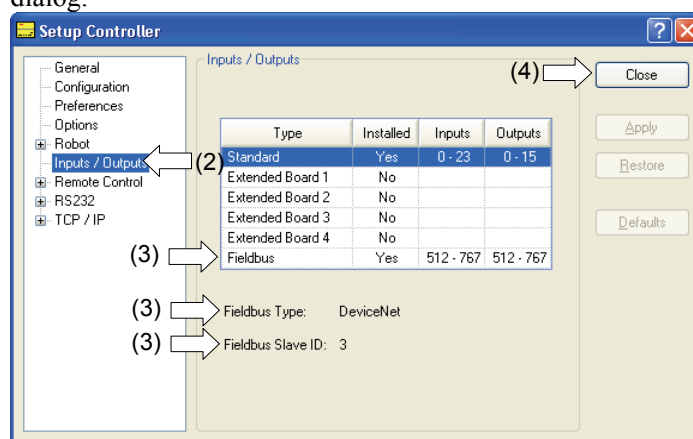


Prepare the cable for DeviceNet sold in the market as a communication cable. Install terminating resistors at both ends of the network.

DeviceNet Confirmation with EPSON RC+ 5.0

When the DeviceNet board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 5.0 has recognized the DeviceNet board using the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select [Inputs / Outputs].
- (3) Make sure that the following are displayed.
- Fieldbus-Installed : Yes
 - Fieldbus Type : DeviceNet
 - Fieldbus Slave ID : (MAC address depending on the setting)
- (4) Click the <Close> button.

Operation

For details, refer to *12.3.8 Operation (DeviceNet, PROFIBUS-DP, EtherNet/IP)*.

Electronic Information File (EDS file)

An EDS file is supplied for DeviceNet network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

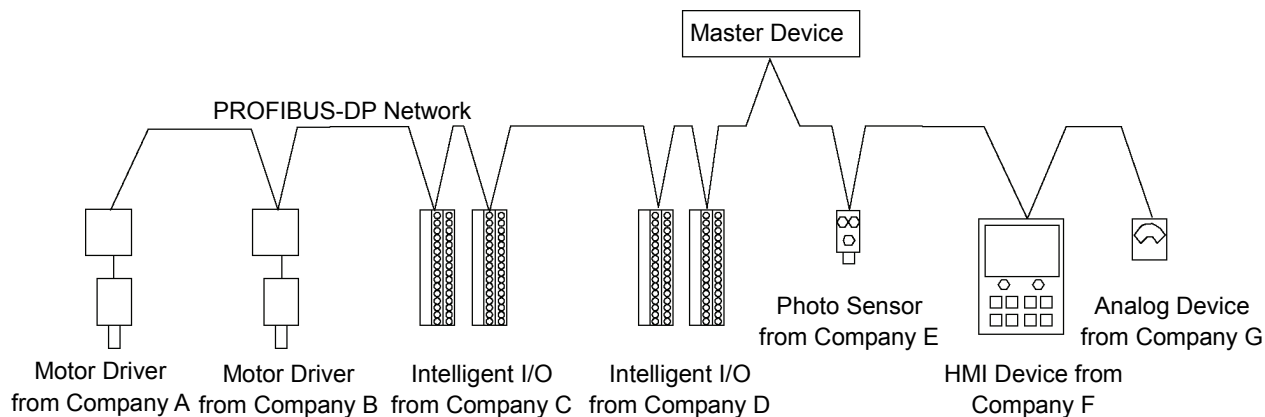
`\EpsonRC50\Fieldbus\DeviceNet`

12.3.5 PROFIBUS-DP

Overview of PROFIBUS-DP

PROFIBUS DP is one of the fieldbus networks that provide easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

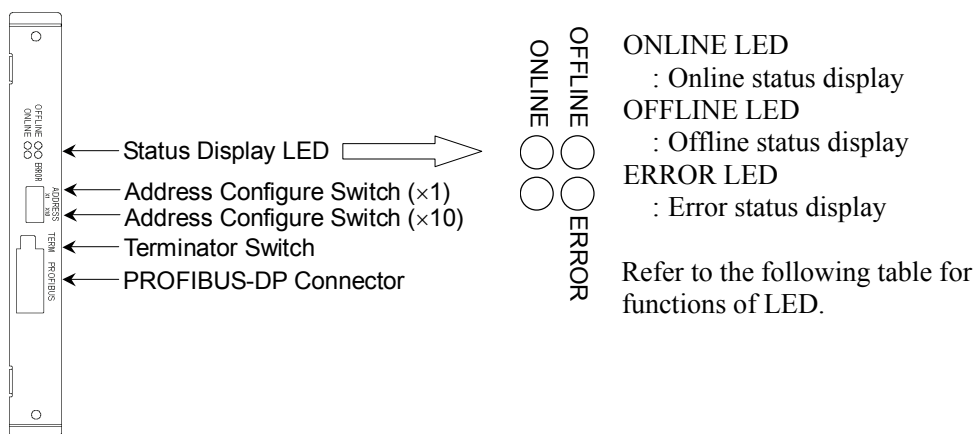
PROFIBUS DP was developed as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, PROFIBUS DP can easily construct multi-vendor system with various devices developed around the world.



PROFIBUS DP Specifications

Item	Specification	
Name	PROFIBUS-DP board	
Code	R12B040707	
Connection Method	Hybrid (token passing procedure and master-slave communication)	
Baud Rates (bps)	9.6 K, 19.2 K, 45.45K, 93.75 K, 187.5 K, 500 K, 1.5 M, 3 M, 6 M, 12 M	
Transfer Distance	Baud Rates	Cable Length
	12 M (bps)	100 m
	6 M (bps)	100 m
	3 M (bps)	100 m
	1.5 M (bps)	200 m
	500 K (bps)	400 m
	187.5 K (bps)	1000 m
	93.75 K (bps)	1200 m
	45.45 K (bps)	1200 m
19.2 K (bps)	1200 m	
9.6 K (bps)	1200 m	
Maximum Stations	126 (including master unit and repeater)	
Data Length / Frame	244 bytes	
Cable	2-wire cable dedicated to PROFIBUS (2 wires for signal)	
Modes	Slave	
Interface	1 PROFIBUS-DP port (EN 50170)	
Output Current Capacity	Maximum 150 mA	
Input Data Size	256 bits (32 bytes)	
Output Data Size	256 bits (32 bytes)	

Appearance of PROFIBUS-DP



LED Description of PROFIBUS-DP

LED status represents the status of the fieldbus board.

LED status	ONLINE GRN	OFFLINE RED	ERROR RED
OFF	Offline	Online	Normal operation
ON	Online Data exchangeable	Offline Data unexchangeable	–
1 Hz blinking	–	–	Initialization error (Mismatch with network configuration)
2 Hz blinking	–	–	Initialization error (Mismatch with user parameter)
4 Hz blinking	–	–	Initialization error (Module initialization error)

Board Installation of PROFIBUS-DP

WARNING
 ■ Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment.

Set the node address of the device using the address configuration switch of the PROFIBUS-DP board. Set network termination ON or OFF with the terminator switch.

- Set the node address of the PROFIBUS-DP board using the address configuration switch. Make sure that the node address is different from the other devices in the network. Switch on the “×10” side for tens digit address configuration. Switch on the “×1” side for units digit address configuration.



Generally, a node address from 0 to 125 is available for the PROFIBUS-DP device, however, this Controller supports node addresses from 0 to 99.

Generally, node addresses are recommended to be configured as shown in the table.

Node address	Device Name
0	Service unit such as PG/PC
1	Operation panel such as HMI
2	Master station
3-99 (-125)	DP slave station

- Turn network termination ON or OFF using the terminator switch.

Wiring (PROFIBUS-DP)

PROFIBUS-DP connector is standard D-sub 9 pins connector.

Terminal name for each pin

Terminal No	Terminal Name
Case	Shield
1	NC
2	NC
3	B line
4	RTS
5	GND BUS
6	+5V BUS
7	NC
8	A line
9	NC

NOTE


Prepare the cable for PROFIBUS-DP sold in the market as a communication cable.

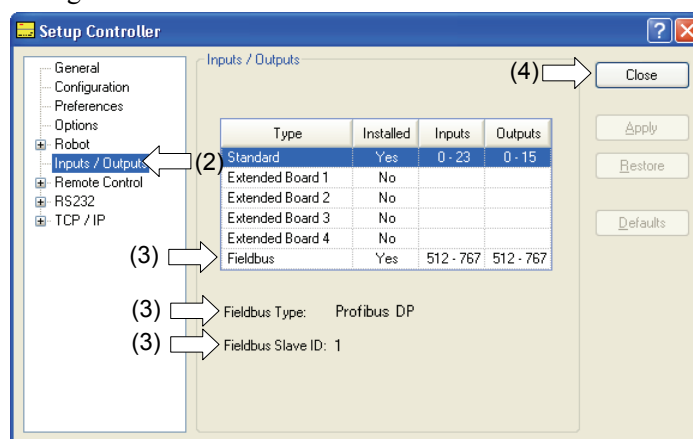
Install terminating resistors at both ends of the network.

A terminating resistor is installed in the PROFIBUS-DP board. Turn the terminating resistor ON or OFF using the terminator switch on the front panel.

PROFIBUS-DP Confirmation with EPSON RC+ 5.0

When a PROFIBUS-DP board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 5.0 has recognized the PROFIBUS-DP board using the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select [Inputs / Outputs].
- (3) Make sure that the following are displayed.

Fieldbus-Installed	: Yes
Fieldbus Type	: Profibus DP
Fieldbus Slave ID	: (depends on the address configure switch)
- (4) Click the <Close> button.

Operation

For details, refer to *12.3.8 Operation (DeviceNet, PROFIBUS-DP, EtherNet/IP)*.

Electronic Information File (GSD file)

A GSD file is supplied for PROFIBUS-DP network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

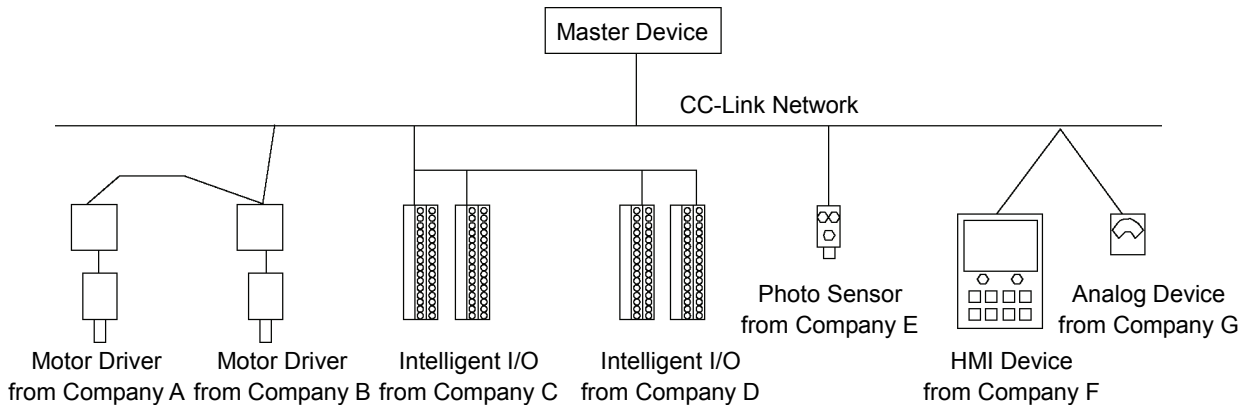
`\EpsonRC50\Fieldbus\Profibus`

12.3.6 CC-Link

Overview of CC-Link

CC-Link is one of fieldbus networks that provide easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

CC-Link was developed as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, CC-Link can easily construct multi-vendor system with various devices developed around the world.



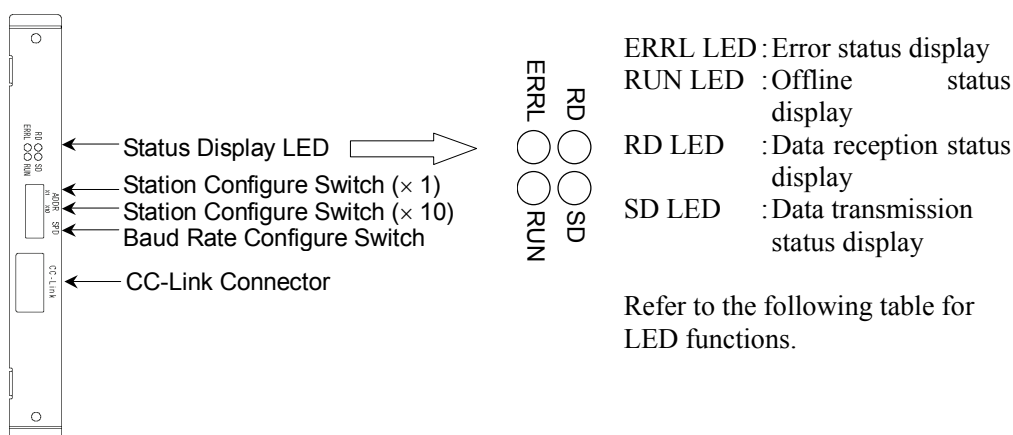
CC-Link Specifications

Item	Specification	
Name	CC-Link board	
Code	R12B040708	
Connection Method	Broadcast polling	
Baud Rates (bps)	156 K, 625 K, 2.5 M, 5 M, 10 M	
Transfer Distance	Baud Rates	Cable Length
	10 M (bps)	100 m
	5 M (bps)	160 m
	2.5 M (bps)	400 m
	625 K (bps)	900 m
156 K (bps)	1200 m	
Maximum Device Volume	64 units	
Cable	Dedicated cable supporting CC-Link Ver.1.10	
Modes	Slave	
Interface	1 CC-Link V1 port	
Occupied stations	3 station fixed	
Input Data Size	256 bits (96 bits + 10 words)*	
Output Data Size	256 bits (96 bits + 10 words)*	

* 16 bits of each system inputs and outputs are reserved. Open data size for user is as follows.

Inputs/Outputs: 80 bits + 10 words

Appearance of CC-Link



LED Description of CC-Link

LED status represents the status of the fieldbus I/O board.

LED status	ERRL RED	RUN GRN	RD GRN	SD GRN
OFF	Normal operation Device power supply OFF	Offline Device power supply OFF	No data reception Device power supply OFF	No data transmission Device power supply OFF
ON	CRC error: station Address error Baud rate configuration error	Normal operation	Data reception	Data transmission
Blinking	—	—	—	—

Board Configuration (CC-Link)

 WARNING	<p>■ Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment.</p>
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Configuration of the device station is available with the station configure switch on the CC-Link board.

Baud rate configuration is available with baud rate configure switch on the CC-Link board.

- Set the station of the CC-Link board with the station configuration switch.
 Make sure that the station does not duplicate with the other devices inside the network at configuration.
 Switches on the ×10 side are for tens place address value configuration. Switches on the ×1 side are for units digit address value configuration. Stations from 1 to 62 are available. CC-Link board occupies three stations. Assign the configured stations +3 stations to the next node.

- (2) Set the CC-Link baud rate. Check the master configuration and set the same baud rate. Refer to the following table for configuration.

Baud Rate	Switch
156 K	0
625 K	1
2.5 M	2
5 M	3
10 M	4
Configuration prohibited	5-9

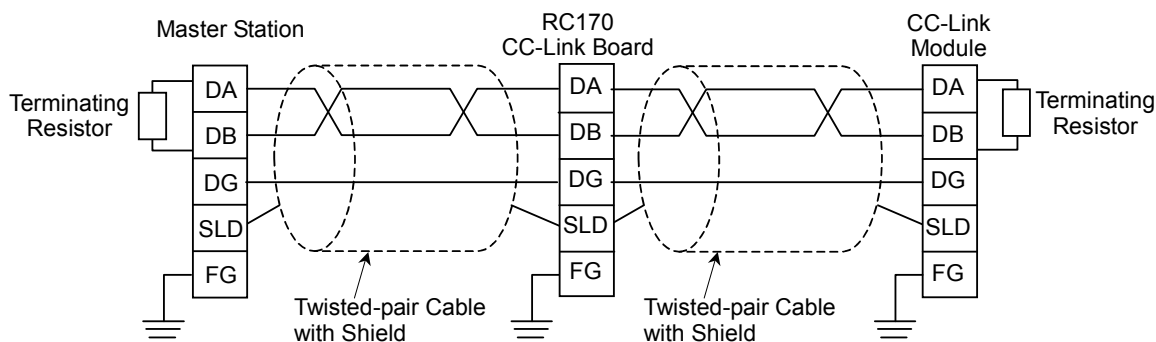
Wiring (CC-Link)

The CC-Link connector is a 5 pin open connector. Use the connector attached to the board for wiring.

Terminal name for each pin

Terminal No	Terminal Name
1	DA
2	DB
3	DG
4	SLD
5	FG

Connect the CC-Link master module and the CC-Link board as follows.



Prepare the cable for CC-Link Ver.1.10 sold in the market as a communication cable.



NOTE Install terminating resistors at both end of the network.

Use the terminating resistor attached to the CC-Link master station.

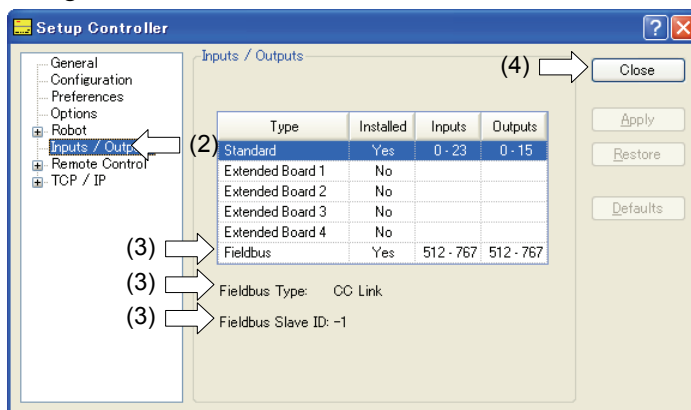
Make sure to disconnect the connectors only after turning OFF the power supply of the specific station.

Connect the shield wire for CC-Link to the “SLD” of each unit and ground the both end via the “FG.”

CC-Link Confirmation with EPSON RC+ 5.0

When CC-Link board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 5.0 has recognized the CC-Link board using the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select [Inputs / Outputs].
- (3) Make sure that the following are displayed.
Fieldbus-Installed : Yes
Fieldbus Type : CC Link
- (4) Click the <Close> button.



For CC-Link, station address cannot be confirmed. “-1” is displayed.

Operation (CC-Link)

When CC-Link is installed, some operation differs from the other Fieldbus I/O options. This section indicates how to operate.

Remote Input

Remote input (RX) and remote output (RY) indicates ON/OFF information. Remote data is bit data and the FROM/TO command is executed per 16 bits (1 word).

“n” in the following tables is address configured as a master station with the station configure. This is calculated by the following expression.

$$n = (\text{Station} - 1) \times 2$$

Result of the calculation is in decimal number. Substitute the result to “n” after converting to hexadecimal number.

(Example)

When CC-Link board station is 1

Remote Input RXn0 to RX(n+5)F → RX00 to RX5F

Remote Output RYn0 to RY(n+5)F → RY00 to RY5F

When CC-Link board station is 4

Remote Input RXn0 to RX(n+5)F → RX60 to RXAF

Remote Output RYn0 to RY(n+5)F → RY60 to RYAF

Remote Input List (3 stations occupied, Default configuration *1)

Signal direction : Remote device station (CC-Link board) → Master station (PLC)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

Address	Signal Name		Controller Bit No
RXn0	Ready	*1	512
RXn1	Start	*1	513
RXn2	Pause	*1	514
RXn3	Error	*1	515

Address	Signal Name		Controller Bit No
RXn4	EStopOn	*1	516
RXn5	SafeguardOn	*1	517
RXn6	SError	*1	518
RXn7	Waning	*1	519
RXn8	MotorOn	*1	520
RXn9	Home	*1	521
RXnA	CurrProg1	*1	522
RXnB	CurrProg2	*1	523
RXnC	CurrProg4	*1	524
RXnD	AutoMode	*1	525
RXnE	TeachMode	*1	526
RXnF	ErrorCode1	*1	527
RX(n+1)0	ErrorCode2	*1	528
RX(n+1)1	ErrorCode4	*1	529
RX(n+1)2	ErrorCode8	*1	530
RX(n+1)3	ErrorCode16	*1	531
RX(n+1)4	ErrorCode32	*1	532
RX(n+1)5	ErrorCode64	*1	533
RX(n+1)6	ErrorCode128	*1	534
RX(n+1)7	ErrorCode256	*1	535
RX(n+1)8	ErrorCode512	*1	536
RX(n+1)9	ErrorCode1024	*1	537
RX(n+1)A	ErrorCode2048	*1	538
RX(n+1)B	ErrorCode4096	*1	539
RX(n+1)C	ErrorCode8192	*1	540
RX(n+1)D	NA		541
RX(n+1)E	NA		542
RX(n+1)F	NA		543
RX(n+2)0	NA		544
:	:		
RX(n+4)F	NA		591
RX(n+5)0	System reservation		592
RX(n+5)1	System reservation		593
RX(n+5)2	System reservation		594
RX(n+5)3	System reservation		595
RX(n+5)4	System reservation		596
RX(n+5)5	System reservation		597
RX(n+5)6	System reservation		598
RX(n+5)7	System reservation		599
RX(n+5)8	Initial data processing request flag	*2	600
RX(n+5)9	Initial data configuration complete flag	*2	601
RX(n+5)A	Error status flag	*2	602
RX(n+5)B	Remote Ready	*2	603
RX(n+5)C	System reservation		604
RX(n+5)D	System reservation		605
RX(n+5)E	System reservation		606
RX(n+5)F	System reservation		607

*1 I/O assignment can be changed or invalid (NA). For details, refer to *EPSON RC+ 5.0 User's Guide 10. Remote Control*.

*2 For details, refer to the *CC-Link flag operation* section.

Remote Output List (3 stations occupied, Default configuration *1)

Signal direction : Master station (PLC) → Remote device station (CC-Link board)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

Address	Signal Name		Controller Bit No
RYn0	Start	*1	512
RYn1	Pause	*1	513
RYn2	Reset	*1	514
RYn3	SelProg1	*1	515
RYn4	SelProg2	*1	516
RYn5	SelProg4	*1	517
RYn6	Stop	*1	518
RYn7	Continue	*1	519
RYn8	MotorOn	*1	520
RYn9	MotorOff	*1	521
RYnA	Home	*1	522
RYnB	NA		523
RYnC	NA		524
RYnD	NA		525
RYnE	NA		526
RYnF	NA		527
RY(n+1)0	NA		528
:	:		
RY(n+4)F	NA		591
RY(n+5)0	System reservation		592
RY(n+5)1	System reservation		593
RY(n+5)2	System reservation		594
RY(n+5)3	System reservation		595
RY(n+5)4	System reservation		596
RY(n+5)5	System reservation		597
RY(n+5)6	System reservation		598
RY(n+5)7	System reservation		599
RY(n+5)8	Initial data processing complete flag	*2	600
RY(n+5)9	Initial data configuration request flag	*2	601
RY(n+5)A	Error reset request flag	*2	602
RY(n+5)B	System reservation		603
RY(n+5)C	System reservation		604
RY(n+5)D	System reservation		605
RY(n+5)E	System reservation		606
RY(n+5)F	System reservation		607

*1 I/O assignment can be changed or invalid (NA). For details, refer to *EPSON RC+ 5.0 User's Guide 10. Remote Control*.

*2 For details, refer to the *CC-Link flag operation* section.

Remote Register

Remote register (RW_r, RW_w) is numeric value

“m” indicated in the following tables are master station address configured with station configure. This is calculated by the following expression.

$$m = (\text{Station} - 1) \times 4$$

Result of the calculation is in decimal number. Substitute the result to “m” after converting to hexadecimal number.

(Example)

When the CC-Link board is 1

Remote Register RW_{rm} to RW_{rm}+B → RW_r0 to RW_rB

Remote Register RW_{wm} to RW_{wm}+B → RW_w0 to RW_wB

When the CC-Link board is 4

Remote Register RW_{rm} to RW_{rm}+B → RW_rC to RW_r17

Remote Register RW_{wm} to RW_{wm}+B → RW_wC to RW_w17

Remote Register List (3 stations occupied, Default configuration *1)

Signal direction : Remote device station (CC-Link board) → Master station (PLC)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

Address	Signal Name	Controller Word No	Controller Bit No
RW _{rm}	NA	38	608 to 623
:	:		
RW _{rm} +9	NA	47	752 to 767
RW _{rm} +A	System reservation	-	-
RW _{rm} +B	System reservation	-	-

Signal direction : Master station (PLC) → Remote device station (CC-Link board)

Bits indicated as “NA” are left for user. Use these free for SPEL+ program.

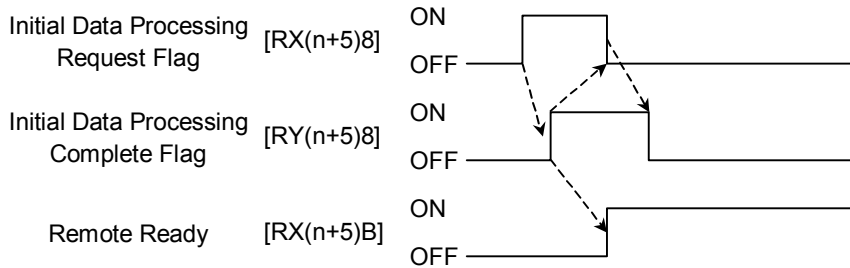
Address	Signal Name	Controller Word No	Controller Bit No
RW _{wm}	NA	38	608 to 623
:	:		
RW _{wm} +9	NA	47	752 to 767
RW _{wm} +A	System reservation	-	-
RW _{wm} +B	System reservation	-	-

CC-Link Flag Operation

Flag operation of the remote output is describes in this section.

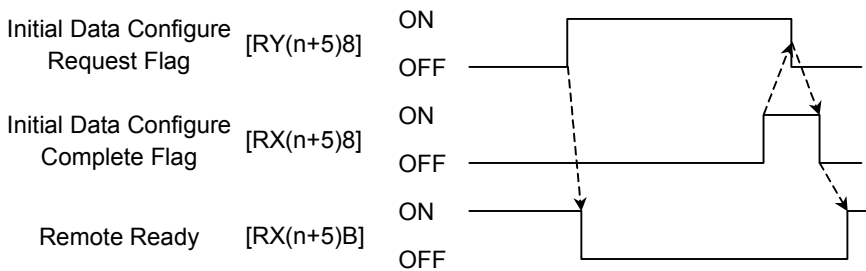
Initial Request Process after Power Supply

Initial request process is executed from the remote device station (CC-Link board). After turning ON the Controller, the initial data processing request flag [RX(n+5)8] will be ON by completing the CC-Link board initialization. Set the initial data processing complete flag [RY(n+5)8] ON.



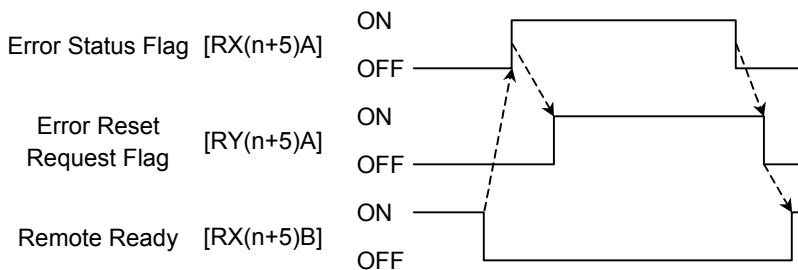
Initial Processing Request from the Master (PLC)

This is an initial configure request for the CC-Link board. No processing is required for no initial data.



Error Flag, Error Reset Process

Error status flag [RX(n+5)A] turns ON at master error or configure error. When error reset request flag [RY(n+5)A] turns ON at error occurrence, [RX(n+5)A] turns OFF at status that enables error status clear.



NOTE When CC-Link error occurs (when error status flag is ON), the Controller status changes to the error status. Reset the error status of the Controller after the error reset process indicated above is completed.

NOTE When an error occurred at the Robot or the program, the error flag indicated above does not turn ON.

Electronic Information File (CSP file)

A CSP file is supplied for CC-Link network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

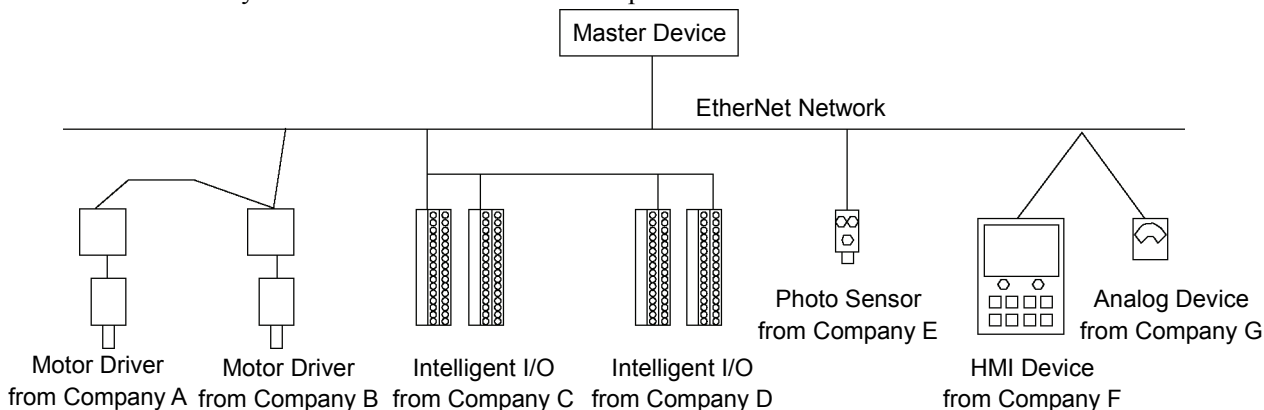
`\EpsonRC50\Fieldbus\CCLink`

12.3.7 EtherNet/IP

Overview of EtherNet/IP

EtherNet/IP is a fieldbus network that provides easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

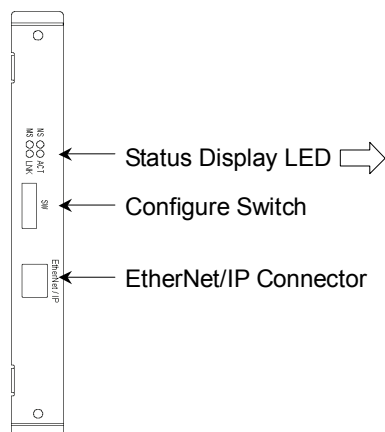
EtherNet/IP was developed by Allen-Bradley as an open communication standard to connect various field devices (sensor, actuator, robot controller, etc.). Because of the open communication standard, EtherNet/IP users can easily construct a multi-vendor system with various devices developed around the world.



EtherNet/IP Communication Specifications

Item	Specification
Name	EtherNet/IP board
Code	R12B040719
Supported Connection	I/O messaging connection (Cyclic) EtherNet/IP communication protocol
Baud Rates	10 M, 100 M (bps)
Transfer Distance	Standard Ethernet protocol
Cable	Standard Ethernet protocol
Mode	Slave
Interface	1 EtherNet/IP port
Connection type	Cyclic
Explicit messaging	Not supported
Input data size	256 bits (32 bytes)
Output data size	256 bits (32 bytes)

EtherNet/IP Appearance



- MS LED : Module status display
- NS LED : Network status display
- LNK LED : Link status display
- ACT LED : Communication packet reception or transmission status display


Refer to the following table for functions of LEDs.

LED Description of EtherNet/IP

LED status		MS	NS
OFF		Power supply OFF	Power supply OFF or IP address not configured
GRN	ON	Master connected (executing)	Online operating
	Blinking	Master connected (idling)	Waiting master connection
RED	ON	Non-recoverable error	Wrong IP address (duplication)
	Blinking	Non-recoverable error	Connection time out
GRN/RED alternate		Self-diagnosing	Self-diagnosing

LED status		LNK	ACT
OFF		No link	No communication packet reception or transmission
ON		Linking	Communication packet reception or transmission

Board Installation of EtherNet/IP



WARNING


- Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment.

Set all EtherNet/IP board configure switches OFF. If all EtherNet/IP board configure switches are not OFF, reset error occurs.

All the EtherNet/IP communication configurations are set by the development software (EPSON RC+ 5.0).

Wiring (EtherNet/IP)

Use a standard Ethernet connector for wiring to the board.



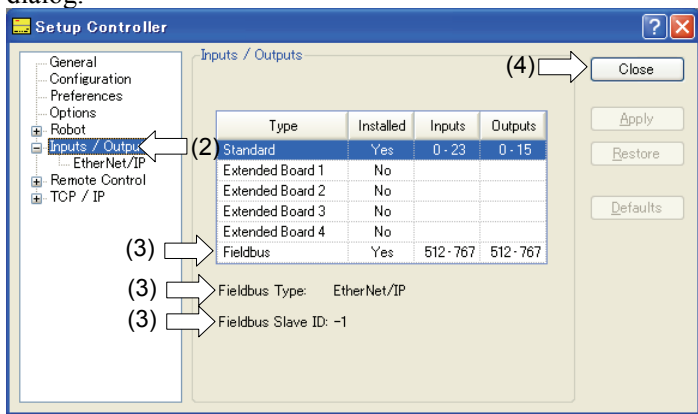
CAUTION

- You can use the general Ethernet hub or Ethernet switch for the EtherNet/IP. However, be sure to use a product complying with the industrial standards or noise resistant Ethernet cable (STP cable). If you use an office use product or UTP cable, it may cause communication errors and may not offer the proper performance.

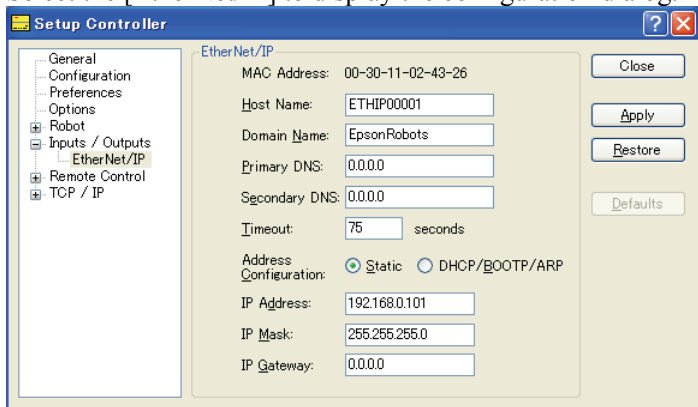
EtherNet/IP Confirmation and Configuration with EPSON RC+ 5.0

When EtherNet/IP board is installed to the Controller, it is recognized automatically. Confirm whether the EPSON RC+ 5.0 has recognized the EtherNet/IP board by the following procedure.

- (1) Select EPSON RC+ 5.0 menu-[Setup]-[Controller] to display the [Setup Controller] dialog.



- (2) Select the [Inputs / Outputs].
- (3) Make sure that followings are displayed.
 Fieldbus-Installed : Yes
 Fieldbus Type : EtherNet/IP
 Fieldbus Slave ID : -1 (fixed)
- (4) Click the “+” displayed on the left of [Input / Output] and [EtherNet/IP] appears. Select the [EtherNet/IP] to display the configuration dialog.



- (5) Set each item to the specific value to connect the Ethernet network.
For information about the setting values, contact your network administrator.
Address Configuration is set to “DHCP/BOOTP/ARP” at shipment.
- (6) When the configuration is completed, click the <Apply> button to apply the setting.
- (7) Click the <Close> button.



When Address Configuration is set to “DHCP/BOOTP/ARP”, the Controller waits for DHCP/BOOTP/ARP sever response for 30 seconds at Controller startup. When DHCP/BOOTP/ARP does not response within a time, the Controller stops the request to the DHCP/BOOTP/ARP server and waits ARP.

Operation

For details, refer to *12.3.8 Operation (DeviceNet, PROFIBUS-DP, EtherNet/IP)*.

Electronic Information File (EDS file)

An EDS file is supplied for EtherNet/IP network configuration. The file is located in the following folder in the Manual Update CD that is attached to the Robot Controller.

\\EpsonRC50\Fieldbus\EtherNet/IP

12.3.8 Operation (DeviceNet, PROFIBUS-DP, EtherNet/IP)

This section indicates how to use the Fieldbus I/O option after it has been installed.
For details of CC-Link, refer to *12.3.5 CC-Link – Operation (CC-Link)*.

SPEL+ Fieldbus I/O Commands

All the commands for the Fieldbus I/O are the same as the standard I/O.
Bit numbers differ from standard I/O. There is no restriction for command use.
Typical I/O commands are listed in the following table.
For command details, refer to EPSON RC+ 5.0 *Online Help* or *SPEL+ Language Reference*.

Command	Function
In	Returns the status of the specified 8 bits input port.
InW	Returns the status of the specified 16 bits input port.
Off	Turns Off the specified output.
On	Turns On the specified output.
Out	Simultaneously sets 8 output bits.
OutW	Simultaneously sets 16 output bits.
Sw	Returns the specified input port status.
Wait	Waits until the specified input condition.

NOTE



Response times for Fieldbus I/O can vary and depend on several factors, including baud rate, scan rate, number and types of devices, communication error, etc.

Outputs Off by Emergency Stop and Reset Instruction

You can configure the controller system so that all outputs including the fieldbus outputs will be turned off when the emergency stop occurs and when a Reset instruction is executed.

For details of the configuration, refer to *[Setup]-[Controller]-[Preference]* in *EPSON RC+ 5.0 User's Guide 5.12.2 Controller command (Setup Menu)*.

NOTE



A command that was issued just before an emergency stop can be executed after the emergency stop condition is cleared. If the outputs from the fieldbus involve risk, check the [Outputs off during Emergency Stop] box to remove all power to output devices when an emergency stop occurs.

Remote I/O Configuration

You can configure the controller system so that all I/O including the fieldbus will be set to remote function.

I/O setup for Fieldbus I/O is the default configuration.

NOTE



Setup for the Remote I/O can be changed by signal. Configuration with bits of standard I/O, expansion I/O and Fieldbus I/O is available.

Input Signal	Bit No.
Start	512
Pause	513
Reset	514
SelProg1	515
SelProg2	516
SelProg4	517
Stop	518
Continue	519
MotorOn	520
MotorOff	521
Home	522

Output Signal	Bit No.	Output Signal	Bit No.
Ready	512	InsideBox1	NA
Start	513	InsideBox2	NA
Pause	514	InsideBox3	NA
Error	515	InsideBox4	NA
EStopOn	516	InsideBox5	NA
SafeguardOn	517	InsideBox6	NA
SError	518	InsideBox7	NA
Waning	519	InsideBox8	NA
MotorOn	520	InsideBox9	NA
Home	521	InsideBox10	NA
CurrProg1	522	InsideBox11	NA
CurrProg2	523	InsideBox12	NA
CurrProg4	524	InsideBox13	NA
AutoMode	525	InsideBox14	NA
TeachMode	526	InsideBox15	NA
ErrorCode1	527	InsidePlane1	NA
ErrorCode2	528	InsidePlane2	NA
ErrorCode4	529	InsidePlane3	NA
ErrorCode8	530	InsidePlane4	NA
ErrorCode16	531	InsidePlane5	NA
ErrorCode32	532	InsidePlane6	NA
ErrorCode64	533	InsidePlane7	NA
ErrorCode128	534	InsidePlane8	NA
ErrorCode256	535	InsidePlane9	NA
ErrorCode512	536	InsidePlane10	NA
ErrorCode1024	537	InsidePlane11	NA
ErrorCode2048	538	InsidePlane12	NA
ErrorCode4096	539	InsidePlane13	NA
ErrorCode8192	540	InsidePlane14	NA
		InsidePlane15	NA