EPSON



Rev.16

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Robot Controller RC700 / RC90 Option Fieldbus I/O Rev.16

Robot Controller RC700 / RC90 Option

Fieldbus I/O

Rev.16

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FOREWORD

This manual contains important information necessary to use the Robot Controller RC700 / RC90 Option Fieldbus I/O properly and safely. This manual is intended for personnel who perform any operations using the pendant, such as teaching robot points.

Please thoroughly read this manual and other related manuals before and while using the equipment.

WARRANTY

The robot and its optional parts are shipped to our customers only after being subjected to the strictest quality controls, tests, and inspections to certify its compliance with our high performance standards.

Product malfunctions resulting from normal handling or operation will be repaired free of charge during the normal warranty period. (Please contact the supplier of your region for warranty period information.)

However, customers will be charged for repairs in the following cases (even if they occur during the warranty period):

- 1. Damage or malfunction caused by improper use which is not described in the manual, or careless use.
- 2. Malfunctions caused by customers' unauthorized disassembly.
- 3. Damage due to improper adjustments or unauthorized repair attempts.
- 4. Damage caused by natural disasters such as earthquake, flood, etc.

Warnings, Cautions, Usage:

- 1. If the robot or associated equipment is used outside of the usage conditions and product specifications described in the manuals, this warranty is void.
- 2. If you do not follow the WARNINGS and CAUTIONS in this manual, we cannot be responsible for any malfunction or accident, even if the result is injury or death.
- 3. We cannot foresee all possible dangers and consequences. Therefore, this manual cannot warn the user of all possible hazards.

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Ether**CAT**

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TRADEMARK NOTATION IN THIS MANUAL

Microsoft® Windows® 7 Operating system

Microsoft® Windows® 8 Operating system

Microsoft® Windows® 10 Operating system

Throughout this manual, Windows 7, Windows 8, and Windows 10 refer to above respective operating systems. In some cases, Windows refers generically to Windows 7, Windows 8, and Windows 10.

NOTICE

No part of this manual may be copied or reproduced without authorization. The contents of this manual are subject to change without notice. Please notify us if you should find any errors in this manual or if you have any comments regarding its contents.

MANUFACTURER

SEIKO EPSON CORPORATION

CONTACT INFORMATION

Contact information is described in "SUPPLIERS" in the first pages of the following manual:

Robot System Safety and Installation Read this manual first

Before Reading This Manual

This section describes what you should know before reading this manual.

Safety Precautions

Installation and transportation of robots and robotic equipment shall be performed by qualified personnel and should conform to all national and local codes.

Please carefully read this manual and other related manuals before installing the robot system or before connecting cables.

Keep this manual handy for easy access at all times. Please read the Safety chapter in User's Guide to understand safety requirements before installing the robot system.

Conventions

Important safety considerations are indicated throughout the manual by the following symbols. Be sure to read the descriptions shown with each symbol.

WARNING	This symbol indicates that a danger of possible serious injury or death exists if the associated instructions are not followed properly.
WARNING	This symbol indicates that a danger of possible harm to people caused by electric shock exists if the associated instructions are not followed properly.
CAUTION	This symbol indicates that a danger of possible harm to people or physical damage to equipment and facilities exists if the associated instructions are not followed properly.

Security support for the network connection

The network connecting function (Ethernet) on our products assumes the use in the local network such as the factory LAN network. Do not connect to the external network such as the Internet.

In addition, please take security measure such as the antivirus software to block the virus from the network connection.

Security support for the USB memory

Make sure that the USB memory is not infected with virus when connecting to the Controller.

For T series, VT series Manipulator user only

T series and VT series Manipulators are controller integrated manipulators.

Read "Controller" and "Robot Controller" described in this manual as "T series Manipulator" "VT series Manipulator".

Control System Configuration

This option is used with the following combinations of Controllers and software.

TYPE A:

Controller	Software
RC700	EPSON RC+ 7.0
RC90-B	EPSON RC+ 7.0

TYPE B: Robot Controller RC90 with the following label attached.

Label	Controller	Software
EPSON RC+ Compatible	RC90	EPSON RC+ 7.0

		RC90 controller firmware
		Ver.7.0.2.0
	Before Ver.7.0.1	!!!
EPSON RC+ 7.0	Ver.7.0.2 or later	ОК

OK: Compatible All functions of the EPSON RC+ 7.0 and the Controller are available.

!!!: Compatible Connection is OK. We recommend using EPSON RC+7.0 Ver. 7.0.2
or later.

TYPE C:

Manipulator	Software
T series	EPSON RC+ 7.0
VT series	EPSON RC+ 7.0

NOTE

Ethernet/IP, PROFINET, and EtherCAT of this option are not available for Robot Controller RC90 (EPSON RC+ 5.0) without the label.

Refer to the Robot Controller RC90 Setup & Operation 13.3 Fieldbus I/O Board.

NOTE	Manual PDF for TYPE B is available from EPSON RC+ 7.0 Ver. 7.0.2.
	Electronic information file for TYPE B is available from EPSON RC+ 7.0 Ver. 7.0.2.
NOTE	Fieldbus I/O supports the following OS. Windows 7 Professional Service Pack 1 Windows 8.1 Pro Windows 10 Pro

1. Intro	duct	tion1
1.1	Over	view of Fieldbus I/O1
1.2	Devid	ceNet3
	1.2.1	Overview of DeviceNet
	1.2.2	Features of DeviceNet3
	1.2.3	General Specifications5
1.3	PRO	FIBUS DP6
	1.3.1	Overview of PROFIBUS DP6
	1.3.2	Features of PROFIBUS DP6
	1.3.3	General Specifications7
1.4	Ether	Net/IP8
	1.4.1	Overview of EtherNet/IP8
	1.4.2	Features of EtherNet/IP8
	1.4.3	General Specifications9
1.5	CC-L	ink10
	1.5.1	Overview of CC-Link10
	1.5.2	Features of CC-Link10
	1.5.3	General Specifications11
1.6	PRO	FINET12
	1.6.1	Overview of PROFINET12
	1.6.2	Features of PROFINET12
	1.6.3	PROFINET Communication13
1.7	Ether	CAT14
	1.7.1	Overview of EtherCAT14
	1.7.2	Features of EtherCAT14
	1.7.3	General Specifications15
2. Insta	allati	on16
2.1	Devid	ceNet16
	2.1.1	How to Setup a DeviceNet Network16
	2.1.2	DeviceNet Network Construction17
	2.1.3	Installing DeviceNet Master Board manufactured by molex
	2.1.4	Installing DeviceNet Board manufactured by Hilscher46
	2.1.5	Installing DeviceNet Slave Board

2.2	PROFIBUS-DP	84
	2.2.1 How to Setup a PROFIBUS DP Network	84
	2.2.2 PROFIBUS DP Network Construction	84
	2.2.3 Installing PROFIBUS-DP Master Board Manufactu	ured by
	molex	89
	2.2.4 Installing PROFIBUS-DP Slave Board	.112
	2.2.5 Installing PROFIBUS-DP Slave Module	.120
2.3	EtherNet/IP	.127
	2.3.1 How to Setup a EtherNet/IP Network	.127
	2.3.2 EtherNet/IP Network Construction	.128
	2.3.3 Installing EtherNet/IP Master Board Manufactured by	/ molex
		.129
	2.3.4 Installing EtherNet/IP Board manufactured by Hilsche	r152
	2.3.5 Installing EtherNet/IP Slave Board	.186
	2.3.6 Installing EtherNet/IP Slave Module	.193
2.4	CC-Link	.200
	2.4.1 Installing CC-Link Slave Board	.200
	2.4.2 Installing CC-Link Slave Module	.211
2.5	PROFINET	.221
	2.5.1 Installing PROFINET Slave Board	.221
	2.5.2 Installing PROFINET Slave Module	.227
2.6	EtherCAT	.233
4	2.6.1 Installing EtherCAT Slave Board	.233
	2.6.2 Installing EtherCAT Slave Module	.240
3. Oper	ration2	247
3.1	SPEL+ Fieldbus I/O Commands	.247
3.2	Outputs Off by Emergency Stop and Reset Instruction	.247
3.3	Using FbusIO_SendMsg	.248
3.4	Explicit Message Connection (for DeviceNet, EtherNet/IP).	.249
3.5	Setting Remote Control Input and Output	.250
4. Trou	bleshooting2	257
4.1	DeviceNet Troubleshooting	.257
2	4.1.1 Examining a Problem	.258
2	4.1.2 Problems and Countermeasures	.260
2	4.1.3 Procedures for Examining Possible Causes	.278

4.2 PROFIBUS DP Troubleshooting	91
4.2.1 Examining a Problem2	91
4.2.2 Problems and Countermeasures	93
4.2.3 Procedures for Examining Possible Causes	80
4.3 EtherNet/IP Troubleshooting	18
4.3.1 Examining a Problem	18
4.3.2 Problems and Countermeasures	20
4.3.3 Tests and Diagnostics	20
4.4 How to Disable Fast Startup in Windows 10	27
4.5 How to Disable Fast Startup in Windows 8 or 8.1	31
5. Maintenance Parts List	34

1. Introduction

1.1 Overview of Fieldbus I/O

The Fieldbus I/O option is an integrated I/O system that supports the following Fieldbuses of the Robot system:

DeviceNet PROFIBUS-DP EtherNet/IP CC-Link PROFINET EtherCAT

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, Fieldbus has the following features:

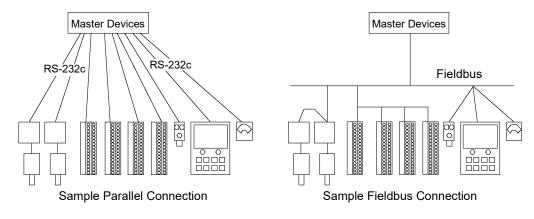
Access to signals from multiple devices and multiple data from each device using one cable.

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.



The Fieldbus master function can be added to the PC with the EPSON RC+ 7.0 installed by installing the Fieldbus master board.

Each type of Fieldbus supports the following boards.

DeviceNet master board manufactured by molex

- PROFIBUS-DP master board manufactured by molex
- EtherNet/IP master board manufactured by molex
- DeviceNet board manufactured by Hilscher

EtherNet/IP board manufactured by Hilscher

You can install one Fieldbus master board per PC. To use the Fieldbus master I/O, the Fieldbus master option of EPSON RC+ software options key must be enabled.

You can also add the Fieldbus slave function by installing the Fieldbus slave board to the Robot Controller.

Each type of Fieldbus supports the following boards.

DeviceNet slave board PROFIBUS-DP slave board EtherNet/IP slave board CC-Link slave board PROFINET slave board

EtherCAT slave board

You can install one Fieldbus slave board per Controller.

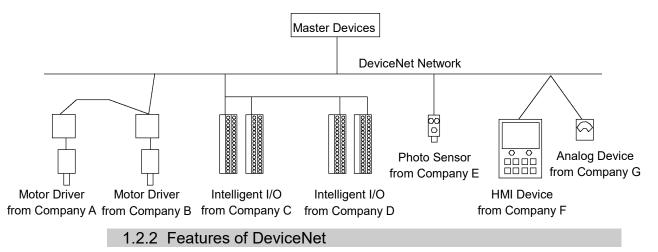
One Fieldbus master board and one Fieldbus slave board of different Fieldbus types can be used together.

1.2 DeviceNet

1.2.1 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.



Reduced Wiring

Compared with parallel wiring, DeviceNet employs a dedicated 5-wire cable (signal wires and power wires) which substantially reduces the number of necessary wires, wiring time and cost.

Detachable communication connectors provide you with simple wiring between nodes and easy network separation or reconstruction.

Specified environment-resistance cables allow you to construct an environment-resistant system at low cost.

Open Standard (Multi-vendor)

Due to an open communication standard, various devices from many manufacturers are available. Standardized communication connectors provide you with easy network reconstruction.

Maintenance spare parts stored on site (factory, etc.) can be reduced because different manufacturers' devices can be used in case of a breakdown. Similar products are available around the world due to a global standard DeviceNet.

Communication Types

There are two types of messaging connections: I/O messaging connection and Explicit messaging connection. I/O messaging connection includes the four methods explained below:

Polling : First, a master device sends output data to a slave device and then the slave device responds. Data is normally exchanged in every communication cycle. The communication frequency can be changed by setting. This connection type is the most often used. Strobe : First, a master device requests slave devices to send data with multicast messages, and then, each slave device responds individually. Data from many sensors on the system can be effectively gathered. When the master does not receive responses from all requested slave devices, a timeout error occurs. Change Of State: A device sends data whenever it changes. Signals for device diagnosis are sent regularly in the background. This connection type is useful for remedying DeviceNet communication traffic. Cyclic : A slave device transfers data regularly according to its internal timer. This connection type is typically used for communicating with a temperature controller. The data transfer frequency is defined by master configuration.

NOTE

For Change of State and Cyclic, the ACK which verifies communication completion can be disabled by setting. However, never disable the ACK since communication errors cannot be detected.

1.2.3 General Specifications

Item	Specification				
	- I/O messaging connection				
Supported	(Polling, Strove, Cyclic, Change of State)				
Connection	- Explicit messaging connection				
Connection	All connections are conformed to DeviceNet				
	communication protocol.				
Baud Rates	125 kbps, 25	0 kbps, 500 kbps	r		
	Baud Rates	Max. Network	Duon Louoth	Total Drop	
	Daud Kales	Length	Drop Length	Line Length	
Transfer Distance	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	
Maximum Nodes	64 (including	g master unit)			
Data Length / Frame	8 bytes (data can be divided and transferred.)				
Bus Access	CSMA/NBA				
Error Detection	CRC error / Duplicate node address check				
Cable	5-wire cable dedicated to DeviceNet				
Cable	(2 wires for signal, 2 wires for power supply, 1 shield wire)				
Communications					
Power Supply	24 V DC (su	pplied from a con	nector)		
Voltage					

DeviceNet Communication Specifications

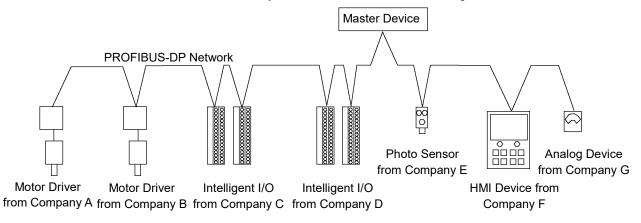
* When thin cable is used for trunk line, the maximum network length is 100 m.

1.3 PROFIBUS DP

1.3.1 Overview of PROFIBUS DP

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

PROFIBUS DP was co-developed by Siemens, Bosch, and ABB 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.



1.3.2 Features of PROFIBUS DP

Reduced Wiring

Compared with a parallel wiring, PROFIBUS DP employing dedicated 2-wire cable substantially reduces the number of necessary wires, wiring time and cost.

Detachable communication connector provides you a simple wiring between devices (stations) and an easy network separation or reconstruction.

Fast Communication

PROFIBUS DP communication speed can be set up to 12Mbps. This is faster than DeviceNet, another communication standard supported by the fieldbus I/O.

Open Standard (Multi-vendor)

Due to an open communication standard, various devices from many manufacturers are available. Standardized communication connectors allow you to reconstruct your network easily.

Maintenance parts stored on site (factory, etc.) can be reduced because different manufacturers' devices can be used in case of a breakdown. Similar products are available around the world due to a global standard PROFIBUS DP.

1.3.3 General Specifications

Item	Specifi	ication
Communication Method	Hybrid (token passing procedure and master-slave communication)	
Baud Rates	9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1500 kbps, 3 Mbps, 6 Mbps, and 12 Mbps.	
	Baud Rates	Cable Length
	12 Mbps	100 m
	6 Mbps	100 m
	3 Mbps	100 m
Transfer Distance	1500 kbps	200 m
Transfer Distance	500 kbps	400 m
	187.5 kbps	1000 m
	93.75 kbps	1200 m
	19.2 kbps	1200 m
	9.6 kbps	1200 m
Maximum Stations	126 (including master unit and	l repeater)
Data Length / Frame	244 bytes	
Cable	2-wire cable dedicated to PRO	FIBUS (2 wires for signal)

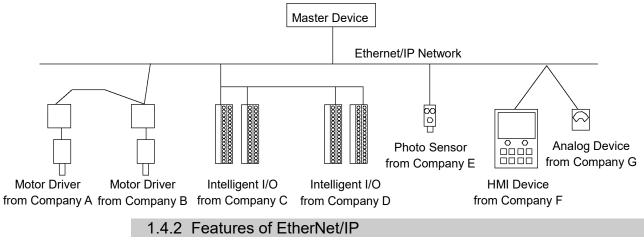
PROFIBUS DP Communication Speci

1.4 EtherNet/IP

1.4.1 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.



Reduced Wiring

Compared with parallel wiring, EtherNet/IP employs a standard Ethernet cable which substantially reduces the number of necessary wires, wiring time and cost.

Detachable communication connectors provide you with simple wiring between nodes and easy network separation or reconstruction.

Specified environment-resistance cables allow you to construct an environment-resistant system at low cost.

NOTE

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

Open Standard (Multi-vendor)

Due to an open communication standard, various devices from many manufacturers are available. Standardized communication connectors provide you with easy network construction.

Maintenance spare parts stored on site (factory, etc.) can be reduced because different manufacturers' devices can be used in case of a breakdown. Similar products are available around the world due to a global standard EtherNet/IP.

Connection Types

There are two types of messaging connections: I/O messaging connection and Explicit messaging connection. I/O messaging connection includes the two methods explained below:

- Change Of State: A device sends data whenever it changes. Signals for device diagnosis are sent regularly in the background. This connection type is useful for remedying EtherNet/IP communication traffic.
- Cyclic : A slave device transfers data regularly according to its internal timer. This connection type is typically used for communicating with a temperature Controller. The data transfer frequency is defined by master configuration.

NOTE

For Change of State and Cyclic, the ACK which verifies communication completion can be disabled by setting. However, never disable the ACK since communication errors cannot be detected.

1.4.3 General Specifications

Item	Specification	
	- I/O messaging connection	
	(Cyclic, Change of State)	
Supported Connection	- Explicit messaging connection	
	All connections are conformed to EtherNet/IP	
	communication protocol.	
Baud Rates	100 Mbps, 10 Mbps	
Maximum Nodes	128 (including master unit)	
Data Length / Frame	244 bytes	
Access Control Type	CSMA/CD	
Cable	Universal Ethernet cable	

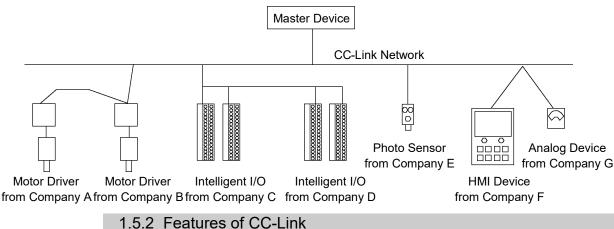
EtherNet/IP Communication Specifications

1.5 CC-Link

1.5.1 Overview of CC-Link

CC-Link is a Fieldbus network that provides 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.



Reduced Wiring

Compared with a parallel wiring, CC-Link employs triplex shielded twisted pair cable which substantially reduces the number of necessary wires, wiring time and cost.

Detachable communication connector provides you a simple wiring between devices (nodes) and an easy network separation or reconstruction.

Fast Communication

From 156k bps to 10M bps is available. The speed of 10M bps is the fastest field network next to PROFIBUS-DP.

Transmission Control

The communication network includes master stations and slave stations. Normally, PLC becomes a master station. Up to 64 slave stations can be connected to a master station. The slave station includes remote device stations (handling the bit data and word data), remote I/O stations (handling the bit data), and others. The master station stores the information such as the type and address of slave stations in the network and controls the whole network.

Open Standard (Multi-vendor)

Due to an open communication standard, various devices from many manufactures are available. Standardized communication connectors allow you to reconstruct your network easily.

Maintenance parts stored on site (such as factory) can be reduced because different manufacturers' devices can be used in case of a breakdown. Similar products are available around the world due to a global standard PROFIBUS DP.

1.5.3 General Specifications

CC-Link Communication Specifications (Ver.1.10)

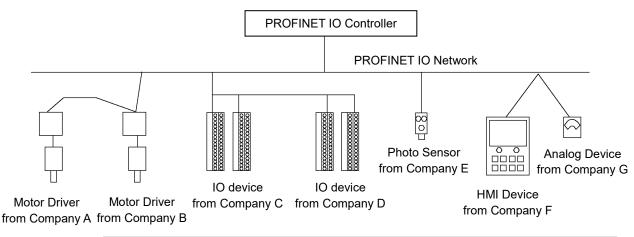
Item	Specification
Baud Rates (bps)	156 k, 625 k, 2.5 M, 5 M, 10 M
Connection Method	Broadcast polling
Synchronization Method	Frame synchronization
Encoding Method	NRZI
Transmission Channel Type	Bus (EIA RS485 compliant)
Transmission Format	HDLC compliant
Maximum Number of Devices	64 units
Slave Station Number	1 to 64
Connection Cable	CC-Link Ver1.10 cable (3 core twist cable with a shield)

1.6 PROFINET

1.6.1 Overview of PROFINET

PROFINET is a fieldbus network that uses industrial Ethernet.

PROFINET 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.



1.6.2 Features of PROFINET

Everything on one cable

With its integrated, Ethernet-based communication, PROFINET satisfies a wide range of requirements, from extremely fast I/O data transmission to parameter monitoring and configurations of equipment.

Flexible network topology

PROFINET is 100% Ethernet compatible according to IEEE standards and adapts to the environment of existing plant due to its flexible line, ring, and star structures.

Standardization

PROFINET is defined by international standards "IEC 61158" and "IEC 61784".

Concept of PROFINET has been developed based on standard Ethernet of IEEE802 through a joint effort with its users. Functionality has been added to cover the area that standard Ethernet cannot satisfy.

1.6.3 PROFINET Communication

PROFINET is designed to support all applications in a plant versatilely with one bus.

Therefore, PROFINET has three different performance levels as described below.

For RC620 option fieldbus I/O, "2: RT (Real-time)" communication is supported.

1: NRT (Non Real-time)

This communication is based on TCP/IP.

This is used for applications where real-time communication is not required, such as inter-unit communication and parameter communication.

2: RT (Real-time)

By adding a software protocol to the standard Ethernet hardware, this method actualizes real-time communication with approximately 10 ms intervals.

In particular, by defining a priority in VLAN tag (IEEE803.1Q) in Ethernet frame, RT frame is processed with a higher priority to non-real-time data (NRT, TCP/IP, etc.)

RT can offer almost the same performance as the existing fieldbus.

3: IRT (Isochronous Real-time)

Isochronous real-time communication (IRT) guarantees that communication is surely executed within an arbitral communication time (Deterministic) at a higher level than Real-time communication (RT).

This enables a clock rate of < 1 ms and a jitter precision of < 1 µs.

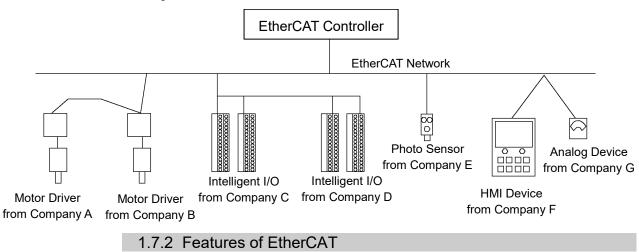
IRT is used for applications where a strict real-time performance is required, such as motion control. As a communication hardware, switch-function-embedded special ASIC is used. This method guarantees the real-time performance by dividing the communication band on Ethernet.

1.7 EtherCAT

1.7.1 Overview of EtherCAT

EtherCAT (Ethernet for Control Automation Technology) is a fieldbus network that provides easy interconnection between control devices (PLC, PC, sensor, actuator, etc.).

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



Protocol

EtherCAT uses only standard frames which comply with IEEE802.3. Therefore, EtherCAT frames are available for transmission from a general Ethernet Controller (master) and are able to use standard tools (such as a monitoring tool).

EtherCAT protocol is optimized for the control data. It is directly stored in the Ethernet frame and transmitted.

Reduced Wiring

Compared with parallel wiring, EtherCAT employs a standard Ethernet cable which substantially reduces the number of necessary wires, wiring time and cost.

Detachable communication connectors provide you with simple wiring between nodes and easy network separation or reconstruction.

Specified environment-resistance cables allow you to construct an environment-resistant system at low cost.

Network topology of EtherCAT is usually line, but other topologies such as star, daisy chain, or ring can also be used.

NOTE

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

Open Standard (Multi-vendor)

Due to an open communication standard, various devices from many manufacturers are available. Standardized communication connectors provide you with easy network construction.

Maintenance spare parts stored on site (factory, etc.) can be reduced because different manufacturers' devices can be used in case of a breakdown. Similar products are available around the world due to a global standard EtherNet/IP.

Network Topology

Network topologies such as line, tree, star, and ring are supported and can be used in combinations.

Line topology, which is most commonly used for fieldbus, especially has no factor which reduces network performance since it does not require a network switch or hub. Therefore, the fastest and most reliable network construction is possible.

1.7.3 General Specifications

EtherCAT Communication Specifications

Item	Specification
Baud Rates (bps)	100 M (Full duplex)
Network Topology	Line, Tree, Star, Ring
Communication Range	Distance between nodes: within 100 m
Maximum Nodes	65535
Cable	STP cable Category 5

2. Installation

This chapter describes procedures for installing the network.

DeviceNet PROFIBUS DP EtherNet/IP CC-Link PROFINET EtherCAT

Refer to the sections according to the type of network you are installing.

2.1 DeviceNet

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

Pay attention to the followings in order to prevent the DeviceNet connecter from coming off.
 Use the connectors attached to the board. Insert the connectors all the way seated. Fix the cables at proper positions in order not to put a load on the connectors.

2.1.1 How to Setup a DeviceNet Network

The following is a basic procedure for setting up a DeviceNet network:

- 1. Choose node layout and pathway on your network. For details, refer to 2.1.2 DeviceNet Network Construction.
- 2. Choose power supply method for communication. For details, refer to 2.1.2 DeviceNet Network Construction.
- 3. Choose baud rate.

Choose the baud rate based on the network length. Select the fastest baud allowed for the length. Increasing network load due to slow baud rate may cause trouble including communication failure.

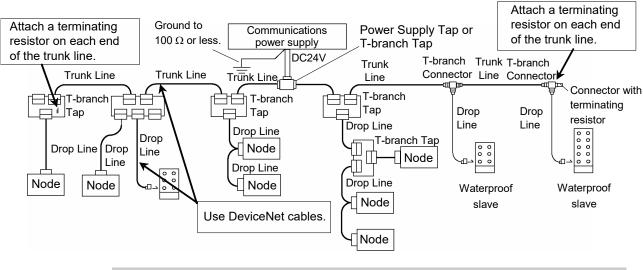
- 4. Lay cables. For details, refer to 2.1.2 DeviceNet Network Construction.
- Configure the nodes.
 For details, refer to respective manuals of your desired nodes.
- 6. Turn ON the communications power supply and nodes. Turn ON the communications power supply. After that (or simultaneously), turn ON the nodes to supply power. When the power to the nodes is supplied earlier than the power to the communication power supply, communication with the nodes may fail.

- 7. Install the DeviceNet board manufactured by Hilscher in your Controller. When installing the DeviceNet master board manufactured by molex, refer to 2.1.3 Installing DeviceNet Master Board Manufactured by molex later in this chapter. When installing the DeviceNet slave board, refer to 2.1.5 Installing DeviceNet Slave Board later in this chapter.
- 8. Operate the DeviceNet network.

2.1.2 DeviceNet Network Construction

Network Configuration

DeviceNet network is configured as shown in the following figure.



Node

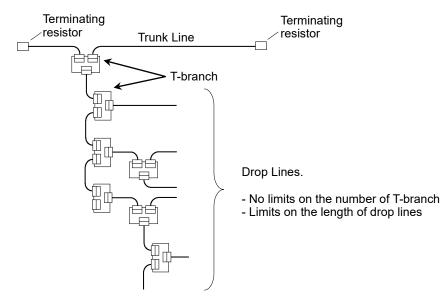
There are two types of nodes: master and slave. The master controls a network and gathers data from its slaves. The slaves, including external I/O and other devices, output data in response to the master's output order and informs the master of its input status.

You can install masters anywhere in the network. You can connect up to 64 nodes (including the server) in the network.

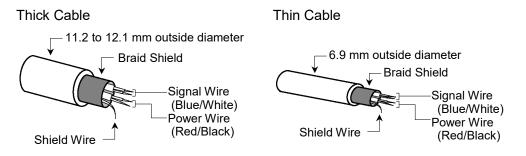
Trunk Line and Drop Line

Trunk line is a backbone cable of DeviceNet network with terminating resistors on the both ends.

Drop line is a branch of the trunk line.



For DeviceNet, 5-wire cables are used for trunk lines and drop lines. Commercially available DeviceNet cables can be used. There are two types of DeviceNet cables: Thick cable and Thin cable. Environment-resistant cable and flexible cable are available. For details of cables, see ODVA's Web site (http://www.odva.org/).



Communications Cable Signal

Wire Type	Color	Details of Signal		Wire Identity
Cignal wire	Blue	Signal	Low	CAN L
Signal wire	White	Signal	High	CAN H
Deversion	Red	Communications Power	Positive	V+
Power wire	Black	Communications Power	Negative	V–
Shield wire	-	Shield		S

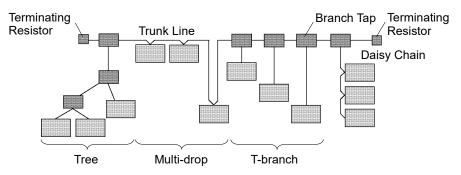
Terminating Resistor

To reduce reflections of communication signal, terminating resistors should be attached on both ends of the trunk line. For DeviceNet, nodes have no terminating resistor on the ends.

Attach 121 Ω +/-1%, 1/4W terminating resistors between the signal wires (CAN-H and CAN-L) of the trunk line cable. Some commercially available T-branch taps and connectors can accept terminating resistors. Molded terminating resistors with connectors are also available to attach to environment-resistant T-branch taps and connectors.

Node Connection

Nodes can be connected to a DeviceNet network by the following topologies: tree, multidrop, T-branch, daisy chain. For tree topology, there is no limitation of daisy chain layer but drop line length is limited. For details of drop line length, refer to the following section *Drop Line Length*.



Communications Power Supply

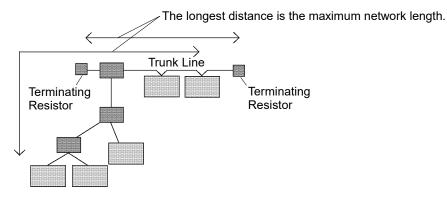
DeviceNet supplies 24V DC communications power to each node via 5-wire cables. You can install the communications power supply at any location in the DeviceNet network. Although the power can be shared to the node internal circuit power supply and I/O power supply, it is recommended to use a dedicated communications power supply.

Shield Ground of Signal Wire

Ground the DeviceNet network at one point with 100Ω or less. As a noise countermeasure, you can leave the network ungrounded. For details, refer to *4. Trouble shooting*.

Maximum Network Length (Maximum Trunk Length)

The maximum network length is the longest distance either between terminating resistors or between the two most distant nodes on the network.



The maximum network length is determined by the type of cable and the baud rate.

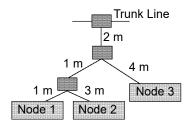
Baud Rate		Maximum Network Length	
		Thin Cable	
	500 kbps	100 m	100 m
	250 kbps	250 m	100 m
	125 kbps	500 m	100 m

Both Thick Cable and Thin Cable can be combined and used for trunk lines. In this case, the maximum network length is calculated using the following formulas.

Baud Rate	Maximum Network Length	
500 kbps	Thick Cable Length + Thin Cable Length ≤ 100m	
250 kbps	Thick Cable Length + 2.5 × Thin Cable Length \leq 250m	
125 kbps	Thick Cable Length + $5.0 \times$ Thin Cable Length ≤ 500 m	

Drop Line Length

Drop line length is the distance from a branch on the trunk line to the end of that branch.



In the figure above, each drop line length is as follows:

Drop Line to Node 1:4 m

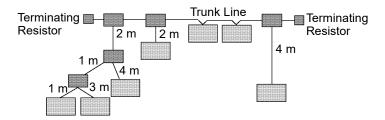
Drop Line to Node 2: 6 m

Drop Line to Node 3: 6 m

One drop line length should be 6 m or less.

Total Drop Line Length

Total drop line length is the total distance of all drop lines in one network.



In the figure above, the total drop line length is 17 m.

The maximum total drop line length is restricted by baud rate as shown in the table below. The cable thickness is not related to the restriction.

Baud Rate	Max. Total Drop Line Length	
500 kbps	39 m	
250 kbps	78 m	
125 kbps	156 m	

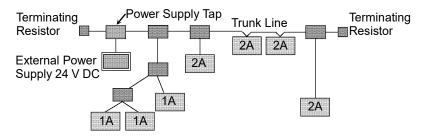
Cable Current Capacity

Current-carrying capacity of the DeviceNet network cable is restricted as below:

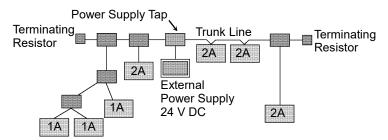
	Trunk	Line	Drop Line (Lipit: A)	
	Thick Cable	Thin Cable	Drop Line (Unit: A)	
Current	8A	3A	4.57 / Drop Line Length (m) \leq 3A	
Capacity				

Following figures illustrate examples of power supply configuration.

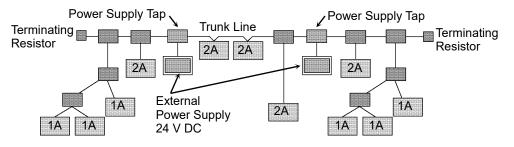
When an external power supply is installed in the network as shown in the figure below, the current capacity is 11A and it exceeds the permissible current of the cable.



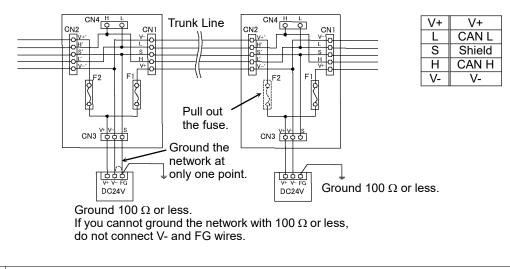
If the location of the external power supply is changed as shown in the figure below, the power supply can be used because the current capacity on the left side of the power supply tap is 5 A and 6 A on the right side.



If the current capacity consumed in the network exceeds the restriction of cable current capacity, it is possible to install more than one power supply in the network. If you attempt to install two or more power supplies, take necessary measures (pulling out a fuse on the power supply tap, etc.) to avoid conflicts between power outputs from multiple power supplies.



Following figure illustrates a sample wiring. An OMRON power supply tap is used in the example.





Carefully connect the wires. Incorrect wiring may cause node malfunction and severe damage to the entire DeviceNet network.

Modification and Installation of Communication Cables

Follow the steps described below to modify communication cables and connect them to connectors.



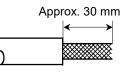
Be careful not to injure your hands or fingers on any sharp blades or tools used to modify the cable.

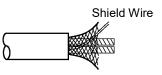
Use appropriate blades and/or tools to modify the cable. Using inappropriate blades and/or tools may result in bodily injury and/or equipment damage.

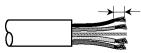
- Strip approx. 30 mm of the cable covering with extra care so that you do not scratch on the braided shield underneath. Do not strip the cable covering more than necessary. Excess stripping may cause short-circuit and/or make the cable more sensitive to noise.
- Carefully expand the meshes of the braided shield. Under the braided shield, there is one exposed bare twisted shield wire other than the signal wires and power wires that are wrapped with aluminum tape. The shield wire is slightly harder than the mesh.
- 3. Cut off the expanded braided shield and remove the aluminum tape around the signal wires and power wires. Then, strip the insulation from the signal wires and power wires for a length sufficient to connect them to crimp terminals.

Twist each stripped signal wire and power wire.

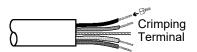
4. Set the crimping terminal on the stripped part of the wire and crimp it with a crimp tool. The following crimping terminals are recommended products.







Peel the coverings in enough length to connect the wires to crimping terminals.



NICHIFU TC series

Model Number	Specifications	Special Tool
TMEV TC-0.5	For Thin Cable	
TMEV TC-2-11	For Thick Cable (power wire)	MH-32
TMEV TC-1.25-11	For Thick Cable (signal wire)	

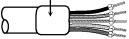
Phoenix Contact AI series

Model Number	Specifications	Special Tool
AI 0.5-8WH	For Thin Cable (power wire)	
AI 0.25-8YE	For Thin Cable (signal wire)	CRIMPFOX UD6
AI 2.5-8BU	For Thick Cable (signal wire)	CRIMPFUA UD0
AI 1-8RD	For Thick Cable (signal wire)	

(B

5. Wrap or cover the cable with vinyl tape or heat-shrink tubing.

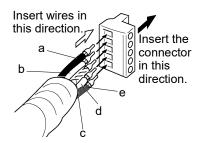
Heat-shrinkable Tube, etc.



Loosen the screws securing the cables on the connector. If the screws are not NOTE loosened, the wires go into different openings on the rear of connector instead of the correct openings and the wires cannot be secured.

> 6. Ensure the correct connector orientation and insert the signal wires and shield wire to their respective holes on the connector.

As shown in the figure, insert the wires (black, blue, shield, white, and red) into the holes in the order named.



The following table shows the specified colors of the cables.

	Color	Details of Signal	Wire Identity
a	Black	Communications Power Supply (negative)	V-
b	Blue	Signal (Low)	CAN L
c	-	Shield	S
d	White	Signal (High)	CAN H
e	Red	Communications Power Supply (positive)	V+

7. Tighten each screw securing the wires on the connector.

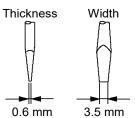
Tighten the screw securing the wire at a correct tightening torque (0.25 to 0.3 $N \cdot m$).

To prevent thick cable from coming out due to cable tension, install the thick cable with enough length to allow for stretch.

Use a small flat blade screwdriver that has the correct width and thickness. If you use a typical screwdriver whose point is narrow, you cannot deeply insert it into the hole on the connector.

Specific screwdrivers for DeviceNet connector screw are:

: XW4Z-00C OMRON Phoenix Contact : SZF-1 0.6×3.5



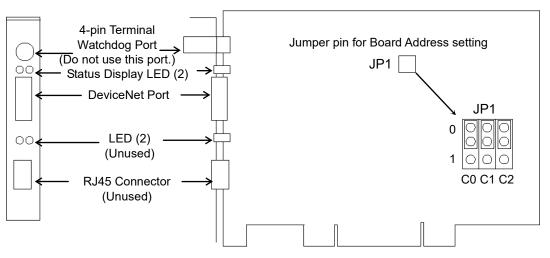
2.1.3 Installing DeviceNet Master Board manufactured by molex

Appearance

Part names and functions of the DeviceNet master board manufactured by molex are shown in the following figure.

For details of the status display LEDs (Module/NetWork LED and IO LED), refer to *4. Troubleshooting* in this manual.

PCU-DVNIO



Specifications		
Item	Specification	
Name	DeviceNet master board manufactured by molex	
Modes	Master	
Baud rates	125, 250, 500 kbps	
Interface	1 DeviceNet port	
Supported Devices	Group 2 Only Server and U.C.M.M. capable	
Maximum Nodes	63	
Connection Types	Strobe, Polling, Cyclic and Change of State	
Explicit Messaging	Yes	
Connection		
EDS Support	Yes	
Max. Input Data Size	1024 bits (128 bytes)	
Max. Output Data Size	1024 bits (128 bytes)	
Automatic Detection	Yes. Devices can be detected automatically.	

Modes

DeviceNet master board manufactured by molex has the master mode and slave mode as motion modes. However, do not select the slave mode.

Master mode

The master device gathers and controls all nodes on one network.

DeviceNet master can control up to 64 nodes (max. 128 bytes) in one network.

PLC is typically configured as a master and controls all nodes in factory automation system, but EPSON RC+ is also capable of being a master.

DeviceNet network configuration is specified by configuration management software. This is normally provided by a master device manufacturer. The configuration management software determines parameters for each slave device via an Electronic Data Sheet (EDS).

Available connection types are Polling, Strove, Cyclic, Change Of State, and Explicit messaging.

Available baud rates are 125 kbps, 250 kbps, and 500 kbps.

For the instruction of configuration, refer to Master Mode later in this chapter.

Installing Software

Before adding DeviceNet master boards manufactured by molex to the PC with the EPSON RC+ 7.0 installed, you must install the applicomIO Console application and drivers according to the type of the board you are using.

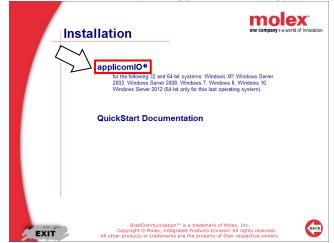
- 1. Insert the applicomIO Console CD-ROM to the PC with the EPSON RC+ 7.0 installed.
- 2. The dialog box shown below appears. Select "Run setup.exe".



3. The [Summary] dialog box appears. Select "Product Installation".



4. The [Installation] dialog box appears. Select "applicomIO".



5. If the Microsoft.NET Framework 4.0 is not installed, following dialog box appears.

Click <install>.</install>	
applicomIO - InstallShield Wizard	
applicomIO requires the following items to be installed on your co to begin installing these requirements.	mputer. Click Install
Status Requirement	
Pending Microsoft .NET Framework 4.0 Full	
Install	Cancel

6. The applicomIO Console application installer runs and the [Welcome to the InstallShield Wizard for applicomIO] dialog box appears.

Click <Next>.

👷 applicomIO - InstallShield Wizard		
note company a world of Innovation	Welcome to the InstallShield Wizard for applicomIO	
molex	The InstallShield(R) Wizard will install applicomIO on your computer. To continue, click Next.	
	WARNING: This program is protected by copyright law and international treaties.	
	\sim	
	< <u>N</u> ext > Cancel	

7. The [License Agreement] dialog box appears.

Read the software license agreement and click <Next>.

applicomIO - InstallShield Wizard	x
License Agreement	lex
Please read the following license agreement carefully.	a world of Innovation
Software License Agreement	<u>^</u>
Please review the following terms and conditions	
carefully before installation. By installing this	
package, you indicate your acceptance of such terms conditions.	and
License and Terms	
Woodhead Software & Electronics (WSE) grants you a	
license to:	-
(i) use the software on a single computer.	
I accept the terms in the license agreement:	Print
\bigcirc I <u>d</u> o not accept the terms in the license agreement	
InstallShield	
< Ba Next >	Cancel

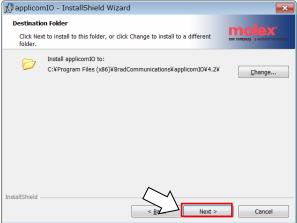
8. The [Customer Information] dialog box appears. Now register the user information. Enter the User Name and Organization.

applicomIO - InstallShield Wizard	×
Customer Information Please enter your information.	DER COMPANY - a world of Innovation
User Name:	
Organization:	
~	
nstallShield	

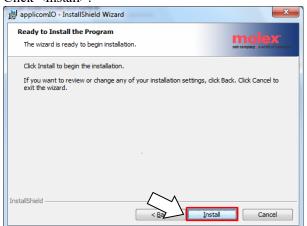
 The [Destination Folder] dialog box appears.
 Specify the installation folder for the applicomIO Console application. The default specifies here:

C:\Program Files(x86)\BradCommunications\applicomIO\4.2

If you agree to the default installation folder, click <Next>.



10. The [Ready to Install the Program] dialog box appears. Click <Install>.



 Installation of applicomIO Console application starts. After the installation completes, the [InstallShield Wizard Completed] dialog box appears.

Click <Finish>.

📸 applicomIO - InstallShield Wizard		
molex ora company > a world of Innovation	InstallShield Wizard Completed	
	The InstallShield Wizard has successfully installed applicomIO. Click Finish to exit the wizard.	
	\sim	
	< Bit Finish Cancel	

12. The message prompting you to reboot your PC appears. Select <Yes> and reboot the PC.

🛃 applico	omIO Installer Informat	tion
i	changes made to applic	system for the configuration comIO to take effect. Click Yes you plan to restart later.
\sum	Yes	No

13. Refer to the next section *Installing a Board* to install the DeviceNet master board manufactured by molex.

Installing a Board



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

1. Configure the board address jumper (JP1) on DeviceNet master board manufactured by molex.

You can install one Fieldbus master board to the PC with the EPSON RC+ 7.0 installed.

The board number should be "1".

Refer to the following table for JP1 configuration.

Short Socket Board No.	C0	C1	C2
1	0: Short	0: Short	0: Short

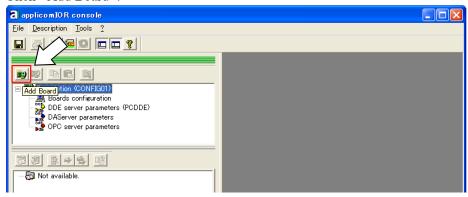
- 2. Install the DeviceNet master board manufactured by molex to the PCI bus of the PC with the EPSON RC+ 7.0 installed. Installation methods of the DeviceNet master board manufactured by molex to the PCI bus and how to open the cover differ depending on the type of PC. Refer to the manuals of each PC on how to install the board to the PCI bus.
- 3. Connect the DeviceNet master board manufactured by molex with the DeviceNet network.
- 4. Start up the PC.
- 5. Open the [applicomIO Console] installation folder and start the "applicomIO Console" application.

Following is specified for [applicomIO Console] installation folder as default. C:\Program Files(x86)\BradCommunications\applicomIO\4.1



6. The [applicomIOR console] dialog box appears. Add the DeviceNet master board manufactured by molex.

Click <Add Board>.



 The [Add New Board] dialog box appears. Confirm that "PCU-DVNIO" is displayed in [Board to Add]-[Board Type] and click <OK>.

Add New Board		? 🗙
Board 1: Board to Abo Board to Abo Board Type PCI/PCU-DVNIO Description : 1 DeviceNet channel	Informations A PCI/PCU-DVNIO board correctly detected. Press Ok to add this one in your configuration.	
PC104/ISA Board Parameters <u>D</u> PRAM Base Address : <u>D4000</u> • Diagnostic and Manual Configuration »	5	
<u></u>		Help

If the board cannot be detected, the following dialog box appears. Make sure that the board is correctly inserted.

Add New Board		? 🗙
Board 1: Board to Add Board Type : ABSENT Description : PC104/ISA Board Parameters DPRAM Base Address : D4000 V Diagnostic and Manual Configuration >>	Informations - No board 1 was detected. Press the "Diagnostic and Manual Configuration" button to have more information or to manually configure this one.	
	OK <u>C</u> ancel H	elp

- 8. When you finish adding the DeviceNet master board manufactured by molex to the applicomIO Console application, reboot the PC.
 - 8-1 Shutdown the applicomIO Console application.

When the applicomIO Console application shuts down, the dialog box below appears. Click <Yes>.

applicomIO® Console	
Save modifications ?	
<u>Y</u> es	Cancel

- 8-2 Then, the following dialog box appears. Click <OK>.

 applicomIOR Console

 You have to restart the PC in order to your new configuration takes effect on the applicomIOa driver.

 OK
- 8-3 Reboot the Windows.
- 9. After the PC is rebooted, refer to the next section *Master Mode* and continue the step.

Master Mode

- 1. Check that the DeviceNet master board manufactured by molex is connected to the DeviceNet network.
- 2. Open the [applicomIO Console] install folder and run the "applicomIO Console" application.

Following is specified for [applicomIO Console] install folder as default. C:\Program Files(x86)\BradCommunications\applicomIO\4.1

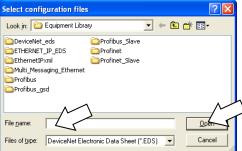


consoleio.exe

3. The [applicomIOR console] dialog box appears. Register the device information (EDS file) that is necessary for the network setup.

applicomIOR console		
<u>File Description Library Network Protocol</u>	<u>T</u> ools <u>I</u> tems	2
	8	
Board 1: PCI/PCU Potocol OeviceNet: DeviceNet pote Server parameters (PCDDE) (5)	=	⊡-#0 DeviceNet Master : MAC ID: 00 - Baud Rate: 125 Kbits/s └──── [None] DeviceNet Local Slave
Contractor Contractor	 	
Loading description files complete Loading configuration files Loading configuration files complete		
🛄 Output Message View		
Ready	Configure	d boards state : 1F

- 4. Select [Protocol].
- 5. Select the [Equipment Library] tab.
- 6. Click <Add>.
- 7. The [Select configuration files] dialog box appears.
 - Specify the EDS file that is supplied by the device manufacturer. Click <Open>.



8. Select [Protocol]-[Properties] from the applicomIOR console menu.



 The [Device Net Master] dialog box appears. Configure the Baud Rate, MAC ID (master address), and so on for the DeviceNet network.

When the master set	ting is completed, click <ok></ok>
DeviceNet Master	
General Configuration 1/0 Summ	
Baud Rate :	125 Kbits/s
MAC ID :	
Interscan Delay (2 - 9000) :	2 Default Values
Foreground to Background Poll Ratio (1- 32000) :	
	\sim
_	<u>H</u> elp <u>O</u> K <u>C</u> ancel



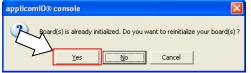
Load on a bus can be controlled by the Baud Rate and Interscan Delay settings. When the load exceeds 60%, the DeviceNet network communication will be unstable, for example, more communication errors. Set the configuration to minimize the load.

For verification of the load on the bus using the applicomIO Console application, refer to *4. Troubleshooting* in this manual.

10. Select [Network Detection].

applicomIOR console		
<u>File Description Library Network Protocol To</u>	[ools Items ?	
	8 B B E 🕨	
	- 🖉 DeviceNet Master : MAC ID: 00 - Baud Rate: 125 Kbits/s	
	[None] DeviceNet Local Slave	
Description (CONFIG01) Boards configuration G-B Board 1: PCI/PCU-DVNIO		
Protocol (DeviceNet): DeviceNet, M Server parameters (PCDDE) (11)	Master/SI	
Regulation		
Loading description files complete Loading configuration files Loading configuration files complete		<) >
🛄 Output Message View		
Ready	Configured boards state : 1F	14

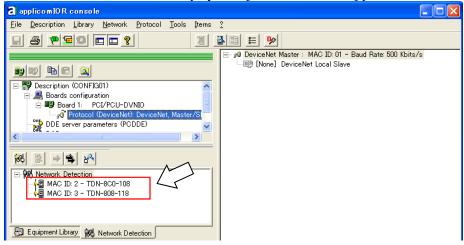
- 11. Click <Read Network Configuration>.
- 12. The following message appears. Click <Yes>.



13. The [Network Detection] dialog box appears and the devices on the Fieldbus will be read in.



14. The list of detected devices is displayed in [Network detection] panel.



15. Select a device you want to scan.

a applicomIOR console	
File Description Library Network Protocol Tools Items	2
	□ DeviceNet Master : MAC ID: 01 - Baud Rate: 500 Kbits/s └── @ [None] DeviceNet Local Slave

- 16. Click <Insert in Configuration>.
- 17. The following dialog box appears.

[002] – 16 Input	
General Configuration EDS Information Connection Configuration Identification Equipment : 002 Equipment : 002	Check Identification
MAC ID : 002	 ✓ Product Type ✓ Product Code ✓ Revision
Description	
<u>Н</u> еф	<u>Q</u> K <u>C</u> ancel

- 17-a Select [Connection Configuration] tab. Connections Parameters appear to communicate with the slave device.
 - Displayed items are different depending on the slave device.
 - Displayed Connections Parameters are information that is set on the Fieldbus master board. Confirm that the information matches with that of the slave device.

àeneral Configuration ↓ Po <u>l</u> ling			Change Of State
Input Size	(0 - 255) :	3 🛨 Bytes	Input Size (0 - 255) : 🛛 🛁 Bytes
Output Size	(0 - 255):	0 🔆 Bytes	Output Size (0 - 255) : 🕕 📃 Bytes
	Poll Rate :	Every scan 💌	Heartbeat Rate (48 - 30000) : 250 📑 ms
- 🗖 Stro <u>b</u> e ———			Cyclic
Input Si	ze (0 - 8):	0 📑 Bytes	Input Size (0 - 255) : 📑 Bytes
			Output Size (0 - 255): 0 🚍 Bytes
EDS <u>D</u> efault Values			Send Rate (48 - 30000) : 1000 🚊 ms
Values from Device			
Name : Input 1 Description :			
			M

Change parameters as necessary.

After completing setting, click <OK>.



Connections Parameters that are set for the Fieldbus master board and information of the slave device need to be matched.

Communication with the slave device is not performed if they do not match. Change the information of either Connections Parameters or Fieldbus master board.

Please consult with the slave device manufacturer if the information is unclear.

17-b <Expert Mode> will appear when the applicomIO Console application is used in the "Expert Mode".

[002] - 16 Input	X
General Configuration EDS Information Connection Configuration Explicit Message EDS Viewer Polling Input Size (0 - 255): Imput Size (0 - 255):	
Strobe Input Size (0 - 8): Input Size (0 - 255): <	
EDS Default Values Expert Mode Send Rate (48 - 30000) : 1000 m Values from Device Name : Input 1 Description :	s

To configure details of "Change Of State" and "Cyclic", click <Expert Mode> and display the [Expert Mode] dialog box.

1 2	L 1			U
Expert Mode				×
Change Of State / Cyclic				
Change Of State				
Inhibit Timer (0 - 32000)	1 -	ms	<u>D</u> ef	ault Values
Ack				
Time Out (0 - 10000)	16	ms		
	<u>H</u> elp		<u>0</u> K	<u>C</u> ancel

NOTE

Never disable [Ack]. When the [Ack] checkbox is unchecked, a failed connection is not regarded as an error.

17-c When the system cannot identify the device you want to use (its EDS file is not registered), the following dialog box will appear.

MAC ID: 2 - TDN-8C0-108	×		
Files Choice			
No EDS file matches to the device! Do you want to create an EDS file ?			
Device Name File Name			
Create New EDS File			
<u>H</u> elp <u>OK</u> <u>C</u> ancel			

In this case, obtain the EDS file from the device manufacturer and register it by following the step 7. After that, follow the step 10.

18. Check the communication status with each slave devices.

Click <Diagnostic>.

applicomIOR console	_ 🗆 🗙
Eile Description Library Network Protocol Iools Items 3	
Master: MAC ID: 00 - Baud Rate: 500 Kbits/s	
BOO2 MAC ID: 02 - EPSON RC700 DeviceNet Slave	
PP Description (CONFIG01)	
中島 Boards configuration	
e I Board 1: PCI/PCU-DVNIO → ² Protocol (DeviceNet). DeviceNet, Ma	
OPC server parameters	
E 96 Network Detection	
Hand ID: 2 - EPSON RC700 DeviceNet Sk	
El Equipment Library Rd Network Detection	
Saving configuration files	
Saving configuration files complete	÷.
Dubput Message View	
Ready	Configured boards state : //

19. The [Diagnostic Board] dialog box appears.

Diagnostic ?
Board 1 PCI/FCU_DVNI0
Channel 0 : DEVICENET

If it cannot communicate with the slave device, the following dialog box appears.

Connections Parameters for the Fieldbus master board and information of the slave device may not be matched.

Diagnostic ?	😕 Diagnostic Board : 1	_ 🗆 ×
Board 1 PC//PCU_DVNI0 Channel 0 : DEVICENET	Diagnostic ?	
	0 U	
	Board 1 PCI/PCU_DVNI0 Channel 0: DEVICENET	

Connections Parameters for the Fieldbus master board can be checked by the following procedure.

First, select the slave device which is registered to the Fieldbus master board.

	Then, click the	left mouse	button and	select	Pro	perties	
--	-----------------	------------	------------	--------	-----	---------	--

a applicomIOR console	_ 🗆 ×
File Description Library Network Protocol Tools Items ?	
Portecellet Master: MAC ID: 00 - Baud Rate: 500 Kbits/ Description (CONFIGO1) Descriptio	
Saving configuration files	
Saving configuration files complete	
🛄 Output Message View	
Ready	Configured boards state :

The property information of selected slave device is displayed.

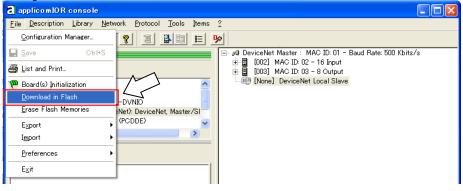
[002] – EPSON RC700 DeviceNet Slave	×
General Configuration EDS Information Connection Configuration Onli Identification Equipment : 002 Y MAC ID : 002 Y Link Y Active	Revision
	×
<< <u>Previous</u> <u>N</u> ext ≫ <u>H</u> elp	OK Cancel

Select the [Connection Configuration] tab.

Connections Parameters appear to communicate with the slave device.

[002] - EPSON RC700 DeviceNet Slave	×
General Configuration EDS Information Connecti	ion Configuration Parameters
Polling	Change Of State
Input Size (0 - 255) : 📴 📑 Bytes	Input Size (0 - 255) : 32 📑 Bytes
Output Size (0 - 255) : 32 📑 Bytes	Output Size (0 - 255) : 32 🚊 Bytes
Poll Rate : Every scan	Heartbeat Rate (48 - 30000) : 250 📻 ms
Strobe	
Input Size (0 - 8) : 8 📑 Bytes	Input Size (0 - 255) : 32 - Bytes
	Output Size (0 - 255) : 32 - Bytes
EDS <u>D</u> efault Values	Send Rate (48 - 30000) : 1000 = ms
Values from Device	
Name : Description :	×
<< <u>P</u> revious <u>N</u> ext >>	Help OK Cancel

20. Select [File]-[Download in Flash] from the applicomIOR console menu. Register the configuration to the Fieldbus master board.

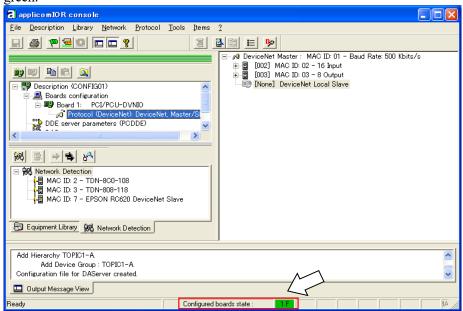


NOTE (B

Make sure that the flash memory of Fieldbus master board stores the configuration; otherwise the Fieldbus master board cannot correctly function. Also, you cannot control it from EPSON RC+7.0.

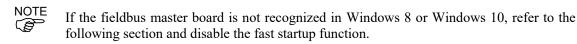
If you changed the configuration, select [File]-[Download in Flash] from the applicomIOR console menu and register the configuration to the fieldbus master board.

21. After few seconds, the display of "Configured boards state" on the status bar turns to green.



Now, the Fieldbus master board is ready to operate in the master mode.

- 22. Close the "applicomIO Console" application.
- 23. Refer to the next section EPSON RC+7.0 Configuration and continue the step.



4. Troubleshooting
4.4 How to Disable Fast Startup in Windows 10
4.5 How to Disable Fast Startup in Windows 8 or 8.1

EPSON RC+ 7.0 Configuration

To use the Fieldbus master board, the Robot system option setting and Fieldbus master setting should be enabled on EPSON RC+ 7.0.

- 1. Select [Setup]-[Option Setting] and display the [Option] dialog box.
- 2. Refer to the *EPSON RC+ Users Guide: 23. Installing Controller Options* and enable the Fieldbus Master option.
- 3. The following message dialog box appears.

EPSON RC+ 7.0
Changes will take affect during the next session.
ОК

Click <OK> and reboot EPSON RC+7.0.

After EPSON RC+7.0 is started, the option setting is enabled.

4. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

📖 System Configuration		?		Х	
⊡-Startup ⊡-Controller General	ieldbus Master General	Close	,]
Configuration Preferences Simulator B-Drive Units Robots Robots Robots Robots Robots Robots Robots 	Eieldbus Type: None Board Type: None	<u>A</u> pply <u>R</u> estor			
General Gaves Fieldbus Slave ⊕ Remote Control ⊕ RS282 ⊕ TCP / IP ⊕ Part Feeders	Update Interval: 10 v ms Total Input Bytes: 0 Total Output Bytes:0				
B-Security B-Vision					

- 5. Select [Inputs/Outputs]-[Fieldbus Master]-[General].
- 6. Set the following items:
 - [Fieldbus Type:] DeviceNet [Board Type:] Molex [Update Interval:] Update cycle for the DeviceNet master I/O System Configuration ? × Fieldbus Master General Close -General -Configuration -Preferences Apply Simulator <u>F</u>ieldbus Type: Dev Drive Units
 Robots
 Inputs / Outputs
 Fieldbus Master
 General Restore Mole> Board Type Update Interval: 10 ms \simGeneral ⊕-Fieldbus Slave ...Remote Control Total Input Bytes: 0 🛓 - RS232 TCP / IP Part Feeders Total Output Bytes0 Security -Vision
- 7. Click < Apply>.

Confirm that the following items are displayed.

Total Input Bytes: Number of inputs the master controls (Bytes)Total Output Bytes: Number of outputs the master controls (Bytes)

8. Click <Close>. The following dialog box appears. The Robot Controller automatically starts rebooting.



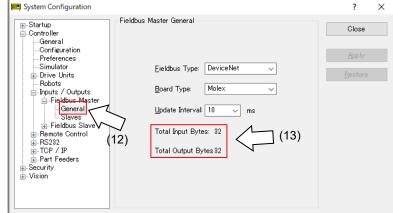
9. Select [Setup]-[System Configuration] and display the [System Configuration] dialog

	-Inputs / Outputs						
⊕-Startup ⊨-Controller	alpute / outpute					Close	
General	Туре	Installed	Inputs	Outputs	^		
Configuration	Drive Unit 1	No			-		
Preferences (10) Drive Unit 1 R-I/O	No					
Drive Units	tended Board 1	No					
Robots	Extended Board 2	No					
Inputs / Outputs	L Extended Board 3	No					
⊡-Fieldbus Master General	Extended Board 4	No					
Slaves	Euromap 67 Boa…	No					
	Euromap 67 Boa…	No					
🖅 Remote Control	Drive Unit 2	No					
	Drive Unit 2 R-I/O	No				(11)	
ia. TCP / IP ia. Part Feeders	Drive Unit 3	No			\sim	>	
-Security	Drive Unit 3 R-I/O	No			1 6		
- Vision	Fieldbus Slave	Yes	512 - 767	512 - 767			
	Fieldbus Master	Yes	6144 - 6399	6144 - 639	9		

- 10. Select [Inputs / Outputs].
- 11. Confirm that "Fieldbus master" displays the following items: Installed :Yes

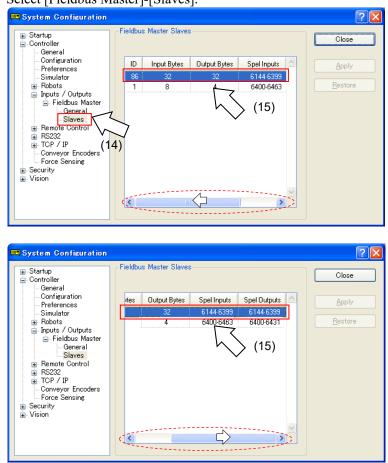
Inputs :"6144" – "6144 + Number of inputs the master controls (Bits)"

- Outputs :"6144" "6144 + Number of outputs the master controls (Bits)"
- 12. Select [Fieldbus Master]-[General].



13. Confirm that the following items are displayed.

Total Input Bytes: Number of inputs the master controls (Bytes)Total Output Bytes: Number of outputs the master controls (Bytes)

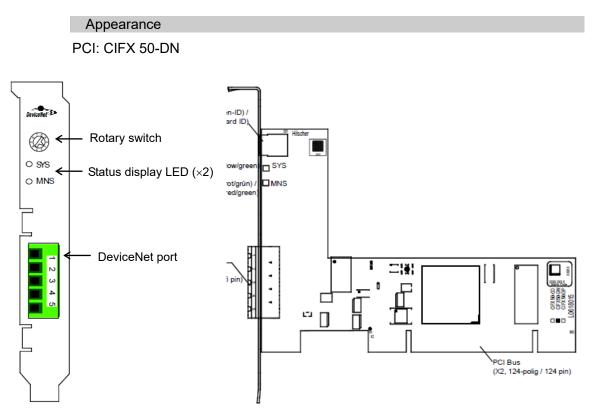


14. Select [Fieldbus Master]-[Slaves].

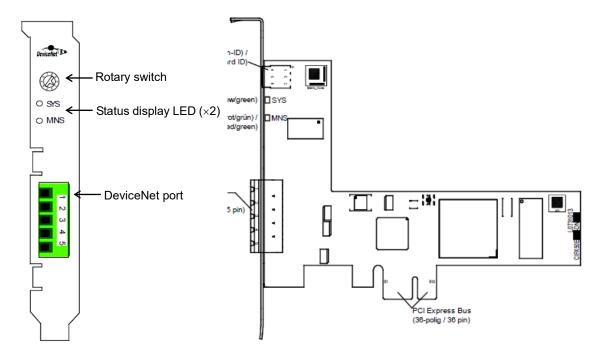
15. Confirm that the following information the master controls is displayed.

ID	: Fieldbus station ID of slave
Input Bytes	: Number of inputs per slave (Bytes)
Output Bytes	: Number of outputs per slave (Bytes)
Spel Inputs	: Number of inputs per slave (Bits)
Spel Outputs	: Number of outputs per slave (Bits)





PCI Express: CIFX 50E-DN



Specifications

Item	Specification
Name	DeviceNet board manufactured by Hilscher
Maximum number of DeviceNet slaves	63
Maximum number of total cyclic input data	3584 bytes
Maximum number of total cyclic output data	3584 bytes
Maximum number of cyclic input data	128 bytes/connection
Maximum number of cyclic output data	128 bytes/connection
Maximum Configuration data	1000 bytes/slave
Acyclic communication	Explicit connection All service codes are supported
Connections	Bit Strobe Change of State Cyclic Poll Explicit Peer-to-Peer Messaging
Function	Quick Connect
Fragmentation	Explicit and I/O
UCMM	Supported
Objects	Identity Object (Class Code 0x01) Message Router Object (Class Code 0x02) DeviceNet Object (Class Code 0x03) Connection Object (Class Code 0x05) Acknowledge Handler Object (Class Code 0x06)
Baud rates	125 kBits/s, 250 kBit/s, 500 kBit/s Auto baud rate detection is not supported
Data transport layer	CAN frames

LED Description

LED state represents the status of the fieldbus board.

SYS: System Status LED

LED state	Description
Green	Operating in normal condition
Flashing	Waiting for firmware to load
Green/Yellow	
Yellow	Waiting for firmware (netX) to load
OFF	The power supply to the device is missing or hardware may
	have faults.

MNS: Module Network Status LED

For the DeviceNet Master protocol, the communication status LED MNS can assume the states described below.

LED	Color	State	Description
MNS	Duo LED red/g	green	
	(Green)	ON	Device operational and on-line, connected: Device is online Connections with all slaves are established.
	🌞 (Green)	Flashing (1 Hz)	Device operational and on-line: Device is online No connection is established. - Configuration missing, incomplete or incorrect
	╬╬ ● (Green, Red, OFF)	Flashing (2 Hz) Green, Red, OFF	Self test after power ON.
	🌞 (Red)	Flashing (1 Hz)	Minor fault and/or connection time-out: Device is online One or more connections are established. Device has data exchange with at least one of the configured slaves or no data exchange with one of the configured slaves.
	• (Red)	ON	Critical fault or critical link failure: Critical connection failure Device has detected a network error. Duplicate MAC- ID or severe error in CAN network.
	• (OFF)	OFF	Device is not powered - The device may not be powered. Device is not on-line and/or no network power - The device has not yet complete the Dup_MAC_ID test. - The device is powered. The network power is missing.

LED state	Description
Flashing (1 Hz)	The indicator turns ON and OFF with a frequency of approx. 1 Hz. Turn ON for 500 ms, followed turn OFF for 500 ms.
Flashing (2 Hz) Green, Red, OFF	The indicator turns to green on for 250 ms, and red on for 250 ms, then turn OFF.

Setting of Rotary Switch

Use a rotary switch of DeviceNet board manufactured by Hilscher at "0" position.

Modes

DeviceNet board manufactured by Hilscher has the master mode and the slave mode. However, do not use in the slave mode.

Master mode

The master device gathers and controls all nodes on DeviceNet network.

DeviceNet board manufactured by Hilscher can control up to 63 nodes (max. 128 bytes per slave) in one network.

PLC is typically configured as a master and controls all nodes in factory automation system, but EPSON RC+ is also capable of being a master.

DeviceNet network configuration is specified by configuration management software. This is normally provided by a master device manufacturer. The configuration management software determines parameters for each slave device via an Electronic Data Sheet (EDS).

Available connection types are Bit Strobe, Change of State, Cyclic, Poll, and Explicit Peerto-Peer Messaging.

Available baud rates are 125kbps, 250kbps, and 500kbps.

Installing Software

Installing device driver

Before adding DeviceNet board manufactured by Hilscher to the PC with the EPSON RC+ 7.0 installed, you must install the Hilscher SYCON.net application and drivers according to the type of the board you are using.

- 1. Insert Communication-Solutions DVD into the PC with EPSON RC+7.0 installed.
- Execute Communication-Solutions.exe. When Windows Security Alert appears, do not click <Cancel> and proceed to the next step.
- 3. The [Communication Solutions] window appears. Select "Install cifX / netJACK Device Driver".

Installation Guide Install SYCON.net Configuration Softwar Install netXStudio (Objekt Engineering) Documentation Drivers, Software and Tools Install CifX / netJACK Device Driver Install USB Diagnosis Driver Install USB SPM Driver Start netHOST for Remote access Driver-Toolkit for Programmers Auxiliary Tools	
--	--

4. The [User Account Control] dialog box appears. Click <Yes>.



5. The [Device Driver Setup] dialog box appears.

Select the [I accept the terms in the License Agreement] check box. Click <Install>.



- 6. The [Windows Security] dialog box appears. Click <Install>.
- 7. When the dialog box switched, click <Install> again.

8. The [Completed the cifX Device Driver (x64) 1.5.0.0 Setup Wizard] dialog box appears.

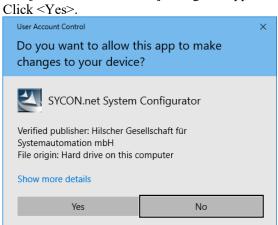
Click <finish>.</finish>		
😸 cifX Device Driver (x64) 1	.5.0.0 Setup	- • •
	Completed the cifX Device 1.5.0.0 Setup Wizard Click the Finish button to exit the Setup If you upgraded from a previous version restart your computer to finish the Inst	Wizard. n, you may need to
	<u>B</u> ack <u>Finish</u>	Cancel

Installing master application software

9. The [Communication Solutions] dialog box appears. Select "Install SYCON.net Configuration Software".

ъÎ	Installation (Guide N.net Configur	ation Software				
		tudio (Objekt E		Ś			CONTRACTOR OF
	Documentat	ion ware and Tools			ALC: NO	Shill be	See 1

- 10. When Windows Security Alert appears, do not click <Cancel> and proceed to the next step.
- 11. The [User Account Control] dialog box appears.



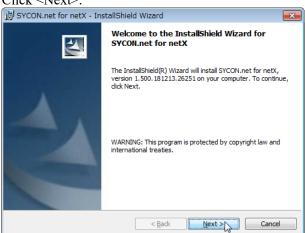
12. The [Choose Setup Language] dialog box appears. Select "Englisch [USA]" and click <OK>.



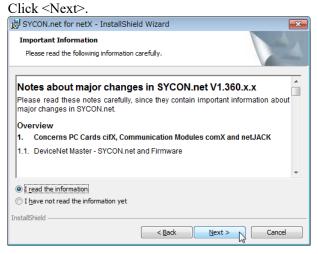
Now, start the installation.

InstallShield Wizard	
	Preparing to Install SYCON.net for netX Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
	Checking Operating System Version
	Cancel

13. The [InstallShield Wizard - Welcome] dialog box appears. Click <Next>.



14. [InstallShield Wizard - Important Information] dialog box appears. Select <I read the information>.



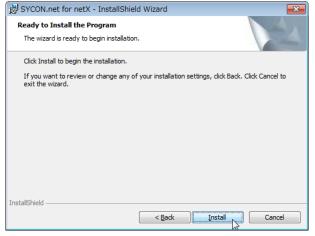
15. The [InstallShield Wizard - License Agreement] dialog box appears. Select <I accept the terms in the license agreement>. Click <Next>

CIICK SINCAL.	
🗒 SYCON.net for netX - InstallShield Wizard	×
License Agreement Please read the following license agreement carefully.	4
HILSCHER SOFTWARE LICENSE AGREEMENT	*
This document is a legally valid contract between you and Hilscher Gesellschaft für Systemautomation mbH ("Hilscher").	
Please read through this License Agreement carefully before installing and using the software. By installing the software and using it, whether in whole or in part, you accept all of the provisions of this Agreement.	
If you decline to accept these terms and conditions, please do not install the software. Instead, return it to us or the retailer from which you purchased it for a refund of the purchase price.	~
(a) I accept the terms in the license agreement \Box I do not accept the terms in the license agreement	
InstallShield	
< <u>B</u> ack <u>N</u> ext > S Cancel	

16. The [InstallShield Wizard - Customer Information] dialog box appears. Enter the User Name and Organization.

Click <next>.</next>	
B SYCON.net for netX - InstallShield Wizard	×
Customer Information	4.
Please enter your information.	
User Name:	
<your name=""></your>	
Organization:	
<your organization=""></your>	
InstallShield	
< <u>B</u> ack	Next > Cancel

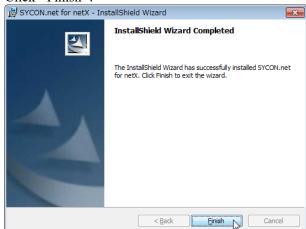
17. The [InstallShield Wizard - Ready to Install the Program] dialog box appears. Click <Install>.



Now, start the installation.

BYCON.	net for netX - InstallShield Wizard 📃 📼 💌					
_	SYCON.net for netX rram features you selected are being installed.					
Please wait while the InstallShield Wizard installs SYCON.net for netX. This may take several minutes.						
	Status:					
InstallShield –	< <u>B</u> ack <u>N</u> ext > Cancel					

18. The [InstallShield Wizard - InstallShield Wizard Completed] dialog box appears. Click <Finish>.



Refer to the next *Installing a Board* and install DeviceNet board manufactured by Hilscher.

Installing a Board

1. Configure the rotary switch of the board address on DeviceNet board manufactured by Hilscher.

You can install one Fieldbus master board to the PC with the EPSON RC+ 7.0 installed. The slot number should be "Not in use (0)". Refer to the following table for configuration.

Slot No.	Rotary switch position
Not in use	0
Slot No. 1	1
Slot No. 9	9

- Install the DeviceNet board manufactured by Hilscher to the PCI bus or PCI Express bus of the PC with the EPSON RC+ 7.0 installed.
 Installation methods of the DeviceNet board manufactured by Hilscher to the PCI bus/PCI Express bus and how to open the cover differ depending on the type of PC.
 Refer to the manuals of each PC on how to install the board to the PCI bus/PCI Express board.
- 3. Connect DeviceNet board manufactured by Hilscher with the DeviceNet network.

4. Describe an example to set the master and the slave as the setting below.

Setting item	Value
Master MACID	0
Slave MACID	1
Baud Rate	500 kbps
Slave Input Bytes	20 bytes
Slave Output Bytes	20 bytes

📖 System Configuration			?	Х
System Configuration System Configuration General Configuration Preferences Simulator B-Drive Units Robots I-Inputs / Outputs	Fieldbus I/O Slave Fieldbus Type: Fieldbus Slave ID: Baud Rate:	DeviceNet 1 500 Kbps	? Close Apply <u>R</u> estore	
	Input Bytes: Output Bytes:	20 v 20 v		

- 5. Start up the PC.
- 6. Select the Start menu-[SYCON.net] and execute it.
- 7. Set a Confirm password of SYCON.net. Click <OK>.

Be careful not to forget the Confirm password.

SYCON.net User Log	gin 💽			
Hilsoher SYDONnet SYDONnet is started for the first time. Please enter an administrator password now.				
<u>U</u> ser Name:	Administrator 🗸			
Password:				
<u>C</u> onfirm password:				
	OK Cancel			

8. SYCON.net starts up.

Click [netDevice]-Device Catalog list on the right side-[CIFX DN/DNM].

YCON.net - [Untitled.spj]	
Eile View Device Network Extras Help	
D 📂 🔲 Q ≝ ≝ 😪 3: 💿 🗗 5: 5; 5;	
netProject	
Project: Untitled	
x y y y y y y y SYCON.net / netDevice /	Administrator

Importing slave EDS files

9. Click [Network]-[Import Device Descriptions...].

			1		
ſ	F SYCON.net - [Untitle	ed.sp	oj]	-	
	Eile <u>V</u> iew <u>D</u> evice	Net	work E <u>x</u> t	ras <u>H</u> elp	
	🗅 🚅 🔚 😰 🖆	⊒*	<u>A</u> dd Buslir	ie	
	netProject	25	<u>D</u> elete La	st Busline	
Ð	Project: Untitleo	3 e	Start Proj	ect <u>D</u> ebug Mode	
-		STOP		ect <u>D</u> ebug Mode	
		<u></u>	De <u>v</u> ice Ca	talog	-
			Import De	evice Descriptions	
			Print Proje	ect Data	~~

The [Import Device Description] dialog box appears.

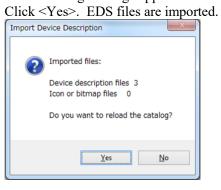
retDevice - I	retDevice - Import Device Description				
Look in:	DeviceNet	✓ G D P			
Quick access	EPSN0501.ed EPSN0700.ed EPSN1001.ed	ls			
Desktop					
Libraries					
Lange Contract This PC					
) Network					
	File <u>n</u> ame:	Open			
	Files of type:	DeviceNet EDS (*.eds)	.		

10. Select EDS files provided by each device manufacturer.

Click <Open>.

🔰 netDevice -	Import Device Des	cription	×
Look in	: DeviceNet	 Image: Image: Ima	
Quick access	EPSN0501.ed	ls	
Desktop			
Libraries			
This PC			
Network			
			_
	File <u>n</u> ame: Files of type:	"EPSN0501eds" "EPSN0700eds" "EPSN1001eds" Ope DeviceNet EDS ("eds) Cancel	
	riles of (ype:	DeviceNet EDS (*.eds) V Cano	

11. The following message appears.

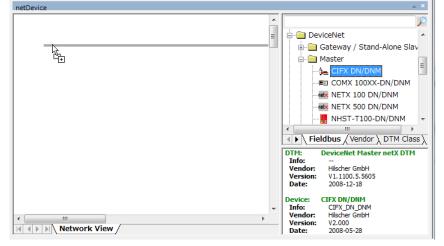


Adding a master icon

12. Click SYCON.net application software-[netDevice]-Device Catalog list on the right side-[DeviceNet]-[Master]-[CIFX DN/DNM].

netDevice	× *
A	P
=	DeviceNet
	🗄 🛅 Gateway / Stand-Alone Slav
	Master
	E COMX 100XX-DN/DNM
	NETX 100 DN/DNM
	NETX 500 DN/DNM
	NHST-T100-DN/DNM
	Fieldbus / Vendor \ DTM Class \
	DTM: DeviceNet Master netX DTM
	Info: Vendor: Hilscher GmbH
	Version: V1.1100.5.5605
	Date: 2008-12-18
	Device: CIFX DN/DNM
T	Info: CIFX_DN_DNM Vendor: Hilscher GmbH
K K K K K K K K K K K K K K K K K K K	Version: V2.000
	Date: 2008-05-28

13. Drag & drop [CIFX DN/DNM] on the bold line on the left side of [netDevice].



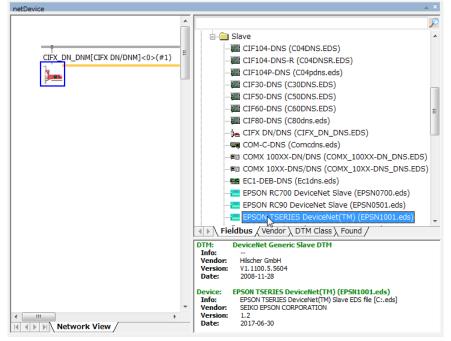
14. "CIFX_DX_DNM" icon indicating DeviceNet board manufactured by Hilscher is connected.

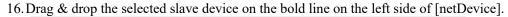
netDevice	× *
CIFX_DN_DNM[CIFX_DN/DNM]<0>(#1)	
< mm → i	

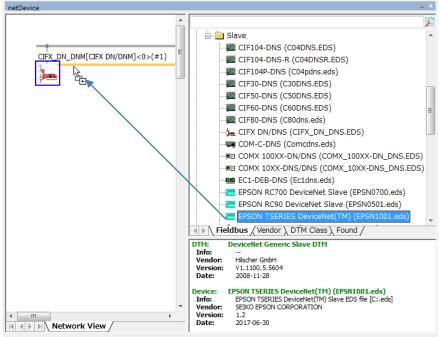
Adding a slave icon

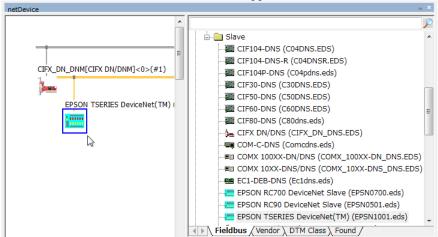
15. Click SYCON.net application software-[netDevice]-Device Catalog list on the right side-[DeviceNet]-[Slave]-Slave device.

In case of DeviceNet slave module:









17. DeviceNet Slave is connected and the icon appears.

Setting on master side

18. Right-click [netDevice]-<CIFX_DN_DNM> and click [Configuration...].

-		-
	N_DNM[CIFX DN/DNM]<0>(#1)	-
	Disconnect Start Debug Mode	E
	D <u>o</u> wnload <u>U</u> pload	
	Cu <u>t</u> Copy Paste	
	<u>N</u> etwork Scan	
	Configuration	
	Measured Value Simulation Diagnosis	
	Additional Functions	
•	<u>D</u> elete	
	Symbolic Name	

19. The [Configuration]dialog box appears. Select [Settings]-[Device Assignment] tab.

Select the installed [CIFX 50E-DN] checkbox and click <Apply>.

Navigation Area	-				During A				
Settings					Device A:	ssignment			
Driver	Scan p	rogress: 1/1 Dev	rices (Current device: -)						
netX Driver									Sca
i Device Assignment	Device	selection:	suitable only 🔹						
Firmware Download		Device	Hardware Port 0/1/2/3	Slot nu	Serial number	Driver	Channel Pro	tocol	Access path
Licensing	V	CIFX 50E-DN	-/-/DeviceNet/-	n/a	21648	CIFX Device Driver	DeviceNet N	laster	¥cifX0_Ch0
Configuration									
Bus Parameters									
Server Parameters									
Process Data									
Address Table	_								
MAC ID Table Ouick Connect Table									
Master Settings									
Master Settings									
	Access		{368BEC58-0E92-4C0E-84	0.04500453					
	Access	s gath:	{368BEC58-0E92-4C0E-84/	49-64-62AE7	AAFA}#citxu_chi	0			

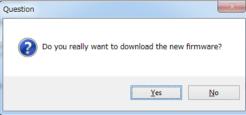
20. Select [Settings]-[Driver]-[Firmware Download]. Click <Browse...>. 21. Display [Firmware\CIFX] folder of Communication-Solutions DVD. Select [cifxdnm.nxf].

Look in:	CIFX	- 3	2
-	Name	A	Firmware
X	cifxdnm.nxf		DeviceNet Master
Quick access Desktop Libraries This PC	Cifxeim.nxf		EtherNet/IP Scanner
	File name:	cifxdnm <i>n</i> xf	✓ <u>Open</u>
S	Files of type:	Firmware Files (*nxf;*nxm)	▼ Cancel
Network	Recent folders:		✓ Help

22. Confirm that [Name] is "DeviceNet Master for CIFX". Click <Download>.

IO Device: CIFX DN/D Vendor: Hilscher Gr			Device ID: Vendor ID:	0 283	
Navigation Area 📃		Firmware Download			
 Settings Driver netX Driver Device Assignment Firmware Download Licensing Configuration Bus Parameters Server Parameters Process Data Address Table MAC ID Table Quick Connect Table Master Settings 	Name: Version:	PeviceNet Master for CIFX 2.4 (build 0) CAUTION: The firmware download - stops the bus communication, - arease the configuration database and - overwrites the existing firmware in the device. To complete the update and to make the device operable again, please re-download to	he configuration	n when this operation ha	Browse
		r	ок	Cancel	Downloa Help

23. Click <Yes>.



Start the installation of firmware.

n	etDevice
Γ	Device: CIFX_DN_DNM[CIFX DN/DNM]<0>(#1)
	Download finished
	99 % complete
	99%

24. Select [Configuration]-[Bus Parameters] tab. Select [MAC ID] and [Baud Rate] on the master side.

Click <apply>.</apply>						
netDevice - Configuration CI	IFX_DN_DNM[CIFX DN	DNM]<0>(#1)				
IO Device: CIFX DN/				Device ID: Vendor ID:	0 283	FÓT
Navigation Area 🚍			Bus Parameters			
 Settings Driver netX Driver Device Assignment Firmware Download Licensing Configuration Bus Parameters Server Parameters Process Data Address Table MAC ID Table Quick Connect Table Master Settings 	General Device Description: Bus Parameters MAC ID: Baud Rate: Error Handling Auto Clear			ΟΚ	Cancel	y N Heb
⊲¤ Disconnected 0 Data Set	1					<u></u>

25. Select [Configuration]-[MAC ID Tables] tab. Enter [MAC ID] on the slave side. Click <OK>.

Device ID: Vendor ID: able Name TSERIES DeviceNet(TM) (EPSN	0 283
able Name	Vendor
Name	
	ancel Apply H
	ок

26. Close the [Configuration] dialog box.

Setting on slave side

27. Right-click [netDevice]-<EPSON TSERIES...> icon. Select [Configuration...].

CIFX_DN_DNM	[CIFX DN/DNM]<0>(#1)
EPSON	TSERIES DeviceNet(TM) (EPSN10
12	<u>C</u> onnect
	Disconnect
	Download
	<u>U</u> pload
	Cu <u>t</u>
	<u>С</u> ору
	<u>P</u> aste
	Configuration
	Measured Value
	Simulation
	Additional Functions
	Delete
Netwo	Symbolic Name

- 28. The [Configuration] dialog box appears.
- 29. Select [Configuration]-[Connection]-[Poll] tab.
- 30. Enter the settings of the slave side and click <OK>.

IO Device: EPSON	PSON TSERIES DeviceNet(TM) (EPSN1001.eds)[EPSON TSER TSERIES DeviceNet(TM) (EPSN1001.eds) PSON CORPORATION	IIES DeviceNet(TM) (EPSN1001.eds)]<1>
Navigation Area	Poll connection	on configuration
General Connection Poll Change of state Cyclic	Size: 20 Bytes Connection Path: User Defined Consumption Data Path description: Image: Consumption Data Image: Production Image: Consumption Data	v 20 04 24 02 30 03
Bit-Strobe Parameter Device Description Device EDS	Size: 20 Bytes Connection Paths: User Defined Production Data Path description:	▼ 20 04 24 01 30 03
	Production Inhibit Time: 0 ms Expected Packet Rate: 200 ms	EDS default values
∜© Disconnected 0 Data Set		OK Cancel Apply Help

Poll connection configuration

Item	State
Consumption	Checked
Consumption - Size	20
Consumption - Connection Path	User Defined Consumption Data
Production	Checked
Production - Size	20
Production - Connection Path	User Defined Production Data

31. Close the [Configuration] dialog box.

Downloading to master board

32. Right-click [netDevice]-<CIFX_DN_DNM> icon. Select [Download].

CIF	DN_DNM[CIFX DN/DNM]<0>(#1)
3	Connect
-	 Disconnect
	(Start <u>D</u> ebug Mode
	Download
	Upload
	Cu <u>t</u>
	Сору
	<u>P</u> aste
	Network Scan
	Configuration
	Measured Value
	Simulation
	Diagnosis
	Additional Functions
_	<u>D</u> elete
	Symbolic Name

By the above step, "Setting on master side" and "Setting on slave side" are downloaded to the DeviceNet master board.

Diagnosis

 Right-click [netDevice]-<CIFX_DN_DNM> icon. Select [Diagnosis...].

CIF	X_DN	L_DNM[CIFX DN/DNM]<0>(#1)
3	_	
7		Connect
		Disconnect
		Start <u>D</u> ebug Mode
		D <u>o</u> wnload
		<u>U</u> pload
		Cu <u>t</u>
		<u>С</u> ору
		Paste
		Network Scan
		Configuration
		Measured Value
		Simulation
		Diagnosis
		Additional Functions
		Delete
		Symbolic Name

34. The [Diagnosis] dialog box appears.Select [Diagnosis]-[General Diagnosis].Confirm that [Device status]-[Communication] turns to green.

Vavigation Area 🦳					•
			General Di	agnosis	
Diagnosis ▲ → General Diagnosis Master Diagnosis Master Diagnosis Station Diagnosis Firmware Diagnosis Etended Diagnosis Extended Diagnosis Etended Diagnosis DPM_COMO_SMBX DPM_COMO_RMBX DPM_COMO_RMBX TLR_TIMER CAN_DL CAN_DL DEVNET_FAL MARSHALLER MARSHALLER PACKET_ROUTER	Device state Communication Run Rady Error Configuration state Configuration locked New configuration pendir Reset required Bus ON Communication error: Watchdog time: Error count:	ng 	Network state Operate Ide Stop Offline		

35. Close [Diagnosis] dialog box.

36. Select [File]-[Save].

	L	
🔶 SY	CON.net - [Untitle	ed.spj] *
<u>F</u> ile	View Device	Ne <u>t</u> work
	New	a 📾 🛛 🗄
j 🚅	Open	X
Ē.	<u>C</u> lose	
	<u>S</u> ave	CIFX DI
	Save <u>a</u> s	RIES Dev
	No Project List	
	<u>E</u> xit	

37. The [Save As] dialog box appears. Enter [File name] and click <Save>. The setting changes are saved.

The setting	g changes	ale saveu.				
➡ Save As						×
Save in:	CIFX	~	G 🌶 📂 🛄 -			
Quick access Desktop Libraries This PC	Name	rsions	Date modified 7/22/2019 3:16 PM	Type File folder	Size	
	File <u>n</u> ame:				~	<u>S</u> ave
	Save as type:	Projekt file (*.spj)			\sim	Cancel

Exporting the configuration file (.csv) for RC+

38. Right-click [netDevice]-<CIFX_DN_DNM> icon. Click [Additional Functions]-[Export]-[CSV...].

D SI C C C C N C C N	DNM[CIFX DN/DNN EDECOM TECEPTEC onnect isconnect tart Debug Mode ownload pload ut opy aste letwork Scan oonfiguration leasured Value imulation	Fiel Condor: rsion: te:	Gateway / Stand-Al	N/DNM NM 'DNM NM TM Class	∑ Found /	
	iagnosis dditional Functions	> C	offline Compare			
_	elete ymbolic Name		nline Compare etpoint Value			
	vork View /	L	ervice ifeList et Slave MAC ID icense	>		
			xport	>	CSV	
		P	rint	>	DBM/nxd XML	N

- 39. Save the CSV file to the file.
 - Exported CSV file is used in the next EPSON RC+7.0 Configuration.

Save As						
Save in:	CIFX		G Ø P III			
Quick access Desktop	Name	^	Date modified 7/22/2019 3:16 PM	Type File folder	Size	
Libraries						
I wetwork						
	File <u>n</u> ame:	EtherNetIRcsv			~	<u>S</u> ave
	Save as type:	CSV Files (*.csv)			~	Cancel

Now, the settings by SYCON.net are complete. Close SYCON.net.



If the fieldbus master board is not recognized in Windows 8 or Windows 10, refer to the following section and disable the fast startup function.

- 4. Troubleshooting
 - 4.4 How to Disable Fast Startup in Windows 10
 - 4.5 How to Disable Fast Startup in Windows 8 or 8.1

EPSON RC+7.0 Configuration

To use the Fieldbus master board, the Robot system option setting and Fieldbus master setting should be enabled on the EPSON RC+ 7.0.

- (1) Select [Setup]-[Option Setting] and display the [Option] dialog box.
- (2) Refer to the *EPSON RC+ Users Guide 23. Installing Controller Options* and enable the Fieldbus Master option.
- (3) The following message dialog box appears.

EPSON	RC+ 7.0		
Change	es will take affec	t during the n	ext session.
01. 1	OTC:	1 1	TDCO

Click <OK> and reboot EPSON RC+7.0.

After EPSON RC+7.0 is started, the option setting is enabled.

(4) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

E System Configuration		? ×
Startup Controller General Configuration	Fieldbus Master General	Close
Preferences Simulator Drive Units Robots Inputs / Outputs Fieldbus Slave Premote Control	Eieldbus Type: None Board Type: None Update Interval: 10	<u>A</u> pply <u>R</u> estore
B-RS232 B-TCP / IP ⊕ Security ⊕-Vision	Total Input Bytes: 0 Total Output Bytes0	

- (5) Select [Inputs/Outputs]-[Fieldbus Master]-[General].
- (6) Set the following items: [Fieldbus Type:] DeviceNet [Board Type:] Hilscher [Update Interval:] Update cycle for the DeviceNet master I/O System Configuration ? × Fieldbus Master General -Startup
 -Controller
 -General
 -Configuration
 -Preferences Close Apply Simulator Eieldbus Type: DeviceNet \sim <u>R</u>estore Drive Units - Drive Units - Robots - Inputs / Outputs ⊕-Fieldbus Master ⊕-Fieldbus Slave - Remote Control DS202 B \sim Type: Update Interval: 10 \sim ms Total Input Bytes: 0 Security
 Vision Total Output Bytes 0 Import Configuration

Click < Import Configuration>.

(7) Select the configuration file (.csv) for RC+.

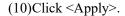
Import Hilscher Fieldbus Master Configuration		×
→ → ↑] → This PC → Documents → CIFX →	✓ Ö Search CIFX	Q
Irganize 🔻 New folder		. ?
This PC Name	Date modified Type	
🗊 3D Objects 🔤 🔒 DeviceNet	7/22/2019 6:35 PM File folder	
Desktop EtherNetIP	7/22/2019 6:35 PM File folder	
Documents DeviceNet.csv	7/22/2019 1:47 AM CSV File	
EtherNetIP.csv	7/8/2019 2:07 AM CSV File	
Music		
E Pictures		
Videos		
L Win10 x64 EN (C:)		
Win10 x64 JP (D:)		
Win10 x64 CS (E:)		
🔜 Win 10 x64 CT (F:) 🗸 <		
File <u>n</u> ame: DeviceNet.csv	✓ Hilscher Config File (*.csv)	~

(8) Confirm that the configuration file (.csv) for RC+ is imported and click <OK>.

EPSON RC	+ 7.0	×
	The Hilscher configuration file 'D:#Users¥0586106¥Documents¥CIFX¥DeviceNet.csv' has been imported successfully.	
	Click Apply to use the new configuration.	
	К	

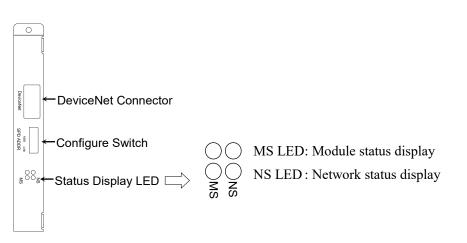
(9) Confirm that the following items are displayed.

System Configuration		? ×
n Startup E-Controller General	ldbus Master General	Close
Configuration Preferences Simulator ⊕-Drive Units ⊕-Robots	Eieldbus Type: DeviceNet	<u>A</u> pply <u>R</u> estore
	Board Type: Hilscher	
n Gr / Ir n Security n Vision	Total Output Bytes 20	
	Import Configuration	
Total Input Byte	es : Number of inputs the m	aster controls (B
Total Output By	tes : Number of outputs the r	master controls (

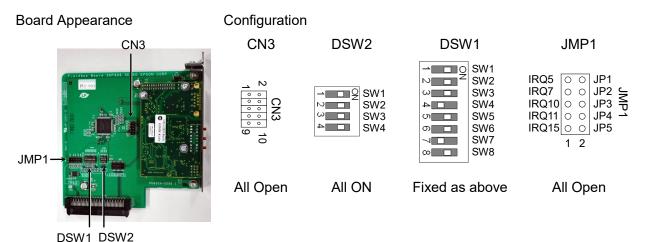


2.1.5 Installing DeviceNet Slave Board

Appearance



The Fieldbus slave board is configured as follows at shipment.



DeviceNet Communication Specifications						
Item		S	pecification			
Name	DeviceNet s	DeviceNet slave board				
Supported Connection	I/O messagin	ng connectio	n (Polling), Expl	licit message		
	connection					
	DeviceNet c	ommunicatio	on protocol			
Baud Rates	125 k / 250 l	x / 500 k (bp	s)			
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 (2 wires for			ply, 1 shield wire)		
Communications Power Supply Voltage	24 VDC (suj	pplied from a	a connector)			
Communication Power Supply Current Consumption	Maximum 30 mA					
Mode	Slave					
Interface	1 DeviceNet port					
Max. Input data size	2048 bits (2:	56 bytes)				
Max. Output data size	2048 bits (2:	56 bytes)				

DeviceNet Communication Specifications

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

LED Description

LED state represents the status of the fieldbus board.

LEC) state	NS	MS
C	OFF	Communications power supply OFF Disconnected	Device power supply OFF
GRN	ON	Link OK Online connected	Device operating
	Blinking	Online disconnected	Data size error
DED	ON	Link error	Critical error
RED	Blinking	Communication time out	Error

Setting Configure Switch



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

Set the baud rates between the MAC address of the device and the master by setting the DeviceNet slave board configure switch.

1. Set the MAC address for DeviceNet slave 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.

	Switch						
MAC address	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 slave baud rate. Check the master configuration and set the same baud rate. Refer to the following table for configuration settings.

Baud Rate	Switch			
Dauu Nale	sw1	sw2		
125 k	OFF	OFF		
250 k	OFF	ON		
500 k	ON	OFF		
Configuration prohibited	ON	ON		

Wiring

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

Terminal name for each pin

Terminal Number	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.

Installing a Board



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

Install the board to the dedicated slot on the Robot Controller.

Reference manuals:

Robot Controller RC700: Maintenance 6.10 Option Board Robot Controller RC90: Maintenance 6.8 Option Board

Confirmation with EPSON RC+ 7.0

When the DeviceNet slave board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the DeviceNet slave board using the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🗵
Startup SPEL Controller Board Drive Units Bobots	Inputs / Outputs				Close
-Inputs / Outputs	Туре	Installed	Inputs	Outputs	E SPP9
🕂 Fieldbus Slave 🗸 🔨	Standard	Yes	0 - 23	0 - 15	Restore
Remote Control	Extended Board 1	Yes	64 - 95	64 - 95	
BS232 (0)	Extended Board 2	No			
TCP / IP (2)	Extended Board 3	No			
- Conveyor Encoders	Extended Board 4	No			
. Security	Fieldbus Slave	Yes	512 - 767	512 - 767	
🗄 Vision	Fieldbus Master	No	Г	ζ	
			h	(3)	

- 2. Select [Inputs / Outputs].
- 3. Confirm that the following items are displayed in the "Fieldbus Slave".

Installed: YesInputs: 512-767 (default setting)Outputs: 512-767 (default setting)

4. Select [Fieldbus Slave]-[General].

System Configuration		? [
System Configuration Startup SPEL Controller Board Drive Units Robots Inputs / Outputs General Remote Control RS232 TCP / IP Conveyor Encoders Security	Fieldbus I/D Slave Fieldbus Type: DeviceNet Fieldbus Slave ID: 63 Baud Rate: 500 Kbps Input Bytes: 32 v Output Bytes: 32 v	Close Apply Restore
		(5)

5. Confirm that the following items are displayed.

Fieldbus Type	: DeviceNet
Fieldbus Slave ID	: (Displays the configure switch MAC address)
Baud Rate	: (Displays the configure switch baud rate)
Input Bytes	: 32 (default setting)
Output Bytes	: 32 (default setting)

6. Click <Close>.

Editing of Input / Output Size

You can change the input/output size of DeviceNet slave board if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

System Configuration			? 🔀
Statup SEL Controller Board Drive Units Robots Fieldbus Slave Feeneral Remote Control RS232 TCP / IP Conveyor Encoders Security Vision	Fieldbus I/O Slave Fieldbus Type: Fieldbus Slave ID: Baud Rate: Input Bytes: Output Bytes:	DeviceNet 63 500 Kbps 32 💌 32 💌	Close Apply Restore

3. Change the settings of [Input Bytes] and [Output Bytes]. In this example, both of them are changed to "20" Bytes

System Configuration	
System Configuration System Configuration SPEL Controller Board Porive Units Robots Fieldbus Slave General Remote Control RS232 Conveyor Encoders Security Vision	Fieldbus I/O Slave Fieldbus Type: DeviceNet Fieldbus Slave ID: 63 Baud Rate: 500 Kbps Input Bytes: 20 V Output Bytes: 20 V

- 4. Click < Apply>.
- Click <Close> and the following message dialog box appears. The Robot Controller automatically starts rebooting.

EPSON RC+ 7.0
Rebooting Controller
Close

6. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🛛
 Startup SPEL Controller Board Drive Units 	Inputs / Outputs				Close
Robots	Туре	Installed	Inputs	Outputs	Apply
Inputs / Outputs Fieldbus Slave	Standard	Yes	0-23	0 - 15	Deuteur
Remote Control	Extended Board 1	Yes	64 - 95	64 - 95	Restore
■ RS232	Extended Board 2	No			
TCP / IP	Extended Board 3	No			
Conveyor Encoders	Extended Board 4	No			
Gecurity	Fieldbus Slave	Yes	512 - 767	512 - 767]
🖭 Vision	Fieldbus Master	No			

- 7. Select [Inputs / Outputs].
- 8. Confirm that the following items are displayed in "Fieldbus Slave".

Inputs :512 - (512 + Changed number of input (Bits)) Outputs :512 - (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs.

Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

9. Click <Close>.



When you change the input/output size of DeviceNet slave board, you need to change the input/output size of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output size of the slave information registered in the Fieldbus master device by the applicomIO Console application.

7] - EPSON RC620 DeviceNet Slave		×
neral Configuration EDS Information Connection Conf	figuration Online Parameters	
✓ Polling	Change O <u>f</u> State	
Input Size (0 - 255) : 20 芸 Bytes	Input Size (0 - 255) : 🛛 🔁 Bytes	
Output Size (0 - 255) : 20 🚊 Bytes	Output Size (0 - 255) : 🛛 📃 Bytes	
Poll Rate : Every scan 💌	Heartbeat Rate (48 - 30000) : 250 🛁 ms	
Strobe		
Input Size (0 - 8) : 8 💮 Bytes	Input Size (0 - 255): 32 - Bytes	
	Output Size (0 - 255) : 🛛 📃 Bytes	
EDS <u>D</u> efault Values	Send Rate (48 - 30000) : 1000 📑 ms	
<u>V</u> alues from Device		
lame :	<u> </u>	
Description :		
< <u>P</u> revious <u>N</u> ext >>	Help <u>O</u> K <u>C</u> ancel	
		_

Electronic Information File (EDS file)

An EDS file is supplied for DeviceNet slave board network configuration. The file is located in the following folder where the EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\DeviceNet

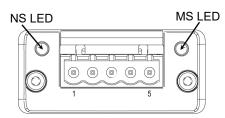
2.1.6 Installing DeviceNet Slave Module

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

Pay attention to the followings in order to prevent the the DeviceNet connecter from coming off.
 Use the connectors attached to the module.
 Insert the connectors all the way seated.
 Fix the cables at proper positions in order not to put a load on the connectors.

Appearance

WARNING



DeviceNet Communication Specifications

Item	Specification				
Name	DeviceNet s	DeviceNet slave module			
Supported Connection	I/O messagin	ng connectio	n (Polling), Expl	licit message	
	connection				
	DeviceNet c	ommunicatio	on protocol		
Baud Rates	125 k / 250 l	x / 500 k (bp	s)		
Transfer Distance		Max.		Total Drop Line	
	Baud Rates	Network	Drop Length	Length	
		Length		Lengui	
	500 k (bps)	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 wir	es for power sup	ply, 1 shield wire)	
Communications	24 VDC (su	notied from	connector)		
Power Supply Voltage	24 VDC (Suj	ppiled from a	a connector)		
Communication					
Power Supply Current	Maximum 3	0 mA			
Consumption					
Mode	Slave				
Interface	1 DeviceNet port				
Max. Input data size	2048 bits (256 bytes)				
Max. Output data size	2048 bits (256 bytes)				

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

LED Description

LED state represents the status of the fieldbus module.

NS: Network Status LED

LED State	Description
Off	Not online / No network power
Green	On-line, one or more connections are established
Flashing Green	On-line, no connections established
(1 Hz)	
Red	Critical link failure, fatal event
Flashing Red	One or more connections timed-out
(1 Hz)	
Alternating	Executing self test
Red/ Green	

MS: Module Status LED

LED State	Description
Off	Not operating
Green	Operating in normal condition
Flashing Green	Missing, incorrect or incomplete configuration, device needs
(1 Hz)	commissioning.
Red	Unrecoverable Fault(s)
Flashing Red	Recoverable Fault(s)
(1 Hz)	
Alternating	Executing self test
Red/ Green	

Setting Configure Switch

The DeviceNet slave module requires no configurations.

All the DeviceNet communication configurations are set by the development software (EPSON RC+ 7.0).

Wiring

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

Terminal name for each pin

Terminal Number	Terminal Name	Description
1	V-	Negative bus supply voltage
1	v -	(DeviceNet bus power)
2	CAN_L	CAN low bus line
3	SHELD	Cable shield
4	CAN_H	CAN high bus line
5	V+	Positive bus supply voltage
3	v+	(DeviceNet bus power)

NOTE

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

Installing Module



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

Install the module to the dedicated slot on the T/VT series Manipulator.

Reference: Manipulator manual Setup & Operation 17. Fieldbus I/O

Confirmation with EPSON RC+ 7.0

When the DeviceNet slave module is installed to the T/VT series Manipulator, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the DeviceNet module board using the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration Sector	Inputs / Outputs				Close
- Robots - Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
E Fieldbus Slave	Standard	Yes	0 · 23	0 - 15	Restore
Remote Control	Extended Board 1	Yes	64 - 95	64 - 95	<u>h</u> estore
🚽 Deana	Extended Board 2	No			
TCP / IP (2)	Extended Board 3	No			
Conveyor Encoders	Extended Board 4	No			
. Becurity	Fieldbus Slave	Yes	512 - 767	512 - 767	
🗄 - Vision	Fieldbus Master	No	Γ	ζ	
			~	∕ ₍₃₎	

- 2. Select [Inputs / Outputs].
- 3. Confirm that the following items are displayed in the Fieldbus slave.
 - Installed : Yes Inputs : 512-767 (default setting) Outputs : 512-767 (default setting)
- 4. Select [Fieldbus Slave]-[General].

Startup Controller General	Fieldbus I/O Slave	Close
Configuration Preferences	Fieldbus Type: DeviceNet	Apply
-Simulator ⊕ Drive Units	Node Address: 1 -	Restore
Robots	Baud Rate: 250 Kbps 💌	
ia Inputs / Outputs ia Fieldbus Master	Input Bytes: 32 -	
Fieldbus Slave	Output Bytes: 32 -	
Remote Contro	7	
		(5)
⊕ Security (+) ⊕ Vision		

5. Confirm that the following items are displayed.

Fieldbus Type	: DeviceNet
Node Address	: Configure switch Node address
Baud Rate	: Configure switch baud rate
Input Bytes	: 32 (default setting)
Output Bytes	: 32 (default setting)

6. Click <Close>.

Editing of Configuration

You can change the configuration of DeviceNet slave module if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

+ Startup	eldbus I/O Slave		Close
General			
Configuration Preferences	Fieldbus Type:	DeviceNet	VlqA
Simulator Drive Units	Node Address:	1 💌	Restore
i Robots i Robot 1	Baud Rate:	250 Kbps 🔻	
i Inputs ∕ Outputs Fieldbus Master	Input Bytes:	32 🔻	
E Fieldbus Slave	Output Bytes:	32 🔻	
Remote Control			
TCP / IP			
Vision			

- Set the Node address.
 Confirm that the Node address is different from the other devices in the network.
- 4. Set the baud rate.

Check the master configuration and set the same baud rate.

- 5. Change the settings of [Input Bytes] and [Output Bytes].
- 6. Click < Apply>.
- Click <Close> and the following message dialog box appears.
 T/VT series Manipulator (Controller) automatically starts rebooting.

EPSON RC+ 7.0		
Rebooting Controller		
Close		

8. Select [Setup]-[System Configuration] and display the [System Configuration] dialog

 ● Startup ● SPEL Controller Board ● Drive Units 	 Inputs / Outputs 				Close
Robots Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0-23	0 - 15	Bastara
Remote Control	Extended Board 1	Yes	64 · 95	64 - 95	Restore
BS232	Extended Board 2	No			
TCP / IP	Extended Board 3	No			
Conveyor Encoders	Extended Board 4	No			
Security Security	Fieldbus Slave	Yes	512 - 767	512 - 767	
🛨 Vision	Fieldbus Master	No			

- 9. Select [Inputs / Outputs].
- 10. Confirm that the following items are displayed in "Fieldbus Slave".

Inputs :512 - (512 + Changed number of input (Bits)) Outputs :512 - (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs.

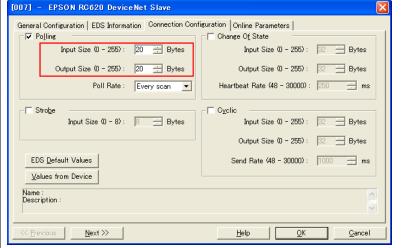
Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

11. Click <Close>.

NOTE Ś

When you change the input/output size of DeviceNet slave module, you need to change the input/output size of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output size of the slave information registered in the Fieldbus master device by the applicomIO Console application.



Electronic Information File (EDS file)

An EDS file is supplied for DeviceNet slave board network configuration. The file is located in the following folder where the EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\DeviceNet

2.2 PROFIBUS-DP



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.

2.2.1 How to Setup a PROFIBUS DP Network

The following is a basic procedure for setting up a PROFIBUS DP network:

- 1. Choose station layout and pathway in your network. For details, refer to the following section 2.2.2 PROFIBUS DP Network Construction.
- 2. Choose the baud rate.

Choose the baud rate based on the network length. Select the fastest baud rate allowed for the length. Increasing network load due to slow baud rate may cause trouble including communication failure.

3. Lay cables.

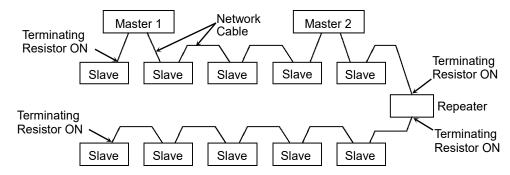
For details, refer to the following section 2.2.2 PROFIBUS DP Network Construction.

- Configure stations.
 For details, refer to respective manuals of your desired stations.
- 5. Turn ON the stations.
- 6. Install the PROFIBUS-DP board into the Controller.
 When installing the PROFIBUS-DP master board
 Refer to 2.2.3 Installing PROFIBUS-DP Master Board Manufactured by molex.
 When installing the PROFIBUS-DP salve board
 Refer to 2.2.4 Installing PROFIBUS-DP Slave Board.
- 7. Operate the PROFIBUS DP network.

2.2.2 PROFIBUS DP Network Construction

Network Configuration

PROFIBUS DP network is configured as shown in the following figure.



Station

There are four types of stations (devices):Master:Controls a network and gathers its slaves.Slave:External I/O and other devices/
Slave outputs data as a response to a master's output order and informs
the master of its input status.Repeater:Repeater is necessary for a network with more than 32 slaves to separate
network segments.Configurator:Used only for network installation. It configures a scan list of the slaves
on the master device.

You can install masters anywhere in the network. You can connect up to 126 stations including server and repeater in the network. However, it is recommended to keep one device for the engineering device.

Network Cable

The PROFIBUS cable can be used as a network cable. There are four types (A, B, C, and D) of PROFIBUS cables. Normally, cable type A is used for PROFIBUS DP network. The cable type A specifications are shown in the table below.

Item	Specification
Impedance	135 to 165 Ω
Capacity	< 30 pf/m
Loop resistance	110 Ω/km
Wire diameter	0.64 mm
Core cross-section	> 0.34 mm2

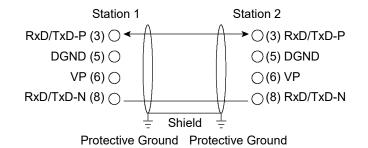
It is recommended to use a 9-pin D-Sub connector for protecting rating IP 20. For IP 65/67, M12 connector (IEC 947-5-2 compliant), Han-Bird connector (DESINA compliant), and Siemens hybrid connector are available.

•	in acongrinite		
	Pin No.	Signal	Assignment
	1	Shield	Shield / Protective ground
	2	M24	Ground of output voltage (24 V)
	3	RxD/TxD-P	Data line B
	4	CNTR-P	Repeater control signal (directional control)
	5	DGND	Communications power supply (5 V)
	6	VP	Supply voltage to terminating resistor (P5V)
	7	P24	Output voltage (24 V)
	8	RxD/TxD-N	Data line A
	9	CNTR-N	Repeater control signal (directional control)

Pin assignment (9-pin D-Sub)

Use pins 2 and 7 for connecting a maintenance device without any power supply.

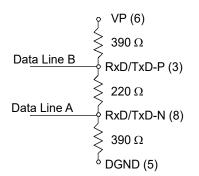
The following figure illustrates wiring sample.



PROFIBUS cables are produced by a variety of manufacturers. For details of the PROFIBUS cables, see PROFIBUS International's website (http://www.profibus.com/).

Terminating Resistor

To reduce reflections of communication signal, terminating resistors should be attached on both ends of each segment. Attach the terminating resistor as shown below.



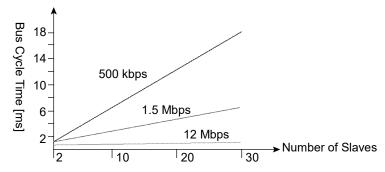
Some commercially available PROFIBUS 9-pin D-Sub connectors have functions of terminating resistor and they can enable/disable the terminating resistors. (Example: Woodhead MA9D00-32)

Molded terminating resistors with connector that can be attached to environment-resistant M12 connector are also available.

Baud Rate and Maximum Cable Length

Available baud rates are 9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1500 kbps, 3 Mbps, 6 Mbps, and 12 Mbps.

PROFIBUS DP requires approximately 1ms at 12 Mbps for transmission of 512 bits input data and 512 bits output data distributed over 32 stations. The following figure shows typical PROFIBUS DP transmission times depending on the number of stations and baud rate.



The maximum cable length is restricted by the baud rate.

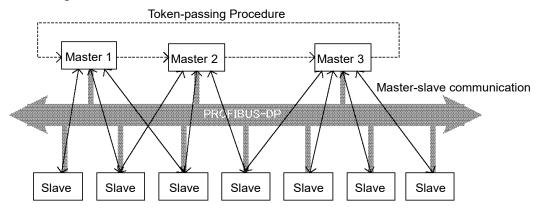
Baud Rate	Maximum Cable Length
12 Mbps	100 m
6 Mbps	100 m
3 Mbps	100 m
1500 kbps	200 m
500 kbps	400 m
187.5 kbps	1000 m
93.75 kbps	1200 m
19.2 kbps	1200 m
9.6 kbps	1200 m

Multi-Master Configuration

PROFIBUS DP allows you to install multiple masters in a single physical network.

All slave devices in the network can be accessed by different masters. Only one master on the network can be used for device configuration.

The following figure illustrates the communication procedure for a multi-master configuration.



When the master receives the logic token, it inquires data from its slaves. After all communications are completed, the master passes the token to another master. In this way, the master can only communicate with its slaves while it is holding the token. The slaves respond to only the inquiry from the master. No slave can output any messages.

Modification and Installation of Communication Cables

The following procedure explains how to modify and install a Woodhead 9-pin D-Sub connector (MA9D00-32).

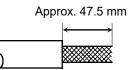
Follow the steps described below to modify communication cables and connect them to the connector.

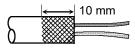
Be careful not to injure your hands or fingers on any sharp blades or tools used to modify the cable. Use appropriate blades and/or other tools to modify the cable. Using inappropriate blades and/or other tools may result in bodily injury and/or equipment damage.

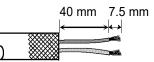
1. Strip approx. 47.5 mm of the cable covering with extra care so that you do not scratch on braided shield underneath.

Do not strip the cable covering more than necessary. Excess stripping may cause short-circuit and/or make the cable more sensitive to noise.

- 2. Carefully expand meshes of the braided shield and fold back the shield over the cable covering. Cut off the shield at approx. 10 mm from the stripped side of the cable covering.
- 3. Strip the covering of the signal wire as shown in the figure.
- 4. Insert the signal wires into the terminal block on the connector and secure the signal wires. Carefully connect the same signal wire to the same terminal on both ends. To prevent faulty wiring, make a rule of connection. For instance, connect the green signal wire to the A1/A2 terminal and the red signal wire to the B1/B2 terminal.





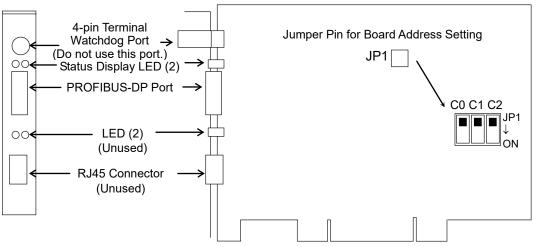


2.2.3 Installing PROFIBUS-DP Master Board Manufactured by molex

Appearance

Part names and functions of the PROFIBUS-DP master board manufactured by molex are shown in the following figure. For details on the status display LEDs, refer to *4. Trouble shooting* in this manual.

PCU-DPIO



Specifications

Item	Specification
Part Number	PROFIBUS-DP master board manufactured by molex
Modes	Master
Baud Rates	9.6, 19.2, 93.75, 187.5, 500, 1500, 3000, 6000, 12000 kbps
Interface	1 PROFIBUS port (EN 50 170)
Output Current Capacity	Maximum 150mA
Supported Devices	All DP Devices
Maximum Stations	126 (32 per segment)
GDS Support	Yes
PROFIBUS DP Class 1	Yes
PROFIBUS DP Class 2	Yes
Max. Input Data Size	1024 bits (128 bytes)
Max. Output Data Size	1024 bits (128 bytes)
Automatic Detection	Yes. Devices can be detected automatically.

Modes

PROFIBUS-DP master board manufactured by molex has two motion modes; Master mode and Slave mode. However, do not select the Slave mode.

Master Mode

There are two types of PROFIBUS DP master: DPM1 and DPM2. DPM1 (DP Master Class 1) gathers and controls all stations in one PROFIBUS DP network. DPM2 (DP master Class 2) operates network configurations, network maintenance, and diagnosis.

PROFIBUS DP master can control up to 126 stations (max. 128 bytes) in one network.

PLC is typically configured as a master and controls all devices in factory automation system, but EPSON RC+ is also capable of being a master.

PROFIBUS DP network configuration is specified by the configuration management software. This software is normally provided by a master device manufacturer. The configuration management software determines parameters for each slave device via an Electronic Data Sheet (GSD).

The connection type is token passing procedure and master-slave communication. The token passing procedure is applied to the PROFIBUS DP network with more than two master devices to transfer network control between masters. The master-slave communication is applied to the communication between the master device with network control and its slave devices.

Available baud rates are 9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1500 kbps, 3 Mbps, 6 Mbps, and 12 Mbps.

For the instruction of configuration, refer to the section Master Mode.

Installing Software

Before installing the PROFIBUS-DP master board manufactured by molex to the PC with EPSON RC+ 7.0 installed, you must install the applicomIO Console application and drivers according to the type of board you are using.

- 1. Insert the applicomIO Console CD-ROM to the PC with EPSON RC+ 7.0 installed.
- 2. <u>The following dialog box appears</u>. <u>Select</u> "Run setup.exe".



3. The [Summary] dialog box appears. Select "Product Installation".



4. The [Installation] dialog box appears. Select "applicomIO".

Installation	one company > a world of innovat
2003, Windows Server 2008	it systems: Windows XP, Windows Server Windows 7, Windows 8, Windows 10, only for this last operating system).
QuickStart Docume	ntation
Copyright © Molex, Integr	" is a trademark of Molex, Inc. ated Products Division. All rights reserved. are the propertive of their reserved.

5. If the Microsoft.NET Framework 4.0 is not installed, following dialog box appears. Click <Install>.

applicomIO - InstallShield Wizard	
applicomIO requires the following items to be installed on your computer. Click Install to begin installing these requirements.	
Status Requirement]
Pending Microsoft .NET Framework 4.0 Full	
Install]

 The applicomIO Console application installer starts up and the [Welcome to the InstallShield Wizard for applicomIO] dialog box appears Click <Next>.



- 7. The [License Agreement] dialog box appears.
 - Read the software license agreement and click <Next>.

applicomIO - InstallShield Wizard	×
License Agreement	ex
Please read the following license agreement carefully.	a world of Innovation
Software License Agreement	<u>^</u>
Please review the following terms and conditions	
carefully before installation. By installing this package, you indicate your acceptance of such terms conditions.	and
License and Terms	
Woodhead Software & Electronics (WSE) grants you a license to:	
(i) was the software on a single computer.	-
I accept the terms in the license agreement	Print
\bigcirc I do not accept the terms in the license agreement	
InstallShield	Cancel

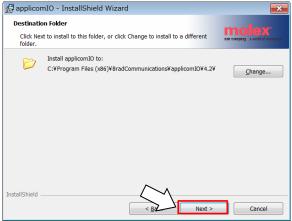
8. The [Customer Information] dialog box appears. Register the user information. Enter the User Name and Organization.

詞 applicomIO - InstallShield Wizard	X
Customer Information Please enter your information.	molex pre company i a world of innovation
User Name:	-
Organization:	
InstallShield	Next > Cancel

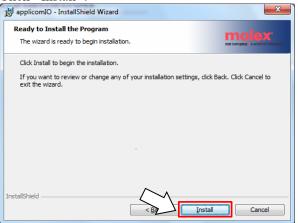
9. The [Destination Folder] dialog box appears.

Specify the installation folder for the applicomIO console application. The default specifies here:

C:\Program Files(x86)\BradCommunications\applicomIO\4.2 If you agree to the default installation folder, click <Next>.



10. The [Ready to Install the Program] dialog box appears. Click <Install>.



11. Installation of applicomIO Console application starts. After the installation completes, the [InstallShield Wizard Completed] dialog box appears.

Click <finish>.</finish>	
applicomIO - InstallShield	Wizard
Difference of the state of the	InstallShield Wizard Completed
HOLDER	The InstallShield Wizard has successfully installed applicomIO. Click Finish to exit the wizard.
	< Bar Finish Cancel

12. The message prompting you to reboot your PC appears. Select <Yes> and reboot the PC.

Select	· I UD· unu I	
🛃 applice	omIO Installer Informa	ation
i	changes made to app	system for the configuration icomIO to take effect. Click Yes f you plan to restart later.
\sum	Yes	No

13. Refer to the next section *Installing a Board* and install the PROFIBUS-DP master board manufactured by molex.

Installing a Board

WARNING

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

1. Configure the board address dip switch (JP1) on PROFIBUS-DP master board manufactured by molex.

You can install one Fieldbus master board to the PC with EPSON RC+ 7.0 installed. The board number should be "1".

Refer to the following table for JP1 configuration.

Switch Board No.	C0	C1	C2
1	OFF	OFF	OFF

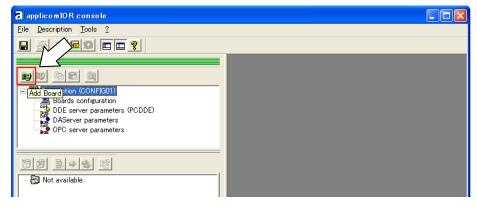
- 2. Install the PROFIBUS-DP master board manufactured by molex to the PCI bus of the PC with EPSON RC+ 7.0 installed. Installation methods of the PROFIBUS-DP master board manufactured by molex to the PCI bus and how to open the cover differ depending on the type of PC. Refer to the manuals of each PC on how to install the board to the PCI bus.
- 3. Connect the PROFIBUS-DP master board manufactured by molex with the PROFIBUS-DP network.
- 4. Start up the PC.
- 5. Open the [applicomIO Console] installation folder and start the [applicomIO Console] application.

Following is specified for [applicomIO Console] installation folder as default. C:\Program Files(x86)\BradCommunications\applicomIO\4.1



6. The [Add New Board] dialog box appears. Add the PROFIBUS-DP master board manufactured by molex.

Click <Add Board>.



- 7. The [Add New Board] dialog box appears.
 - Confirm that "PCU-DP2IO" is displayed in [Board to Add]-[Board Type] and click <OK>.

Add New Board	×
Board 1 PCU-DP2IO Board 1 PCU-DP2IO Description : 1 Profibus channel 12 Mb PC104/ISA Board Parameters PRAM Base Address : DPRAM Base Address : D4000 Please start the Console as Administrator to be able to set this value. Informations	
Diagnostic and Manual Configuration > OK Cancel Hei	

If the board cannot be detected, the following dialog box appears. Make sure that the board is correctly inserted.

Add New Board	2 ×
Board 1: Board to Add Board Type : ABSENT Description : Informations PC104/JSA Board Parameters Press the "Diagnostic and Manual Configuration" button to have more information or to manually configure this one. PPRAM Base Address : D4000 y Diagnostic and Manual Configuration >>	
OK Cancel Help	

- 8. When you finish adding the PROFIBUS-DP master board manufactured by molex to the applicomIO Console application, reboot the PC.
 - 8-1 Close the applicomIO Console application.When closing the applicomIO Console application, the following message



8-2 The following dialog box appears. Click <OK>.

app	licom	nIOR Console
Q	Ç	You have to restart the PC in order to your new configuration takes effect on the applicom10a driver.

- 8-3 Reboot the Windows.
- 9. After the PC is rebooted, refer to the next section *Master Mode* and continue the step.

Master Mode

- 1. Check that the PROFIBUS-DP master board manufactured by molex is connected to the PROFIBUS-DP network.
- 2. Start the "applicomIO Console" application.



3. The [applicomIOR console] dialog box appears. Register the device information (GSD file) that is necessary for the network setup.

applicomIOR console		
<u>File Description Library Network Protocol</u>	Tools Items ?	
	PROFIBUS Master - Station: 000 - 9.6 kbit/s	
□-∰ Description (CONFIG01) □		
Board 1: PCI-DPI		
E server parameters (PCDDE)	ister/Slave	
(6) Server parameters		
Equipment Available		
🗄 🛃 Brad Harrison 🔨		
E SEIKO ERSO RPORATION		
Equipment Library 🔂 Network Detection		
Loading description files complete		
Loading configuration files		
Loading configuration files complete		<u>×</u>
Dutput Message View		
Ready	Configured boards state : 1F	TA A

- 4. Select [Protocol].
- 5. Select the [Equipment Library] tab.
- 6. Click <Add>.

7. The [GSD Management] dialog box appears. Register the GSD file that is supplied from the device manufacturer in the Robot system.

Click <Next>.

GSD Manag	ement ×
This Wizard allows you to add GSD files.	GSD
< Back	lext > Cancel Help

8. Following dialog box appears. Specify the folder in which the GSD file is stored.

Select <Add all the GSD from the Directory>.

GSD Management
Select the Location of the GSD File(s) : (8) Add File(s) Add all the GSD from a Directory Directory or File Name : E:\Fieldbus_for RC7.0\PROFIBUS
The GSD files usable in the configuration console must be registered in the devices library. Select the location of the file(s) to insert and click on Next button. (10) < Back Next > Cancel Help

- 9. Click <Browse>.
- 10. Click <Next>.

11. The following dialog box appears. Confirm the retrieved device information.

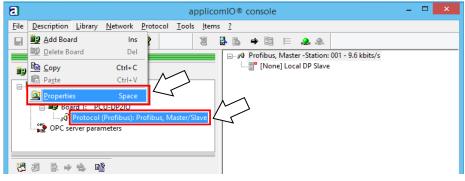
File Name	Status	Device Name	Revision	Manufa
EPSB0D5E.gsd	Replaced	EPSON RC90 PROFIBUS-DP Slave	Ver.2.0	SEIKO
		EPSON RC700 PROFIBUS-DP Slave	Ver.1.0	SEIKO
<				

- 12. Click <Next>.
- 13. The following dialog box appears. Click <Finish> to complete the GSD file registration.

	GSD Management	×
Click on Finish to add the GSD.	GSD	
	< Back Finish Cancel He	elp

14. Configure the PROFIBUS-DP master.

Select "Protocol" and then select [Description]-[Properties] from the applicomIOR console menu.



15. The [Channel Properties] dialog box appears. Select "Profibus, Master/Slave" and click <OK>.

Channel Properties	×
Available Protocols Protocol Manufacturer None None Profibus, Master/Slave EN 50170 Profibus, Slave EN 50170	ĺ
Profibus=DP]

16. Select [Protocol]-[Properties]-[Configuration] from the applicomIOR console menu.

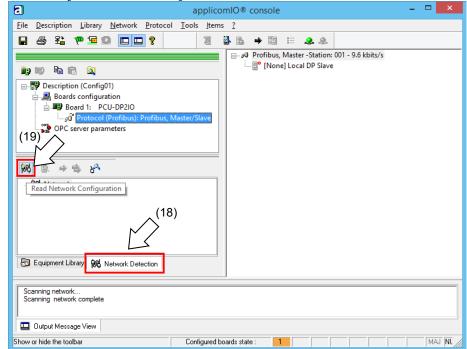


- 17. The [Profibus Master] dialog box appears.
 - Set Baud Rate for the PROFIBU-DP network, the master address (Profibus Address of this Station), and Highest Station Address in the network.

Profibus, Master -S	tation	: 001 - 9.6 kbits/s	2	×
General Configuration TTR Configuration	ı			
Name	Value	Unit		Ī
► Baud Rate	9.6	kbits/s		
➡ TS : Profibus Address of this Station	1			
► HSA : Highest Station Address	126			
Parameter				
	eed of th	ne applicom master. This must		
be identical to the equip	ment sp	eed. The baud rate range		
depends on the profile (DP or ur	iversation of board type.		
		\square	\geq	
	<u>0</u> K	Cancel	<u>H</u> elp	

When the PROFIBUS-DP master setting is completed, click <OK>.

18. Select the [Network Detection] tab.



- 19. Click the <Read Network Configuration>.
- 20. The following message box appears. Click <Yes>.



21. The [Profibus Master] dialog box appears.

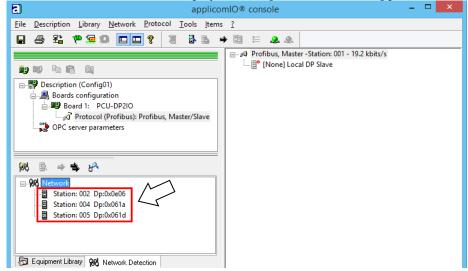
Set Baud Rate for the PROFIBU-DP network, the master address (Profibus Address of this Station), and Highest Station Address in the network.

lick <ok>.</ok>				
Prot	ibus, Master -	Station	n: 001 - 9.6 kbits/s	
General Configuration	TTR Configuration	n		
Name		Value	Unit	
⊨ Baud Rate		9.6	kbits/s	
► TS : Profibus A	ddress of this Station	n 1		
HSA : Highest :	Station Address	126		
Parameter Description	64			
Description : Pro			ne applicom master. This	
Description : Pro	identical to the equi	ipment sp	ne applicom master. This eed. The baud rate range iiversal) and board type.	
Description : Pro	identical to the equi	ipment sp	eed. The baud rate range	
Description : Pro	identical to the equi	ipment sp	eed. The baud rate range	
Description : Pro	identical to the equi	ipment sp	eed. The baud rate range	

22. The [Network Detection] dialog box appears and starts scanning the device information on the Fieldbus.

Network detection
\$
Scanning network
21%
Cancel

23. The list of detected devices is displayed in the [Network Detection] panel.



24. Select a device you want to register as slave.

a	applicomIO® console – – ×
<u>File Description Library Network Protocol</u>	<u>T</u> ools <u>i</u> tems <u>?</u>
8 🧐 🖬 🕾 🥐 🛥 💁 🔋	
	□
🏭 🕸 🖻 💼 🚳	[None] Local DP Slave
	faster/Slave 24)
Scanning network Scanning network complete	
Dutput Message View	
Ready	Configured boards state : 1 MAJ NL

- 25. Click <Insert in Configuration>.
- 26. The following dialog box appears.

The device name is displayed in the title of the dialog box.

[002] - EPSON RC700 PROFIBUS-D	P Slave	X
General Configuration GSD Informatio	in Module uration	
Identification Equipment : 002 Station : 002	√ Link	✓ A <u>c</u> tive
Parameters Watchdog Control (0-255) :	50 x 100 ms	
Data Format :	Big Endian (Motorola) 🔻	
Description		*
		Ŧ
<pre></pre>	Help OK	<u>Q</u> ancel

- 27. Select [Modules Configuration] tab. Connections Parameters appear to communicate with the slave device.
 - Displayed items are different depending on the slave device.
 - Displayed Connections Parameters are information that is set on the Fieldbus master board.

Make sure that the information matches with that of the slave device.

[002] - EPSON RC700) PROF	IBUS-I	DP Slave			X
General Configuration	GSD I	informat	ion Module	es Configuration		
Informations					\Box	
Input Size (0-244)		32	Bytes	Module Count	$(1^{k_{4}})$	4
Output Size (0-24	4):	32	Bytes		~	
Data Size (1-488)		64	Bytes			
Available Module(s)	Input	Output	Configurat	tion	A	
I Byte In		0	10		E	
≫2 Bytes In	2	0	11			Add
😵 3 Bytes In	3	0	12			
≫4 Bytes In	4	0	13		~	
One name to	c	0	4.4			
Configured Module(s) Inpu	t Outp	ut Configu	iration		Remove
😵16 Bytes Out	0	16	2F			
😵16 Bytes Out	0	16	2F			Move <u>U</u> p
😵16 Bytes In	16	0	1 F			/
❤16 Bytes In	16	0	1 F		h	Move <u>D</u> own
L						\checkmark
< Previous	xt >>			Help	ОК	<u>C</u> ancel

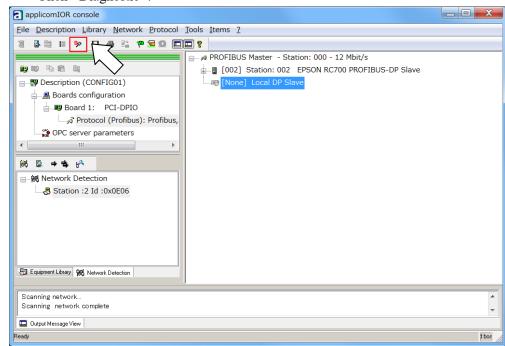
NOTE

Connections Parameters that are set for the Fieldbus master board and information of the slave device need to be matched.

Communication with the slave device is not performed if they do not match. Change the information of either Connections Parameters or Fieldbus master board. Please consult with the slave device manufacturer if the information is unclear.

28. Click <OK> to complete the registration.

29. Check the communication status with each slave devices. Click <Diagnostic>.



The [Diagnostic Board] dialog box is displayed.

Diagnostic Board : 1	X
Diagnostic ?	
Board I PCL_DPIO	
Channel 0: PROFIBUS	
E Slave N*2→DP	

If it cannot communicate with the slave device, the following dialog box appears.

Connections Parameters for the Fieldbus master board and information of the slave device may not be matched.

Diagnostic Board : 1
Diagnostic ?
فر 10
Social FOLDFIO Channel 0: PROFIBUS Slave N:2->DP

Connections Parameters for the Fieldbus master board can be checked by the following procedure.

First, select the slave device which is registered to the Fieldbus master board.

Then, click the left mouse button and select <Properties>.

applicomIOR console	
File Description Library Network Protocol	Tools Items ?
🔳 🔍 🖻 🖷 🤟 🖉 🗎 🖉	
	PROFIBUS Master - Station: 000 - 12 Mbit/s [102] Station: 002 _EPSON PC 200 PROFIBUS-DP Slave [102] Station: 002 _EPSON PC 200 PROFIBUS-DP Slave [102] Station: 002 _EPSON PC 200 PROFILES_DP Slave [102] POPERTIES _ Space
Scanning network Scanning network complete	A
Output Message View	
Ready	sout

The property information of selected slave device is displayed.

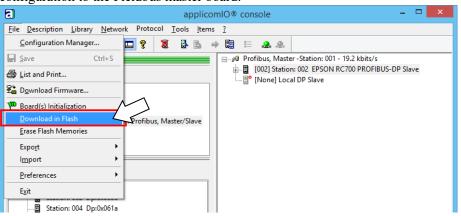
[002] - EPSON RC700 PROFIBUS-DP Slave
General Configuration GSD Information Modules Configuration
Equipment : 002 Station : 002 Stat
Parameters Watchdog Control (0-255) : 50 x 100 ms
Data Format : Big Endian (Motorola) 🔻
Description
A
Kervious Mext >>

Select the [Connection Configuration] tab.

Connections Parameters appear to communicate with the slave device.

[002] - EPSON RC700 F	PROFIBUS	-DP Slave
General Configuration	GSD Informa	ation Modules Configuration
Informations		
Input Size (0-244) :	32	Bytes Module Count (1-4) : 4
Output Size (0-244)	: 32	Bytes
Data Size (1-488) :	64	Bytes
Available Module(s) Ir	nput Outpu	
8 1 Byte In 1	0	10 =
≫2 Bytes In 2		11 Add
	0	12
≫4 Bytes In 4		13 🚽
000 m	^	4.8
Configured Module(s)	Input Out	tput Configuration Remove
I6 Bytes Out	0 16	2F
😵 16 Bytes Out	0 16	2F Move Up
I6 Bytes In №16	16 0	1F
😵 16 Bytes In	16 0	1F Move Down
<u>N</u> ext	: >>	Help OK Cancel

30. Select [File]-[Download in Flash] from the applicomIOR console menu. Register the configuration to the Fieldbus master board.

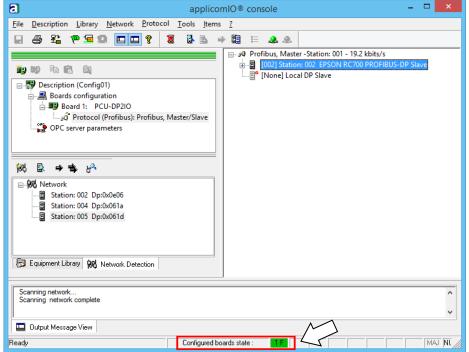




Make sure that the flash memory of the Fieldbus master board stores the configuration; otherwise, the Fieldbus master board cannot correctly function. Also, you cannot control it from EPSON RC+7.0.

If you changed the configuration, select [File]-[Download in Flash] from the applicomIOR console menu and register the configuration to the Fieldbus master board.

31. After a few seconds, the display of "Configured boards state" on the status bar turns to green.



Now, the Fieldbus master board is ready to operate in the master mode.

- 32. Close the "applicomIO console" application.
- 33. Refer to the section EPSON RC+7.0 Configuration and continue the step.



If the fieldbus master board is not recognized in Windows 8 or Windows 10, refer to the following section and disable the fast startup function.

- 4. Troubleshooting
 - 4.4 How to Disable Fast Startup in Windows 104.5 How to Disable Fast Startup in Windows 8 or 8.1

EPSON RC+7.0 Configuration

To use the Fieldbus master board, the Robot system option setting and Fieldbus master setting should be enabled on EPSON RC+ 7.0.

- 1. Select [Setup]-[Option Setting] and display the [Option] dialog box.
- 2. Refer to *EPSON RC+ Users Guide: 23. Installing Controller Options* and enable the Fieldbus Master option.
- 3. The following message dialog box appears.

E	EPSON RC+ 7.0 🔀
	Changes will take affect during the next session.
	ОК

Click <OK> and reboot EPSON RC+7.0.

After EPSON RC+7.0 is started, the option setting is enabled.

4. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

E System Configuration		?	Х
∎-Startup ⊟-Controller —General	Fieldbus Master General	Close	
−Configuration −Preferences −Simulator ⊕ Drive Units −Robots ⊡nputs / Outputs ⊖ Frieldbus Master	<u>F</u> ieldbus Type: <mark>None</mark> ✓ Board Type: None ✓	<u>A</u> pply <u>R</u> estore	
General Slaves B-Fieldbus Slave Remote Control RS282	Update Interval: 10 v ms Total Input Bytes: 0		
B TOP / IP B Part Feeders Security I Vision	Total Output Bytes0		

- 5. Select [Inputs/Outputs]-[Fieldbus Master]-[General].
 - Set the following items: PROFIBUS-DP [Fieldbus Type:] [Board Type:] Molex [Update Interval:] Update cycle for the PROFIBUS-DP master I/O E System Configuration × ? Fieldbus Master General ⊪-Startup ⊨-Controller Close --General --Configuration --Preferences Apply PROFIBUS-DF <u>F</u>ieldbus Type: Restore Molex Board Type General Slaves ⊕ Fieldbus Slave Update Interval: 10 v ms Total Input Bytes: 32 Remote Control
 RS232
 TCP / IP
 Part Feeders Total Output Bytes 32 i Security - Vision

6.

7. Click < Apply>.

......

Confirm that the following is displayed.

Total Input Bytes : Number of inputs the master controls (Bytes)

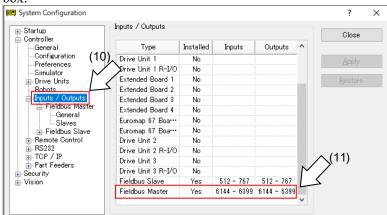
Total Output Bytes: Number of outputs the master controls (Bytes)

8. Click <Close>. The following dialog box appears.

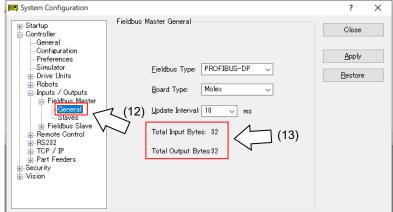


Close

9. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

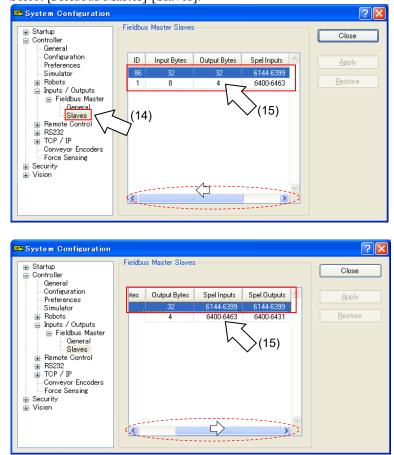


- 10. Select [Inputs / Outputs].
- 11. Confirm that the following are displayed in "Fieldbus Master".
 - Installed : Yes
 - Inputs : "6144" "6144+ Number of inputs the master controls (Bits)
 - Outputs : "6144" "6144 + Number of outputs the master controls (Bits)
- 12. Select [Fieldbus Master]-[General].



13. Confirm that the following are displayed.

Total Input Bytes: Number of inputs the master controls (Bytes)Total Output Bytes: Number of outputs the master controls (Bytes)

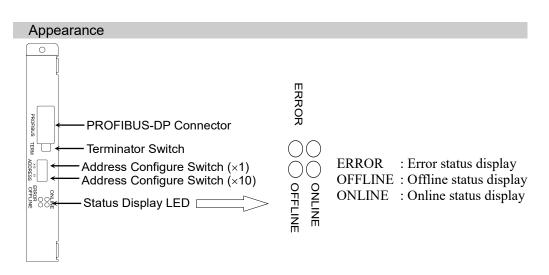


14. Select [Fieldbus Master]-[Slaves].

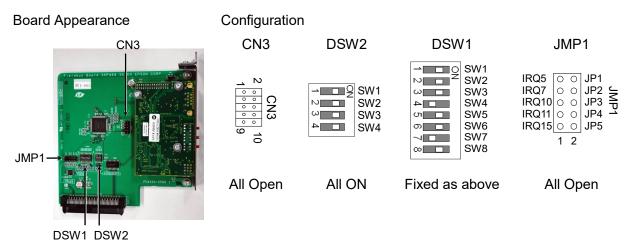
15. Confirm that the following information the master controls is displayed.

ID	: Fieldbus station ID of slave
Input Bytes	: Number of inputs per slave (Bytes)
Output Bytes	: Number of outputs per slave (Bytes)
Spel Inputs	: Number of inputs per slave (Bits)
Spel Outputs	: Number of outputs per slave (Bits)

2.2.4 Installing PROFIBUS-DP Slave Board



The Fieldbus slave board is configured as follows at shipment.



	cation
PROFIBUS-DP slave board	
Hybrid	
(token passing procedure and i	naster-slave
communication)	
9.6 k, 19.2 k, 45.45 k, 93.75 k,	187.5 k, 500 k,
1.5 M, 3 M, 6 M, 12 M (bps)	
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
126 (including master unit and repeater)	
244 bytes	
2-wire cable dedicated to PROFIBUS (2 wires for signal)	
Slave	
1 PROFIBUS-DP port (EN 50170)	
Maximum 150 mA	
1952bits (244bytes) *	
1952bits (244bytes) *	
DP-V0	
	communication) 9.6 k, 19.2 k, 45.45 k, 93.75 k, 1.5 M, 3 M, 6 M, 12 M (bps) Baud Rates 12 M (bps) 6 M (bps) 3 M (bps) 1.5 M (bps) 500 k (bps) 187.5 k (bps) 93.75 k (bps) 45.45 k (bps) 19.2 k (bps) 9.6 k (bps) 126 (including master unit and 244 bytes 2-wire cable dedicated to PRO Slave 1 PROFIBUS-DP port (EN 50 Maximum 150 mA 1952bits (244bytes) * 1952bits (244bytes) *

* The sum of input and output data size is restricted as follows:

For Byte format : 372 bytes

For Word format : 208 words

LED Description

LED state represents the states of the fieldbus board.

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

Setting Configure Switch



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

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

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



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

Generally, node addresses are	Node address	Device Name
recommended to be	0	Service unit such as PG/PC
	1	Operation panel such as HM
configured as shown in the	2	Master station
table.	3-99 (-125)	DP slave station

HMI

Turn the network termination ON or OFF using the terminator switch. 2.

Wiring

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



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 slave board.

Turn the terminating resistor ON or OFF using the terminator switch on the front panel.

Installing a Board



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

Install the board to the dedicated slot on the Robot Controller.

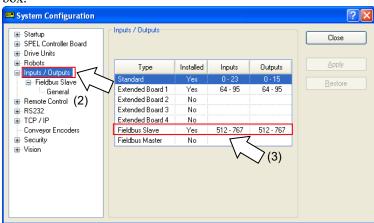
Reference manuals:

Robot Controller RC700: *Maintenance 7.10 Option Board* Robot Controller RC90/90-B: *Maintenance 7.9 Option Board*

Confirmation with EPSON RC+ 7.0

When a PROFIBUS-DP slave board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the PROFIBUS-DP board using the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.



- 2. Select [Inputs / Outputs].
- 3. Confirm that the following items are displayed in "Fieldbus Slave".

Installed : Yes Inputs : 512-767 (default setting) Outputs : 512-767 (default setting)

4. Select [Fieldbus Slave]-[General].

System Configuration ? 2
Controller General Configuration Preferences Broubator Remote Control Remote Control Re

5. Confirm that the following items are displayed.

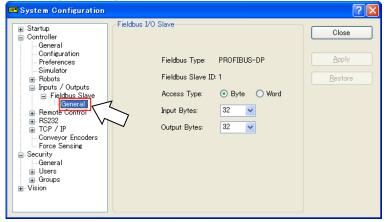
Fieldbus Type	: PROFIBUS-DP
Fieldbus Slave ID	: (Displays the configure switch node address)
Туре	: Byte (default setting)
Input Bytes	: 32 (default setting)
Output Bytes	: 32 (default setting)

6. Click <Close>.

Editing of Input / Output Size

You can change the input/output size of PROFIBUS-DP slave board if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].



3. Change the settings of [Input Bytes] and [Output Bytes]. In this example, both of them are changed to "20" Bytes.

System Configuration		? 🛛
Startup Controller Configuration Preferences Simulator Repote Fieldbus Slave Conneral Remote Control Res22 TOP / IP Conveyor Encoders Fore Sensing Security General Remote Control Res2 Conveyor Encoders Fore Sensing Fore S	Fieldbus I/O Slave Fieldbus Type: PROFIBUS-DP Fieldbus Slave ID: 1 Access Type: Byte Word Input Bytes: Dutput Bytes: Dutput Bytes:	Close Apply Restore

The sum of input and output data sizes is restricted as follows:

For Byte format : 372 bytes For Word format : 208 words

4. Click < Apply>.

5. Click <Close> and the following dialog box appears.





6. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🗵
	Inputs / Outputs				Close
Bobots Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Bastara
General	Extended Board 1	Yes	64 - 95	64 - 95	Restore
Bemote Control	Extended Board 2	No			
■ RS232	Extended Board 3	No			
. TCP / IP	Extended Board 4	No			
Conveyor Encoders	Fieldbus Slave	Yes	512 - 671	512 - 671	
😟 Security	Fieldbus Master	No			N
☑ Vision					

- 7. Select [Inputs / Outputs].
- 8. Confirm that the following items are displayed in "Fieldbus Slave".

Inputs : 512 – (512 + Changed number of input (Bits)) Outputs : 512 – (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs. Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

NOTE

When you change the input/output size of PROFIBUS-DP slave board, you need to change the input/output size of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output size of the slave information registered in the Fieldbus master device by the applicomIO console application.

[099] - EPSON RC620 PROFIBUS-DP Slave	
General Configuration GSD Information Modules Configuration	
_ Informations	1
Input Size (0-32): 20 Bytes Module Count (1-4):	4
Output Size (0-32): 20 Bytes	
Data Size (1-64): 40 Bytes	
Available Module(s) Input Output Configuration	•
😵 3 Bytes In 3 0 12	5
😵 4 Bytes In 4 0 13	Add
≫ 5 Bytes In 5 0 14	
≫6 Bytes In 6 0 15	Image: A state of the state
Configured Module(s) Input Output Configuration	Remove
🗫 16 Bytes Out 0 16 2F	
😵 4 Bytes Out 0 4 23	Move <u>U</u> p
😵 16 Bytes In 16 0 1 F	
🐦 4 Bytes In 4 0 13	Move <u>D</u> own
<u>H</u> elp <u>O</u> K	<u>C</u> ancel
16 Bytes Out } Output : 20 Bytes	
4 Bytes Out	
16 Bytes In } Input : 20 Bytes	
4 Bytes In	

Editing of Input / Output Format

You can change the input/output format of PROFIBUS-DP slave board. Change to the format to "byte" or "word" as necessary.

NOTE (P

When you change the input/output format of PROFIBUS-DP slave board, you need to change the input/output format of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output format of the slave information registered in the Fieldbus master device by the applicomIO console application.

Electronic Information File (GSD file)

A GSD file is supplied for PROFIBUS-DP slave board network configuration. The file is located in the following folder where EPSON RC+7.0 is installed.

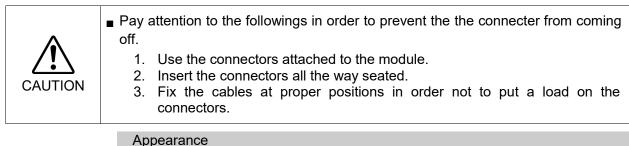
\EpsonRC70\Fieldbus\Profibus

For Robot Controller RC700 EPSN0E06.gsd For Robot Controller RC90/90-B EPSB0D5E.gsd

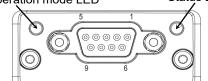
2. Installation

2.2.5 Installing PROFIBUS-DP Slave Module

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



Operation mode LED Status LED



Specifications

Item	Specification			
Name	PROFIBUS-DP slave module			
Connection Method	Hybrid			
	(token passing procedure and master-slave			
	communication)			
Baud Rates (bps)	9.6 k, 19.2 k, 45.45 k, 93.75 k	. 187.5 k. 500 k.		
	1.5 M, 3 M, 6 M, 12 M (bps)	, , , , ,		
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	l repeater)		
Data Length / Frame	244 bytes			
Cable	2-wire cable dedicated to PRC	FIBUS (2 wires for signal)		
Modes	Slave			
Interface	1 PROFIBUS-DP port (EN 50170)			
Output Current Capacity	Maximum 150 mA			
Max. Input Data Size	1952 bits (244 bytes) *			
Max. Output Data Size	1952 bits (244 bytes) *			

* The sum of input and output data size is restricted as follows:

For Byte format : 372 bytes For Word format : 208 words

LED Description

LED state represents the states of the fieldbus board.

Operation Mode

LED State	Indication
OFF	Not online / No power
Green	Online, data exchange
Flashing Green	Online, clear
Flashing Red	Parameterization error
(1 flash)	
Flashing Red	PROFIBUS Configuration error
(2 flashes)	

Status

LED State	Indication	Comments
OFF	Not initialized	Anybus state = SETUP or NW_INIT
Green	Initialized	Anybus module has left the NW_INIT
		state
Flashing Green	Initialized, diagnostic event(s) present	Extended diagnostic bit is set
Red	Exception error	Anybus state = EXCEPTION

Setting Configure Switch

The PROFIBUS-DP slave module requires no configurations. All the PROFIBUS-DP communication configurations are set by the development software (EPSON RC+ 7.0).

Wiring

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

Terminal name for each pin

Pin	Signal	Description
1	-	-
2	-	-
3	B Line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	Ground (isolated)
6	+5 V Bus Output	+5 V termination power (isolated, short-circuit protected)
7	-	-
8	A Line	Negative RxD/TxD, RS485 level
9	-	-
Housing	Cable Shield	Internally connected to the Anybus protective earth via cable shield filters according to the PROFIBUS standard.

NOTEPrepare 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 slave board. Turn the terminating resistor ON or OFF using the terminator switch on the front panel.

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

Install the module to the dedicated slot on the T/VT series Manipulator.

Reference: Manipulator manual Setup & Operation 17. Fieldbus I/O

Confirmation with EPSON RC+ 7.0

When a PROFIBUS-DP slave module is installed to the T/VT series Manipulator, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the PROFIBUS-DP module using the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box

00.					
System Configuration					? 🔀
⊕-Startup ⊕-SPEL Controller Board ⊕-Drive Units ⊕-Robots	Inputs / Outputs		. (-	
inputs / Outputs	Туре	Installed	Inputs	Outputs	
Fieldbus Slave	Standard	Yes		0-15	Restore
General V	Extended Board 1	Yes	64 - 95	64 - 95	
	Extended Board 2	No			
⊕ RS232	Extended Board 3	No			
TCP / IP	Extended Board 4	No			
- Conveyor Encoders	Fieldbus Slave	Yes	512 - 767	512 - 767	
🖶 Security	Fieldbus Master	No	57		
B Vision)(3)	

- 2. Select [Inputs / Outputs].
- 3. Confirm that the following items are displayed in "Fieldbus Slave".

Installed	: Yes
Inputs	: 512-767 (default setting)
Outputs	: 512-767 (default setting)

4. Select [Fieldbus Slave]-[General].

System Configuration	14 IV	? ×
Estartup	Fieldbus I/O Slave	Close
Configuration Preferences	Fieldbus Type: PROFIBUS-DP	Apply
-Simulator Drive Units	Node Address: 1 💌	<u>R</u> estore
Robots	Access Type: 💿 Byte 🔘 Word	
	Input Bytes: 32 🔻	
Remote Control	Output Bytes: 32 -	57
		(5)
⊕ Security (17 ⊕ Vision		V (0)

5. Confirm that the following items are displayed.

Fieldbus Type
Node Address
Туре
Input Bytes
Output Bytes

- : PROFIBUS-DP : Configure switch node address : Byte (default setting) : 32 (default setting) : 32 (default setting)
- 6. Click <Close>.

Editing of Configuration

You can change the configuration of PROFIBUS-DP slave module if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

E Startup	īeldbus I/O Slave		Close
Centroller -General -Oonfiguration -Preferences -Simulator B Drive Units B Rolots ⊡ Inputs / Outputs	Fieldbus Type: Node Address: Access Type:	PROFIBUS-DP	Apply <u>R</u> estore
Fieldbus Master Ferdbus Stater Ferdbus Stater General Remote Control R5232 TOP / IP Security Vision	Input Bytes: Output Bytes:	32 • 32 •	

3. Configure a node address.

A node address from 0 to 125 is available for the PROFIBUS-DP device.

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

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

4. Change the settings of [Input Bytes] and [Output Bytes]. The sum of input and output data sizes is restricted as follows:

> For Byte format : 372 bytes For Word format : 208 words

- 5. Click <Apply>.
- 6. Click <Close> and the following dialog box appears.

T/VT series Manipulator (Controller) automatically starts rebooting.

EPSON RC+ 7.0
Rebooting Controller
Close

7. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🔀
 B Startup B SPEL Controller Board B Drive Units 	 Inputs / Outputs 				Close
Bobots	Туре	Installed	Inputs	Outputs	Apply
Inputs / Outputs Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Destar
General	Extended Board 1	Yes	64 - 95	64 - 95	Restore
Bemote Control	Extended Board 2	No			
	Extended Board 3	No			
TCP / IP	Extended Board 4	No			
- Conveyor Encoders	Fieldbus Slave	Yes	512 - 671	512 - 671	
🖻 Security	Fieldbus Master	No			
B Vision					

- 8. Select [Inputs / Outputs].
- 9. Confirm that the following items are displayed in "Fieldbus Slave".

Inputs : 512 - (512 + Changed number of input (Bits)) Outputs : 512 - (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs.

Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

NOTE

When you change the input/output size of PROFIBUS-DP slave module, you need to change the input/output size of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output size of the slave information registered in the Fieldbus master device by the applicomIO console application.

-Informations Input Size (0-32) :		20	Bytes	Module Count (1-4) :	4
Output Size (0-32)	:	20	Bytes		
Data Size (1-64) :		40	Bytes		
Available Module(s)	Input	Output	t Configurati	ion	<u>^</u>
≫3 Bytes In	3	0	12		-
😵 4 Bytes In	4	0	13		<u>A</u> dd
≫5 Bytes In	5	0	14		
≫6 Bytes In	6	0	15		~
Configured Module(s) Inpu	ut Outp	ut Configura	ation	Remove
😵 16 Bytes Out	0	16	2F		
😵 4 Bytes Out	0	4	23		Move <u>U</u> p
· · · · · · · · · · · · · · · · · · ·	16	0	1F		Mar Da
😵 4 Bytes In	4	0	13		Move Dow
				<u>H</u> elp <u>O</u> K	<u>C</u> ancel
16 Bytes Oı	ıt Դ	0	utnut ·	20 Bytes	
10 Dytes 00	۲ r	0	uipui .	20 D J 105	

Editing of Input / Output Format

You can change the input/output format of PROFIBUS-DP slave module. Change to the format to "byte" or "word" as necessary.

NOTE (P

When you change the input/output format of PROFIBUS-DP slave board, you need to change the input/output format of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output format of the slave information registered in the Fieldbus master device by the applicomIO console application.

Informations				
Input Size (0-32) :	20	Bytes	Module Count (1-4) :	4
Output Size (0-32)	: 20	Bytes		
Data Size (1-64) :	40	Bytes		
Available Module(s)	Input Out	put Configurat	ion 🔼	1
≫ 3 Bytes In	3 0	12		
🔗 4 Bytes In	4 0	13		Add
₽5 Bytes In	5 0	14		
⊳6 Bytes In	6 0	15	×	
onfigured Module(s) Input Ou	utput Configura	ation	Bemove
16 Bytes Out	0 16	2F		
▶4 Bytes Out	0 4	23		Move <u>U</u> p
▶16 Bytes In	16 0	1F		Move Down
	4 0	13		
🕈 4 bytes in				
r 4 dytes in			Нею ОК	Cancel
*+ oytes in			Help QK	<u>C</u> ancel
			Help <u>O</u> K	<u>C</u> ancel
e format		utput: 321		Cancel
e format Bytes Out	- Οι	1tput: 321		<u>C</u> ancel
e format Bytes Out	- Οι	ıtput: 321		<u>C</u> ancel
e format Bytes Out Bytes Out	ר - Oו	-	Bytes	<u>C</u> ancel
e format Bytes Out Bytes Out Bytes In	ר - Oו	utput: 321	Bytes	<u>C</u> ancel
e format Bytes Out Bytes Out Bytes In	ר - Oו	-	Bytes	Qancel
e format Bytes Out Bytes Out Bytes In	ר - Oו	-	Bytes	Qancel
e format Bytes Out Bytes Out Bytes In	ר - Oו	-	Bytes	Qancel
e format Bytes Out Bytes Out Bytes In Bytes In Bytes In	ר - Oו	-	Bytes	Qancel
e format Bytes Out Bytes Out Bytes In Bytes In Td format	≻ Ou } Inj	put: 32B	Bytes	<u>Q</u> ancel
e format 3ytes Out 3ytes Out 3ytes In 3ytes In	≻ Ou } Inj	-	Bytes	<u>C</u> ancel

Electronic Information File (GSD file)

A GSD file is supplied for PROFIBUS-DP slave module network configuration. The file is located in the following folder where EPSON RC+7.0 is installed.

\EpsonRC70\Fieldbus\Profibus

For T/VT series Manipulator:

EPSN0FED.gsd

2.3 EtherNet/IP



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.

2.3.1 How to Setup a EtherNet/IP Network

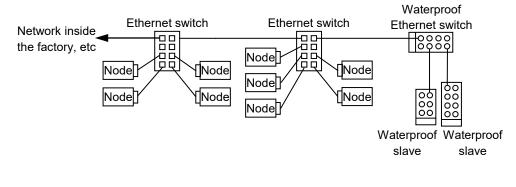
The following is a basic procedure for setting up an EtherNet/IP network:

- Choose node layout and pathway in your network.
 For details, refer to the following section 2.3.2 EtherNet/IP Network Construction.
- Lay cables.
 For details, refer to the following section 2.3.2 EtherNet/IP Network Construction.
- Configure nodes.
 For details, refer to respective manuals of your desired nodes.
- 4. Turn ON the nodes.
- 5. Install the EtherNet/IP board manufactured by Hilscher in the Controller. When installing the EtherNet/IP master board manufactured by molex, refer to 2.3.3 Installing EtherNet/IP Master Board manufactured by molex. When installing the EtherNet/IP slave board, refer to 2.3.5 Installing EtherNet/IP Slave Board.
- 6. Operate the EtherNet/IP network.

2.3.2 EtherNet/IP Network Construction

Network Configuration

EtherNet/IP network is configured as shown in the following figure.



Node

There are two types of node: master and slave. The master controls a network and gathers data from its slaves. The slaves, including external I/O and other devices, output data in response to the master's output order and informs the master of its input status.

You can install the master anywhere in the network. One master node can control up to 127 nodes.

Universal Ethernet cable is used for EtherNet/IP. Use a proper cable such as environmental resistance and refraction resistance that fulfills the environment. For details, see the website of ODVA. (http://www.odva.org/)

Wiring

Wirings should be conformed to EtherNet/IP connection protocol.

NOTE

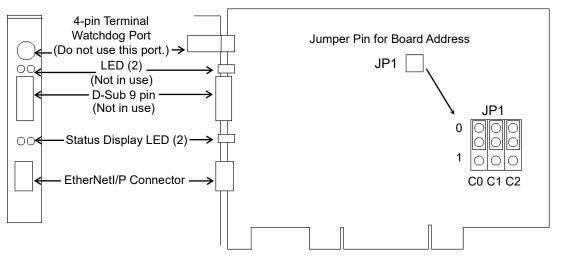
You can use the general Ethernet hub or Ethernet switch for the EtherNet/IP. However, be sure to use a product complying with the industrial standards or noise resistant Ethernet cable (STP cable). If you use an office use product or UTP cable, it may cause communication errors and may not offer the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

2.3.3 Installing EtherNet/IP Master Board Manufactured by molex

Appearance

Part names and functions of the EtherNet/IP Master Board manufactured by molex are shown in the following figure. For details on the status display LEDs, refer to *4*. *Troubleshooting* in this manual.

PCU-ETHIO



Specifications			
Item	Specification		
Part Number	EtherNet/IPMaster Board manufactured by molex		
Mode	Master		
Baud Rates	10, 100 (Mbps)		
Interface	EtherNet/IP 1 port		
Maximum Node	127		
Connection Type	Cyclic, Change of State		
Explicit message connection	Yes		
EDS support	Yes		
Max. Input Data Size	1024 bit (128 bytes)		
Max. Output Data Size	1024 bit (128 bytes)		
Automatic Detection	Yes. Devices can be detected automatically.		

Modes

EtherNet/IP master board manufactured by molex has the Master mode and Slave mode as the motion mode. However, do not select the Slave mode.

Master mode

The Master device gathers and controls all nodes in one network.

EtherNet/IP master can control up to 127 nodes (max. 128 bytes) on one network.

PLC is typically configured as a master and controls all nodes in factory automation system, but EPSON RC+ is also capable of being a master.

EtherNet/IP network configuration is specified by configuration management software. This software is normally provided by a master device manufacturer. The configuration management software determines parameters for each slave device via an Electronic Data Sheet (EDS).

Available connection types are Cyclic, Change Of State, and Explicit messaging.

Available baud rates are 100 Mbps and 10 Mbps. (auto-detect)

For the instruction of configuration, refer to the section Master Mode later in this chapter.

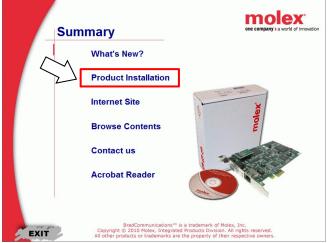
Installing Software

Before installing the EtherNet/IP master board manufactured by molex to the PC with EPSON RC+ 7.0 installed, you must install the applicomIO Console application and drivers according to the type of board you are using.

- 1. Insert the applicomIO Console CD-ROM to the PC with EPSON RC+ 7.0 installed.
- 2. The dialog box shown below appears. Select "Run setup.exe".



3. The [Summary] dialog box appears. Select "Product Installation".



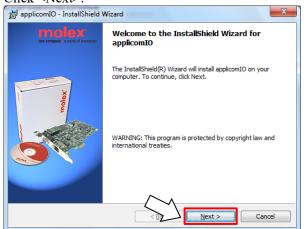
4. The [Installation] dialog box appears. Select "applicomIO".

Installation	one company > a world of innovati
applicomIO® For the following 32 and 64-bit syst 2003, Windows Server 2018, Wind Windows Server 2012 (64-bit only	
QuickStart Documentat	ion
BradCommunication" is a Copyright & Molex, Integrated I All other products or trademarks are th	Products Division. All rights reserved.

5. If the Microsoft.NET Framework 4.0 is not installed, following dialog box appears. Click <Install>.

applicomIO - InstallShield Wizard		
	pplicomIO requires the following items to be installed on your computer. Click Install begin installing these requirements.	
Status	Requirement	
Pending	Microsoft .NET Framework 4.0 Full	
	Install Cancel	

6. The applicomIO Console application installer runs and the [Welcome to the InstallShield Wizard for applicomIO] dialog box appears. Click <Next>.



 The [License Agreement] dialog box appears. Read the software license agreement and click <Next>.

pplicomIO - InstallShield Wizard	_
License Agreement Please read the following license agreement carefully.	molex and company is a world of innovation
Software License Agreement	•
Please review the following terms and condition carefully before installation. By installing th package, you indicate your acceptance of such to conditions.	his
License and Terms Woodhead Software & Electronics (WSE) grants yo license to:	ou a
I accept the terms in the license agreement	Print
I go not accept the terms in the license agreement InstallShield CB2 Next >	Cancel

8. The [Customer Information] dialog box appears. Now register the user information. Enter the User Name and Organization.

company a a world of innovation

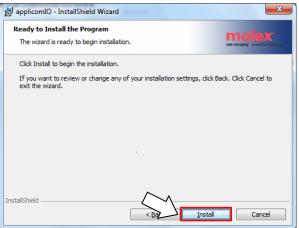
9. The [Destination Folder] dialog box appears.

Specify the installation folder for the applicomIO Console application. The default specifies here:

C:\Program Files(x86)\BradCommunications\applicomIO\4.2 If you agree to the default installation folder, click <Next>.

🔂 applicon	nIO - InstallShield Wizard	×
Destinatio Click Nex folder.	n Folder t to install to this folder, or click Change to install to a different	molex DR Company 1 a world of innexation
	Install applicomIO to: C:¥Program Files (x86)¥BradCommunications¥applicomIO¥4.2¥	<u>C</u> hange
InstallShield –	< B2 Next >	Cancel

10. The [Ready to Install the Program] dialog box appears. Click <Install>.



 Installation of applicomIO Console application starts. After the installation completes, the [InstallShield Wizard Completed] dialog box appears. Click <Finish>

Click <finish>.</finish>	
applicomIO - InstallShield \	Wizard 📃
molex one company is a world of innovation	InstallShield Wizard Completed
La construction de la constructi	The InstallShield Wizard has successfully installed applicomIO. Click Finish to exit the wizard.
	<b2 cancel<="" finish="" td=""></b2>

12. The message prompting you to reboot your PC appears. Select <Yes> and reboot the PC.



13. Refer to the next section *Installing a Board* to install the EtherNet/IP master board manufactured by molex.

Installing a Board



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

1. Configure the board address jumper (JP1) on EtherNet/IP master board manufactured by molex.

You can install one Fieldbus master board to the PC with EPSON RC+ 7.0 installed. The board number should be "1".

Refer to the following table for JP1 configuration.

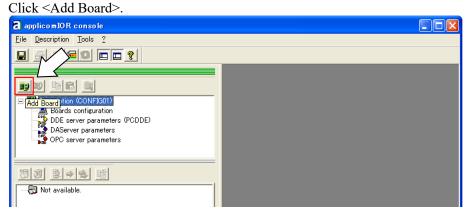
Short Socket Board No.	C0	C1	C2
1	0: Short	0: Short	0: Short

- 2. Install the EtherNet/IP master board manufactured by molex to the PCI bus of the PC with EPSON RC+ 7.0 installed. Installation methods of the EtherNet/IP master board manufactured by molex to the PCI bus and how to open the cover differ depending on the type of PC. Refer to the manuals of each PC on how to install the board to the PCI bus.
- 3. Connect the EtherNet/IP master board manufactured by molex with the EtherNet/IP network.
- 4. Start up the PC.
- 5. Open the [applicomIO Console] installation folder and start the "applicomIO Console" application.

Following is specified for [applicomIO Console] installation folder as default. C:\Program Files(x86)\BradCommunications\applicomIO\4.1



6. The [applicomIOR console] dialog box appears. Add the EtherNet/IP master board manufactured by molex.



2. Installation

7. The [Add New Board] dialog box appears.

Confirm that "PCI/PCU-ETHIO" is displayed in [Board to Add]-[Board Type] and click <OK>.

Add New Board		? 🗙
Board to PCI/PCU-ETHIO Board Type PCI/PCU-ETHIO Description : 1 Ethernet channel 10/100 Mb	Informations A PCI/PCU-ETHIO board correctly detected. Press Ok to add this one in your configuration.	
PC104/ISA Board Parameters <u>D</u> PRAM Base Address : D4000 Diagnostic and Manual Configuration »	<u></u>	
	OK <u>C</u> ancel	Help

If the board cannot be detected, the following dialog box appears. Make sure that the board is correctly inserted.

Add New Board		?×
Board 1: Board to Add Board Type : ABSENT Description : PC104/ISA Board Parameters DPRAM Base Address : D4000 ¥ Diagnostic and Manual Configuration ≫	Informations No board 1 was detected. Press the "Diagnostic and Manual Configuration" button to have more information or to manually configure this one.	
	OK Cancel He	lp

8. The [Channel Properties] dialog box appears. Select [Protocol]-[EtherNet/IP] and click <OK>.

Channel I	roperties	•			×
Available	Protocols				
Protoc EtherN		Manufacturer ODVA			
Modbu: None PROFI	s on Ethern NET IO Con NET IO Device	Schneider Electric None PNIO PNIO PNIO			
	2	ОК	Cancel	×	

The following dialog box appears. Set the IP address for the EtherNet/IP master 9. board manufactured by malay

TCP/IP: 000.000.000.000			
General Advanced			
Configuration : Static		•	
Name	Value	Unit	
IP Address: applicom/DR channel IP Address Sub-Network Mask Gateway IP Address DNS Server: Primary DNS Server Address	255.255.255.000 000.000.000.000 000.000.000.000		
L. Secondary DNS Server Address ⊫ Domain Name ⊫ Host Name	000.000.000.000		
Parameter Description :			
	<u>O</u> K	<u>C</u> ancel	<u>H</u> elp

Select the IP address from [Configuration]. There are following three types. (Do not select "Flash Memory")

"Static (assign as fixed IP address)" "DHCP (obtain from the DHCP server)" "BOOTP (obtain from the BOOTP server"

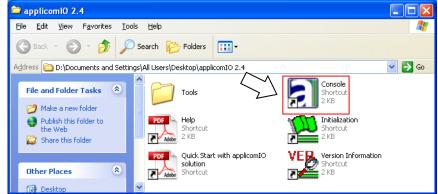
TCP/IP: 000.000.000		
General Advanced		
Configuration :	Static	
Name P IP Address: applicomJOR channel IP Sub-Network Mask	Static DHCP BOOTP Flash Memory 255,255,255,000	

If you select "Static (Fixed IP address)", enter the values in each item.

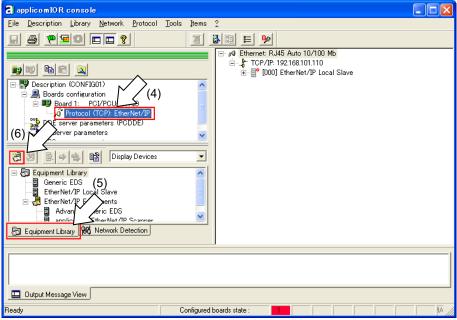
- 10. When you complete adding the EtherNet/IP master board manufactured by molex to the applicomIO Console application, reboot the PC.
 - Shutdown the applicomIO Console application. 10-1 When the applicomIO Console application shuts down, the following dialog box appears. Click <Yes>. applicomIO® Console Save modificati Cancel Then, the following dialog box appears. Click <OK>. 10-2 applicomIOR Console i You have to restart the PC in order es effect on the applicomIOa driver Õ
 - 10-3 Reboot the Windows.
- 11. After the PC is rebooted, refer to the next section *Master Mode* and continue the step.

Master Mode

- 1. Check that the EtherNet/IP master board manufactured by molex is connected to the EtherNet/IP network.
- 2. Start "applicomIO Console" application.

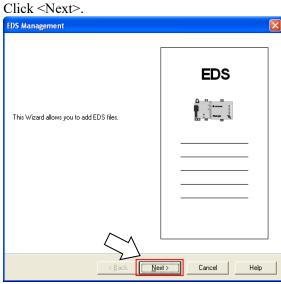


3. The [applicomIOR console] dialog box appears. Register the device information (EDS file) that is necessary for the network setup.



- 4. Select [Protocol].
- 5. Select the [Equipment Library] tab.
- 6. Click <Add>.

 The [EDS Management] dialog box appears. Register the EDS file that is supplied from the device manufacturer in the Robot system.



8. The following dialog box appears. Specify the folder in which the EDS file is stored. Select <Add all the EDS from the Directory>.

EDS Management
EtherNet/IP>>>
Select the Location of the EDS File(s). Add File(s) (8) (9) Add all the EDS from the Directory Cook in Subfolders Directory or File Name : D:\Program Files\Woodhead\Direct-Link\applicomI02.3\Equipment Library\DeviceNet_ed
The EDS files usable in the Console are registered in the EDS base. Select the location of the file(s) and click on Next button to insert the EDS files in the base.

- 9. Click <Browse>.
- 10. Click <Next>.

11. The following dialog box appears. Confirm the retrieved device information.

	oduct Name	^ ^
0	DriveLogix5725 Revision 10.1	
	DriveLogix5725 Revision 11.1	$\int (11)$
0	DriveLogix5725 Revision 8.1	
-	1203 - SCANPort	
	1203-SM1	
-	1305 AC Drive	
	1305 AC Drive Revision 6.1	
	1305 AC Drive Revision 7.1	
	received in the enternade	er
	1336 FORCE w/ PLC Adapter	
0	1336 FORCE w/ Std Adapter	×
<		>

- 12. Click <Next>.
- 13. The following dialog box appears. Click <Finish> to complete the EDS file registration.

EDS Management	
The action is completed.	EDS
	< Back Finish Cancel Help

14. Select the [Network Detection] tab.

applicomIOR console Ele pescription Library Network Protocol Tools Items ? Image: Image			
Corring network. Scarning network. Scarning network. Scarning network. Scarning network complete Output Message View	applicomIOR console		
Contract Retwork Cont	<u>File Description Library Network Protocol</u>	I <u>T</u> ools <u>I</u> tems <u>?</u>	
CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUITIO CONFIGUI	u s ve s s s s s s s s s s s s s s s s s		
Control CONFIGUI Control Configuration Control Control Configuration Control Control Control Control Control Contr			
Boards configuration Board 1: PCI/PCU-ETHIO of Protocol (TGP): EtherNet/IP server parameters rever parameters (15) Retwork Equipment Library Retwork Detection Scanning network Scanning network complete Dutput Message View	iy IV Par a		
Bend 1: POLYPOL-ETHIO Protocol (TCP) EtherNet//P Server parameters (PCDDE) erver parameters (14) Equipment Library Betwork Scanning network. Scanning network complete Dutput Message View	🖃 🚏 Description (CONFIG01)		
Image: Server parameters Image: Se			
Isource Server parameters Isource Isource			
Image: Second	Protocol (TCP): EtherNet/IP		
Image: Second			
RR Network (14) Contract (14) Scanning network Scanning network Scanning network.complete Complete Dutput Message View Complete			
RR Network (14) Contract (14) Scanning network Scanning network Scanning network.complete Complete Dutput Message View Complete			
Canning network Scanning network.complete			
Equipment Library Retwork Detection Scanning network Scanning network complete Image: Dutput Message View			
Scanning network complete Image: Dutput Message View		4)	
Scanning network complete Image: Dutput Message View	Scanning network		
Uutput Message View			
	· · ·		
Ready Configured boards state : 1	Dutput Message View		
	Ready	Configured boards state : 1	1A //

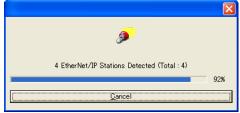
- 15. Click <Read Network Configuration>.
- 16. The following message appears. Click <Yes>.

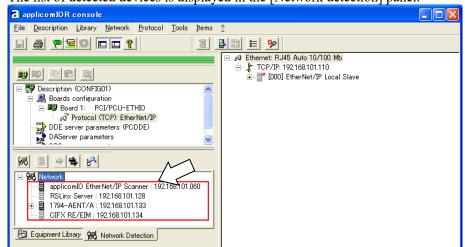
applicomIO® console	×
Board(s) is already initialized. Do you want to reinitialize your board(s)?

17. Specify the range of detection. If you do not change the range, click <OK>.

twork Detection				×
eneral				
Name	Value	Unit		
⊨ Stop IP Address	192.168.101.255			
Parameter				
	ed to define the s	tart address for network detection		
. 03.				
			~	
	\sim			
				_
		<u>O</u> K <u>C</u> ancel	Help	
	eneral Name Start IP Address Stop IP Address Parameter	eneral Name Value Start IP Address 192168.101.001 Stop IP Address 192.168.101.255 Parameter	eneral Name Value Unit Start IP Address 192168.101.001 > Stop IP Address 192168.101.255 Parameter Description : Used to define the start address for network detection	Parameter Description : Used to define the start address for network detection

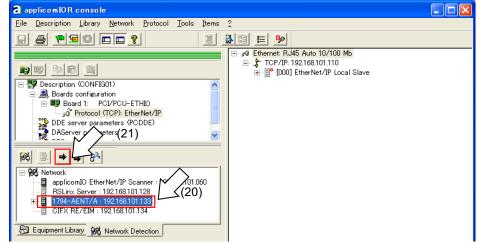
18. The following dialog box appears and read in the devices on the Fieldbus.





19. The list of detected devices is displayed in the [Network detection] panel.

20. Select a device you want to scan.



- 21. Click < Insert in Configuration>.
- 22. The following dialog box appears. Uncheck the [Link Parameters] checkbox.

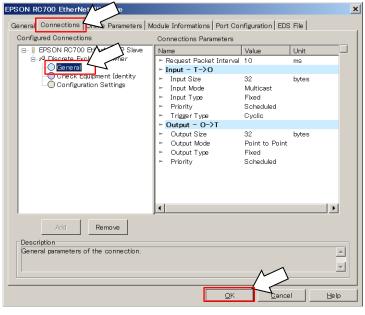
794-AENT FLE	X 1/O Ethernet Adapter	
General Chassis	Connections Online Parameters Module Informations Port Configuration EDS File	1
-Equipment Des	tignation	
Topic Name :	101226121	
Number :	001 V Link Parameters Active Configuration :	R
Comment :	(23) (22)	()
Network Prope		
	Name Value Unit - Address Type IP - - IP Address 192.168.101.133 -	
Description :	Define address type: IP or host name.	2 3
	QK Qancel	Help

23. Assign a number in the range from 1 to 127 in <Number: >. This number is "Device ID". It is required when creating a SPEL+ program. 24. Click <General> on [Connections] tab.

Connections Parameters appear to communicate with the slave device.

- Displayed items are different depending on the slave device.
- Displayed Connections Parameters are information that is set for the Fieldbus master board.

Make sure that the information matches with that of the slave device





Connections Parameters that are set for the Fieldbus master board and information of the slave device need to be matched.

Communication with the slave device is not performed if they do not match. Change the information of either Connections Parameters or Fieldbus master board. Please consult with the slave device manufacturer if the information is unclear.

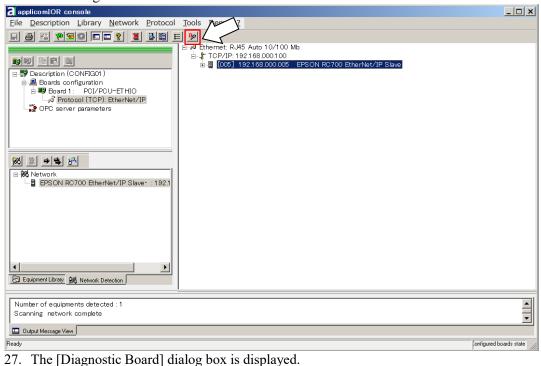
24-1 Double-click the items to change if necessary.

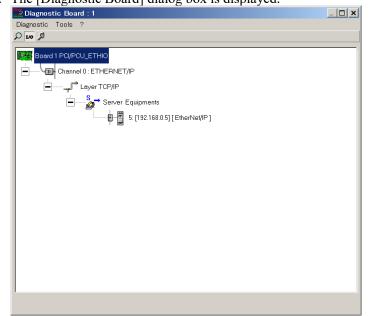
After changing items, click <OK> button. (The figure below is an example of edit screen of Output Size)

of call bere	en or ourput bize)	
Output Size		×
Value		
Parameter		
Name :	Output Size	
Description :	The default size in the EDS file is 32 bytes.	
	μ	
Setting		
Maximum :	256	
Default :	32 July bytes	
Minimum :	0	
Previous	Next QK Qancel	elp

25. Click <OK> to complete the registration.

26. Check the communication status with each slave devices. Click <Diagnostic>.





If it cannot communicate with the slave device, the following dialog box appears.

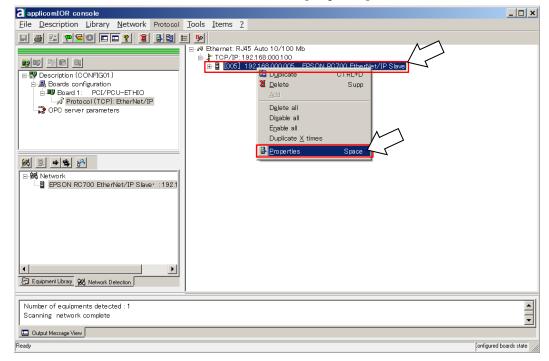
Connections Parameters that are set for the Fieldbus master board and information of the slave device may not be matched.

Diagnostic Board : 1	_ 🗆 ×
Diagnostic Tools ?	
Q 100 \$	
Channel 0 : ETHERNET/IP	
Layer TCP/IP	
- Server Equipments	
5: [192.168.0.5] [EtherNet/IP]	
1	

Connections Parameters for the Fieldbus master board can be checked by the following procedure.

First, select the slave device which is registered to the Fieldbus master board.

Then, click the left mouse button and select [Properties].



1794-AENT FLE General Chassis			Module Informat	ions Port Co	nfiguration EDS File	1	E
- Equipment Des Topic Name : Number :	1009001=8	Link Parameters		A	ctive Configuration :	r r	
Comment :						K N	
- Network Prope	rties Name ← Address Type ← IP Address		Unit				
Description :	Define address ty	pe: IP or host nam	e.			K N	
				QK	Cancel	Help	

The property information of selected slave device is displayed.

Select <General> on the [Connections] tab.

Connections Parameters appear to communicate with the slave device.

Configured Connections	Connections Parameters Name Value	Unit
		bytes ast uled bytes to Point
Add Remove Description General parameters of the connection.	<u> </u>	×

28. Select [File]-[Download in Flash] from the applicomIOR console menu. Register the configuration to the Fieldbus master board.

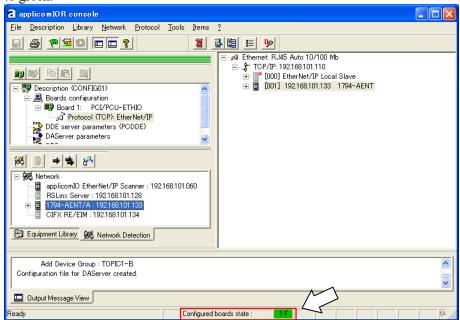
applicomIOR console	
<u>File</u> <u>D</u> escription <u>L</u> ibrary <u>N</u> etw	vork <u>P</u> rotocol <u>T</u> ools Items <u>?</u>
Configuration Manager	? 384 38 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
🔚 Save Ctrl+S	Ethernet: RJ45 Auto 10/100 Mb
🞒 List and Print	e - \$ TCP/IP: 192.168.101.110 ⊕ ∰ [000] EtherNet/IP Local Slave
🐙 Board(s) Initialization	
<u>D</u> ownload in Flash	-ETHIO
<u>E</u> rase Flash Memories	EtherNet/IP
Export +	(PCDDE)
I <u>m</u> port >	
Preferences •	
E <u>x</u> it	
applicomIU EtherNet/I RSLinx Server : 192.16	Scanner : 192.168.101.060 8.101.128



Make sure that the flash memory of Fieldbus master board stores the configuration; otherwise, the Fieldbus master board cannot function correctly. Also, you cannot control it from EPSON RC+7.0.

If you changed the configuration, select [File]-[Download in Flash] from the applicomIOR console menu and register the configuration to the Fieldbus master board.

29. After a few seconds, the display of "Configured boards state" on the status bar turns to green.



Now, the Fieldbus master board is ready to operate in the master mode.

- 30. Close the "applicomIO Console" application.
- 31. Refer to the next section EPSON RC+7.0 Configuration and continue the step.

NOTE

If the fieldbus master board is not recognized in Windows 8 or Windows 10, refer to the following section and disable the fast startup function.

4. Troubleshooting
4.4 How to Disable Fast Startup in Windows 10
4.5 How to Disable Fast Startup in Windows 8 or 8.1

EPSON RC+7.0 Configuration

To use the Fieldbus master board, the Robot system option setting and Fieldbus master setting should be enabled on EPSON RC+ 7.0.

- 1. Select [Setup]-[Option Setting] and display the [Option] dialog box.
- 2. Refer to *EPSON RC+ User's Guide 23. Installing Controller Options* and enable the Fieldbus Master option.
- 3. The following dialog box appears.

EPSON RC+ 7.0
Changes will take affect during the next session.
ОК

Click <OK> and reboot EPSON RC+7.0.

After EPSON RC+7.0 is started, the option setting is enabled.

4. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

	? ×
Eieldbus Type: None Board Type: None Update Interval: 10 v ms Total Input Bytes: 0 Total Output Bytes0	? × Close Apply Restore
	Board Type: None Update Interval: 10 ms Total Input Bytes: 0

- 5. Select [Inputs/Outputs]-[Fieldbus Master]-[General].
- 6. Set the following items:

[Fieldbus Type:] EtherNet/IP	
[Board Type:] Molex	
[Update Interval:] Update cycle for the EtherNet/IP m	naster I/O
E System Configuration	? ×
Startup Controller General Configuration Preferences Simulator Drive Units Robots Inputs / Outputs Fieldbus Master General Slaves Fieldbus Slave Remote Control R5232 TOP / IP Part Feeders Security Vision	Close Apply Restore

7. Click <Apply>.

Confirm that the following items are displayed.

Total Input Bytes : Number of inputs the master controls (Bytes) Total Output Bytes : Number of outputs the master controls (Bytes) 8. Click <Close>. The following dialog box appears. The Pebet Controller automatically starts rebooting.



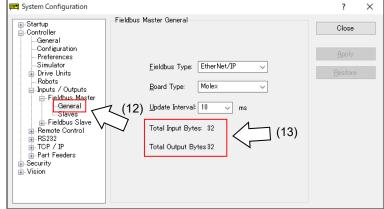
9. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

∎-Startup ⊒-Controller						Close
General	Туре	Installed	Inputs	Outputs	^	
Configuration (10) Drive Unit 1	No			-	Apply
Simulator 🗸 📈	Drive Unit 1 R-I/O	No				<u></u>
Drive Units	Extended Board 1	No				
Robots	Extended Board 2	No				
Inputs / Outputs	Extended Board 3	No				
-Fieldbus Master General	Extended Board 4	No				
General Slaves B-Fieldbus Slave B-Remote Control B-R5282 B-Part Feeders B-Security B-Vision	Euromap 67 Boa…	No				
	Euromap 67 Boa····	No				
	Drive Unit 2	No				
	Drive Unit 2 R-I/O	No				(44)
	Drive Unit 3	No				へ(11)
	Drive Unit 3 R-I/O	No			M	/
	Fieldbus Slave	Yes	512 - 767	512 - 767		2
	Fieldbus Master	Yes	6144 - 6399	6144 - 6399	-	

- 10. Select [Inputs / Outputs].
- Confirm that the following items are displayed in "Fieldbus Master". Installed :Yes

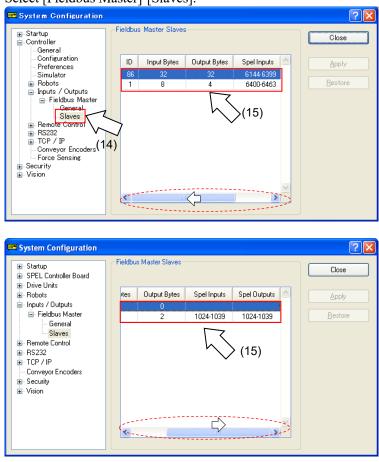
Inputs :6144 – (6144 + Number of inputs the master controls (Bits)) Outputs :6144 – (6144 + Number of outputs the master controls (Bits))

12. Select [Fieldbus Master]-[General].



13. Confirm that the following items are displayed.

Total Input Bytes:Number of inputs the master controls (Bytes)Total Output Bytes:Number of outputs the master controls (Bytes)



14. Select [Fieldbus Master]-[Slaves].

15. Confirm that the following information the master controls are displayed.

ID	: Fieldbus station ID of slave
Input Bytes	: Number of inputs per slave (Bytes)
Output Bytes	: Number of outputs per slave (Bytes)
Spel Inputs	: Number of inputs per slave (Bits)
Spel Outputs	: Number of outputs per slave (Bits)

[&]quot;Encapsulation Inactivity Timeout"

Fieldbus EtherNet/IP master board manufactured by molex is not supported "Encapsulation Inactivity Timeout" which is added by EtherNet/IP standard update. If connecting the EtherNet/IP slave device that supports "Encapsulation Inactivity Timeout", connection will be disconnected due to inconsistency with standard update on the above.

You need to change the set value of "Encapsulation Inactivity Timeout" on the Fieldbus EtherNet/IP master board side.

How to Change the Set Value on the Master Side

Set "0x0000" of UINT below.

TCP/IP Interface Object (F5h) class - Instance #1 - Attribute#13 - Encapsulation Inactivity Timeout

Describe the procedures to set on applicomIO 4.2 Console application.

- (1) Connect the fieldbus master and the slave.
- (2) Select [Network]-[Online Action] on the menu of the [applicomIO Console] application.
- (3) The [Outline Action] dialog box appears. Select the [Explicit Message] tab.

	~
Explicit Message Ping	
Address	
IP Address 192.168.0.123 Class 0x000000F5 Instance 1 ✓ Attribute IS 0 ✓ Send to Device ✓ Connected	
Continue (500ms) Continue (500ms)	
 _ Status	
<u>C</u> lose <u>H</u> el	р

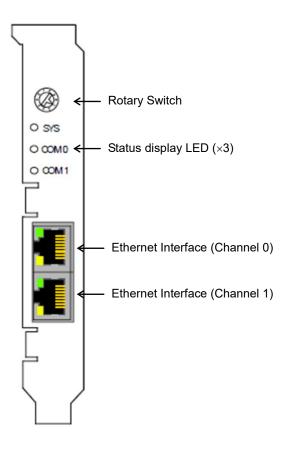
Set as follows:

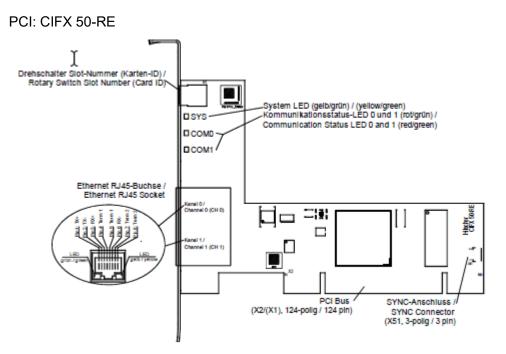
Address		
IP Address	:	IP address of the fieldbus EtherNet/IP slave
Class	:	0x000000F5
Instance	:	1
Attribute	:	13
Service		
Name	:	Set_Attribute_Single
Data	:	0000

- (4) Click <Send to Device>.
- (5) Confirm that the "CIP Status: 0x0. Success" is displayed on the [Status]. Now, changing the setting is complete.

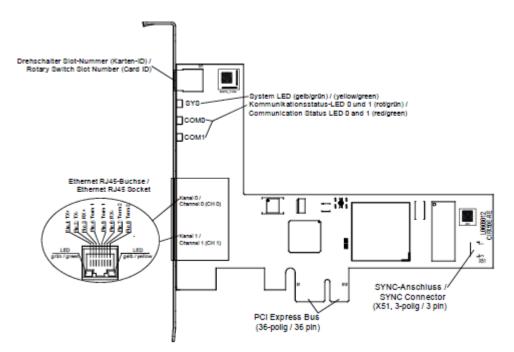
2.3.4 Installing EtherNet/IP Board manufactured by Hilscher

Appearance





PCI Express: CIFX 50E-RE



Specifications

EtherNet/IP Scanner

Item	Specification
Name	EtherNet/IP board manufactured by Hilscher
Maximum number of EtherNet/IP connections	64 connections for implicit and explicit
Maximum number of total cyclic input data	5712 bytes
Maximum number of total cyclic output data	5760 bytes
Maximum number of cyclic input data	128 bytes per slave per telegram
Maximum number of cyclic output data	128 bytes per slave per telegram
IO connection type	Cyclic, minimum 1 ms (depending on used number of connections and used number of input and output data)
Maximum number of unscheduled	1400 bytes per telegram
data	~
UCMM, Class 3	Supported
Explicit Messages, Client and Server	Get_Attribute_Single/All
Services	Set_Attribute_Single/All
Quick connect	Supported
Predefined standard objects	Identity Object Message Route Object Assembly Object Connection Manager Ethernet Link Object TCP/IP Object DLR Object QoS Object
Maximal number of user specific objects	20
Network scan	Supported
Topology	Tree, Line, Ring
DLR (Device Level Ring)	Beacon based "Ring Node"
ACD (Address Conflict Detection)	Supported
DHCP	Supported
BOOTP	Supported
Baud rates (bps)	10M, 100 M
Data transport layer	Ethernet II, IEEE 802.3
Switch function	Integrated
Limitations	CIP Sync Services are not implemented, TAGs are not supported.
Reference to firmware/stack version	V2.9

LED Description

For the EtherNet/IP scanner protocol, the communication LEDs MS and NS as wellas the Ethernet LEDs LINK and ACT can assume the state described below.

LED	Color	State	Description
MS	Duo LED re	d/green	
(Module Status) General name:	(green)	ON	Device operational: The device is operating correctly.
COM 0	₩ (green)	Flashing (1 Hz)	Standby: The device has not been configured.
	* *	Flashing (green, red, green)	Self-test: The device is performing its power-up testing.
	₩ (red)	Blinking (1 Hz)	Major recoverable fault: The device has detected major recoverable fault. E.g. an incorrect or inconsistent configuration can be considered a major recoverable fault.
	• (red)	ON	Major unrecoverable fault: The device has detected a major unrecoverable fault.
	• (OFF)	OFF	No power: The device is powered OFF.
NS	Duo LED re	d/green	
(Network status) General name: : COM 1	• (green)	ON	Connected: An IP address is configured, at least one CIP connection (any transport class) is established. Exclusive Owner connection has not timed out.
	₩(green)	Flashing (1 Hz)	No connections: An IP address is configured, but no CIP connections are established. Exclusive Owner connection has not timed out.
	* *	Flashing (red, green, OFF)	Self-test: The device is performing its power-up testing.
	ored)	Blinking (1 Hz)	Connection timeout: An IP address is configured, and Exclusive Owner connection for which this device is the target has timed out. The NS indicator returns to steady green only when all timed out Exclusive Owner connections are reestablished.
	• (red)	ON	Duplicate IP: The device has detected that its IP address is already in use.
	• (OFF)	OFF	Not powered, no IP address: The device does not have an IP address. (Or is powered OFF).

2. Installation

LED	Color	State	Description
LINK	LED green		
Ch0 & Ch1	(green)	ON	The device is linked to the Ethernet.
	• (OFF)	OFF	The device has no link to Ethernet.
ACT	LED yellow		
Ch0 & Ch1	╬ (yellow)	Flickering (load dependent)	The device sends/receives Ethernet frames.
	• (OFF)	OFF	The device does not send/receive Ethernet frame.

LED state	Description
Blinking (1 Hz)	The indicator turns ON and OFF with a frequency of 1 Hz. Turn ON for 500 ms, followed turn OFF for 500 ms.
Flickering (load dependent)	The indicator turns ON and OFF with a frequency of approx. 10Hz to indicate high Ethernet activity. Turn ON for approx. 50 ms, followed turn OFF for 50 ms. The indicator turns ON and OFF in irregular intervals to indicate low Ethernet activity.

Modes

EtherNet/IP board manufactured by Hilscher has the master mode and the slave mode. However, do not use in the slave mode.

Master mode

The master device gathers and controls all nodes on EtherNet/IP network.

EtherNet/IP master can control up to 64 nodes (max. 128 bytes per slave) in one network.

PLC is typically configured as a master and controls all nodes in factory automation system, but EPSON RC+ is also capable of being a master.

EtherNet/IP network configuration is specified by configuration management software. This is normally provided by a master device manufacturer.

The configuration management software determines parameters for each slave device via an Electronic Data Sheet (EDS).

Available connection types are Cyclic, Change of State, and Explicit Messaging.

Available baud rates are 100 Mbps and 10 Mbps.

Installing Software

Installing device driver

Before adding EtherNet/IP board manufactured by Hilscher to the PC with the EPSON RC+ 7.0 installed, you must install the Hilscher SYCON.net application and drivers according to the type of the board you are using.

- 1. Insert Communication-Solutions DVD into the PC with EPSON RC+7.0 installed.
- Execute Communication-Solutions.exe. When Windows Security Alert appears, do not click <Cancel> and proceed to the next step.
- 3. The [Communication Solutions] window appears. Select "Install cifX / netJACK Device Driver".



4. The [User Account Control] dialog box appears. Click <Yes>.



5. The [Device Driver Setup] dialog box appears.

Select the [I accept the terms in the License Agreement] check box. Click <Install>.



- 6. The [Windows Security] dialog box appears. Click <Install>.
- 7. When the dialog box switched, click <Install> again.

8. The [Completed the cifX Device Driver (x64) 1.5.0.0 Setup Wizard] dialog box appears.

Click <finish>.</finish>		
😸 cifX Device Driver (x64) 1	.5.0.0 Setup	- • •
	Completed the cifX Devic 1.5.0.0 Setup Wizard Click the Finish button to exit the Set If you upgraded from a previous ver restart your computer to finish the In	tup Wizard. sion, you may need to
	Back Einis	sh Cancel

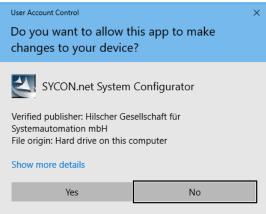
Installing master application software

9. The [Communication Solutions] dialog box appears. Select "Install SYCON.net Configuration Software".

Installation Guide Install SYCON.net Configuration Software Install netXStudio (Objekt Engineering) Documentation Drivers, Software and Tools
CANOPER CC-Link DeviceNet EtherCAT EtherNet/IP POWERLINK MOODUS PROPRY RECORD SECONS

10. When Windows Security Alert appears, do not click <Cancel> and proceed to the next step.

11. The [User Account Control] dialog box appears. Click <Yes>.



12. The [Choose Setup Language] dialog box appears. Select "Englisch [USA]" and click <OK>.

Choose S	etup Language
Z	Select the language for this installation from the choices below.
	Englisch (USA)
	OK Cancel

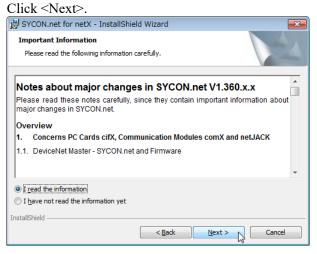
Now, start the installation.

InstallShield Wizard	
	Preparing to Install SYCDN.net for netX Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
	Checking Operating System Version
	Cancel

13. The [InstallShield Wizard - Welcome] dialog box appears. Click <Next>.



14. [InstallShield Wizard - Important Information] dialog box appears. Select <I read the information>.



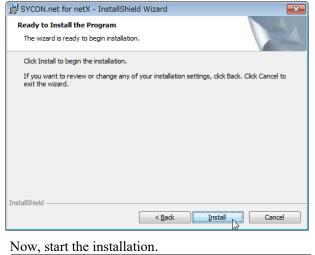
15. The [InstallShield Wizard - License Agreement] dialog box appears. Select <I accept the terms in the license agreement>. Click <Next>

CHCK SINEXU.			
😸 SYCON.net for netX - InstallShield Wizard	x		
License Agreement			
Please read the following license agreement carefully.			
	_		
HILSCHER SOFTWARE LICENSE AGREEMENT	<u> </u>		
This document is a legally valid contract between you and Hilscher Gesellschaft für Systemautomation mbH ("Hilscher").			
Please read through this License Agreement carefully before installing and using the software. By installing the software and using it, whether in whole or in part, you accept all of the provisions of this Agreement.			
If you decline to accept these terms and conditions, please do not install the software. Instead, return it to us or the retailer from which you purchased it for a refund of the purchase price.			
I accept the terms in the license agreement			
\bigcirc I $\underline{d}o$ not accept the terms in the license agreement			
InstallShield			
< Back Next > Cancel			

16. The [InstallShield Wizard - Customer Information] dialog box appears. Enter the User Name and Organization.

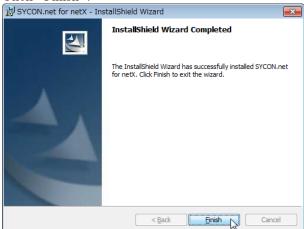
Click <next>.</next>	
븅 SYCON.net for netX - InstallShield Wizard	×
Customer Information Please enter your information.	
User Name:	
<your name=""></your>	
Organization:	
<your organization=""></your>	_
InstallShield < Back	Next > Cancel

17. The [InstallShield Wizard - Ready to Install the Program] dialog box appears. Click <Install>.



🛃 SYCON.	net for netX - InstallShield Wizard	- • •
-	SYCON.net for netX ram features you selected are being installed.	
P	Please wait while the InstallShield Wizard installs SYCON.net for may take several minutes.	r netX. This
	Status:	
InstallShield -		
	< <u>B</u> ack <u>N</u> ext >	Cancel

18. The [InstallShield Wizard - InstallShield Wizard Completed] dialog box appears. Click <Finish>.



Refer to the next *Installing a Board* to install EtherNet/IP board manufactured by Hilscher.

Installing a Board

1. Configure the rotary switch of the board address on EtherNet/IP board manufactured by Hilscher.

You can install one Fieldbus master board to the PC with the EPSON RC+ 7.0 installed. The slot number should be "Not in use (0)". Refer to the following table for configuration.

Slot No.	Rotary switch position
Not in use	0
Slot No. 1	1
Slot No. 9	9

- Install the EtherNet/IP board manufactured by Hilscher to the PCI bus or PCI Express bus of the PC with the EPSON RC+ 7.0 installed.
 Installation methods of the EtherNet/IP board manufactured by Hilscher to the PCI bus/PCI Express bus and how to open the cover differ depending on the type of PC.
 Refer to the manuals of each PC on how to install the board to the PCI bus/PCI Express board.
- 3. Connect EtherNet/IP board manufactured by Hilscher with the EtherNet/IP network.

4. Describe an example to set the master and the slave as the setting below.

Setting item	Value
Address configuration	Fixed address
Master IP address	192.168.0.2
Slave IP address	192.168.0.3
Subnet mask	255.255.255.0
Input Bytes	32
Output Bytes	32

📖 System Configuration			? ×
Startup Controller General Configuration Preferences Simulator Drive Units Robots Inputs / Outputs Pieldbus Master General Fieldbus Slave General Bremote Control Bras232 TCP / IP Conveyor Encoders B-Force Sensing Security	Inp	dbus Type: EtherNet/IP ut Bytes: 32 ~ put Bytes: 32 ~	Close Apply Restore
E System Configuration			? ×
	A EtherNet/IP		Close
- Controller	MAC Addres	s: 00-30-11-FF-01-D1	Close
General Configuration	Host Name:	ETHIP0000	
Preferences	_		<u>A</u> pply
Simulator	Domain <u>N</u> am	e: EpsonRobots	Restore
	Primary DNS	: 0.0.0.0	<u>n</u> estore
⊡ · Inputs / Outputs ⊟ · Fieldbus Master	S <u>e</u> condary [DNS: 0.0.0.0	
General ⊟Fieldbus Slave	<u>T</u> imeout:	75 seconds	
General EtherNet/IP Analog I/O	Address <u>C</u> onfiguration	n: ● <u>S</u> tatic ○ DHCP/ <u>B</u> OOTP/ARP	
⊕ · Remote Control ⊕ · RS232	IP A <u>d</u> dress:	192.168.0.3	
TCP / IP	IP <u>M</u> ask:	255.255.255.0	
Conveyor Encoders	ID C-1	0.0.0.0	
	IP <u>G</u> ateway:	0.0.0.0	
	•		

- 5. Start up the PC.
- 6. Select the Start menu-[SYCON.net] and execute it.

7. Set a Confirm password of SYCON.net. Click <OK>.



8. SYCON.net starts up.

Click [netDevice]-Device Catalog list on the right side-[CIFX RE/EIM].

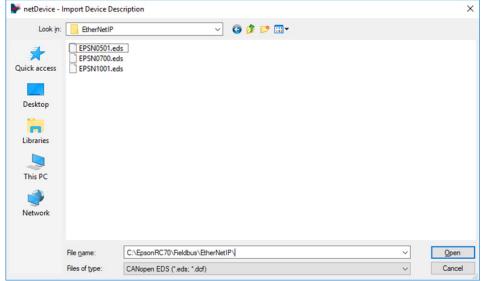
SYCON.net - [Untitled.spj]			- • •
Eile View Device Network	E <u>x</u> tras <u>H</u> elp		
D 📽 🖬 😨 ≝ ☱ 📾	5t. 🚳 📑 🗗 🗗 🗗		
netProject 🔺 🗙	netDevice		
Project: Untitled	< m < < >> Network View /		EIM DOXX-RE/EIM O RE/EIM O RE/EIM LOO-EN/EIM
x y y y y y y y y y y y y y y y y y y y	Device /	< _ m_	•
Ready		Administrator	

Importing slave EDS files

9. Click [Network]-[Import Device Descriptions...].



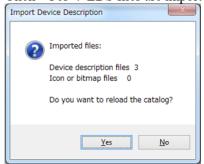
The [Import Device Description] dialog box appears.



10. Select EDS files provided by each device manufacturer. Click <Open>.

F netDevice - I	mport Device Des	cription	×
Look in:	EtherNetIP	 i i i i i i i i i i i i i i i i i i i	
Quick access	EPSN0501.ed	\$	
Desktop			
Libraries			
 This PC			
Network			
	File <u>n</u> ame:	"EPSN0901.eds" "EPSN0601.eds" "EPSN0800.eds"	1
	Files of type:	CANopen EDS (*.eds; *.dcf) Cance	el

11. The following message appears. Click <Yes>. EDS files are imported.



Adding a master icon

12. Click SYCON.net application software-[netDevice]-Device Catalog list on the right side-[EtherNet/IP]-[Master]-[CIFX RE/EIM].

YCON.net - [Untitled.spj]		
Eile View Device Network	k E <u>x</u> tras <u>H</u> elp	
🗅 📽 🖬 🕼 발 발 📾) 5: 💿 🗖 5: 5: 5: 5:	
netProject 🔺 🗙	netDevice	
Project: Untitled	< الله الله الله الله الله الله الله الل	
× yu yu yu yu yu yu yu yu yu yu	tDevice /	4
Ready		Administrator

13. Drag & drop [CIFX RE/EIM] on the bold line on the left side of [netDevice].

FSYCON.net - [Untitled.spj]		
<u>File View Device Network</u>	E <u>x</u> tras <u>H</u> elp	
🗅 📽 🔛 🕲 램 램 🚳	3: 💿 🖪 5, 5, 5, 5,	
netProject ×	netDevice	
- Project: Untitled		
	Metwork View	Fieldbus / Vendor) DTM Clas
Ready	Device /	Administrator

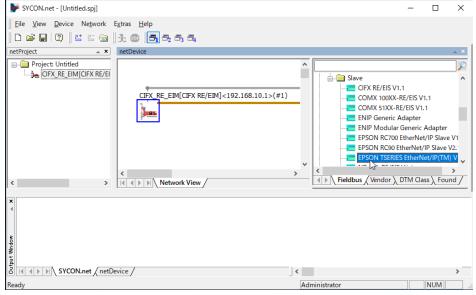
14. The "CIFX_RE_EIM" icon indicating EtherNet/IP board manufactured by Hilscher is connected.

F SYCON.net - [Untitled.spj]	
<u>File View Device Network</u>	E <u>x</u> tras <u>H</u> elp
D 📽 🖬 😨 ≝ ☱ 📾	3k 💿 🛅 32 33 34
netProject ×	netDevice
☐- Project: Untitled CIFX_RE_EIM[CIFX R	CIFX_RE_EIM[CIFX RE/EIM]<192.168.10.1>(Gateway / Stand-Alone Sla Gateway / Stand-Alone Sla Master CIFX RE/EIM CIFX RE/E
۰ III >	Implement of the second s
Ready	Device / I Administrator

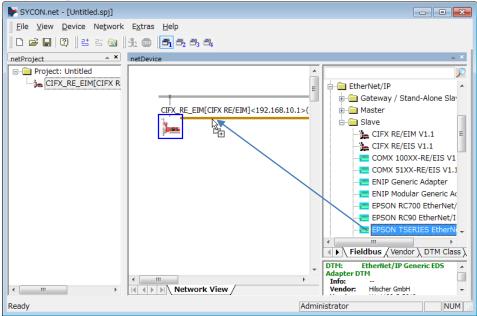
Adding a slave icon

15. Click SYCON.net application software-[netDevice]-Device Catalog list on the right side-[EtherNet/IP]-[Slave]-Slave device.

In case of EtherNet/IP slave module:



16. Drag & drop the selected slave device on the bold line on the left side of [netDevice].



17. EtherNet/IP Slave is connected and the icon appears.

	11	
YCON.net - [Untitled.spj]		
<u>File View D</u> evice Ne <u>t</u> work	E <u>x</u> tras <u>H</u> elp	
D 🚅 🖬 Q ≝ ≝ 🚳 3	i: 💿 📑 🗛 3; 3;	
netProject 🔺 🗙	netDevice	× *
Project: Untitled		
EPSON_TSERIES_I	E	
EPSON_TSERIES_I		🕒 🖻 Gateway / Stand-Alone Sla
	CIFX_RE_EIM[CIFX RE/EIM]<192.168.10.1>(#1)	😟 💼 Master
	Jan.	Slave
	EPSON_TSERIES_EtherNet_IP_TM_[EPSON	CIFX RE/EIM V1.1
		COMX 100XX-RE/EIS V1
		COMX FIGURATE VI
		ENIP Generic Adapter
		ENIP Modular Generic Ac
		EPSON RC700 EtherNet/
		EPSON RC90 EtherNet/I
		EPSON TSERIES EtherNi 🚽
		✓ III → Fieldbus / Vendor \ DTM Class \
		DTM: EtherNet/IP Generic ED5
	4	Adapter DTM
	Image: A set of the set of t	Info: Vendor: Hilscher GmbH -
Ready	Adm	ninistrator NUM

Setting on master side

18. Right-click [netDevice]-<CIFX_RE_EIM> and click [Configuration...].

necoevice			
_			
CIFX_F	E_EIM[CIFX RE/EIM]<192.168.	10.1>(#1)	
)-	<u>Connect</u> Disconnect	1_[EPSON	
	D <u>o</u> wnload <u>U</u> pload		
	Cu <u>t</u> Copy Paste		
_	Network Scan		
<	Configuration Measured Value Simulation	4	
	Diagnosis	Ad	r

19. The [Configuration]dialog box appears. Select [Settings]-[Driver] tab.

Select the [CIFX Device Driver] checkbox and click < Apply>.

Navigation Area 📃		Drive	ər	
Settings	Driver	Version	ID	
Driver	CIFX Device Driver	1.101.4.7941	{3688EC58-0E92-4C0E-84A9-64F62AE7AAFA}	
	netX SPM USB Driver	1.01.4.7941	{9634996A-AEA6-42FA-BF8D-5758AED2D303}	
	netX Driver	1,200,4,8037	{B54C8CC7-F333-4135-8405-6E12FC88EE62}	
Firmware Download	nex briver	1.200.4.0037	(034000074 333-4133-6463-0212) C6622623	
Licensing				
Configuration				
Network Settings				
Scanlist				
Process Data				
Address Table				
Quick Connect Table				
Scanner Settings				

20. Select [Settings]-[Device Assignment].

21. Select the [CIFX 50E-RE] checkbox.

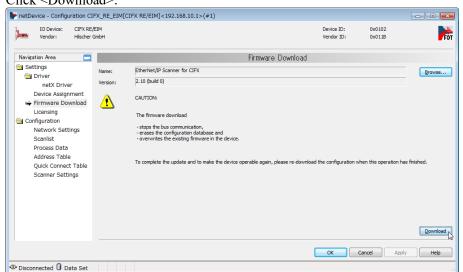
IO Device: CIFX RE Vendor: Hilscher							vice ID: ndor ID:	0x0102 0x011B	
Navigation Area 📃					Device A	ssignment			
Settings	Scan pro	igress: 1/1 De	vices (Current device: -)						
netX Driver	Device s	election:	suitable only						Scan
Firmware Download		Device	Hardware Port 0/1/2/3	Slot nu	Serial number	Driver	Channel Prot	ocol	Access path
Licensing Configuration Network Settings Scanlist Process Data Address Table Quick Connect Table Scanner Settings		CIFX 50E-RE	Ethernet,Ethernet/-S		28772	CIFX Device Driver	EtherNet/IP	scanner	¥dît0_Ch0
	Access g	jath:	{3688EC58-0E92-4C0E-844	9-64F62AE7	AAFA}¥cifX0_Ch	0			

22. Select [Settings]-[Driver]-[Firmware Download] tab. Click <Browse...>.

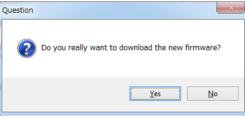
▶ netDevice - Configuration CI	FX_RE_EIM[C	IFX RE/EIM]<192.168.10.1>(#1)	
IO Device: CIFX RE, Vendor: Hilscher		Device ID: 0x0102 Vendor ID: 0x011B	FDT
Navigation Area		Firmware Download	
Settings	Name: Version:	- -	Browse
Device Assignment → Firmware Download Licensing → Configuration Network Settings Scanlist Process Data Address Table Quick Connect Table Scanner Settings	£	CAUTION: The firmware download = stops the bus communication, - eraces the configuration database and - overwrites the existing firmware in the device. To complete the update and to make the device operable again, please re-download the configuration when this operation	has finished.
		CK Cancel Ap	ply Help
∜⊫ Disconnected 0 Data Set			.4

- 23. Display [Firmware\CIFX] folder of Communication-Solutions DVD. Select [cifxeim.nxf].
 - Click < Open>. Firmware File × - 🗿 🎓 Look in:)) CIFX ~ Name Firmware Hardware V * cifxdnm.nxf DeviceNet Master CIFX 2 Quick access cifxeim.nxf EtherNet/IP Scanner CIFX 2 Desktop Libraries This PC cifxeimnxf File name: • Open Files of type: Firmware Files (*nxf;*nxm) • Cancel Network Recent folders: • Help EtherNet/IP Scanner V2.10 (build 0) for CIFX Firmware:

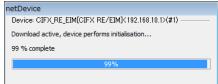
24. Confirm that [Name] is "EtherNet/IP Scanner for CIFX". Click <Download>.



25. Click <Yes>.



Start the installation of firmware.



- 26. Select [Settings]-[Licensing] tab.
- 27. Confirm that the license of [EtherNet/IP Scanner] is set to "Existing: YES".

Vavigation Area 🛛 🧮			Licensing			
Settings	License Type					
🔄 Driver	License Type		1			
netX Driver			Existing	Order	A	
	DeviceNet Master AS-Interface Mast		YES			
Device Assignment	- PROFINET IO RT		YES	H		
Firmware Download	EtherCat Master	Johnoller	YES	H	=	
i Licensing	EtherNet/IP Scann	or .	YES			
Configuration	Sercos III Master	0. Lit	YES	ä		
			120			
Network Settings	-OPC Server		NO		*	
Scanlist	н			=		
Process Data	Request Form, please fill out					
Address Table	Name		Value		A	
Ouick Connect Table	License type	User Single Device Li	cense			
	Manufacturer*	00000001			E	
Scanner Settings	Article number*	01251100				
	Serial number*	00028772			_	
	Chiptype*	00000001				
	Step* Romcode revision*	00000000			_	
	Checksum*	A			-	
	Fields marked with "" are manda					

28. Select [Configuration]-[Network Settings] tab.

29. Configure [IP Settings] and click <Apply>. (Ex.) IP Address: 192.168.0.2 (Fixed Addresses)

netDevice - Configuration CI	FX_RE_EIM[CIFX RE/EIM	1]<192.168.0.2>(#1)				- • ×
IO Device: CIFX RE/				Device ID: Vendor ID:	0x0102 0x011B	FDT
Navigation Area 📃		1	Vetwork Settings			
Settings		X_RE_EIM				
Device Assignment	IP Settings					
Firmware Download	DHCP BootP					
Licensing	Eixed Addresses					
ir Network Settings	IP Address:	192 . 168 . 0 . 💈				
Scanlist	Network Mask:	255 . 255 . 255 . 0				
Process Data Address Table	Gateway Address:	0.0.0.0				
Quick Connect Table Scanner Settings		sequence is DHCP, BootP, Fixed.				
ound occurgo	Port 1					
	Operation mode: All c	apable, Auto Negotiation enabled				-
	MDI mode: Aut	o MDI-X				
	Port 2					
	Operation mode: All c	apable, Auto Negotiation enabled				•
				ОК	Cancel Apply	Help
∜ Disconnected 0 Data Set	1					

30. Select [Configuration]-[Scanlist].

Select the [Activate] check box of the slave device.

	CIFX RE/EIM Hilscher Gmb					Device ID: Vendor ID:	0x0102 0x011B)
Navisation Area	_				0			
					Scanlist			
Settings	E	Activate	Index	IP Address	Name	Descripti		RPI(ms) Timeout m
Driver	2	IH V	1	192.168.0.3	EPSON TSERIES Ether	Ne EPSON TSERIES	EtherNet/I	
netX Driver								
Device Assignm								
Firmware Down	load							
Licensing								
Configuration								
Network Settin	gs							
🛶 Scanlist								
Process Data								
Address Table								
Quick Connect 1	Table							
Scanner Setting	js							
	1							
				▼ <u>▼</u>				
						ок р	Cancel	Apply Help
						N		

- 31. Configure [IP Settings] and click <OK>. (Ex.) IP Address: 192.168.0.3 (Fixed Address)
- 32. Close the [Configuration] dialog box.

Setting on slave side

 Right-click [netDevice]-< EPSON_TSERIES_EtherNet_IP....> icon. Select [Configuration...].

netDevice	
	E
CIFX_RE_EIM[CIFX RE/EIM]<192.168.0.2>(#
EPSO	
	Connect
	Disconnect
	D <u>o</u> wnload
	<u>U</u> pload
	Cu <u>t</u>
	Сору
	Paste
	Configuration
<	Measured Value
II I I I I I Net	Simulation
	D1 1

- 34. The [Configuration] dialog box appears.
- 35. Select [Configuration]-[Connection].
- 36. Select [Connection parameters] tab-[Connection1]-[O -> T]-[Size]. Enter "32" to [Parameter] and click <Apply>.

retDevice - Configuration	EPSON_TSERIES_EtherNet_IP_T	M_[EPSON TSERIES EtherNet/IF	P(TM) V1.2]<192.168.0.2	>	
	N TSERIES EtherNet/IP(TM) D EPSON CORPORATION		Device ID: Vendor ID:	0x0009 0x03F1	P
Navigation Area 📃		Connect	tion		<u>*</u>
Configuration General	Select connection:	[Connection 1] Discrete Exclusion	ive Owner	•	
Electronic Keying	Connection settings Cor	·	•	m	•
Solution EDS Viewer	Connection1	Value: 32 (0x20) Bytes Para. Parameter name Bit. F 1 Output Size 16	'aramet Min Max Unit 27 0 256	Descripti	E
4 III >	<u> </u>		ОК	ancel Apply	
∜⊳ Disconnected 0 Data Se	t 🖊				√

- 37. Select [Configuration]-[Connection].
- 38. Select [Connection parameters] tab-[T->O]-[Size]. Enter "32" to [Parameter] and click <OK>.

▶ netDevice - Configuration	EPSON_TSERIES_EtherNet_IP_T	TM_[EPSON TSERIES EtherNet/I	P(TM) V1.2]<192.168.0.2	>	- • ×
	IN TSERIES EtherNet/IP(TM) D EPSON CORPORATION		Device ID: Vendor ID:	0x0009 0x03F1	FÓT
Navigation Area 📃		Connec	tion		
Configuration General	Select connection:	[Connection 1] Discrete Exclus	sive Owner	•	
Electronic Keying	∢ ▶ / Connection settings / Con	nnection parameters \	•	m	•
Description EDS Viewer	Connection1 Conn	Value: 32 (0x20) Bytes Para Parameter name Bit] 2 Input Size 16	Paramet Min. Max. Unit	Descripti	H.
4 III +		1			-
			ОК С	ancel Apply	Help
♥▷ Disconnected 0 Data Set	t 🖊				d

39. Close the [Configuration] dialog box.

Downloading to master board

- 40. Right-click [netDevice]-<CIFX_RE_EIM> icon again, and click [Configuration...]. The [Configuration] dialog box appears.
- 41. Click [Configuration]-[Address Table].
- 42. Check the settings of [Address Table] and click <OK>.
 - "Address Table"-Inputs Length: 0x0020

"Address Table"-Outputs Length: 0x0020

▶ netDevice - Configuration CIF	FX_RE_EIM[CIFX RE/EIM]<192.168.0.1>(#1)			_ • •
IO Device: CIFX RE/C			Device ID: Vendor ID:	0x0102 0x011B
Navigation Area 🗖		Address Table		
 Settings Driver netX Driver Device Assignment Firmware Download Licensing Configuration Network Settings Scanlist Process Data 	Igputs: Device Slot PEPSON TSERIES EtherNet IP TM 0x00	Display mode: │ Connection name Discrete Exclusive Owner	Hexadecimal Hexadecimal Hexadecimal Hexadecimal Hexadecimal Hexadecimal	CSV Export
➡ Address Table Quick Connect Table Scanner Settings	Outputs: EPSON_TSERIES_EtherNet_JP_TM0x00	Connection name Discrete Exclusive Owner	Instance ID 0x96	Length Address 0x0020 0x0000
			OK Can	cel Apply Help
아 Disconnected 🛈 Data Set				đ

- 43. Close the [Configuration] dialog box.
- 44. Right-click [netDevice]-<CIFX_RE_EIM> icon and click [Download]. By the above step, "Setting on master side" and "Setting on slave side" are downloaded to the EtherNet/IP board.

netDevice		
CIFX	RE_EIM[CIFX RE/EIM]<192.168.	0.2>(#
***	Connect	LTM_[
	<u>D</u> isconnect	
	Download	
	<u>U</u> pioad	
	Cu <u>t</u> Copy	
	<u>P</u> aste	
	<u>N</u> etwork Scan	
	Configuration	-
< <u> </u>	Measured Value Simulation	•

The settings are applied to EtherNet/IP board manufactured by Hilscher.

Diagnosis

45. Right-click [netDevice]-<CIFX_RE_EIM> icon. Select [Diagnosis...].

netDevice		
	<u>RE_EIM[CIFX RE/EIM]<192.1</u>	.68.0.2>(#
	<u>C</u> onnect <u>D</u> isconnect D <u>o</u> wnload <u>U</u> pload	FM_[
	Cu <u>t</u> Copy Paste Network Scan	
< III (Configuration Measured Value Simulation Diagnosis	Admir

 The [Diagnosis] dialog box appears. Select [Diagnosis]-[Master Diagnosis]. Right after this, click [Diagnosis]-[General Diagnosis].

	RE/EIM				Device ID: Vendor ID:	0x0102 0x011B	F
Navigation Area				General Di	agnosis		
 Diagnosis → General Diagnosis Master Diagnosis Station Diagnosis Station Diagnosis Extended Diagnosis → HALEDD_2PS_LOW → HALEDD_2PS_HIGI → RX_SYSTEM → DPM_COM0_SMBX → DPM_COM0_SMBX → DPM_COM0_SMBX → EIM_CL1_TASK → EIM_CL1_TASK → EIM_CN2_TASK → EIM_CPUPP → EIM_AP_TASK ✓ ■ IM_ASA 	-	Device state Communication Run Ready Error Configuration state Configuration locked New configuration pend Reset required Bus ON Communication error: Watchdog time: Error count:	ing 1000 ms 0	Network state Operate Idle Stop Offine			
Connected & Device		8			ОК	Cancel Apply	Help

47. State is normal when the indicators of Communication, Run, and Bus ON are turned to green and the indicator of Ready is turned ON.

48. Select [Tools]-[IO Monitor] and perform the input/output test. Click <OK>.

CHCK > OK > .					
retDevice - Diagnosis CIFX_RE	_EIM[CIFX RE/EIM]<192.168.0.2>(#1)				3
IO Device: CIFX RE/EIN Vendor: Hilscher Gmb			Device ID: Vendor ID:	0x0102 0x011B	DT
Navigation Area 📃		IO Monito	r		
DPM_COM0_SMBX	Columns: 16 -			Display mode: Decimal	•
EIM_ENCAP_TASK	Offset: 0 Go				
EIM_OBJECT_TASK	0 1 2 3 4 0 ▶0 0 0 0 0 16 0 0 0 0 0	5 6 7 8 0 0 0 0 0 0 0 0 0 0	9 10 11 0 0 0 0 0	12 13 14 15 0 0 0 0 0 0 0 0	
EIP_DLR_TASK	,				
ETH_INTF PTP_TASK	Output data				-
PACKET_ROUTER		5 6 7 8 0 0 0 0	9 10 11 0 0 0	12 13 14 15 0 0 0 0	
Packet Monitor	<u>16</u> 000000	0 0 0 0	0 0 0	0 0 0 0 Update	 1
< +					-
			OK Car	Apply Help	
Connected Levice	8				

- 49. Close the [Diagnosis] dialog box.
- 50. Click [File]-[Save] and save the setting changes to the file.

SYCON.net	- [Untitled.spj] *	c				
<u>File</u> <u>V</u> iew	<u>D</u> evice Ne <u>t</u> wor	'k				
∬ <u>N</u> ew	- 📾					
_ <u>⊖</u> <u>O</u> pen	<u></u> ▲ X]				
<u>C</u> lose						
Save <u>Save</u>						
No Proje						
<u>E</u> xit	CULISU					
Save As						×
Save in:	CIFX	~	G 🤌 📂 🛄 -			
_	Name	^	Date modified	Туре	Size	
Quick access	Outdated ve	ersions	7/22/2019 3:16 PM	File folder		
Quick access						
Desktop						
1						
Libraries						
This PC						
1						
Network						
	File <u>n</u> ame:				~	<u>S</u> ave
	Save as type:	Projekt file (*.spj)			\sim	Cancel

Exporting the Configuration File (.csv) for RC+

51. Right-click [netDevice]-<CIFX_RE_EIM> icon.

Clie	ck [Additional Fu	hctionsj-[Export]-[C	J.
CIFX	_RE_EIM[CIFX RE/E		
	Connect	Master	
î		CIFX RE/EIM	
	Disconnect	I COMX 100XX-RE/EIM	
	Download	-nets NETX 100 RE/EIM	
	Upload	-net NETX 500 RE/EIM	
	· · · · · · · · · · · · · · · · · · ·		
	Cut	NJ 100XX-RE/EIM	
	Сору	eldbus (Vendor) DTM Class)	Found /
	Paste	EtherNet/IP Scanner DTM	
	Network Scan	Hilscher GmbH	
	Configuration	2008-07-07	
	Measured Value	CIFX RE/EIM	
	Simulation	CIFX_RE_EIM Hilscher GmbH	
	Diagnosis	V1.000	
		2006-08-24	
	Additional Functions	> Offline Compare	
	Delete	Online Compare	
	beiete	Setpoint Value	
N	Symbolic Name	Service	
			,
		License	
		Export >	CSV
		Print	DBM/nxd
			XML

52. Save the CSV file to the file.

Exported CSV file is used in the next EPSON RC+7.0 Configuration.

Save As					:
Save in:	CIFX		v 🎯 🥬 I	"	
Quick access Desktop Libraries This PC	Name DeviceNe EtherNet	IP	Date modified 2019/07/08 12:21 2019/06/28 11:16 2019/07/08 11:51	Type File folder File folder Microsoft Ex	Siz
	< File <u>n</u> ame:	DeviceNet		~	Save
	Save as type:	CSV Files (*.csv)		\sim	Cancel

Now, the settings by SYCON.net are complete. Close SYCON.net.



If the fieldbus master board is not recognized in Windows 8 or Windows 10, refer to the following section and disable the fast startup function.

- 4. Troubleshooting
 - 4.4 How to Disable Fast Startup in Windows 10
 - 4.5 How to Disable Fast Startup in Windows 8 or 8.1

EPSON RC+7.0 Configuration

To use the Fieldbus master board, the Robot system option setting and Fieldbus master setting should be enabled on EPSON RC+ 7.0.

- (1) Select [Setup]-[Option Setting] and display the [Option] dialog box.
- (2) Refer to the *EPSON RC+ Users Guide: 23. Installing Controller Options* and enable the Fieldbus Master option.
- (3) The following message dialog appears.

EPSON RC+ 7.0	×
Changes will take affect during the next se	ession.
ОК	

Click <OK> and reboot EPSON RC+7.0.

After EPSON RC+7.0 is started, the option setting is enabled.

(4) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration		? ×
	Fieldbus Master General	Close
Preferences Simulator Drive Units Robots Inputs / Outputs	Eieldbus Type: None Board Type: None	<u>A</u> pply <u>R</u> estore
Fieldbus Master Fieldbus Slave Fieldbus Slave FRemote Control FRS282 FTCP / IP	∐pdate Interval: 10 v ms Total Input Bytes: 0	
ia-Security ia-Vision	Total Output Bytes0	

(5) Select [Inputs/Outputs]-[Fieldbus Master]-[General].

(6)	Set the following i		
	[Fieldbus Type:]	EtherNet/IP	
	[Board Type:]	Hilscher	
	[Update Interval:]] Update cycle for the EtherNet/IP 1	master I/O
	End System Configuration		? ×
	Startup General Controller General Configuration Preferences Simulator Drive Units Robots Protex Jourts	Fieldbus Master General Eieldbus Type: EtherNet/IP	Close <u>A</u> pply <u>R</u> estore
		Update Interval: 10 v ms	
	TCP / IP	Total Input Bytes: 0	
	in Security in Vision	Total Output Bytes0	
		Import Configuration	

Click < Import Configuration>.

(7) Select the configuration file (.csv) for RC+. Click <Open>.

📖 Import Hilscher Fieldbus Mast	er Configuration		×
\leftarrow \rightarrow \checkmark \uparrow \square \rightarrow This PC	> Documents > CIFX >	Search CIFX	Q
Organize 🔻 New folder			•
This PC	Name	Date modified Type	s
3D Objects	EtherNetIP	7/22/2019 6:35 PM File folder	
E. Desktop	EtherNetIP.csv	7/8/2019 2:07 AM CSV File	
Documents			
🖊 Downloads			
b Music			
E Pictures			
🚰 Videos			
🏪 Win10 x64 EN (C:)			
Win10 x64 JP (D:)			
🕳 Win10 x64 CS (E:)			
🕳 Win 10 x64 CT (F:) 🗸	<		>
File <u>n</u> ame:	EtherNetIP.csv	→ Hilscher Config File (*.csv)	~
	<u> </u>	<u>O</u> pen Cancel	

(8) Confirm that the configuration file (.csv) for RC+ is imported and click <OK>

EPSON RC	+ 7.0	^	
1	The Hilscher configurat \o file 'D:¥Users¥0586106¥DoQ&ments¥CIFX¥EtherNetIRcsv' has been imported successfully. Click Apply to use the new configuration.		
	OK		

(9) Confirm that the following items are displayed.

System Configuration		? >	×
Startup Controller Controller Controller Configuration Preferences Simulator Prive Units Robots Piputs / Outputs Fieldbus Slave Remote Control RS232 B-TCP / IP Security E-Vision	Fieldbus Master General Eieldbus Type: EtherNet/IP Board Type: Hilscher Update Interval: 10 v ms Total Input Bytes: 32 Total Output Bytes: 32 Import Configuration	Close Apply Restore	

Total Input Bytes : Number of inputs the master controls (Bytes) Total Output Bytes : Number of outputs the master controls (Bytes)

- (10) Click < Apply>.
- (11) Click < Close>.
 - The following dialog box appears.

The Robot Controller automatically starts rebooting.

EPSON RC+ 7.0
Rebooting Controller
Close

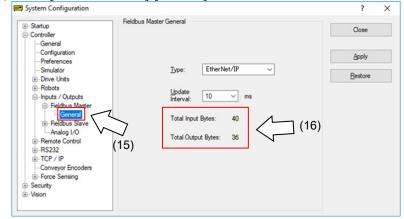
(12) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration	Inputs / Outputs				? 🛛
					Close
Preferences (13)	Туре	Installed	Inputs	Outputs	Apply
Simulator (13) ⊕ Robots	e ndard	Yes	0 - 23	0 - 15	Restore
Inputs / Outputs	e Unit 1	No			<u>N</u> estore
🗐 Fieldbus Master	Extended Board 1	No			
General	Extended Board 2	No			
Slaves	Extended Board 3	No			•
	Extended Board 4	No		. /	\land
TCP / IP	Drive Unit 2	No		\sim	(14)
Conveyor Encoders	Fieldbus Slave	No		L	2
Force Sensing	Fieldbus Master	Yes	6144 - 6463	6144 - 6431	1
⊪-Security ⊪-Vision					

- (13) Select [Inputs/Outputs].
- (14) Confirm that "Fieldbus Master" displays the following items:

Installed :	Yes
Inputs :	"6144" – "6144 + Number of inputs the master controls (Bits)
Outputs :	"6144" – "6144 + Number of outputs the master controls (Bits)

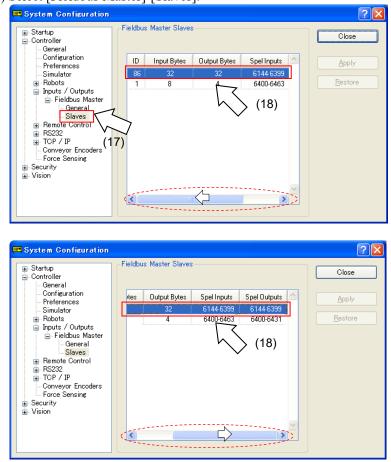
(15) Select [Fieldbus Master]-[General].



(16) Confirm that the following items are displayed.

Total Input Bytes : Number of inputs the master controls (Bytes)

Total Output Bytes : Number of outputs the master controls (Bytes)



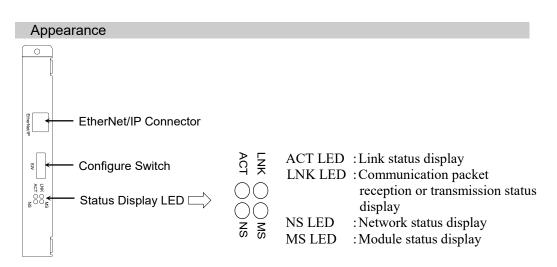
(17) Select [Fieldbus Master]-[Slaves].

(18) Confirm that the following information the master controls is displayed.

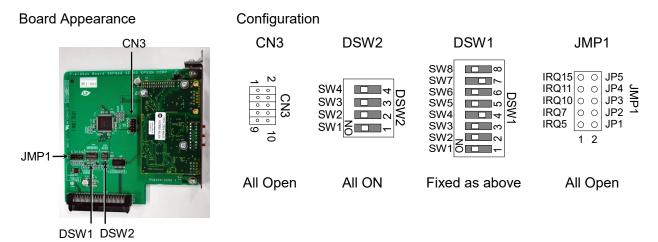
ID: Fieldbus station ID of slaveInput Bytes: Number of inputs per slave (Bytes)Output Bytes: Number of outputs per slave (Bytes)Spel Inputs: Number of inputs per slave (Bits)Spel Outputs: Number of outputs per slave (Bits)

RC700 / RC90 Option Fieldbus I/O Rev.16

2.3.5 Installing EtherNet/IP Slave Board



The Fieldbus slave board is configured as follows at shipment.



Item	Specification		
Name	EtherNet/IP slave board		
Supported Connection	I/O messaging connection (Cyclic),		
	Explicit messaging connection		
	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		
Max. Input data size	2048 bits (256 bytes)		
Max. Output data size	2048 bits (256 bytes)		
Assembly Instance	Input: 100 (64h) size: Depending on I/O settings		
	Output: 150 (96h) size: Depending on I/O settings		
	Configuration: 1 size: 0		

LED Description

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

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

	Setting Configure Switch
^	
4	Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Working with the power ON is extremely because and many result in electrical shark and/or malfunction of environment.
WARNING	hazardous and may result in electrical shock and/or malfunction of equipment.
	Set all EtherNet/IP board configure switches OFF. Otherwise, the initialization error occurs.
	All the EtherNet/IP communication configurations are set by the development software (EPSON RC+ 7.0).
	Wiring
	Use a standard Ethernet connector for wiring to the board.
	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.
	Installing a Board
Â	Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Working with the power ON is extremely
WARNING	hazardous and may result in electric shock and/or malfunction of equipment.
	Install the board to the dedicated slot on the Robot Controller.

Install the board to the dedicated slot on the Robot Controller.

Reference manuals:

Robot Controller RC700: *Maintenance 7.10 Option Board* Robot Controller RC90/90-B: *Maintenance 7.9 Option Board*

Confirmation and Configuration of EPSON RC+ 7.0

When the EtherNet/IP slave board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the EtherNet/IP slave board using the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

00.					
System Configuration					? 🛽
	Inputs / Outputs				Close
Robots	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0-15	Restore
General V	Extended Board 1	Yes	64 - 95	64 - 95	Testore
EtherNet/IP(2)	Extended Board 2	No			
Remote Control	Extended Board 3	No			
	Extended Board 4	No			
	Fieldbus Slave	Yes	512 - 767	512 - 767	
- Conveyor Encoders	Fieldbus Master	No	Г	7	
Security					
. Uision			v	(3)	

- 2. Select [Inputs / Outputs].
- Confirm that the following items are displayed in "Fieldbus Slave". Installed : Yes
 - Inputs : 512-767 (default setting) Outputs : 512-767 (default setting)
- 4. Select [Fieldbus Slave]-[General].

System Configuration		? 🛛
Startup SFEL Controller Board Drive Units Robots Inputs / Outputs Fieldbus Slave EtherNet/IP Conveyor Encoders Security Vision	Fieldbus I/O Slave Fieldbus Type: EtherNet/IP Input Bytes: 32 V Output Bytes: 32 V	Close Apply Bestore (5)

- 5. Confirm that the following items are displayed. Fieldbus Type : EtherNet/IP Input Bytes : 32 (default setting) Output Bytes : 32 (default setting)
- 6. Click <Close>.

7. Select [Fieldbus Slave]-[EtherNet/IP].

System Configuration			? 🛛
Startup SPEL Controller Board Drive Units Robots Inputs / Outputs Fieldbus Slave <u>Enerted</u> Enerted TCP / IP Conveyor Encoders Security Vision	 EtherNet/IP MAC Address: Host Name: Domain Mame: Primary DNS: Secondary DNS: Secondary DNS: Timeout: Address Configuration: IP Address: IP Mask: IP Gateway: 	00-30-11-03-93-49 ETHIP0000 EpsonRobots 0.0.0.0 75 seconds Static O DHCP/B00TP/ARP 192168.0.100 255.255.255.0 0.0.0	Close Apply Restore

- 8. 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.
- 9. When the configuration is completed, click <Apply> to apply the setting.
- 10. Click <Close>.

NOTE

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 respond within the time, the Controller stops the request to the DHCP/BOOTP/ARP server and waits ARP.

Editing of Input / Output Size

You can change the input/output size of the EtherNet/IP slave board if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

System Configuration			? 🛛
 Startup SPEL Controller Board Drive Units Robots Inputs / Outputs Fieldbus Slave EtherNet/IF Reade Control RS232 TCP / IP Conveyor Encoders Security Vision 	Fieldbus I/O Slave Fieldbus Type: Input Bytes: Output Bytes:	EtherNet/IP 32 V 32 V	Close Apply Bestore

3. Change the settings of [Input Bytes] and [Output Bytes]. In this example, both of them are changed to 20 Bytes.

System Configuration		? 🛛
Startup SPEL Controller Board Drive Units Robots Inputs / Outputs Fieldbus Slave General EtherNet/IP Remote Control RS232 TCP / IP Conveyor Encoders Security Vision	idbus I/D Slave Fieldbus Type: EtherNet/IP Input Bytes: 20 V Output Bytes: 20 V	Close Apply Restore

- 4. Click < Apply>.
- 5. Click <Close> and the following dialog box appears. The Robot Controller automatically starts rebooting.

EPSON RC+ 7.0
Rebooting Controller
Close

6. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🛛
■ - Startup ■ - SPEL Controller Board ■ - Drive Units	Inputs / Outputs				Close
Bobots	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
General (7	Extended Board 1	Yes	64 - 95	64 - 95	
EtherNet/IP	Extended Board 2	No			
Remote Control	Extended Board 3	No			
. RS232	Extended Board 4	No			1
	Fieldbus Slave	Yes	512 - 671	512 - 671	$\overline{\boldsymbol{\zeta}}$
- Conveyor Encoders	Fieldbus Master	No			(8)
i Security	E				
i → Vision					

- 7. Select [Inputs / Outputs].
- 8. Confirm that the following items are displayed in "Fieldbus Slave". Inputs : 512 - (512 + Changed number of input (Bits)) Outputs : 512 - (512 + Changed number of output (Bits))

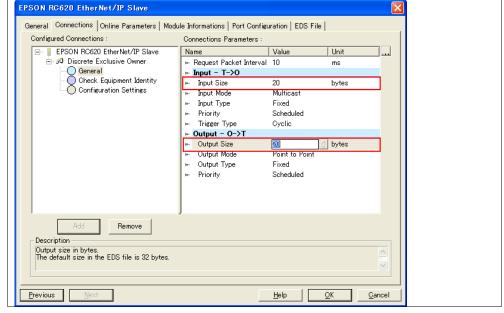
In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs. Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

9. Click <Close>.

NOTE (B

When you change the input/output size of EtherNet/IP slave board, you need to change the input/output size of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output size of the slave information registered in the Fieldbus master device by the applicomIO Console application.



Electronic Information File (EDS file)

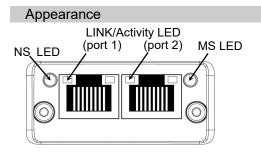
An EDS file is supplied for EtherNet/IP slave Board network configuration. The file is located in the following folder where EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\EtherNet/IP

2.3.6 Installing EtherNet/IP Slave Module

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

A	Pay attention to the followings in order to prevent the the connecter from coming off.
	 Use the connectors attached to the module. Insert the connectors all the way seated. Fix the cables at proper positions in order not to put a load on the connectors.



Specifications

WARNING

Item	Specification
Name	EtherNet/IP slave module
	I/O messaging connection (Cyclic),
Supported Connection	Explicit messaging connection
	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
Max. Input data size	2048 bits (256bytes)
Max. Output data size	2048 bits (256bytes)

LED Description

LED state represents the states of the fieldbus module.

NS: Network Status LED

LED State	Description
Off	No power or no IP address
Green	Online, one or more connections established (CIP Class 1 or 3)
Green, flashing	Online, no connections established
Red	Duplicate IP address, FATAL error
Red, flashing	One or more connections timed out (CIP Class 1 or 3)

MS: Module Status LED

LED State	Description
Off	No power
Green	Controlled by a Scanner in Run state
Green, flashing	Not configured, or Scanner in Idle state
Red	Major fault (EXCEPTION-state, FATAL error etc.)
Red, flashing	Recoverable fault(s). Module is configured, but stored parameters differ from currently used parameters.

LINK/Activity LED

LED State	Description
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

Setting Configure Switch

WARNING

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

Set all EtherNet/IP modules configure switches OFF. Otherwise, the initialization error occurs.

All the EtherNet/IP communication configurations are set by the development software (EPSON RC+ 7.0).

Wiring

Use a standard Ethernet connector for wiring to the board.



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.

Installing Module

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

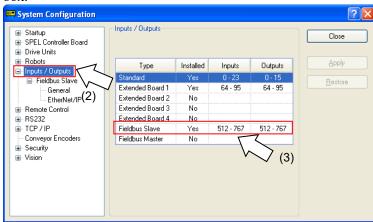
Install the module to the dedicated slot on the T/VT series Manipulator.

Reference: Manipulator manual Setup & Operation 17. Fieldbus I/O

Confirmation and Configuration of EPSON RC+ 7.0

When the EtherNet/IP slave module is installed to the T/VT series Manipulator, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the EtherNet/IP slave module using the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.



- 2. Select [Inputs / Outputs].
- 3. Confirm that the following items are displayed in "Fieldbus Slave".

Installed	:	Yes
Inputs	:	512-767 (default setting)
Outputs	:	512-767 (default setting)

Select [Fieldbus Slave]-[General]. 4.

System Configuration			? 🛛
Image: Startup Fieldbus I/ Image: Speak Controller Board Drive Units Image: Drive Units Fieldbus Slave Image: Fieldbus Slave Image: Drive Units Image: Drive Units Image: Drive Units	O Slave Fieldbus Type: Input Bytes: Output Bytes:	EtherNet/IP 32 V 32 V	Close Apply Bestore (5)

- 5. Confirm that the following items are displayed. Fieldbus Type : EtherNet/IP Input Bytes : 32 (default setting) **Output Bytes**
 - : 32 (default setting)
- Click <Close>. 6.
- Select [Fieldbus Slave]-[EtherNet/IP]. 7.

System Configuration			? 🛽
Startup SPEL Controller Board Drive Units Robots Input / Outputs Fieldbus Slave <u>General</u> <u>EthenNet/IP</u> Remote Control RS232 TCP / IP Conveyor Encoders Security Vision	EtherNet/IP MAC Address: Host Name: Domain Name: Primary DNS: Secondary DNS: Secondary DNS: Imeout: Address Configuration: IP Address: IP Mask: IP Gateway:	00-30-11-03-93-49 ETHIP0000 EpsonRobots 0.0.0 0.0.0 75 seconds Static • DHCP/ <u>B</u> DOTP/ARP 192.168.0.100 255.255.255.0 0.0.0	Close

- 8. 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.
- 9. When the configuration is completed, click <Apply> to apply the setting.
- 10. Click <Close>.

NOTE (P

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 respond within the time, the Controller stops the request to the DHCP/BOOTP/ARP server and waits ARP.

Editing of Input / Output Size

You can change the input/output size of the EtherNet/IP slave module if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

System Configuration			? 🛛
Startup SPEL Controller Board Drive Units Robots Inputs / Outputs Fieldbus Slave Ceneral Res232 TCP / IP Conveyor Encoders Security Vision	Fieldbus I/O Slave Fieldbus Type: Input Bytes: Output Bytes:	EtherNet/IP 32 V 32 V	Close Apply Restore

3. Change the settings of [Input Bytes] and [Output Bytes]. In this example, both of them are changed to 20 Bytes.

System Configuration			? 🛛
 Startup SPEL Controller Board Drive Units Robots Input / Dutputs Fieldbus Slave General EtherNet/IP Resource Control RS232 TCP / IP Conveyor Encoders Security Vision 	Input Bytes:	EtherNet/IP 20 V 20 V	Close Apply Restore

- 4. Click < Apply>.
- 5. Click <Close> and the following dialog box appears.
 - T/VT series Manipulator (Controller) automatically starts rebooting.

Rebooting Controller
Close

6. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🛛
 B - Startup B - SPEL Controller Board B - Drive Units 	Inputs / Outputs				Close
Bobots Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave A Z	Standard	Yes	0-23	0 - 15	Restore
General General	Extended Board 1	Yes	64 - 95	64 - 95	Testole
EtherNet/IP	Extended Board 2	No			
Remote Control	Extended Board 3	No			
	Extended Board 4	No			
. TCP / IP	Fieldbus Slave	Yes	512 - 671	512 - 671	∇
- Conveyor Encoders	Fieldbus Master	No			[−] √(8)
🗐 Security	E				
. ■ Vision					

- 7. Select [Inputs / Outputs].
- 8. Confirm that the following items are displayed in "Fieldbus slave". Inputs : 512 - (512 + Changed number of input (Bits)) Outputs : 512 - (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs.

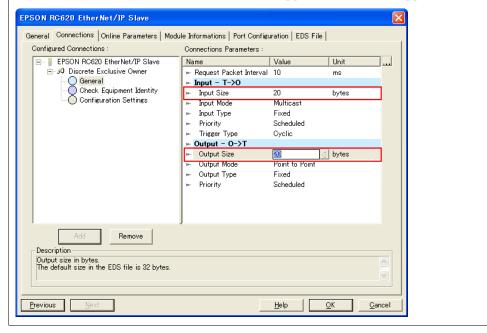
Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

9. Click <Close>.

NOTE (P

When you change the input/output size of EtherNet/IP slave module, you need to change the input/output size of the slave information registered in the Fieldbus master device.

Use the window below to change the input/output size of the slave information registered in the Fieldbus master device by the applicomIO Console application.



"Encapsulation Inactivity Timeout"

Fieldbus EtherNet/IP slave module supports "Encapsulation Inactivity Timeout" which is added by EtherNet/IP standard update.

If the EtherNet/IP master device is not supported for the standard on the above, connection will be disconnected.

You need to change the "Encapsulation Inactivity Timeout" set value of the slave on the EtherNet/IP master device side.

For more details, refer to 2.3.3 Installing EtherNet/IP Master Board Manufactured by molex How to Change the Set Value on the Master Side.

Electronic Information File (EDS file)

An EDS file is supplied for EtherNet/IP slave module network configuration. The file is located in the following folder where EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\EtherNet/IP

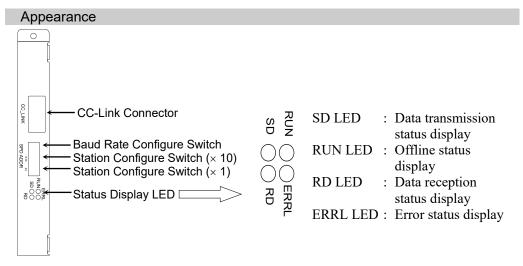


2.4 CC-Link

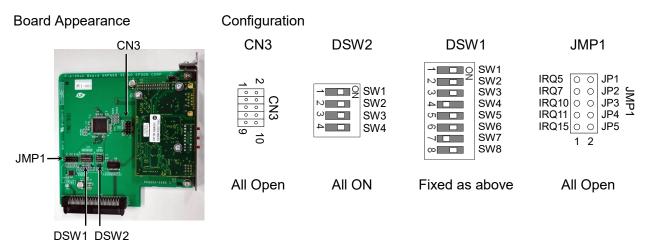
2.4.1 Installing CC-Link Slave Board

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.

Pay attention to the followings in order to prevent the the connecter from coming off.
 Use the connectors attached to the board. Insert the connectors all the way seated. Fix the cables at proper positions in order not to put a load on the connectors.



The Fieldbus slave board is configured as follows at shipment.



Specifications		
Item	Specification	
Name	CC-Link Slave Board	
Connection Method	Broadcast polling	
Baud Rates (bps)	156 k, 625 k, 2.5 M, 5 M,	10 M (bps)
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 Number	64 units	
Cable	Dedicated cable supporting CC-Link Ver.1.10	
Mode	Slave	
Interface	1 CC-Link V1 port	
Occupied Stations	1 to 4 station(s) (Remote device station)	
Master Station's Handshake		
Max. Input Data Size	384 bits (48 bytes)	
Max. Output Data Size	384 bits (48 bytes)	

LED Description

LED state represents the states of the fieldbus I/O board.

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

Setting Configure Switch



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

Configuration of the device station is available with the station configure switch on the CC-Link slave board.

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

 Set the station of the CC-Link slave 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 $\times 10$ side are for tenths digit address value configuration. Switches on the $\times 1$ side are for units digit address value configuration. Stations from 1 to 62 are available.

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

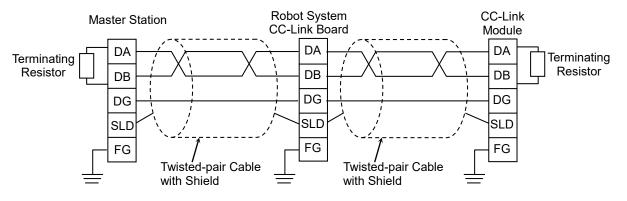
8	8
Baud Rate	Switch
156 k	0
625 k	1
2.5 M	2
5 M	3
10 M	4
Configuration prohibited	5-9

Wiring

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

Ferminal 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 slave board as follows.





Prepare the cable for CC-Link Ver.1.10 sold in the market as a communication cable. Install terminating resistors at both ends of the network.

Use the terminating resistors 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 ends via "FG".

Installing a Board



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

Install the board to the dedicated slot on the Robot Controller.

Reference manuals:

Robot Controller RC700: *Maintenance 7.10 Option Board* Robot Controller RC90/90-B: *Maintenance 7.9 Option Board*

Confirmation of EPSON RC+ 7.0

When the CC-Link slave board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the CC-Link board using the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog

box.					
System Configuration					? 🛛
 ■ Startup ■ SPEL Controller Board ■ Drive Units 	Inputs / Outputs				Close
Bobots	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Daulaus
Remote Control	Extended Board 1	Yes	64 - 95	64 · 95	Restore
T	Extended Board 2	No			
	Extended Board 3	No			
- Conveyor Encoders	Extended Board 4	No			
. Security	Fieldbus Slave	Yes	512 - 767	2.767	
😟 Vision	Fieldbus Master	No)		
				× √(3)	

- 2. Select [Inputs / Outputs].
- 3. Confirm that the following items are displayed in "Fieldbus slave".

Installed : Yes Inputs : 512-767 (default setting) Outputs : 512-767 (default setting)

4. Select [Fieldbus Slave]-[General].

System Configuration			? 🛛
Startup SPEL Controller Board SPEL Controller Board Prive Units Robots Imputs / Outputs General Remote Control R5232 TCP / IP Conveyor Encoders Security Security Vision	Fieldbus I/O Slave Fieldbus Type: Input Bytes: Output Bytes:	CC-Link 32 V 32 V	Close Apply <u>R</u> estore

5. Confirm that the following items are displayed.

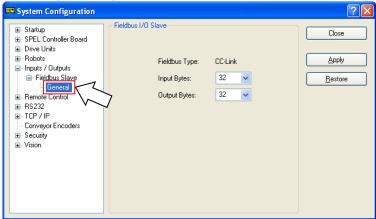
Fieldbus Type	:	CC-Link
Input Bytes	:	32 (default setting)
Output Bytes	:	32 (default setting)

6. Click <Close>.

Editing of Input / Output Size

You can change the input/output size of the CC-Link slave board if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].



3. Change the settings of [Input Byte] and [Output Byte]. In this example, both of them are changed to "20" Bytes.

System Configuration	? 🛛
Startup SFEL Controller Board Drive Units Robots Input / Outputs Fieldbus Slave General Remote Control RS232 TCP / IP Conveyor Encoders Security Vision	 Close Apply Restore

- 4. Click <Apply>.
- 5. Click <Close> and the following dialog box appears. The Robot Controller automatically starts rebooting.

EPSON	RC+ 7.0	
	Rebooting Controller	
	Close	

6. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

UUA.					
System Configuration					? 🛛
Startup SPEL Controller Board Drive Units	- Inputs / Outputs				Close
Bobots Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
- Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
General	Extended Board 1	Yes	64 - 95	64 - 95	
Bemote Control	Extended Board 2	No			
⊕ RS232	Extended Board 3	No			(8)
🛓 TCP / IP	Extended Board 4	No			$\mathcal{M}^{(8)}$
- Conveyor Encoders	Fieldbus Slave	Yes	512 - 671	512 - 671	\triangleleft
🖮 Security	Fieldbus Master	No			
i Vision					-

- 7. Select [Inputs / Outputs].
- 8. Confirm that the following items are displayed in "Fieldbus slave".

Inputs : 512 – (512 + Changed number of input (Bits)) Outputs : 512 – (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs.

Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

9. Click <Close>.

Operation

When the CC-Link is installed, some operation differs from the other Fieldbus I/O options. This section describes about these differences.

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.

 $n = (Station - 1) \times 2$

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 \rightarrow RX00 to RX5F
Remote Output	RYn0 to RY(n+5)F \rightarrow RY00 to RY5F

When CC-Link board station is 4

Remote Input	RXn0 to RX(n+5)F \rightarrow RX60 to RXAF
Remote Output	RYn0 to RY(n+5)F \rightarrow RY60 to RYAF

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

Signal direction: Remote device station (CC-Link board) \rightarrow 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	Paused	*1	514
RXn3	Error	*1	515
RXn4	EStopOn	*1	516
RXn5	SafeguardOn	*1	517
RXn6	SError	*1	518
RXn7	Warning	*1	519
RXn8	MotorsOn	*1	520
RXn9	AtHome	*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

Address	Signal Name		Controller Bit No
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	CmdRunning	*1	541
RX(n+1)E	CmdError	*1	542
RX(n+1)F	NA		543
RX(n+2)0	NA		544
:	:		
RX(n+4)F	NA		591
RX(n+5)0	NA		592
RX(n+5)1	NA		593
RX(n+5)2	NA		594
RX(n+5)3	NA		595
RX(n+5)4	NA		596
RX(n+5)5	NA		597
RX(n+5)6	NA		598
RX(n+5)7	NA		599
RX(n+5)8	NA		600
RX(n+5)9	NA		601
RX(n+5)A	NA		602
RX(n+5)B	Remote Ready	*2	603
RX(n+5)C	NA		604
RX(n+5)D	NA		605
RX(n+5)E	NA		606
RX(n+5)F	NA		607

- *1: Remote control inputs and outputs are not allocated to fieldbus slave I/O by default. To allot remote control input and output to fieldbus slave I/O, refer to *3.5 Setting Remote Control Input and Output* later in this manual.
- *2 When initialization of the CC-Link board is completed at the Controller turn-on, Remote Ready flag [RX(n+5)B] turns ON.
 I/O assignment of Remote Ready cannot be changed or disabled (NA).

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

Signal direction: Master station (PLC) \rightarrow 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	SelProg1	*1	513
RYn2	SelProg2	*1	514
RYn3	SelProg4	*1	515
RYn4	Stop	*1	516
RYn5	Pause	*1	517
RYn6	Continue	*1	518
RYn7	Reset	*1	519
RYn8	SetMotorsOn	*1	520
RYn9	SetMotorsOff	*1	521
RYnA	Home	*1	522
RYnB	Shutdown	*1	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	NA		592
RY(n+5)1	NA		593
RY(n+5)2	NA		594
RY(n+5)3	NA		595
RY(n+5)4	NA		596
RY(n+5)5	NA		597
RY(n+5)6	NA		598
RY(n+5)7	NA		599
RY(n+5)8	NA		600
RY(n+5)9	NA		601
RY(n+5)A	NA		602
RY(n+5)B	NA		603
RY(n+5)C	NA		604
RY(n+5)D	NA		605
RY(n+5)E	NA		606
RY(n+5)F	NA		607

*1: Remote control inputs and outputs are not allocated to fieldbus slave I/O by default. To allot remote control input and output to fieldbus slave I/O, refer to *3.5 Setting Remote Control Input and Output* later in this manual.

Remote Register

Remote register (RWr, RWw) is numeric value

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

 $m = (Station - 1) \times 4$

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	RWrm to RWrm+B \rightarrow RWr0 to RWrB	
Remote Register	RWwm to RWwm+B \rightarrow RWw0 to RWwB	
When the CC-Link board is 4		
Remote Register RWrm to RWrm+B \rightarrow RWrC to RWr17		
Remote Register RWwm to RWwm+B \rightarrow RWwC to RWw		

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

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

-	Shis indicated as 101 are left for user. Ose these nee for SI EE, program.			
	Address	Signal Name	Controller Word No	Controller Bit No
	RWrm	NA	38	608 to 623
	:	:		
	RWrm+9	NA	47	752 to 767
	RWrm+A	System reserved	-	-
	RWrm+B	System reserved	-	-

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

Signal direction: Master station (PLC) \rightarrow 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
RWwm	NA	38	608 to 623
:	:		
RWwm+9	NA	47	752 to 767
RWwm+A	System reserved	-	-
RWwm+B	System reserved	-	-

1			
Input / Output Size	Occupied Stations	Remote I/O	Remote Register
(x)	Occupied Stations	(Bytes)	(Bytes)
0 < x = < 4	1	S	0
4 < x = < 12	1	4	x – 4
12 < x = < 24	2	8	x - 8
24 < x = <36	3	12	x - 12
36 < x = <48	4	16	x – 16

The number of stations, remote I/O range, and remote register range depend on the input / output size.

The number of occupied stations is the ones on the CC-Link network. Set this number to the master station.

Remote I/O is the information of ON/OFF.

Remote I/O data is in bit data and the FROM/TO command are executed in units of 16 bits. Remote register is in numeric data.

Electronic Information File (CSP File)

A CSP file is supplied for the CC-Link slave board network configuration. The file is located in the following folder in where EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\CCLink

According to the input/output size, the CSP file you use differs. See the table below and select the CSP file.

For Robot Controller RC700

Input / Output Size (x)	Occupied stations	Electronic file name
0 < x = < 12	1	EPSN0400_1.csp
12 < x = < 24	2	EPSN0400_2.csp
24 < x = <36	3	EPSN0400_3.csp
36 < x = <48	4	EPSN0400_4.csp

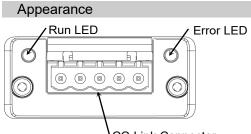
For Robot Controller RC90/90-B

Input / Output Size (x)	Occupied stations	Electronic file name
0 < x = < 12	1	EPSN0301_1.csp
12 < x = < 24	2	EPSN0301_2.csp
24 < x = <36	3	EPSN0301_3.csp
36 < x = <48	4	EPSN0301_4.csp

2.4.2 Installing CC-Link Slave Module

Make sure that the power is turned OFF before installing/removing any modules 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.

A	Pay attention to the followings in order to prevent the the connecter from coming off.
	 Use the connectors attached to the module. Insert the connectors all the way seated. Fix the cables at proper positions in order not to put a load on the connectors.



CC-Link Connector

Specifications			
Items	Specification		
Name	CC-Link Slave Module		
Connection Method	Broadcast polling		
Baud Rates (bps)	156 k, 625 k, 2.5 M, 5 M, 1	10 M (bps)	
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 Number	64 units		
Cable	Dedicated cable supporting	g CC-Link Ver.1.10	
Mode	Slave		
Interface	1 CC-Link V1 port		
Occupied Stations	1 to 4 station(s) (Remote d	evice station)	
Master Station's			
Handshake			
Max. Input Data Size	384 bits (48 bytes)		
Max. Output Data Size	384 bits (48 bytes)		

Specifications

WARNING

LED Description

1

LED state represents the states of the fieldbus I	I/O board.
---	------------

LED	State		
	OFF	No network participation, timeout state (no power)	
Run LED	Green	Participating, normal operation	
	Red	Major fault (FATAL error)	
	OFF	No error detected (no power)	
	Red	Major fault (Exception or FATAL event)	
Error	Red,	CRC error (temporary flickering)	
LED	blinking		
	Red, ON	Station Number or Baud rate has changed since startup	
		(flashing)	

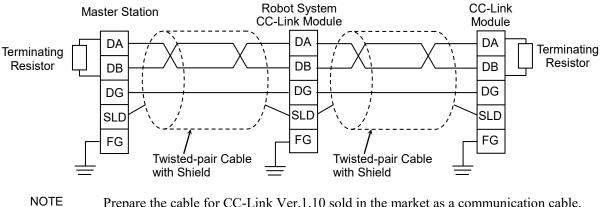
Wiring

The CC-Link connector is a 5-pin open connector. Use the connector attached to the module 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 slave module as follows.





Prepare the cable for CC-Link Ver.1.10 sold in the market as a communication cable. Install terminating resistors at both ends of the network.

Use the terminating resistors 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 ends via "FG".

Installing Module

how



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

Install the module to the dedicated slot on the T/VT series Manipulator.

Reference: Manipulator manual Setup & Operation 17. Fieldbus I/O

Confirmation of EPSON RC+ 7.0

When the CC-Link slave module is installed to the T/VT series Manipulator, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the CC-Link board using the following procedure.

(1) Select [Setup]-[System Configuration] and display the [System Configuration] dialog

System Configuration - Startup - SPEL Controller Board - Drive Units	- Inputs / Outputs				Close
Robots Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
Remote Control	Extended Board 1	Yes	64 - 95	64 - 95	Tiestore
T	Extended Board 2	No			
	Extended Board 3	No			
- Conveyor Encoders	Extended Board 4	No			
Security	Fieldbus Slave	Yes	512 - 767 🗸	7 2 · 767	
	Fieldbus Master	No			
				(3)	

- (2) Select [Inputs / Outputs].
- (3) Confirm that the following items are displayed in "Fieldbus Slave".
 - Installed : Yes Inputs : 512-767 (default setting) Outputs : 512-767 (default setting)
- (4) Select [Fieldbus Slave]-[General].

- Field	lbus I/O Slave			
Startup				Close
🖻 Controller				L
-Configuration -Preferences	Fieldbus Type:	CC-Link		Apply
–Simulator ⊕ Drive Units	Station Number:	1 💌		<u>R</u> estore
Robots Inputs / Outputs	Baud Rate:	156 Kbps 🔻		
Fieldbus Slave	Input Bytes:	32 🔹	7	
Remote Control	Output Bytes:	32 -	\sum	
TCP/IP Security (4)		v	\sim	
E Security (4)		(5)	
-				

- (5) Set each item to the specific value to connect the CC-Link network. For information about the setting values, contact your network administrator.
- (6) Click <Close>.

Editing of Input / Output Size

You can change the input/output size of the CC-Link slave module if necessary.

- (1) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- (2) Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

System Configuration		? 🗙
Startup Controller Controller Controller Configuration -Preferences -Simulator Robots Fieldbus Slave Corectal Resource Contro	Fieldbus I/O Slave Fieldbus Type: CC-Link Station Number: 1 • Baud Rate: 156 Kbps • Input Bytes: 32 • Output Bytes: 32 •	Close Close Apply Restore

(3) Change the settings of [Input Byte] and [Output Byte]. In this example, both of them are changed to "20" Bytes.

E System Configuration			-?
Startup Controller General Configuration Preferences Simulator Robots Robots Fieldbus Slave General Resca2 TOP / IP Security Vision	Fieldbus I/O Slave Fieldbus Type: Station Number: Baud Rate: Input Bytes: Output Bytes:	CC-Link 1 • 156 Kbps • 20 • 20 •	Close Apply Restore

- (4) Click < Apply>.
- (5) Click <Close> and the following dialog box appears. T/VT series Manipulator (Controller) automatically starts rebooting.

EPOON NOT 7.0
Rebooting Controller
Close

(6) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🛛
Startup SPEL Controller Board Drive Units Rebots M(7)	- Inputs / Outputs				Close
🗐 Inputs / Outputs	Туре	Installed	Inputs	Outputs	
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
General	Extended Board 1	Yes	64 - 95	64 - 95	
Remote Control	Extended Board 2	No			
. BS232	Extended Board 3	No			(8)
± TCP / IP	Extended Board 4	No			$M^{(8)}$
- Conveyor Encoders	Fieldbus Slave	Yes	512 - 671	512 - 671	\triangleleft
💼 Security	Fieldbus Master	No			
⊕- Vision					

- (7) Select [Inputs / Outputs].
- (8) Confirm that the following items are displayed in "Fieldbus slave". Inputs : 512 - (512 + Changed number of input (Bits) Outputs: 512 - (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs.

Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

(9) Click <Close>.

Operations

When the CC-Link is installed, some operation differs from the other Fieldbus I/O options. This section describes about these differences.

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.

 $n = (Station - 1) \times 2$

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 \rightarrow RX00 to RX5F			
Remote Output	RYn0 to RY(n+5)F \rightarrow RY00 to RY5F			
When CC-Link board station is 4				
Remote Input	RXn0 to RX(n+5)F \rightarrow RX60 to RXAF			
Remote Output	RYn0 to RY($n+5$)F \rightarrow RY60 to RYAF			

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

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

Address	Signal Name		Robot System Bit No
RXn0	Ready	*1	512
RXn1	Running	*1	513
RXn2	Paused	*1	514
RXn3	Error	*1	515
RXn4	EStopOn	*1	516
RXn5	SafeguardOn	*1	517
RXn6	SError	*1	518
RXn7	Warning	*1	519
RXn8	MotorsOn	*1	520
RXn9	AtHome	*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
$\frac{RX(n+1)0}{RX(n+1)1}$	ErrorCode4	*1	529
$\frac{XX(n+1)1}{RX(n+1)2}$	ErrorCode8	*1	530
$\frac{RX(n+1)2}{RX(n+1)3}$	ErrorCode16	*1	531
· · · · ·	ErrorCode32	*1	532
$\frac{RX(n+1)4}{PX(n+1)5}$	ErrorCode64	*1	533
$\frac{RX(n+1)5}{PX(n+1)6}$		*1	
$\frac{RX(n+1)6}{RX(n+1)7}$	ErrorCode128		534
$\frac{RX(n+1)7}{RX(n+1)9}$	ErrorCode256	*1	535
$\frac{RX(n+1)8}{RX(n+1)8}$	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	CmdRunning	*1	541
RX(n+1)E	CmdError	*1	542
RX(n+1)F	NA		543
RX(n+2)0	NA		544
$\frac{1}{RX(n+4)F}$: NA		591
RX(n+5)0	NA		592
RX(n+5)1	NA		593
RX(n+5)2	NA		594
$\frac{RX(n+5)2}{RX(n+5)3}$	NA		595
RX(n+5)	NA		596
RX(n+5)5	NA		597
$\frac{RX(n+5)5}{RX(n+5)6}$	NA		598
$\frac{RX(n+5)0}{RX(n+5)7}$	NA		599
$\frac{RX(n+5)}{RX(n+5)8}$	NA		600
$\frac{RX(n+5)8}{RX(n+5)9}$	NA		601
$\frac{KX(n+3)9}{RX(n+5)A}$	NA		602
		*2	602
$\frac{RX(n+5)B}{PX(n+5)C}$	Remote Ready	••2	
$\frac{RX(n+5)C}{PX(n+5)D}$	NA		604
$\frac{RX(n+5)D}{DX(n+5)D}$	NA		605
$\frac{RX(n+5)E}{RX(n+5)E}$	NA		606
RX(n+5)F	NA		607

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

- *1: Remote control inputs and outputs are not allocated to fieldbus slave I/O by default. To allot remote control input and output to fieldbus slave I/O, refer to *3.5 Setting Remote Control Input and Output* later in this manual.
- *2: When initialization of the CC-Link module is completed at the Robot system turn-on, Remote Ready flag [RX(n+5)B] turns ON.

I/O assignment of Remote Ready cannot be changed or disabled (NA).

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

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

Address	Signal Name		Robot System Bit No
RYn0	Start	*1	512
RYn1	SelProg1	*1	513
RYn2	SelProg2	*1	514
RYn3	SelProg4	*1	515
RYn4	Stop	*1	516
RYn5	Pause	*1	517
RYn6	Continue	*1	518
RYn7	Reset	*1	519
RYn8	SetMotorsOn	*1	520
RYn9	SetMotorsOff	*1	521
RYnA	Home	*1	522
RYnB	Shutdown	*1	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	NA		592
RY(n+5)1	NA		593
RY(n+5)2	NA		594
RY(n+5)3	NA		595
RY(n+5)4	NA		596
RY(n+5)5	NA		597
RY(n+5)6	NA		598
RY(n+5)7	NA		599
RY(n+5)8	NA		600
RY(n+5)9	NA		601
RY(n+5)A	NA		602
RY(n+5)B	NA		603
RY(n+5)C	NA		604
RY(n+5)D	NA		605
RY(n+5)E	NA		606
RY(n+5)F	NA		607

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

*1: Remote control inputs and outputs are not allocated to fieldbus slave I/O by default. To allot remote control input and output to fieldbus slave I/O, refer to *3.5 Setting Remote Control Input and Output* later in this manual.

Remote Register

Remote register (RWr, RWw) is numeric value

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

 $m = (Station - 1) \times 4$

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	RWrm to RWrm+B \rightarrow RWr0 to RWrB		
Remote Register	RWwm to RWwm+B \rightarrow RWw0 to RWwB		
When the CC-Link board is 4			
Remote Register	RWrm to RWrm+B \rightarrow RWrC to RWr17		
Remote Register	RWwm to RWwm+B \rightarrow RWwC to RWw17		

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

Signal direction: Remote device station (CC-Link module) \rightarrow Master station (PLC)

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

Address	Signal Name	Robot System Word No.	Robot System Bit No.
RWrm	NA	38	608 to 623
:	:		
RWrm+9	NA	47	752 to 767
RWrm+A	System reserved	-	-
RWrm+B	System reserved	-	-

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

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

Address	Signal Name	Robot System Word No.	Robot System Bit No.
RWwm	NA	38	608 to 623
:	•		
RWwm+9	NA	47	752 to 767
RWwm+A	System reserved	-	-
RWwm+B	System reserved	-	-

Input / Output Size (x)	Occupied Stations	Remote I/O (Bytes)	Remote Register (Bytes)
0 < x = < 4	1	S	0
4 < x = < 12	1	4	x – 4
12 < x = < 24	2	8	x – 8
24 < x = <36	3	12	x - 12
36 < x = <48	4	16	x – 16

The number of stations, remote I/O range, and remote register range depend on the input / output size.

The number of occupied stations is the ones on the CC-Link network. Set this number to the master station.

Remote I/O is the information of ON/OFF.

Remote I/O data is in bit data and the FROM/TO command are executed in units of 16 bits. Remote register is in numeric data.

Electronic Information File (CSP File, CSP+ File)

CSP file, CSP+ file are supplied for the CC-Link slave board network configuration. The file is located in the following folder in where EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\CCLink

CSPfile

According to the input/output size, the CSP file you use differs. See the table below and select the CSP file.

Input / Output Size (x)	Occupied stations	Electronic file name
0 < x = < 12	1	EPSN0500_1.csp
12 < x = < 24	2	EPSN0500_2.csp
24 < x = <36	3	EPSN0500_3.csp
36 < x = <48	4	EPSN0500_4.csp

CSP+file

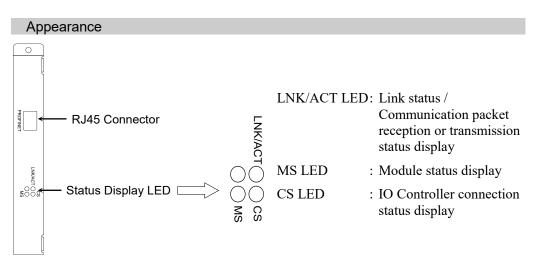
0x0353_EPSON T Series_1_en.cspp

2.5 PROFINET

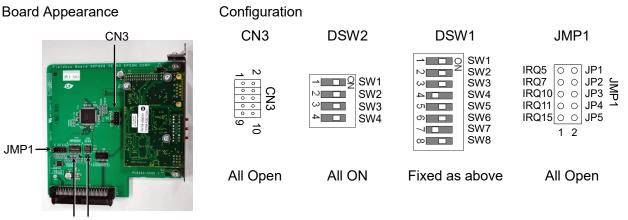


Make sure that the power is turned OFF before installing/removing any boards or connecting/disconnecting any cables. Installing/removing any boards or connecting/disconnecting any cables with the power ON is extremely hazardous and may result in electric shock and/or malfunction of equipment.

2.5.1 Installing PROFINET Slave Board



The Fieldbus slave board is configured as follows at shipment.



DSW1 DSW2

Specifications

Item	Specification
Name	PROFINET board
Connection Method	RT (Real-Time)
Protocol	PROFINET IO
Device type	IO device
Baud Rates (bps)	100 M bps, full duplex
Maximum segment length	100 m
Cable	RJ45 with connector 100BASE-TX (Cat5)
Cycle time	2 msec
Interface	RJ45 port \times 1
Input Data Size	Max. 2048 bits (256 bytes)
Output Data Size	Max. 2048 bits (256 bytes)

LED Description

LED state represents the states of the fieldbus board.

	LED state MS		MS	CS	LNK/ACT
	OFF		Power OFF or Device is being initialized	Offline	No link or Power OFF
	ON		Normal operation	Offline IO Controller is in RUN	Linking
GRN	I	Blinking	-	-	Receiving/transmitting communication packet
	Blinking once		Evaluating	Offline / IO Controller is in STOP	-
RED	Blinking	Blinking once	 Structure Error Too many (Sub) Modules I/O size set by IO Controller is too large. Structure mismatched (No module, wrong module) 	-	-
	<u>a</u> d	Blinking 3 times	No station name has been set or No IP address has been set	-	-
		Blinking 4 times	Internal error	-	-

Setting Configure Switch

The PROFINET board requires no configurations.

All the PROFINET communication configurations are set by the development software (EPSON RC+ 7.0).

Wiring

PROFINET connector is RJ45 connector. Use 100BASE-TX (STP type) cable.

Be sure to use cables and connectors 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.

Installing a Board



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

Install the board to the dedicated slot on the Robot Controller.

Reference manuals:

Robot Controller RC700: *Maintenance 7.10 Option Board* Robot Controller RC90/90-B: *Maintenance 7.9 Option Board*

Confirmation with EPSON RC+ 7.0

When PROFINET slave board is installed in the Controller, it is recognized automatically. Confirm that EPSON RC+ 7.0 has recognized the board in the following procedure.

1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

Startup SPEL Controller Board Drive Units	- Inputs / Outputs				Close
Robots Inputs / Outputs	(2) Type	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
Remote Control	Extended Board 1	Yes	64 - 95	64 · 95	<u>Pestole</u>
■ BS232	Extended Board 2	No			
TCP / IP	Extended Board 3	No			
- Conveyor Encoders	Extended Board 4	No			1
Security	Fieldbus Slave	Yes	512 - 767	512 - 767	(3)
🗄 Vision	Fieldbus Master	No			

- 2. Select [Inputs / Outputs].
- 3. Confirm that following items are displayed in "Fieldbus Slave".

Installed	: Yes
Inputs	: 512-767 (default setting)
Outputs	: 512-767 (default setting)

4. Click [Fieldbus Slave]-[General].

5. Confirm that following items are displayed.

Fieldbus Type	: PROFINET IO
Input Byte	: 32 (default setting)
Output Byte	: 32 (default setting)

6. Click <Close>.

Editing of Input / Output Size and DAP Mode

You can change the input/output size of the PROFINET slave board if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

📟 System Configuration			? 🔀
Startup SPEL Controller Board Drive Units Robots Inputs / Outputs Fieldbus Slave General Remote Control RS232 TOP / IP Conveyor Encoders Security Vision	Fieldbus I/O Slave Fieldbus Type: MAC Address: Station Type: Input Bytes: Output Bytes: DAP Mode:	PROFINET IO 00-30-11-05-52-E0 RC620-PROFINET-IO 32 V 32 V Ver 2 V	Close Apply Restore

- 3. Change the settings of [Input Byte] and [Output Byte].
 - In this example, both of them are changed to 20 Bytes.

System Configuration			? 🔀
Startup SPEL Controller Board Drive Units Robots Inputs / Outputs Fieldbus Slave General Remote Control RS232 TOP / JP Conveyor Encoders Security Vision	Fieldbus I/O Slave Fieldbus Type: MAC Address: Station Type: Input Bytes: Output Bytes: DAP Mode:	PROFINET IO 00-30-11-05-52-E0 RC620-PROFINET-IO 20 20 Ver 2 Ver 2	Close Apply Restore

- 4. Change the setting of [DAP mode] if necessary.
- Set [DAP mode] according to the PROFINET IO Controller that you want to use. Usually, select DAP Ver.2. DAP Ver.1 is available for the obsolete PROFINET IO Controller.



The PROFINET option does not have the alert function that is an optional function in DAP Ver.2.

- 6. Click <Apply>.
- Click <Close> and the following dialog box appears. The Robot Controller automatically starts rebooting.
 EPSON RC+ 7.0

EPSON RC+ 7.0
Rebooting Controller
Close

8. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

📟 System Configuration					? 🛛
 Startup SPEL Controller Board Drive Units 	-Inputs / Outputs				Close
i - Robots i - Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
E Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Destaur
General ⊕-Remote Control	Drive Unit 1	No			Restore
RS232	Extended Board 1	No			
TOP / IP	Extended Board 2	No			
- Conveyor Encoders	Extended Board 3	No			
i Security i Vision	Extended Board 4	No			
± Vision	Drive Unit 2	No			
	Fieldbus Slave	Yes	512 - 671	512 - 671	
	Fieldbus Master	No			

- 9. Select [Inputs / Outputs].
- 10. Confirm that the following items are displayed in "Fieldbus slave".

Inputs : 512 – (512 + Changed number of input (Bits)) Outputs : 512 – (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs. Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

```
11. Click <Close>.
```



When setting this option to the PROFINET IO Controller (Master), configure as below.
The Robot Controller includes 16 pseudo I/O slots. In these slots, add 1 to 32 bytes input modules, output modules.
Make sure to add the output modules first, and then, add the input modules.
<Example> Input: 40 bytes / Output: 48bytes (set in the RC+ window)
Slot 1 : 32 bytes output module
Slot 2 : 16 bytes output module
(Set 48 bytes in total for the Output.)
Slot 3 :32 bytes input module
Slot 4 : 8 bytes input module

(Set 40 bytes in total for the Input.)

Electronic Information File (GSDML file)

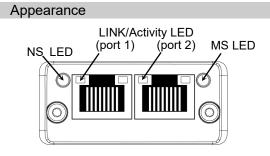
A GSDML file is provided for the PROFINET slave board network configuration. The file is located in the following folder where EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\PROFINET

2.5.2 Installing PROFINET Slave Module

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

^	Pay attention to the followings in order to prevent the the connecter from coming off.
	 Use the connectors attached to the module. Insert the connectors all the way seated. Fix the cables at proper positions in order not to put a load on the connectors.



Specifications

WARNING

Item	Specification
Name	PROFINET Slave Module
Connection Method	RT (Real-Time)
Protocol	PROFINET IO
Device type	IO device
Baud Rates (bps)	100 M bps, full duplex
Maximum segment length	100 m
Cable	RJ45 with connector 100BASE-TX (Cat5)
Cycle time	2 ms
Interface	RJ45 port \times 1
Input Data Size	Max. 2048 bits (256 bytes)
Output Data Size	Max. 2048 bits (256 bytes)

LED Description

LED state represents the states of the fieldbus module.

NS: Network Status LED

LED State	Description	Comments
OFF	Offline	No power
		No connection with IO Controller
Green	Online (RUN)	Connection with IO Controller established
		IO Controller in RUN state
Green, 1 flash	Online (STOP)	Connection with IO Controller established
		IO Controller in STOP state or IO data bad
		IRT synchronization not finished
Green, blinking	Blink	Used by engineering tools to identify the
		node on the network
Red	Fatal event	Major internal error (this indication is
		combined with a red module status LED)
Red, 1 flash	Station Name error	Station Name not set
Red, 2 flashes	IP address error	IP address not set
Red, 3 flashes	Configuration error	Expected Identification differs from Real
		Identification

MS: Module Status LED

LED State	Description	Comments
OFF	Not Initialized	No power OR Module in SETUP or
		NW_INIT state.
Green	Normal Operation	Module has shifted from the NW_INIT
		state.
Green, 1 flash	Diagnostic Event(s)	Diagnostic event(s) present
Red	Exception error	Device in state EXCEPTION.
	Fatal event	Major internal error (this indication is
		combined with a red net- work status
		LED)
Alternating Red/	Firmware update	Do NOT power off the module. Turning
Greed		the module off during this phase could
		cause permanent damage.

LINK/Activity LED

LED State	Description	Comments
OFF	No Link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green, flickering	Activity	Ethernet link established, communication present

Setting Configure Switch

The PROFINET module requires no configurations.

All the PROFINET communication configurations are set by the development software (EPSON RC+ 7.0).

Wiring

PROFINET connector is RJ45 connector. Use 100BASE-TX (STP type) cable.



Be sure to use cables and connectors 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.

Installing Module

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

Install the module to the dedicated slot on the T/VT series Manipulator.

Reference: Manipulator manual Setup & Operation 17. Fieldbus I/O

Confirmation with EPSON RC+ 7.0

When PROFINET slave module is installed in the T/VT series Manipulator, it is recognized automatically.

Confirm that EPSON RC+ 7.0 has recognized the module in the following procedure.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs].

System Configuration						? 🔀
	- Inpu	uts / Outputs				Close
	(2)	Туре	Installed	Inputs	Outputs	Apply
		andard	Yes	0 - 23	0 - 15	Restore
Remote Control	Ex	tended Board 1	Yes	64 - 95	64 - 95	
	Ex	tended Board 2	No			
TCP / IP	Ex	tended Board 3	No			
- Conveyor Encoders	Extended Board 4 No				1	
. Security	Fie	eldbus Slave	Yes	512 - 767	512 - 767	(3)
🗄 - Vision	Fie	eldbus Master	No			

3. Confirm that following items are displayed in "Fieldbus Slave".

Installed	: Yes
Inputs	: 512-767 (default setting)
Outputs	: 512-767 (default setting)

4. Click [Fieldbus Slave].

Fieldbus I/O Slave	System Configuration				? ×
Controller General Configuration Preferences Brobots	Startup General Controller General Configuration Preferences Simulator Brive Units Robots Fieldbus Slave Remote Control R5282 ⊕ TOP / IP Security	Fieldbus Type: MAC Address: Station Type: Input Bytes: Output Bytes:	00-30-11-17-C3-6C TSERIES-PROFINET-IO 32 32	Restore	

5. Confirm that following items are displayed.

Fieldbus Type	: PROFINET IO
Input Byte	: 32 (default setting)
Output Byte	: 32 (default setting)

6. Click <Close>.

2 1

Editing of Input / Output Size and DAP Mode

You can change the input/output size of the PROFINET slave module if necessary.

- 1. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 2. Select [Inputs / Outputs]-[Fieldbus Slave].

and dystelli Outrigulation			<u></u>
€-Startup	Fieldbus I/O Slave		Close
⊟ Controller			Close
General Configuration			
Preferences	Fieldbus Type:	PROFINET IO	Apply
Simulator			
i Drive Units i Robots	MAC Address:	00-30-11-17-C3-6C	Restore
-Inputs / Outputs	Station Type:	TSERIES-PROFINET-IO	
😥 Fieldbus Master	L. I.D.I.	32 🔻	
	Input Bytes:	32 💌	
	Output Bytes:	32 💌	
TCP / IP			
i Security i Vision	DAP Mode:	Ver .2 💌	

3. Change the settings of [Input Byte] and [Output Byte].

System Configuration		? ×
Startup Controller General Configuration Freferences Simulator Drive Units Foldbus Master Fieldbus Slave Freidbus Slave Freid	Fieldbus I/O Slave Fieldbus Type: PROFINET IO MAC Address: 00-30-11-17-C3-6C Station Type: TSERIES-PROFINET-IO Input Bytes: 32 Output Bytes: 32 DAP Mode: Ver 2	Close Apply Restore

- 4. Change the setting of [DAP mode] if necessary.
- 5. Set [DAP mode] according to the PROFINET IO Controller that you want to use. Usually, select DAP Ver.2. DAP Ver.1 is available for the obsolete PROFINET IO Controller.



- The PROFINET option does not have the alert function that is an optional function in DAP Ver.2.
- 6. Click <Apply>.
- 7. Click <Close> and the following dialog box appears.

T/VT series Manipulator (Controller) automatically starts rebooting.

Rebooting Controller
Close

- 8. Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- 9. Select [Inputs / Outputs].

∎-Startup ∎-SPEL Controller Board ∎-Drive Units ∎-Robots	Inputs / Outputs				Close
🚊 Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Pastava
General Remote Control	Drive Unit 1	No			Restore
a RS232	Extended Board 1	No			
🛓 TOP / IP	Extended Board 2	No			
Conveyor Encoders	Extended Board 3	No			
i∎ Security i∎ Vision	Extended Board 4	No			
	Drive Unit 2	No			
	Fieldbus Slave	Yes	512 - 671	512 - 671	
	Fieldbus Master	No			

10. Confirm that the following items are displayed in "Fieldbus slave".

Inputs : 512 – (512 + Changed number of input (Bits)) Outputs : 512 – (512 + Changed number of output (Bits))

In this example, Input byte is 20 bytes (160 bits) and 512-671 is displayed in Inputs. Also, Output byte is 20 bytes (160 bits) and 512-671 is displayed in Outputs.

11. Click <Close>.

NOTE

When setting this option to the PROFINET IO Controller (Master), configure as below. The Robot Controller includes 16 pseudo I/O slots. In these slots, add 1 to 32 bytes input modules, output modules. Make sure to add the output modules first, and then, add the input modules.

<Example> Input: 40 bytes / Output: 48bytes (set in the RC+ window)

- Slot 1 : 32 bytes output module
- Slot 2 : 16 bytes output module (Set 48 bytes in total for the Output.)
- Slot 3 :32 bytes input module
- Slot 4 : 8 bytes input module

(Set 40 bytes in total for the Input.)

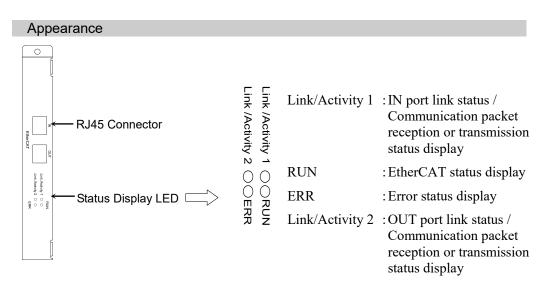
Electronic Information File (GSDML file)

A GSDML file is provided for the PROFINET slave module network configuration. The file is located in the following folder where EPSON RC+ 7.0 is installed.

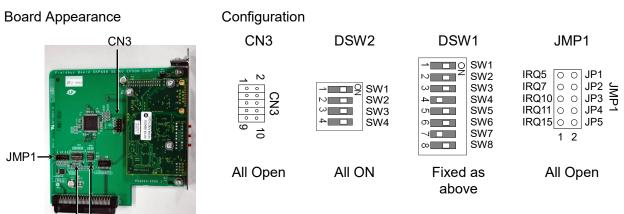
\EpsonRC70\Fieldbus\PROFINET

2.6 EtherCAT

2.6.1 Installing EtherCAT Slave Board



The Fieldbus slave board is configured as follows at shipment



-	•
DSW1	DSW2

Specifications	
Item	Specification
Name	EtherCAT board
Protocol	EtherCAT
Transmission Type	100BASE-TX
Baud Rate	100 M bps, full duplex
Maximum Segment Length	100m
Maximum Number of Nodes	65535
Cable	100BASE-TX(Cat5) with RJ45 connector
Interface	Two RJ45 ports IN: EtherCAT input / OUT: EtherCAT Output
Input Data Size	Max. 2048 bits (256 bytes)
Output Data Size	Max. 2048 bits (256 bytes)
Device Profile	CANopen over EtherCAT (CoE) PDO (Process Data Object) SDO (Service Data Object)

Specifications

LED Description

L	ED state	Link/Activity 1	RUN	ERR	Link/Activity 2
OFF		No IN port link	Initialized status	No error	No OUT port link
	ON	IN port linking	Operational status	-	OUT port linking
GRN	Blinking (Flickering)	IN port communication packet transmission and receiving	-	_	OUT port communication packet transmission and receiving
	Blinking (Blinking)	_	Preoperational status	_	_
	Blinking (Single flash)	_	Safe operational status	_	_
	ON	_	_	Critical error	_
RED	Blinking (Blinking)	_	_	EtherCAT communication configuration error	_
	Blinking (Single flash)	_	_	Communication synchronization	-
	Blinking (Double flash)	_	_	Watchdog error	-

LED state represents the states of the fieldbus board.

LED's blinking patterns are as follows:

Flickering	: Repeats lighting on and off every 50 ms.
Blinking	: Repeats lighting on and off every 200 ms.
Single flash	: Repeats 200 ms of lighting on and 1000 ms c of lighting off.
Double flash	: Repeats a cycle of 200 ms of lighting on, 200 ms of lighting off 200 ms of lighting on and 1000 ms of lighting off.

Setting Configure Switch

Configuration of an EtherCAT board is not necessary. All settings such as communication configuration for EtherCAT are done by EPSON RC+ 7.0.

Wiring

Wiring of an EtherCAT slave board uses RJ45 connectors. Make sure to use STP-type 100BASE-TX cables.



For cables and connectors, be sure to use a product complying with the industrial standards or a noise-resistant Ethernet cable (STP cable). If you use office use products or UTP cables, it may cause communication errors and may not offer the proper performance.

Installing a Board



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

Install the board to the dedicated slot on the Robot Controller.

Reference manuals: Robot Controller RC700: *Maintenance 7.10 Option Board*

Robot Controller RC90/90-B: Maintenance 7.9 Option Board

Confirmation with EPSON RC+ 7.0

When an EtherCAT slave board is installed to the Controller, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the EtherCAT board using the following procedure.

(1) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					? 🔀
 ■ Startup ■ SPEL Controller Board ■ Drive Units 	Inputs / Outputs				Close
Robots Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
E Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
General	Extended Board 1	Yes	64 - 95	64 - 95	Testole
⊞ Remote Control (2)	Extended Board 2	No			
	Extended Board 3	No			
😟 TCP / IP	Extended Board 4	No			
- Conveyor Encoders	Fieldbus Slave	Yes	512 - 767	512 - 767	
i Security	Fieldbus Master	No	57		
B Vision			h	(3)	

- (2) Select [Inputs / Outputs].
- (3) Confirm that the following items are displayed in "Fieldbus Slave".

Installed: YesInputs: 512-767 (default setting)Outputs: 512-767 (default setting)

(4) Select [Fieldbus Slave]-[General]

⊕-Startup ⊜-Controller General	Fieldbus I	/O Slave		Close
General General	⊐ (4)	Fieldbus Type: Input Bytes: Output Bytes:	EtherCAT	Apply Restore

(5) Confirm that the following items are displayed.

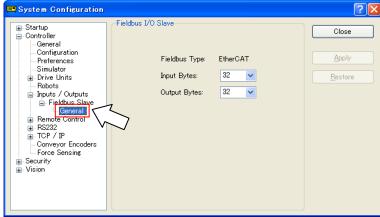
Fieldbus Type	: EtherCAT
Input Bytes	: 32 (default setting)
Output Bytes	: 32 (default setting)

(6) Click <Close>.

Editing of Input / Output Size

You can change the input/output size of the EtherCAT slave board if necessary.

- (1) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- (2) Select [Inputs / Outputs]-[Fieldbus Slave]-[General].



(3) Change the settings of [Input Bytes] and [Output Bytes]. In this example, both of them are changed to 20 Bytes.

📟 System Configuration		? 🔀
Startup General Controller General Configuration Preferences Simulator Drive Units Robots Fieldbus Slave General Remote Control RS232 TCP / IP Conveyor Encoders Force Sensing Security General Users Groups Vision	Fieldbus I/O Slave Fieldbus Type: EtherCAT Input Bytes: 20 v Output Bytes: 20 v	Close Apply Restore

NOTE

Cautions when connecting OMRON PLC and this option:

The input/output size has limitations.

Select any of 32 bytes, 64 bytes, 128 bytes, or 256 bytes for both [Input Bytes] and [Output Bytes].

[Input Bytes] and [Output Bytes] may have a different size.

(4) Click < Apply>.

(5) Click <Close> and the following dialog box appears. The Robot Controller automatically starts rebooting.

EPSON F	C+ 7.0	
	Rebooting Controller	
	Close	

(6) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

■ Startup ■ SPEL Controller Board ■ Drive Units	Inputs / Outputs				Close
i∎- Robots ⊟- Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
General	Extended Board 1	Yes	64 - 95	64 - 95	Tiestole
Remote Control	Extended Board 2	No			
B RS232	Extended Board 3	No			
TCP / IP	Extended Board 4	No			
Conveyor Encoders	Fieldbus Slave	Yes	512 - 671	512 - 671	
Security	Fieldbus Master	No			
∎ Vision					

- (7) Select [Inputs / Outputs].
- (8) Confirm that the following items are displayed in "Fieldbus Slave".

Inputs: 512 - 512 + Changed number of input (Bits)Outputs: 512 - 512 + Changed number of output (Bits)

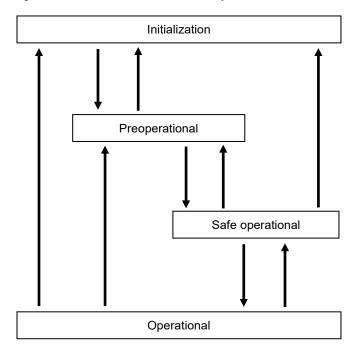
In this example, Input byte is 20 bytes (160 bits) and "512-671" is displayed in "Inputs".

Also, Output byte is 20 bytes (160 bits) and "512-671" is displayed in "Outputs".

(9) Click <Close>.

Communication State Transition

The EtherCAT slave board goes into initialized state after the power is turned ON. Subsequent state transition is controlled by the EtherCAT master.



State	Description	
Initialization	Status after turning ON the power. Initialization state is continued by the EtherCAT until preoperational state.	
Preoperational	Set by the EtherCAT master. SDO (Service Data Object) communication is only available in this state.	
Safe operational	Set by the EtherCAT master. PDO (Process Data Object) transmission, along with SDO (Service Data Object) communication is available in this state.	
Operational	Set by the EtherCAT master. All communications are available in this state. Control of I/O data with the EtherCAT master is possible.	

Electronic Information File (ESI file)

An ESI (EtherCAT Slave Information) file is supplied for EtherCAT slave board network configuration. The file is located in the following folder where EPSON RC+ 7.0 is installed.

\EpsonRC70\Fieldbus\EtherCAT EPSN_RC90_ECT_V2.3.xml EPSN_RC700_ECT_V2.3.xml

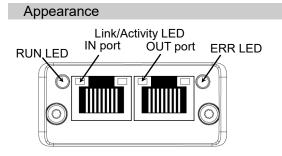
When "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte/256byte)" When "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL32byte When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte When "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128t When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128t When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte/256byte)" or "TxF Example: When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows:				
Use the following ESI files specialized for the OMRON's PL \EpsonRC70\Fieldbus\EtherCAT EPSN_RC90_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EVENT ''S20' bytes is set for [Input Bytes], select ''RxPDO(USINT128byte)'' or ''RxPDO(REAL128byte)''S64'' bytes is set for [Output Bytes], select ''TxPDO(USINT128byte)'' or ''TxPDO(REAL24byt When ''64'' bytes is set for [Output Bytes], select ''TxPDO(USINT128byte)'' or ''TxPDO(REAL128byte)'' or ''TxPDO(REAL128byte)''' or ''TxPDO(REAL128byte)''' or ''TxPDO(REAL128b				
EPSN_RC90_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt EPSN_RC700_ECT_V2.3_for_OMRON_rev2.xt On the OMRON's setting tool (Sysmac Studio), set as follow input/output size set for this option and the data type (USINT USINT : Unsigned integer (1 byte) REAL : Floating point (4 bytes) When "32" bytes is set for [Input Bytes], select "RxPDO(USINT32byte)" or "RxPDO(REAL32byte) When "64" bytes is set for [Input Bytes], select "RxPDO(USINT164byte)" or "RxPDO(REAL64byte) When "128" bytes is set for [Input Bytes], select "RxPDO(USINT128byte)" or "RxPDO(REAL128f When "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte)" or "TxPDO(REAL32byte)" When "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL32byte) When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL32byte) When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte) When "128" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128f When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128f When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128f When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128f When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128f When [Input] is "256" bytes and [Output] is "256" bytes on the OMRON's setting tool (Sysmac Studio) are as follows: Very Provide Setting Tool (Sysmac Studio) are as follows:	C.			
EPSN_RC700_ECT_V2.3_for_OMRON_rev2.3 On the OMRON's setting tool (Sysmac Studio), set as follow input/output size set for this option and the data type (USINT USINT : Unsigned integer (1 byte) REAL : Floating point (4 bytes) When "32" bytes is set for [Input Bytes], select "RxPDO(USINT32byte)" or "RxPDO(REAL32byte)" When "64" bytes is set for [Input Bytes], select "RxPDO(USINT64byte)" or "RxPDO(REAL64byte) When "128" bytes is set for [Input Bytes], select "RxPDO(USINT128byte)" or "RxPDO(REAL128byte)" When "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL32byte)" When "44" bytes is set for [Output Bytes], select TxPDO(USINT64byte)" or "TxPDO(REAL32byte)" When "42" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte)" When "64" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "128" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" or "TxPDO(REAL128byte)" When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)?56byte)" or "TxPDO(REAL128byte)" When [Input] is "256" bytes and [Output] is "256" bytes on the OMRON's setting tool (Sysmac Studio) are as follows: Very Provide Definition Very Provide Definition 				
On the OMRON's setting tool (Sysmac Studio), set as follow input/output size set for this option and the data type (USINT USINT : Unsigned integer (1 byte) REAL : Floating point (4 bytes) When "32" bytes is set for [Input Bytes], select "RxPDO(USINT32byte)" or "RxPDO(REAL32byte)" When "64" bytes is set for [Input Bytes], select "RxPDO(USINT64byte)" or "RxPDO(REAL64byte) When "128" bytes is set for [Input Bytes], select "RxPDO(USINT128byte)" or "RxPDO(REAL128byte)" When "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL32byte)" When "44" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL32byte)" When "64" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "64" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "56" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)" or "TxPDO(REAL128byte)" When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)256byte)" or "TxFE Example: When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows: Vertice of the Setting Tool (Sysmac Studio) are as follows: Vertice of the Setting Tool (Sysmac Studio) are as follows: Vertice of the Setting Tool (Sysmac Studio) are as follows: Vertice of the Setting Tool (Sysmac Studio) are as follows: Vertice of the Set Traped Set (Stape Se	าไ			
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select "RxPDO(USINT32byte)" or "RxPDO(REAL32byte)" when "64" bytes is set for [Input Bytes], select "RxPDO(USINT64byte)" or "RxPDO(REAL64byte)" when "128" bytes is set for [Input Bytes], select "RxPDO(USINT128byte)" or "RxPDO(REAL1281) when "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte)" or "TxPDO(REAL32byte)" when "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL64byte)" when "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte)" when "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte)" when "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)256byte)" or "TxPDO(REAL1281] when "256" bytes is set for [Output] is "256" bytes on the OMRON's setting tool (Sysmac Studio) are as follows:				
select "RxPDO(USINT64byte)" or "RxPDO(REAL64byt When "128" bytes is set for [Input Bytes], select "RxPDO(USINT128byte)" or "RxPDO(REAL128 When "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte/256byte)" When "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL32byt When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byt When "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128 When "256" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128 When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128 When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128 When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows: Total tool Map Setting Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048	rte)"			
select "RxPDO(USINT64byte)" or "RxPDO(REAL64byt When "128" bytes is set for [Input Bytes], select "RxPDO(USINT128byte)" or "RxPDO(REAL128 When "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte/256byte)" When "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL32byt When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byt When "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128 When "256" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128 When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128 When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128 When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows: Total tool Map Setting Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048 [bt] Too Map Troub State: Input 2048 [bt] / 2048	,			
select "RxPDO(USINT128byte)" or "RxPDO(REAL128b When "256" bytes is set for [Input Bytes], select two of "RxPDO(USINT128byte/256byte)" When "32" bytes is set for [Output Bytes], select "TxPDO(USINT32byte)" or "TxPDO(REAL32byte When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte When "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128b When "256" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128b When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte/256byte)" or "TxF Example: When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows: Setting tool (Sysmac Studio) are as follows: Setector1ppt/Output Name Foroe(USINT64byte) is the USINT input Byte Output RefPO(USINT32byte) is bit USINT input Byte	e)"			
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select "TxPDO(USINT32byte)" or "TxPDO(REAL32byt When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byt When "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128t When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL128t When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte/256byte)" or "TxF Example: When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows:	select two of "RxPDO(USINT128byte/256byte)"			
When "64" bytes is set for [Output Bytes], select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte) When "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL1284 When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte)" or "TxPDO(REAL1284 When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte/256byte)" or "TxF Example: When [Input] is "256" bytes and [Output] is "256" bytes on to the OMRON's setting tool (Sysmac Studio) are as follows: Image: Image: When [Input] is "256" bytes and [Output] is "256" bytes on to the OMRON's setting tool (Sysmac Studio) are as follows: Image: I	When "32" bytes is set for [Output Bytes],			
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When "128" bytes is set for [Output Bytes], select "TxPDO(USINT128byte)" or "TxPDO(REAL128b When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte/256byte)" or "TxP Example:When [Input] is "256" bytes and [Output] is "256" bytes on the the OMRON's setting tool (Sysmac Studio) are as follows:Imput Steep 100 Map Process Data Size : Input 2048 [bt] / 2048 [bt] Output RxPDO(USINT128byte/256 + 100 Map Process Data Size : Input 2048 [bt] / 2048 [bt] Output RxPDO(USINT128byte/256 + 100 Map Process Data Size : Input 2048 [bt] / 2048 [bt] Output RxPDO(USINT128byte/256 + 100 Map Process Data Size : Input 2048 [bt] / 2048 [bt] Output RxPDO(USINT128byte/256 + 100 Map Process Data Size : Input 2048 [bt] / 2048 [bt] Output RxPDO(USINT128byte/256 + 100 Map Process Bitt USINT Input Byte Output RxPDO(USINT128byte/256 + 100 Map	When "64" bytes is set for [Output Bytes],			
select "TxPDO(USINT128byte)" or "TxPDO(REAL128H When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte/256byte)" or "TxP Example: When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows: Image: State Pool Map Process Data Size : Input 2048 [bit] / 2048 [bit] Output No option Pool Map Pool Map Pool Map Pool Map Pool output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output	select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte)"			
When "256" bytes is set for [Output Bytes], select two of "TxPDO(USINT128byte/256byte)" or "TxP Example: When [Input] is "256" bytes and [Output] is "256" bytes on t the OMRON's setting tool (Sysmac Studio) are as follows: <pre> Edit PDO Map Settings POO entries included in TxPDO(128byte/256</pre>				
select two of "TxPDO(USINT128byte/256byte)" or "TxF Example: When [Input] is "256" bytes and [Output] is "256" bytes on the OMRON's setting tool (Sysmac Studio) are as follows: SelectionInput/Output 2048 [bit] / 2048 [bit] PDO map Process Data Size : Input 2048 [bit] / 2048 [bit] PDO map Process Data Size : Input 2048 [bit] / 2048 [bit] SelectionInput/Output Name Flag Output RxPDO(USINT32byte) Output RxPDO(USINT128byte/256 Output RxPDO(USINT128byte/256 Output RxPDO(USINT128byte/256 Output RxPDO(USINT128byte/256 Output RxPDO(USINT128byte/256 Output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output RxPDO(USINT128byte) Output RxPDO(USINT128byte)	yte)"			
Example: When [Input] is "256" bytes and [Output] is "256" bytes on the OMRON's setting tool (Sysmac Studio) are as follows:	select two of "TxPDO(USINT128byte/256byte)" or "TxPDO(REAL256byte)" Example:			
When [Input] is "256" bytes and [Output] is "256" bytes on the OMRON's setting tool (Sysmac Studio) are as follows:				
the OMRON's setting tool (Sysmac Studio) are as follows: Edit PD0 Map PD0 entries included in TxPD0(128byte/256 Process Data Size : Input 2048 [bit] / 2048 [bit] PD0 entries included in TxPD0(128byte/256 Index Size Data type! PD0 entries SelectionIInput/Output Name Flag Output RxPD0(USINT 32byte) Flag Output RxPD0(USINT 128byte/256 Ox2001:00 8 [bit] Output RxPD0(USINT 128byte) Flag Ox2001:00 8 [bit] USINT Flag Output RxPD0(USINT 128byte)				
Edit PDO Map PDO entries included in TxPDO(128byte/256 PDO Map PDO entries included in TxPDO(128byte/256 Process Data Size : Input 2048 [bit] / 2048 [bit] Output 2048 [bit] / 2048 [bit] Index Size : Data type! PDO entry Selection!Input/Output! Name Flag! • • 0x0ption • • 0x2001:00 8 [bit] • • 0x2001:02 8 [bit] • • 0x2001:02 8 [bit] • • 0x2001:03 8 [bit] • • 0x2001:04 8 [bit] • • 0x2001:05 8 [bit] • • 0x2001:07 8 [bit] • • 0x2001:07 8 [bit] • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • <	nis option, settings on			
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Output RxPOO(USINT 128byte/25{ Ox2001:09 8 [bit] USINT Input Byte • No option 0x2001:00 8 [bit] USINT Input Byte • Input TXPDO(USINT 32byte) 0x2001:00 8 [bit] USINT Input Byte • Input TXPDO(USINT 64byte) 0x2001:00 8 [bit] USINT Input Byte • Input TXPDO(USINT 128byte) 0x2001:00 8 [bit] USINT Input Byte • Input TXPDO(USINT128byte) 0x2001:00 8 [bit] USINT Input Byte • Input TXPDO(USINT128byte) 0x2001:00 8 [bit] USINT Input Byte • Input TXPDO(USINT128byte) 0x2001:00 8 [bit] USINT Input Byte • Input TXPDO(USINT128byte) 0x2001:06 8 [bit] USINT Input Byte	0136			
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● Input TxPDO(USINT128byte) 0x2001:0E 8 [bit] USINT Input Byte ● Input TxPDO(USINT128byte/25t 0x2001:0F 8 [bit] USINT Input Byte	0140			
	0142			
● No option 0x2001:10 8 [bit] USINT Input Byte ● Input TXPDO(USINT 128byte/25€ 0x2001:11 8 [bit] USINT Input Byte ● Input TXPDO(USINT 128byte/25€ 0x2001:11 8 [bit] USINT Input Byte	0145			
Ox2001:12 8 fbit1 USINT Input Byte Move Up Move Dow Edit PDO Entry Add PDO Entry				
	Cancel Apply			

2. Installation

2.6.2 Installing EtherCAT Slave Module

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

Pay attention to the followings in order to prevent the the connecter from coming off.
 Use the connectors attached to the module. Insert the connectors all the way seated. Fix the cables at proper positions in order not to put a load on the connectors.



Specifications

Item	Specification
Name	EtherCAT module
Protocol	EtherCAT
Transmission Type	100BASE-TX
Baud Rate	100 M bps, full duplex
Maximum Segment Length	100m
Maximum Number of Nodes	65535
Cable	100BASE-TX(Cat5) with RJ45 connector
Interface	Two RJ45 ports IN: EtherCAT input / OUT: EtherCAT Output
Input Data Size	Max. 2048 bits (256 bytes)
Output Data Size	Max. 2048 bits (256 bytes)
Device Profile	CANopen over EtherCAT (CoE) PDO (Process Data Object) SDO (Service Data Object)

LED Description

LED state represents the states of the fieldbus Module.

RUN LED

LED State	Indication	Description
OFF	INIT	EtherCAT device in 'INIT'-state (or no
		power)
Green	OPERATIONAL	EtherCAT device in 'OPERATIONAL'-
		state
Green, blinking	PRE-OPERATIONAL	EtherCAT device in 'PRE-
		OPERATIONAL'-state
Green, single flash	SAFE-OPERATIONAL	EtherCAT device in 'SAFE-
		OPERATIONAL'-state
Flickering	BOOT	The EtherCAT device is in 'BOOT' state
Red	(Fatal Event)	If RUN and ERR turn red, this indicates
		a fatal event, forcing the bus interface to
		a physically passive state.

ERR LED

LED State	Indication	Description
OFF	No error	No error (or no power)
Red, blinking	Invalid configuration	State change received from master is not possible due to invalid register or object settings.
Red, single flash	Unsolicited state change	Slave device application has changed the EtherCAT state autonomously.
Red, double flash	Application watchdog timeout	Sync manager watchdog timeout.
Red	Application Controller failure	Anybus module in EXCEPTION. If RUN and ERR turn red, this indicates a fatal event, forcing the bus interface to a physically passive state.
Flickering	Booting error detected	E.g. due to firmware download failure.

Link/Activity

LED State	Indication	Description
OFF	No link	Link not sensed (or no power)
Green	Link sensed, no activity	Link sensed, no traffic detected
Green, flickering	Link sensed, activity	Link sensed, traffic detected

Setting Configure Switch

Configuration of an EtherCAT module is not necessary. All settings such as communication configuration for EtherCAT are done by EPSON RC+ 7.0.

Wiring

Wiring of an EtherCAT slave board uses RJ45 connectors. Make sure to use STP-type 100BASE-TX cables.



For cables and connectors, be sure to use a product complying with the industrial standards or a noise-resistant Ethernet cable (STP cable). If you use office use products or UTP cables, it may cause communication errors and may not offer the proper performance.

Installing Module



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

Install the module to the dedicated slot on the T/VT series Manipulator.

Reference: Manipulator manual Setup & Operation 17. Fieldbus I/O

Confirmation with EPSON RC+ 7.0

When an EtherCAT slave module is installed to the T/VT series Manipulator, it is recognized automatically. Confirm whether EPSON RC+ 7.0 has recognized the EtherCAT module using the following procedure.

(1) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

System Configuration					?
 Be Startup SPEL Controller Board Drive Units 	Inputs / Outputs				Close
Robots	Туре	Installed	Inputs	Outputs	Apply
E Fieldbus Slave	Standard	Yes	0-23	0 - 15	Restore
General V	Extended Board 1	Yes	64 - 95	64 - 95	<u>n</u> estore
Bemote Control (2)	Extended Board 2	No			
BS232	Extended Board 3	No			
TCP / IP	Extended Board 4	No			
- Conveyor Encoders	Fieldbus Slave	Yes	512 - 767	512 - 767	
	Fieldbus Master	No	5		
■ Vision			\sim	(3)	

(2) Select [Inputs / Outputs].

.. .

(3) Confirm that the following items are displayed in "Fieldbus Slave".

Installed	: Yes
Inputs	: 512-767 (default setting)
Outputs	: 512-767 (default setting)

(4) Select [Fieldbus Slave]-[General]

- Startup - Controller - Controller	Fieldbus I/O Slave		Close
General - Configuration - Preferences - Simulator - Robots - Robots - Robots - Fieldbus Slave - General - Remote Control - RS232 - TOP / IP - Corveyor Encoders - Force Sensine - Security - Vision	Fieldbus Type: Input Bytes: Output Bytes:	EtherCAT 32 V 32 V	Apply Bestore (5)

(5) Confirm that the following items are displayed.

Fieldbus Type	: EtherCAT
Input Bytes	: 32 (default setting)
Output Bytes	: 32 (default setting)

(6) Click <Close>.

Editing of Input / Output Size

You can change the input/output size of the EtherCAT slave module if necessary.

- (1) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.
- (2) Select [Inputs / Outputs]-[Fieldbus Slave]-[General].

📟 System Configuration			? 🔀
Startup Controller Controller Configuration Preferences Simulator Drive Units Probots Fieldbus Stave Fieldbus	Fieldbus I/O Slave Fieldbus Type: Input Bytes: Output Bytes:	EtherCAT 32 V 32 V	Close Apply Restore

(3) Change the settings of [Input Bytes] and [Output Bytes]. In this example, both of them are changed to "20" Bytes.

System Configuration		[? 🔼
Startup Controller Controller Configuration Preferences Simulator Drive Units Robots Fieldbus Slave Conerol BR3232 Corveyor Encoders Force Sensing Security Ceneral Coneyos Concept Conveyor Condens Force Sensing Conveyor Condens Force Sensing Conveyor Condens Force Sensing Force Sensing Condens Force Sensing Force Sensing Condens Force Sensing Force Se	Fieldbus I/O Slave Fieldbus Type: EtherCAT Input Bytes: 20 V Output Bytes: 20 V	Close Apply Restore

NOTE

Cautions when connecting OMRON PLC and this option: The input/output size has limitations. Select any of 32 bytes, 64 bytes, 128 bytes, or 256 bytes for both [Input Bytes] and [Output Bytes]. [Input Bytes] and [Output Bytes] may have a different size.

- (4) Click < Apply>.
- (5) Click <Close> and the following dialog box appears.
 T/VT series Manipulator (Controller) automatically starts rebooting.

EPSON RC+ 7.0
Rebooting Controller
Close

(6) Select [Setup]-[System Configuration] and display the [System Configuration] dialog box.

■ Startup ■ SPEL Controller Board ■ Drive Units	Inputs / Outputs				Close
Robots Inputs / Outputs	Туре	Installed	Inputs	Outputs	Apply
Fieldbus Slave	Standard	Yes	0 - 23	0 - 15	Restore
General	Extended Board 1	Yes	64 - 95	64 - 95	
 Remote Control 	Extended Board 2	No			
	Extended Board 3	No			
TCP / IP	Extended Board 4	No			
- Conveyor Encoders	Fieldbus Slave	Yes	512 - 671	512 - 671	
Security	Fieldbus Master	No			
₽- Vision					

- (7) Select [Inputs / Outputs].
- (8) Confirm that the following items are displayed in "Fieldbus Slave".

Inputs: 512 - 512 + Changed number of input (Bits)Outputs: 512 - 512 + Changed number of output (Bits)

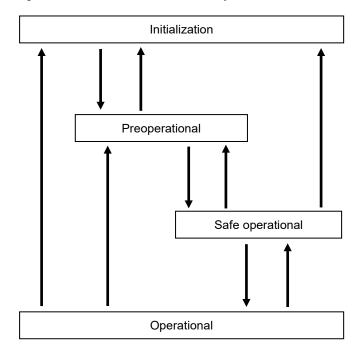
In this example, Input byte is 20 bytes (160 bits) and "512-671" is displayed in "Inputs".

Also, Output byte is 20 bytes (160 bits) and "512-671" is displayed in "Outputs".

(9) Click <Close>.

Communication State Transition

The EtherCAT slave module goes into initialized state after the power is turned ON. Subsequent state transition is controlled by the EtherCAT master.



State	Description			
Initialization	Status after turning ON the power. Initialization state is continued by the EtherCAT until preoperational state.			
Preoperational	Set by the EtherCAT master. SDO (Service Data Object) communication is only available in this state.			
Safe operational	Set by the EtherCAT master. PDO (Process Data Object) transmission, along with SDO (Service Data Object) communication is available in this state.			
Operational	Set by the EtherCAT master. All communications are available in this state. Control of I/O data with the EtherCAT master is possible.			

Electronic Information File (ESI file)

An ESI (EtherCAT Slave Information) file is supplied for EtherCAT slave module network configuration. The file is located in the following folder where EPSON RC+ 7.0 is installed.

 $\label{eq:expectation} $$ EpsonRC70\Fieldbus\EtherCAT $$$

EPSN_TSERIES_ECT_V2.3.xml

NOTE	When connecting the OMRON's PLC and this option:
(P	Use the following ESI files specialized for the OMRON's PLC.
	\EpsonRC70\Fieldbus\EtherCAT
	EPSN TSERIES ECT V2.3 for OMRON rev2.xml
	On the OMRON's setting tool (Sysmac Studio), set as follows according to the
	input/output size set for this option and the data type (USINT/REAL).
	USINT : Unsigned integer (1 byte)
	REAL : floating point (4 bytes)
	When "32" bytes is set for [Input Bytes],
	select "RxPDO(USINT32byte)" or "RxPDO(REAL32byte)"
	When "64" bytes is set for [Input Bytes],
	select "RxPDO(USINT64byte)" or "RxPDO(REAL64byte)"
	When "128" bytes is set for [Input Bytes],
	select "RxPDO(USINT128byte)" or "RxPDO(REAL128byte)"
	When "256" bytes is set for [Input Bytes],
	select two of "RxPDO(USINT128byte/256byte)"
	When "32" bytes is set for [Output Bytes],
	select "TxPDO(USINT32byte)" or "TxPDO(REAL32byte)"
	When "64" bytes is set for [Output Bytes],
	select "TxPDO(USINT64byte)" or "TxPDO(REAL64byte)"
	When "128" bytes is set for [Output Bytes],
	select "TxPDO(USINT128byte)" or "TxPDO(REAL128byte)"
	When "256" bytes is set for [Output Bytes],
	select two of "TxPDO(USINT128byte/256byte)" or "TxPDO(REAL256byte)"
	Example:
	When [Input] is "256" bytes and [Output] is "256" bytes on this option, settings on
	the OMRON's setting tool (Sysmac Studio) are as follows:
	PDO Map PDO entries included in TxPDO(128byte/256byte)
	Process Data Size : Input 2048 [bit] / 2048 [bit] Index I Size Dota trype iPOD entry name IComment Output 2048 [bit] / 2048 [bit] 0x2001:01 8 [bit] USINT Input Byte 0129 Selection/Input/Output1 Name IFlag 0x2001:02 8 [bit] USINT Input Byte 0129
	● No option 0x2001:03 8 [bit] USINT Input Byte 0131 ● Output RxPDO(USINT 32byte) 0x2001:04 8 [bit] USINT Input Byte 0132
	Output RxPDO(USINT64byte) 0x2001:05 8 [bit] USINT Input Byte 0133 Output RxPDO(USINT12Byte) 0x2001:06 8 [bit] USINT Input Byte 0134 Output RxPDO(USINT2Byte) 0x2001:06 8 [bit] USINT Input Byte 0134
	Output RxPDO(USINT128byte/25t 0x2001:07 8 [bit] USINT Input Byte 0135 Image: Strain Strai
	Output No option 0x2001:0A 8 [bit] USINT Input Byte 0138 Trans No option 0x2001:0B 8 [bit] USINT Input Byte 0139
	Input TxPDO(USINT64byte) 0x2001:00 8 [bit] USINT Input Byte 0141
	Input TxPDO(USINT1250yte) 0x2001:0E 8 [bit] USINT Input Byte 0142 Input TxPDO(USINT1250yte/256 0x2001:0F 8 [bit] USINT Input Byte 0143 No option 0x2001:0F 8 [bit] USINT Input Byte 0143
	Input TxPDO(USINT 128byte/25\$ 0x2001:11 8 [bit] USINT Input Byte 0145 0x2001:12 8 [bit] USINT Input Byte 0145 Input Byte 0145
	Move Up Move Down Align Edit PDO Entry Add PDO Entry Delete PDO Entry
	OK Cancel Apply

3. Operation

This chapter describes how to use the Fieldbus I/O option after installing it.

3.1 SPEL⁺ Fieldbus I/O Commands

Here are the main commands for Fieldbus I/O. Input/output command and function for fieldbus I/O are same as these for the normal I/O. For details, refer to the *Online Help* or *SPEL*⁺ *Language Reference manual*.

FbusIO_GetBusStatus	Returns the status of the specified fieldbus.
FbusIO_GetDeviceStatus	Returns the status of the specified fieldbus device.
FbusIO_SendMsg	Sends an explicit message to a device and returns the reply.
In	Returns the status of an 8-bit input port.
InW	Returns the status of a 16-bit input port.
IONumber	Returns the I/O port number of the specified Fieldbus I/O
IONUIIbei	label.
Off	Turns an output OFF.
On	Turns an output ON.
Out	Simultaneously sets eight output bits.
OutW	Simultaneously sets 16 output bits.
Sw	Returns the status of one input bit.

NOTE

Response times for Fieldbus I/O varies and depends on several factors, including baud rate, scan rate, number of tasks, communication error, etc. EPSON RC+ does not guarantee the real-time response for the fieldbus I/O and message inputs. When the fastest and most consistent response times are required, please use EPSON Standard digital I/O, which incorporates interrupt driven inputs and outputs.

3.2 Outputs Off by Emergency Stop and Reset Instruction

You can configure the 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 the EPSON RC+ User's Guide.



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, the "Outputs off during Emergency Stop" option should be enabled to remove all power to output devices when an emergency stop occurs.

3.3 Using FbusIO_SendMsg

To use FbusIO_SendMsg, install the Fieldbus master board.

FbusIO_SendMsg is used to send an explicit message to a device and return a reply. This command operates according to the protocol.

The syntax is as follows:

FbusIO_SendMsg bus, device, msgParam, sendBytes(), recvBytes()

Description of parameter

There are two arrays passed to the parameter. The sendData array contains the data that is sent to the device in bytes. This array must be dimensioned to the correct number of bytes to send. If there are no bytes to send, you must use "0" for the parameter. The recvData array returns the response in bytes. This array is automatically re-dimensioned to the number of bytes received.

For DeviceNet, you need to initialize the sendData array with the command, class, instance, and attribute, as shown in the example below. Consult the documentation that came with the device for the values that can be used. The msgParam parameter value is always "0" for DeviceNet messages.

Here is an example for DeviceNet and EtherNet/IP:

The following example acquires the information of a device MacID = 1.

```
' Send explicit message to the device
Byte sendData(5)
Byte recvData(10)
Integer i
sendData(0) = 14 ' Command (GetAttributeSingle)
sendData(1) = 1 ' Class
sendData(3) = 1 ' Instance
sendData(5) = 7 ' Attribute
FbusIO_SendMsg 16, 1, 0, sendData(), recvData()
For i = 0 To UBound(recvData)
    Print recvData(i)
Next i
```

For PROFIBUS DP, you need to specify the service number in the msgParam parameter. Consult the documentation that came with the device for the services that are supported. Some services require "0" send bytes. In this case, use "0" for the sendBytes parameter.

Here is an example for PROFIBUS DP:

```
' Send message to Profibus device
Byte recvData(10)
Integer i
' Service 56 - read all inputs
' sendBytes = 0
FbusIO_SendMsg 1, 1, 56, 0, recvData()
For i = 0 To UBound(recvData)
    Print recvData(i)
Next i
```

3.4 Explicit Message Connection (for DeviceNet, EtherNet/IP)

Issuing an Explicit message from the DeviceNet/EtherNet/IP master unit to the Robot System acquires and configures the DeviceNet and EtherNet/IP I/O area.

Supported function and Class ID configurations are as follows:

When using Assembly	v Obiect Class	(Class ID = 4)

Function	Class ID	Instance	Service Code
Input acquisition	4 (04h)	100 (64h)	14 (0Eh)
Output configuration	4 (04h)	150 (96h)	16 (10h)
Output acquisition	4 (04h)	150 (96h)	14 (0Eh)

When using I/O Data Mapping Object Class (Class ID = 160, 161)

Function	Class ID	Instance	Service Code
Input acquisition	160 (A0h)	01 (01h)	14 (0Eh)
Output configuration	161 (A1h)	01 (01h)	16 (10h)
Output acquisition	161 (A1h)	01 (01h)	14 (0Eh)

Command response

It can acquire up to 32 bytes* input/output data.

* It depends on the input/output size setting.

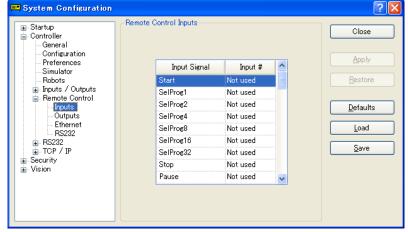
3.5 Setting Remote Control Input and Output

Remote control inputs and outputs are not allocated to fieldbus I/O by default.

To allot remote control inputs and outputs to fieldbus I/O, follow the steps below.

(1) Select EPSON RC+7.0 menu-[Setup]-[System Configuration] and display the [System

Configuration] dialog box. Select-[Controller]-[Remote Control]-[Inputs] or [Outputs].



(2) <u>Click <Defaults> to display the [Default Remote Type] dialog box.</u>

Default Remote Type 🛛 🔀		
⊙ Standard I/O		
○ Extended I/O		
◯ Fieldbus <u>M</u> aster I/O		
○ <u>F</u> ieldbus Slave I/O		
<u>○</u> <u>C</u> lear All		
OK Cancel		

- (3) Select [Fieldbus Master I/O] or [Fieldbus Slave I/O] and click <OK>.
- (4) Fieldbus I/O will be allotted default remote control input and output setting. Select bit numbers by clicking the input or output numbers corresponding to the signals to be used for remote control.
- (5) Click <Apply> to save the settings. Then, click <Close>.

To enable the remote control, refer to EPSON RC+ 7.0 User's Guide 12. Remote Control.

Default Remote Control Input Setting for Fieldbus Master I/O

Default remote control input settings for fieldbus master I/O are as follows:

Input Signal	Robot System Input Bit No
Start	6144
SelProg1	6145
SelProg2	6146
SelProg4	6147
SelProg8	Not used
SelProg16	Not used
SelProg32	Not used
Stop	6148
Pause	6149
Continue	6150
Reset	6151
Shutdown	6155
SelRobot1	Not used
SelRobot2	Not used
SelRobot4	Not used
SelRobot8	Not used
SelRobot16	Not used
SetMotorsOn	6152
SetMotorsOff	6153
SetPowerHigh	Not used
SetPowerLow	Not used
ForcePowerLow	Not used
Home	6154
MCal	Not used
Recover	Not used
ExtCmdSet	Not used
ExtRespGet	Not used
ExtCmdReset	Not used
ExtCmd_0-15	Not used
ExtCmd_16-31	Not used
ExtCmd_32-47	Not used
ExtCmd_48-63	Not used
ExtCmd_64-79	Not used
ExtCmd_80-95	Not used
ExtCmd_96-111	Not used
ExtCmd_112-127	Not used

Default Remote Control Output Setting for Fieldbus Master I/O

Default remote control output settings for fieldbus master I/O are as follows:

Output Signal	Robot System Output Bit No
	6144
Ready	
Running	6145
Paused	6146
Error	6147
EStopOn	6148
SafeguardOn	6149
SError	6150
Warning	6151
MotorsOn	6152
AtHome	6153
PowerHigh	Not used
MCalReqd	Not used
RecoverReqd	Not used
RecoverInCycle	Not used
WaitingRC	Not used
CmdRunning	6173
CmdError	6174
CurrProg1	6154
CurrProg2	6155
CurrProg4	6156
CurrProg8	Not used
CurrProg16	Not used
CurrProg32	Not used
AutoMode	6157
TeachMode	6158
TestMode	Not used
EnableOn	Not used
ErrorCode1	6159
ErrorCode2	6160
ErrorCode4	6161
ErrorCode8	6162
ErrorCode16	6163
ErrorCode32	6164
ErrorCode64	6165
ErrorCode128	6166
ErrorCode256	6167
ErrorCode512	6168
ErrorCode1024	6169
ErrorCode2048	6170
ErrorCode4096	6171
ErrorCode8192	6172
InsideBox1	Not used
InsideBox2	Not used
IIISIUCDUA2	1101 4004

Output Signal	Robot System Output Bit No
InsideBox3	Not used
InsideBox4	Not used
InsideBox5	Not used
InsideBox6	Not used
InsideBox7	Not used
InsideBox8	Not used
InsideBox9	Not used
InsideBox10	Not used
InsideBox11	Not used
InsideBox12	Not used
InsideBox13	Not used
InsideBox14	Not used
InsideBox15	Not used
InsidePlane1	Not used
InsidePlane2	Not used
InsidePlane3	Not used
InsidePlane4	Not used
InsidePlane5	Not used
InsidePlane6	Not used
InsidePlane7	Not used
InsidePlane8	Not used
InsidePlane9	Not used
InsidePlane10	Not used
InsidePlane11	Not used
InsidePlane12	Not used
InsidePlane13	Not used
InsidePlane14	Not used
InsidePlane15	Not used
ExtCmdGet	Not used
ExtRespSet	Not used
ExtCmdResult	Not used
ExtError	Not used
ExtResp_0-15	Not used
ExtResp_16-31	Not used
ExtResp_32-47	Not used
ExtResp_48-63	Not used
ExtResp_64-79	Not used
ExtResp_80-95	Not used
ExtResp_96-111	Not used
ExtResp_112-127	Not used

Default Remote Control Input Setting for Fieldbus Slave I/O

Default remote control input settings for fieldbus slave I/O are as follows:

Input Signal	Robot System Input Bit No
Start	512
SelProg1	513
SelProg2	514
SelProg4	515
SelProg8	Not used
SelProg16	Not used
SelProg32	Not used
Stop	516
Pause	517
Continue	518
Reset	519
Shutdown	523
SelRobot1	Not used
SelRobot2	Not used
SelRobot4	Not used
SelRobot8	Not used
SelRobot16	Not used
SetMotorsOn	520
SetMotorsOff	521
SetPowerHigh	Not used
SetPowerLow	Not used
ForcePowerLow	Not used
Home	522
MCal	Not used
Recover	Not used
ExtCmdSet	Not used
ExtRespGet	Not used
ExtCmdReset	Not used
ExtCmd_0-15	Not used
ExtCmd_16-31	Not used
ExtCmd_32-47	Not used
ExtCmd_48-63	Not used
ExtCmd_64-79	Not used
ExtCmd_80-95	Not used
ExtCmd_96-111	Not used
ExtCmd_112-127	Not used

Default Remote Control Output Setting for Fieldbus Slave I/O

Default remote control output settings for fieldbus slave I/O are as follows:

Ready Running Paused	512
Paused	512
	513
	514
Error	515
EStopOn	516
SafeguardOn	517
SError	518
Warning	519
MotorsOn	520
AtHome	521
PowerHigh	Not used
MCalReqd	Not used
RecoverReqd	Not used
RecoverInCycle	Not used
WaitingRC	Not used
CmdRunning	541
CmdError	542
CurrProg1	522
CurrProg2	523
CurrProg4	524
CurrProg8	Not used
CurrProg16	Not used
CurrProg32	Not used
AutoMode	525
TeachMode	526
EnableOn	Not used
ErrorCode1	527
ErrorCode2	528
ErrorCode4	529
ErrorCode8	530
ErrorCode16	531
ErrorCode32	532
ErrorCode64	533
ErrorCode128	534
ErrorCode256	535
ErrorCode512	536
ErrorCode1024	537
ErrorCode2048	538
ErrorCode4096	539
ErrorCode8192	540
InsideBox1	Not used
InsideBox2	Not used
InsideBox2	Not used

Output Signal	Robot System Output Bit No
InsideBox4	Not used
InsideBox5	Not used
InsideBox6	Not used
InsideBox7	Not used
InsideBox8	Not used
InsideBox9	Not used
InsideBox10	Not used
InsideBox11	Not used
InsideBox12	Not used
InsideBox13	Not used
InsideBox14	Not used
InsideBox15	Not used
InsidePlane1	Not used
InsidePlane2	Not used
InsidePlane3	Not used
InsidePlane4	Not used
InsidePlane5	Not used
InsidePlane6	Not used
InsidePlane7	Not used
InsidePlane8	Not used
InsidePlane9	Not used
InsidePlane10	Not used
InsidePlane11	Not used
InsidePlane12	Not used
InsidePlane13	Not used
InsidePlane14	Not used
InsidePlane15	Not used
ExtCmdGet	Not used
ExtRespSet	Not used
ExtCmdResult	Not used
ExtError	Not used
ExtResp_0-15	Not used
ExtResp_16-31	Not used
ExtResp_32-47	Not used
ExtResp_48-63	Not used
ExtResp_64-79	Not used
ExtResp_80-95	Not used
ExtResp_96-111	Not used
ExtResp_112-127	Not used

4. Troubleshooting

4.1 DeviceNet Troubleshooting

Exclusion

Every system has its special environment, conditions, specifications, and usages. This guide is provided as a general reference for troubleshooting a DeviceNet network. Every effort has been made to ensure the information is accurate. However, we do not guarantee the complete accuracy of the information and thus we decline any liability for damages or costs incurred by the use of this troubleshooting.

Before examining a problem on the network, please ensure that your established DeviceNet system satisfies network specifications. (Refer to this troubleshooting and the section 2.1.2 DeviceNet Network Construction.)

Tools

Prepare the following tools for troubleshooting. Philips screwdriver Flat-blade screwdriver Tester



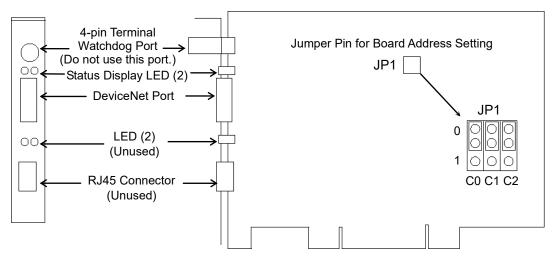
Using the Woodhead NetMeter (DeviceNet diagnostic tool) is a simple way to learn physical status of the DeviceNet network. For details of NetMeter, see Woodhead's Web site (http://www.mysst.com/diagnostics/NetMeter.asp).

4.1.1 Examining a Problem

4.1.1.1 Scanner Board Diagnostic LEDs

The DeviceNet master board used with EPSON RC+ has two status display LEDs. The layout of the LEDs is shown in the following figure.

PCU-DVNIO



The Module/NetWork LED is on the left side and the IO LED is on the right side seen from the rear panel. These LED names are used in applicomIO Console application and this manual. Only in this troubleshooting section, general names of the status display of the DeviceNet device are used.

The Module/NetWork LED is referred to as the Network Status (NS) in this section.

The IO LED is referred to as the Module Status LED (MS) in this section.

4.1.1.2 Checking Network Status

(1) Master Status: MS/NS LEDs

LED	Col	or	L	ight Condition	
MS (Module Status)	Green	□ Red	\Box ON	🗖 Blinking	□ OFF
NS (Network Status)	Green	□ Red	\Box ON	Blinking	□ OFF

(2) Node Number of Absent Slaves

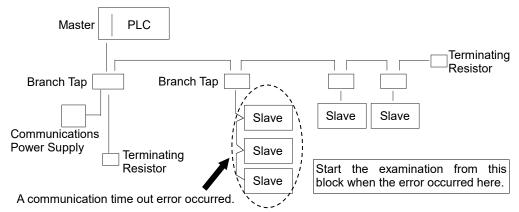
Absent slaves are disconnected from or not added to the network.

- 1. See the status flag regarding to the removal and addition if the master has status information.
- 2. See the MS/NE LEDs of all slaves if the master has no status information.

(3) Absent Slave Status: MS/NS LEDs

LED	Color		Light Condition		n
MS (Module Status)	□ Green	□ Red	□ ON	🗖 Blinking	□ OFF
NS (Network Status)	□ Green	□ Red	□ ON	Blinking	□ OFF

(4) Physical Node Location of Absent Slave



(5) Error Occurrence Condition

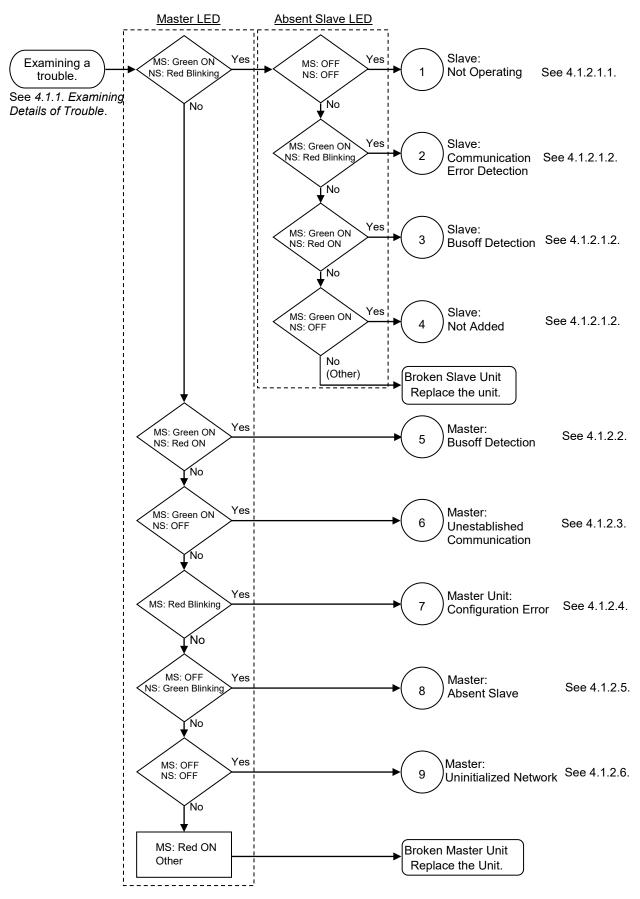
□ Immediate occurrence (high reproducibility)

□ Rare occurrence (low reproducibility)

4.1.2 Problems and Countermeasures

Master Unit LED		Error	Description [Reference]
MS	NS		
Green Light ON	Green Light ON	Normal communication	- Normal condition
Green Light ON	Green Light Blinking	During connection establishment	 Processing connection establishment (The NS LED will be ON in green in a few seconds.) Master function in stop state (When communication does not start, master analysis with NetMeter is required.)
Green Light ON	Red Light Blinking	Communication error	 [Refer to the section 4.1.2.1 Master: Communication Error.] Slave disconnected from the network (Remote I/O communication error) Slave not added to the network (Scan list collation error) Communications power supply OFF (Error detection after the communication establishment)
Green Light ON	Red Light ON	Busoff detection Duplicate MAC ID	 [Refer to the section 4.1.2.2 Master: Busoff Detection.] Busoff detection: Communication stopped due to critical error. Duplicate MAC ID: The MAC ID configuration was duplicated. (This error occurs only during unit start-up)
Green Light ON	Light OFF	Unestablished communication	 [Refer to the section 4.1.2.3 Master: Unestablished Communication.] No slave (Error detection before communication establishment) Communications power supply OFF (Error detection before the communication establishment) Duplicate MAC ID: The MAC ID configuration was duplicated.
Red Light Blinking	No Matter	Configuration error	 Master unit configuration error Refer to the respective device manuals. When EPSON RC+ was configured as a master: [Refer to the section 4.1.2.4 Master: Configuration Error.] Slave disconnected from the network (Remote I/O communication error) Slave not added to the network (Scan list collation error) Duplicate MAC ID: The MAC ID configuration was duplicated.
Red Light ON	No Matter	Module error	- Broken master unit \rightarrow Unit Replacement
Light OFF	Green Light Blinking	Absent slave	 [Refer to the section 4.1.2.5 Absent Slave.] No slave (Error detection before communication establishment) Communications power supply OFF
Light OFF	Light OFF	Uninitialized network Absent slave	 [Refer to the section 4.1.2.6 Uninitialized Network.] Master unit start-up error No slave (Error detection before communication establishment) Communications power supply OFF

Process Flowchart



4. Troubleshooting (DeviceNet)

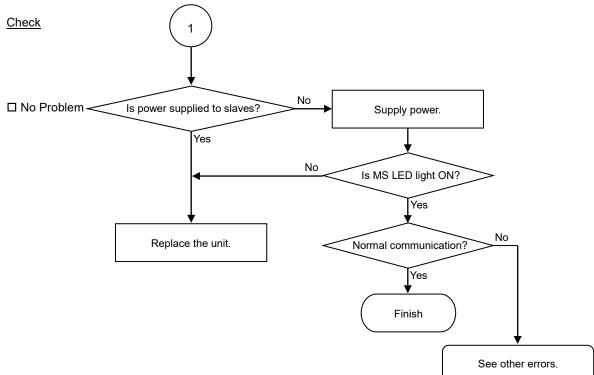
4.1.2.1	Master:	Communication	Error
---------	---------	---------------	-------

Master l	Jnit LED	Error	Description
MS	NS	EIIOI	Description
Green	Red Light	Communication	- Slave disconnected from the network
Light ON	Blinking	error	(Remote I/O communication error)
			- Slave not added to the network
			(Scan list collation error)
			- Communications power supply OFF
			(Error detection after the communication
			establishment)

Slave: Not Operating

	MS	NS
Master LED Condition	Green Light ON	Red Light Blinking
Absent Slave LED Condition	Light OFF	Light OFF

Process Flowchart



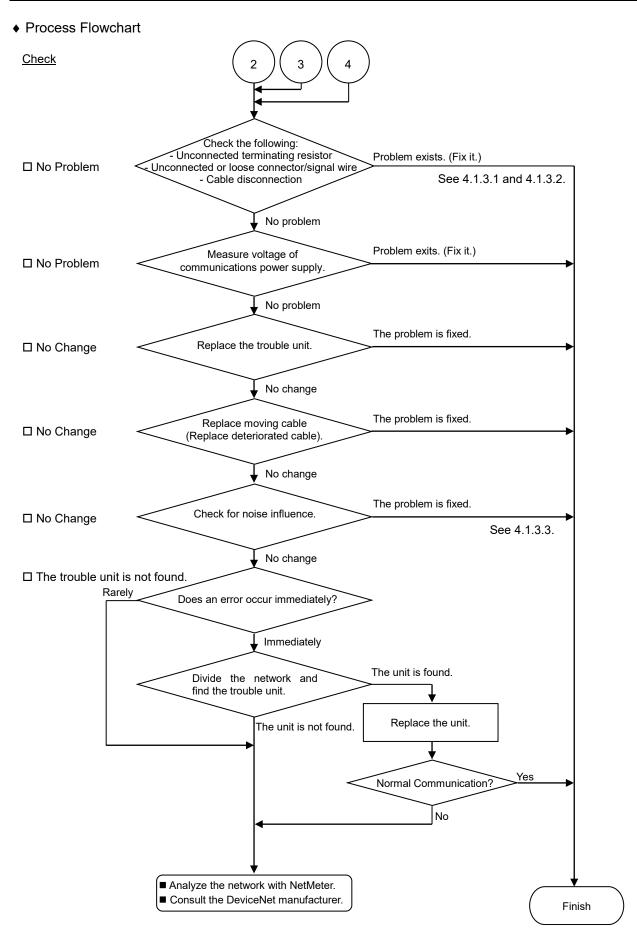
♦ Causes of Error

Possible Cause	Examination Method	Countermeasure	
O Slave power OFF	Measure the power voltage of the slaves. (It should be within the range	Supply power to the slave.	
UT	of sufficient voltage for the slave operation.)	slave.	
	NOTE: For slaves operating with communications power		
	supply, measure voltage at the		
	DeviceNet connector.		
O Broken unit	Slave unit replacement	Replace the broken	
		slave unit with a	
		new one.	

Slave: Communication Error Detection / Busoff Detection / Not-added

	MS	NS
Master LED Condition	Green Light ON	Red Light Blinking
(1) Absent Slave LED Condition (Communication error detection)	Green Light ON	Red Light Blinking
(2) Absent Slave LED Condition (Busoff detection)	Green Light ON	Red Light ON
(3) Absent Slave LED Condition (Slave not added to the network)	Green Light ON	Light OFF

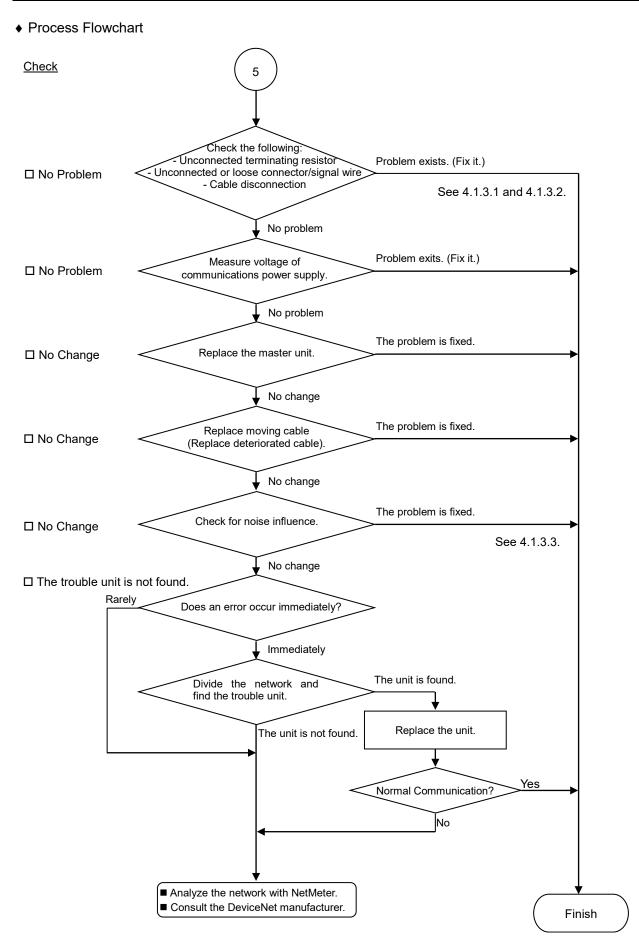
4. Troubleshooting (DeviceNet)



Possible Cause	Examination Method	Countermeasure
O Disconnected terminating	(1) Check that terminating resistors are connected to	Fix the problem.
resistors O Cable disconnection O Disconnected connector O Disconnected signal wire	 both ends of the network. (2) Measure resistance between signal wires with communications power supply OFF. → Normal: 50 to 70 Ω Measuring point: Connection of the trouble unit For details, refer to the section 4.1.3.1 Connection Problem. 	How to find the trouble point: Remove the terminating resistor on one end of the network. The trouble point is where resistance changes from 120 Ω .
O Loose connector O Loose signal wire	 Check for the connection of connectors and signal wires. → The connectors and signal wires should be firmly connected. Checkpoint: all nodes and all branch taps For details, refer to the section 4.1.3.2 Loose Connector and Signal Wire. 	Connect the connectors and signal wires again.
O Voltage drop of communications power supply	 Measure voltage of communications power supply at the unit with a trouble. → Normal: 11V or more between V+ and V- If the voltage is 11 to 14 V, the unit is a possible cause. Fix the problem on the unit. 	Check the voltage of the power supply. Calculate the current capacity of the cable and add more communications power supplies.
O Noise (external cause)	 Check the noise intrusion via the following paths (1) to (3). (1) Noise via DRAIN (FG) (2) Induced noise via communication cable (3) Communications power supply → For details, refer to the section 4.1.3.3 Noise Intrusion. 	Take countermeasures against noise.
O Broken unit	Replace the broken unit with a new one. → Verify whether the problem is fixed.	Replace the unit with a new one.
 No cause is identified. 	Identify the trouble point by dividing the network. → For details, refer to the section 4.1.3.4 Broken Unit Examination.	

4.1.2.2 Master: Busoff Det	ection

Master l	Jnit LED	F	Description	
MS	NS	Error	Description	
Green	Red	Busoff detection	Communication stopped due to critical	
Light ON	Light ON		error.	
		Duplicate MAC ID	The MAC ID configuration was	
			duplicated. (This error occurs only	
			during unit start-up)	

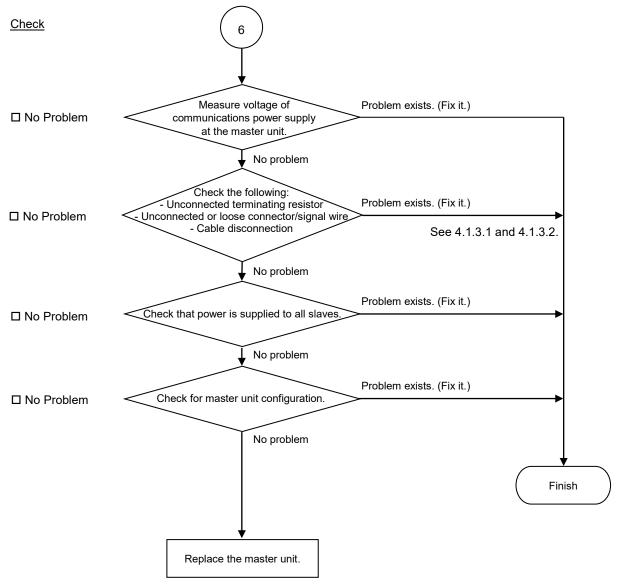


Possible Cause	Examination Method	Countermeasure
O Disconnected	(1) Check that terminating	Fix the problem.
terminating	resistors are connected to	
resistors	both ends of the network.	How to find the trouble
O Cable	(2) Measure resistance between	point:
disconnection	signal wires with	Remove the terminating
O Disconnected	communications power	resistor on one end of the
connector	supply OFF.	network. The trouble
O Disconnected signal	\rightarrow Normal: 50 to 70 Ω	point is where resistance
wire	 Measuring point: Connection 	changes from 120 Ω .
	of the problem unit	
	• For details, refer to the section	
	4.1.3.1 Connection Problem.	
O Loose connector	Check for the connection of	Connect the connectors
O Loose signal wire	connectors and signal wires.	and signal wires again.
	\rightarrow The connectors and signal	
	wires should be firmly	
	connected.	
	 Checkpoint: all nodes and all 	
	branch taps	
	• For details, refer to the section	
	4.1.3.2 Loose Connector and	
	Signal Wire.	
O Voltage drop of	Measure voltage of	Check the voltage of the
communications	communications power supply at	power supply.
power supply	the trouble unit.	Calculate the current
	\rightarrow Normal: 11V or more	capacity of the cable and
	between V+ and V-	add more communication
	• If the voltage is 11 to 14 V,	power supplies.
	the unit is a possible cause.	
	Fix the problem on the unit.	
O Noise	Check the noise intrusion via the	Take countermeasures
(external cause)	following paths (1) to (3) .	against noise.
	(1) Noise via DRAIN (FG)	
	(2) Induced noise via	
	communication cable	
	(3) Communications power	
	supply	
	\rightarrow For details, refer to the	
	section 4.1.3.3 Noise	
	Intrusion.	
O Broken unit	Replace the broken unit with a	Replace the unit with a
	new one.	new one.
	\rightarrow Verify whether the problem is	
	fixed.	
 No cause is 	Identify the trouble point by	
identified.	dividing the network.	
	\rightarrow For details, refer to the	
	section 4.1.3.4 Broken Unit	
	Examination.	

4.1.2.3 Master: Unestablished Communication

Master Unit LED		Глан	Description
MS	NS	Error	Description
Green	Light	Master	Communications power supply OFF
Light ON	OFF	Unestablished	No slave
		communication	

Process Flowchart



4. Troubleshooting (DeviceNet)

Causes of Error

Causes of Error				
Possible Cause	Examination Method	Countermeasure		
O Voltage drop of communications power supply	 Measure voltage of communications power supply at the master unit. → Normal: 11V or more between V+ and V- If the voltage is 11 to 14 V, the master unit is a possible cause. Fix the problem on it. 	Check voltage of the power supply.		
 O Disconnected terminating resistors O Cable disconnection O Disconnected connector O Disconnected signal wire 	 (1) Check that terminating resistors are connected to both ends of the network. (2) Measure resistance between signal wires with communications power supply OFF. → Normal: 50 to 70Ω Measuring point: Connection of the master For details, refer to the section 4.1.3.1 Connection Problem. 	Fix the problem. How to find the trouble point: Remove the terminating resistor on one end of the network. The trouble point is where resistance changes from 120Ω .		
O Loose connector O Loose signal wire	 Check for the connection of connectors and signal wires. → The connectors and signal wires should be firmly connected. Checkpoint: Between the master and its slaves For details, refer to the section 4.1.3.2 Loose Connector and Signal Wire. 	Connect the connectors and signal wires again.		
O All slaves power OFF	Measure the power voltage of the slaves. (It should be within the range of sufficient voltage for slave operation.)	Supply power to the slaves.		
O Master unit configuration	 (1) Start applicomIO Console application and check that the configuration has no difference with the network condition. (2) Check that the configuration data were written in flash. For details, refer to the section 4.1.3.6 EPSON RC+ Master Configuration. 	Change the configuration.		

4.1.2.4 Master: Configuration Error

Master Unit LED		F ame a	Description
MS	NS	Error	Description
Red	No	Configuration error	- Slave disconnected from the network
Light	Matter	Slave error	(Remote I/O communication error)
Blinking		detection	- Slave not added to the network
			(Scan list collation error)
			- Duplicate MAC ID: The MAC ID
			configuration was duplicated.

Process Flowchart Check Check for master unit The problem is fixed. configuration (scan list configuration). □ No Problem No problem Check the following: - Unconnected terminating resistor Problem exists. (Fix it.) - Unconnected or loose connector/signal wire □ No Problem - Cable disconnection See 4.1.3.1 and 4.1.3.2. No problem Problem exists. (Fix it.) Measure voltage of communications power supply □ No Problem No problem The problem is fixed. □ No Change Replace moving cable (Replace deteriorated cable) No change The problem is fixed. □ No Change Check for noise influence. See 4.1.3.3. No change The problem is fixed. Replace the master unit. □ No Change No change □ The trouble unit is not found. Rarely Does an error occur immediately? Immediately Divide the network and The unit is found. find the trouble unit. ↓ Replace the unit. The unit is not found. Yes Normal Communication? No Analyze the network with NetMeter. Consult the DeviceNet manufacturer. Finish

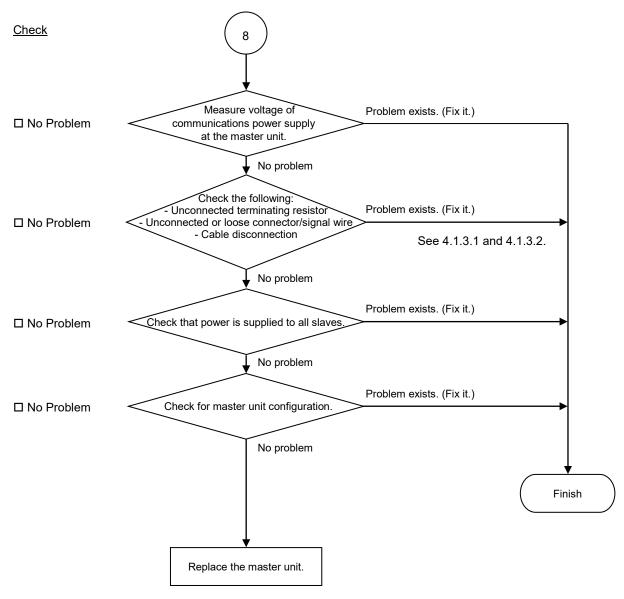
♦ Causes of Error		
Possible Cause	Examination Method	Countermeasure
O Master unit configuration	 Start applicomIO Console application and check that the configuration has no difference with the network condition. Check that the configuration data were written in flash. Check that the network load is within allowable range. For details, refer to the section 4.1.3.6 EPSON RC+ Master Configuration. 	Change the configuration.
O Disconnected terminating resistors	(1) Check that terminating resistors are connected to both ends of the network.	Fix the problem. How to find the trouble
 Cable disconnection O Disconnected connector O Disconnected signal wire 	 hetwork. (2) Measure resistance between signal wires with communications power supply OFF. → Normal: 50 to 70Ω Measuring point: Connection of the trouble unit For details, refer to the section 4.1.3.1 Connection Problem. 	From the find the trouble point: Remove the terminating resistor on one end of the network. The trouble point is where resistance changes from 120Ω .
O Loose connector O Loose signal wire	 4.1.3.1 Connection Problem. Check for the connection of connectors and signal wires. → The connectors and signal wires should be firmly connected. Checkpoint: all nodes and all branch taps For details, refer to the section 4.1.3.2 Loose Connector and Signal Wire. 	Connect the connectors and signal wires again.
O Voltage drop of communications power supply	 Measure voltage of communications power supply at the unit with a trouble. → Normal: 11V or more between V+ and V- If the voltage is 11 to 14 V, the unit is a possible cause. Fix the problem on the unit. 	Check the voltage of the power supply. Calculate the current capacity of the cable and add more communications power supplies.
O Noise (external cause)	 Check the noise intrusion via the following paths (1) to (3). (1) Noise via DRAIN (FG) (2) Induced noise via communication cable (3) Communications power supply → For details, refer to the section 4.1.3.3 Noise Intrusion. 	Take countermeasures against noise.
O Broken unit	Replace the broken unit with a new one. \rightarrow Verify whether the problem is fixed.	Replace the unit with a new one.
• No cause is identified.	Identify the trouble point by dividing the network. \rightarrow For details, refer to the section 4.1.3.4 Broken Unit Examination.	

4. Troubleshooting (DeviceNet)

4.1.2.5 Absent Slave

Master Unit LED		F irms in	Description
MS	NS	Error	Description
Light	Green		- No slave (Error detection before
OFF	Light	Absent slave	communication establishment)
	Blinking		- Communications power supply OFF

Process Flowchart



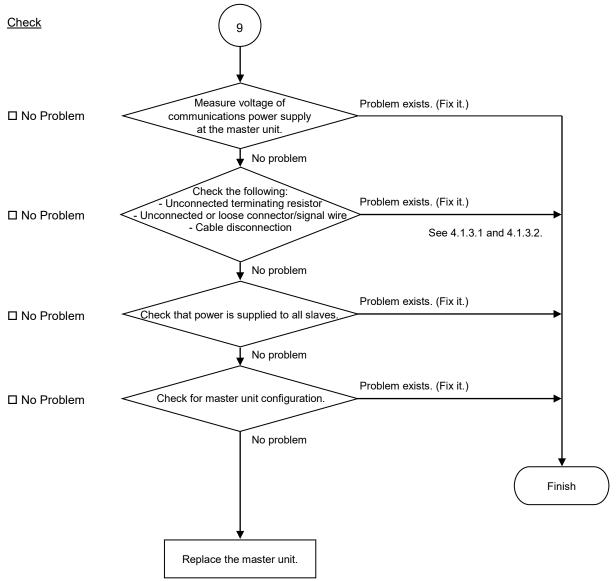
 Causes of Error Possible Cause 	Examination Method	Countermeasure
O Voltage drop of communications power supply	 Measure voltage of communications power supply at the master unit. → Normal: 11V or more between V+ and V- If the voltage is 11 to 14 V, the unit is a possible cause. Fix the problem on the unit. 	Check voltage of the power supply.
 O Disconnected terminating resistors O Cable disconnection O Disconnected connector O Disconnected signal wire 	 (1) Check that terminating resistors are connected to both ends of the network. (2) Measure resistance between signal wires with communications power supply OFF. → Normal: 50 to 70 Ω Measuring point: Connection of the master For details, refer to the section 4.1.3.1 Connection Problem. 	Fix the problem. How to find the trouble point: Remove the terminating resistor on one end of the network. The trouble poin is where resistance changes from 120Ω .
O Loose connector O Loose signal wire	 Check for the connection of connectors and signal wires. → The connectors and signal wires should be firmly connected. Checkpoint: Between the master and its slaves For details, refer to the section <i>4.1.3.2 Loose Connector and Signal Wire</i>. 	Connect the connectors and signal wires again.
O All slaves power OFF	Measure the power voltage of the slaves. (It should be within the range of sufficient voltage for the slave operation.)	Supply power to the slaves
O Master unit configuration	 Start applicomIO Console application and check that the configuration has no difference with the network condition. Check that the configuration data were written in flash. For details, refer to the section 4.1.3.6 EPSON RC+ Master Configuration. 	Change the configuration.

4. Troubleshooting (DeviceNet)

4.1.2.6 Uninitial	ized Network
-------------------	--------------

Master Unit LED		F	Description
MS	NS	Error	Description
Light OFF	Light OFF	Uninitialized network	- Master unit start-up error
		Absent slave	- No slave (Error detection before
			communication establishment)
			- Communications power supply
			OFF

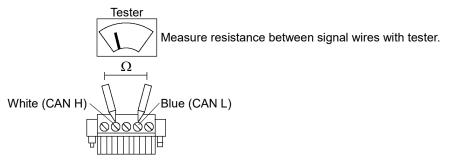
Process Flowchart



Possible Cause	Examination Method	Countermeasure
O Voltage drop of communications power supply	 Measure voltage of communications power supply at the master unit. → Normal: 11V or more between V+ and V- If the voltage is 11 to 14 V, the master unit is a possible cause. Fix the problem on it. 	Check voltage of the power supply.
 O Disconnected terminating resistors O Cable disconnection O Disconnected connector 	 Check that terminating resistors are connected to both ends of the network. Measure resistance between signal wires with communications power 	Fix the problem. How to find the trouble point: Remove the terminating
O Disconnected signal wire	 supply OFF. → Normal: 50 to 70 Ω Measuring point: Connection of the master For details, refer to the section 4.1.3.1 Connection Problem. 	resistor on one end of the network. The trouble point is where resistance changes from 120Ω .
O Loose connector O Loose signal wire	 Check for the connection of connectors and signal wires. → The connectors and signal wires should be firmly connected. Checkpoint: Between the master and its slaves For details, refer to the section 4.1.3.2 Loose Connector and Signal Wire. 	Connect the connectors and signal wires again.
O All slaves power OFF	Measure the power voltage of the slaves. (It should be within the range of sufficient voltage for slave operation.)	Supply power to the slaves.
O Master unit configuration	 Start applicomIO Console application and check that the configuration has no difference with the network condition. Check that the configuration data were written in flash. For details, refer to the section 4.1.3.6 EPSON RC+ Master Configuration. 	Change the configuration

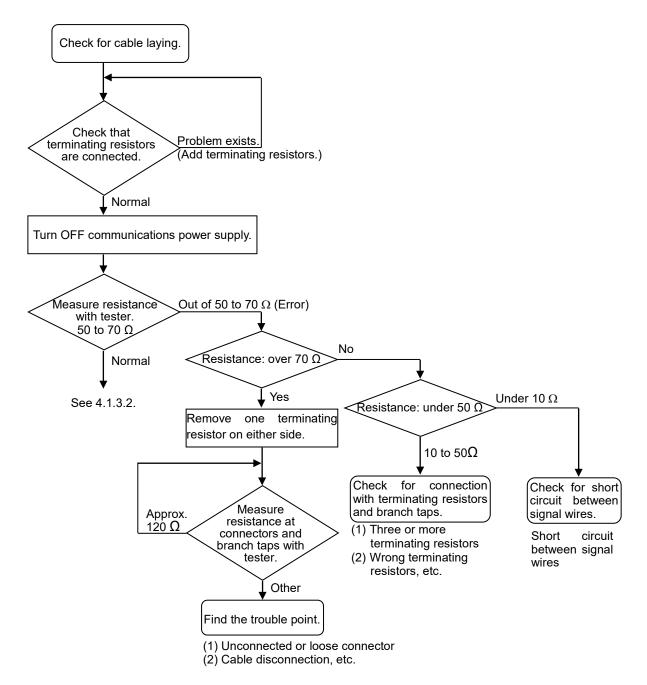
4.1.3 Procedures for Examining Possible Causes

- 4.1.3.1 Connection Problem (Disconnected Terminating Resistors, Cable Disconnection, Disconnected Connector, and Disconnected Signal Wire)
- (1) Ensure that two terminating resistors are connected to both ends of the network.
- (2) Turn OFF the communications power supply.
- (3) Measure resistance between CAN_H and CAN_L wires of the absent slave using the tester.



Resistance	Determination	
0 Ω	Short circuit	
Under 50 Ω	Three or more terminating resistors on one network	
50 to 70 Ω	Normal	
70 to 120 Ω	Error (cable disconnection or disconnected signal wire on the	
	trunk line)	
Over 120 Ω	Error (cable disconnection or disconnected signal wire on drop	
	line or trunk line \rightarrow Both CAN_H and CAN_L)	

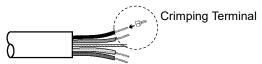
- (4) How to find the trouble point:
 - Remove the terminating resistor on one end of the network. (The resistance at the point where the terminating resistor is connected is 120Ω .)
 - Measure resistance at branch taps of all units.
 - The trouble point is where resistance changes from 120 $\Omega.$
 - After finding the trouble point, verify the connector and cable conditions.



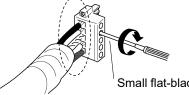
4.1.3.2 Loose Connector and Signal Wire

Check for the connections of the following parts on the connector and cable.

(1) Crimping Terminal

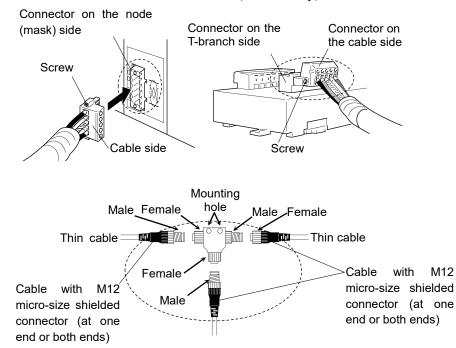


(2) Connection of the connector and the signal wire



Small flat-blade screwdriver with even thickness

(3) Connection of the connector and the unit (T-branch tap)

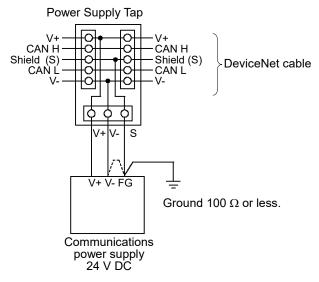


4.1.3.3 Noise Intrusion

Verify how an error occurrence condition changes while taking the following countermeasures.

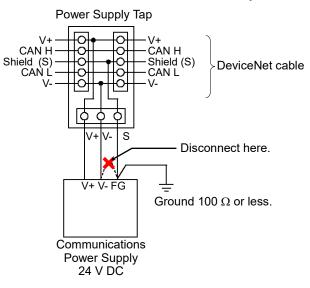
Ground of FG (DRAIN) wire

Normal Grounding: Ground the DeviceNet network at only one point.



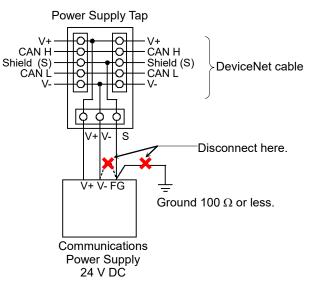
Countermeasure 1: Disconnect the wire between V- and FG.

Disconnect the wire between V- and FG when you cannot ground the FG wire.



Countermeasure 2: Disconnect the shield wire to isolate it from the ground.

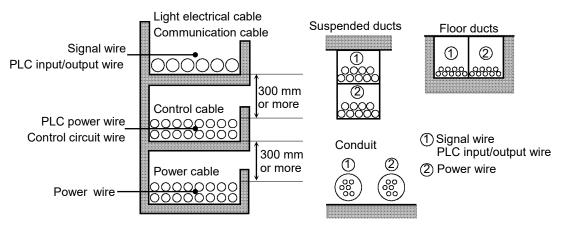
When noise intrudes the ground line due to a noise source such as an inverter installed near the communications power supply, disconnect the shield wire of the communication cable and isolate it from the ground to restrain noise intrusion.



Induced noise via communication cable

Separate the DeviceNet signal wire from the other wires (especially power wires).

* Separate the signal wire from the power wires 300 mm or more.

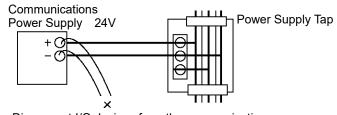


During site inspection, bypass the wire that is possibly affected by induced noise with other cables and then lay the cables. Establish the communication under no induced noise condition and verify whether an error occurs.

Communications Power Supply

When sharing the communications power supply with I/O devices, provide power sources separately.

Separating power source prevents noise caused by I/O device operations from affecting communication.



Disconnect I/O devices from the communications power supply.

4.1.3.4 Broken Unit Examination (Dividing Network Examination)

When you cannot quickly find the trouble point due to a broken unit, connection failure including loose connector, or cable partial disconnection, divide the network to find the trouble point. Verify how error occurrence conditions change while taking the following countermeasures.

How to Examine

Divide the network to find which node is the cause of the problem.

Verify that a master can establish communications with the slaves even though one slave is separated from the network.

After finding the problem node, check the cables connected to it and replace the unit.

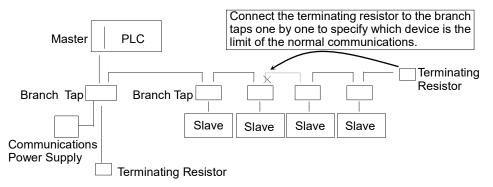
How to Divide

To divide the network, follow either procedure described below depending on the cable layout.

- Separating each block from the network
 Divide the network by block and check each block.
 - 1. Ensure that the master has no problem by connecting it to its slaves one by one. (MS/NS: green light ON)
 - 2. Divide the network in the middle of it and check for the communication condition. (MS/NS: green light ON)

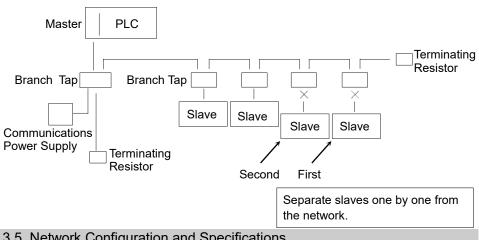
Normal: The trouble point is on the other half of the network. Error: The trouble point is on the current half of the network. (Continue dividing the network further to distinguish error part from normal part.)

3. Check for communication on the block to specify the trouble point.



(2) Separate each slave from the network

Check for each slave. The trouble point is where error condition changes into normal condition.



4.1.3.5 Network Configuration and Specifications

(1) Maximum Network Length and Drop Line Length

Check that the cables used on the network meet the following specifications.

Туре	Baud Rate	Max. Network Length	Drop Line Length	Total Drop Line Length
Thick Cable Thin Cable	500 kbps	100 m		39 m
	250 kbps	250 m		78 m
	125 kbps	500 m	6.00	156 m
	500 kbps	100 m	6 m	39 m
	250 kbps	100 m		78 m
	125 kbps	100 m		156 m

(2) Terminating Resistor

Ensure that two terminating resistors are connected to both ends of the network (trunk line). The terminating resistor should be $121 \Omega 1/4$ W.

(3) Cable and Branch Tap

The cables and branch taps should meet the DeviceNet specifications.

(4) Communications Power Supply

The communications power supply should be dedicated to DeviceNet. Do not share the communications power supply with I/O devices. *

* Noise due to load on/off may affect DeviceNet communications via the communications power supply.

(The noise causes remote I/O communication error, Busoff detection, and broken unit.)

4.1.3.6 EPSON RC+ Master Configuration

For details of EPSON RC+ master configuration, refer to the section 2.1.3 Installing DeviceNet Master Board manufactured by molex.

The following section describes the procedure for verifying the scanner board condition with applicomIO Console application.

Verifying applicomIO Console application condition

The status bar at the bottom of the window shows the applicomIO Console application status. The status bar varies as shown below:

Character : The address number of the scanner board is indicated with characters. When the character "F" appears, the flash memory on the board initialized the scanner board.

Background color : The background color indicates the scanner board status. For details, refer to the table below.

Background	Character	Status						
Gray	Black	Access to scanner board was failed.						
		After that, the status bar will not be renewed						
		automatically. To renew the status bar, right-click the						
		status bar and select Refresh.						
Magenta	Black	The scanner board was initialized with an earlier						
		version applicomIO Console application.						
		It is recommended that the scanner board be written						
		into the flash memory (reinitializing the scanner board)						
		again with the current version applicomIO Console						
		application.						
Red	Black	The scanner board was not initialized.						
		Initialize the scanner board to use it.						
Yellow	Black	The scanner board was partially initialized.						
		This status happens only during network detection and						
	TTTI 1	on-line actions.						
Dark green	White	Although the scanner board was initialized, it is						
		different than the currently opened configuration.						
		(Different version, etc.)						
		It is recommended that the scanner board be written						
		into the flash memory (reinitializing the scanner board)						
		again with the current version applicomIO Console						
		application.						
		This status happens only during network detection, on-						
	D1 1	line actions, and diagnostic.						
Green	Black	The scanner board was initialized properly and it is no						
		different with the currently opened configuration.						
		This status happens only during network detection, on-						
		line actions, and diagnostics.						

Verifying the DeviceNet network condition

The applicomIO Console application has a network diagnostic function (Diagnostic). The procedure for using the Diagnostic is described below.

(1) Open the Diagnostic window, click the magnifying grass icon, and select the "Channel" on the device tree in the left side of the window.

The window changes as shown below.

🙅 Diagnostic Board : 1	
Diagnostic ?	
Q 01 Q	
Board 1 PCI_DVNID Channel 0 : DEVICENET Equipment N*:2 Equipment N*:3	Channel Information Rx : [0] Bytes [0] Frames/s Tx : [7] Bytes [0] Frames/s OverRun : [0] Frames/s Bus Diff : [0] Baud rate : [50] Bus Load : [100 %] [50 %] Max : [0,00 %] [50 %] Min : [0,00 %] [0 %] Reset Counters [0 %] CAN DeviceNet (scannet)

The [CAN] and [DeviceNet (scanner)] tabs appear on the data display in the right side of the window.

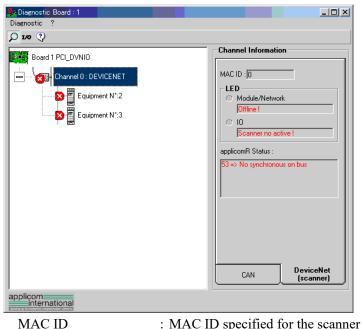
The [CAN] Controller status of the scanner board is displayed on the CAN Controller.

Rx	: Number of receive data bytes and frames
Tx	: Number of send data bytes and frames
OverRun	: Number of communication overrun errors detected by CAN Controller
Errors	: Number of communication errors detected by CAN Controller
Bus Off	: Number of Busoff detections
Baud Rate	e : Baud rate
Bus Load	: Load on the bus (maximum, minimum, current)
_	

NOTE

Use DeviceNet so that the load on a bus is under 60% of the maximum load. When the load exceeds 60%, the DeviceNet network communication will be unstable. (For example, more communication errors)

For the procedure for master configuration, refer to respective master device manuals. For EPSON RC+ master configuration, refer to the section 2.1.3 *Installing DeviceNet Master Board manufactured by molex*.



(2) Select the [DeviceNet (scanner)] tab. The window changes as shown below.

C	andryg Lys The Statest Statest and advantation Lindowick	
	MAC ID	: MAC ID specified for the scanner board
	Module/NetWork LED	: Network Status (NS) LED status
	IO LED	: Module Status (MS) LED status
	applicomR Status	: Scanner board status

The scanner board status is shown in the "Code No. => Comment" form. The table below shows the code numbers.

Status	Code	Descriptions
General	Protocol	Descriptions
0		No fault detected.
0		The function was performed correctly.
		Inaccessible data.
	4	Additional information:
		The remote device is in error. Check its status.
32		The parameters passed to the functions are not
52		correct (eg: Number of requested variables too large)
		Response time-out error.
		Additional information:
	33	The device does not respond. Check the device
	55	status and the wiring.
		The DeviceNet master has no device to be scanned in
		the configuration.
		Physical defect on the line.
		Additional information:
	34	No +24V power supply was detected.
	51	The CAN component of the applicomIO® interface
		is "Bus Off".
		Check the network wiring and Baud Rate.
		Device not configured.
		Define the device configuration with the
36		applicomIO® Console and re-initiate the
		initialization of the applicomIO® product by running
		the PcInitIO

	Code	Descriptions
General	Protocol	Descriptions
		Non-resident dialogue software.
45		Additional information:
43		Initialize the applicomIO® interface before use by
		running the PcInitIO
47		Targeted applicomIO® card invalid or incorrectly
47		initialized by the function IO Init
		Synchronization problem on the line.
		Additional information:
	52	The DeviceNet master is "off line" (power supply
	53	not detected or the CAN component of the
		applicomIO® is "Bus Off")
		Check the network wiring and Baud Rate.
		Response time-out exceeded.
		Additional information:
	55	The device accepted the connection but did not
		respond the request.
		Check the device status.
		Connection denied.
		Additional information:
	65	Connection to the DeviceNet master is in progress
		or refused by the device.
		Connection finished.
		Additional information:
	70	Duplication of MAC ID detected on the DeviceNet
70		network.
		Modify the MAC ID of the DeviceNet master.
		Profile incompatible.
		Additional information:
	79	The device does not match the configuration.
		Check the device identity and the connection sizes.
		Indicates that a communication error has been
63		encountered on serial Port.
66		
		Not enough applicomIO® interface memory.
93		Driver cannot be accessed.
99		Indicates that applicomIO® solution is already
-		running.
		Indicates that the local input buffer was not
255		updated beforehand by the function
		IO_RefreshInput.

(3) When you click <I/O> icon on the upper left of the window, the window changes as shown below.

Nagnostic Board : 1								<u> </u>
Diagnostic ?								
P 10 ?								
Board 1 PCI_DVNIO	Chann	el Ir 1	nforr 2	natio 3	on — 4	5	6	7
Channel 0 : DEVICENET	0	0	•	•	0	0	0	0
Equipment N*:2	8	9	10	11	12	13	14	15 O
	16	17	18	19	20	21	22	23
Equipment N*:3	0	0	0	0	0	0	0	0
	24	25	26	27	28	29	30	31
	32	33	34	35	36	37	38	39
	0	0	0	0	0	0	Ö	Ö
	40	41	42	43	44	45	46	47
	0	0	0	0	0	0	0	0
	48	49	50	51	52	53	54	55 (*)
	56	57	58	59	60	61	62	63
	0	Ö	Ö	Ö	Ö	0	Ö	Ö
			evior	us		<u>N</u> e	et >>	
applicom								

Each slave device status is shown in the right side of the window.

A green circle indicates that the communication of the corresponding device is normal, and a red circle indicates that there is a communication error.

A gray circle indicates that the corresponding device does not exist.

(4) When you select [Equipment] on the device tree in the left side of the window, the window changes as shown below.

👱 Diagnostic Board : 1	
Diagnostic ?	
P 1/0 ?	
Board 1 PCI_DVNID Channel 0 : DEVICENET Equipment N*:2 Equipment N*:3	Equipment informations Input Mapping (in Byte) : Output Mapping (in Byte) : Selected Output Value : Hex O Wite Input Lenght (Bytes) : [2 Output Lenght (Bytes) : [1 applicomR Status : No synchronous on bus
applicom international	

The input and output statuses of the selected device are shown in the right side of the window.

If you want to change output data, click the byte number you want to change in [Output Mapping]. Then, enter a value in [Selected Output Value:]-[Write] and click the <Write> button.

4.2 PROFIBUS DP Troubleshooting

Exclusion

Every system has its special environment, conditions, specifications, and usages. This guide is provided as a general reference for troubleshooting a PROFIBUS DP network. Every effort has been made to ensure the information is accurate. However, we do not guarantee the complete accuracy of the information and thus we decline any liability for damages or costs incurred by the use of this troubleshooting.

Before examining a problem on the network, please ensure that your established PROFIBUS DP system satisfies network specifications. (Refer to this troubleshooting and the section 2.2.2 PROFIBUS DP Network Construction.)

Tools

Prepare the following tools for troubleshooting.

Philips screwdriver

Flat-blade screwdriver

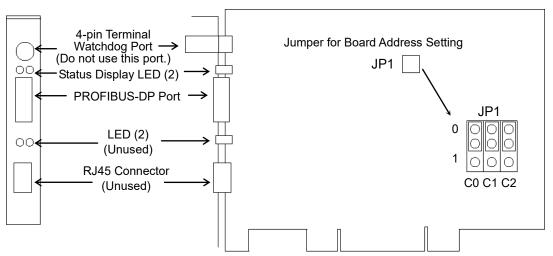
Tester

4.2.1 Examining a Problem

4.2.1.1 Scanner Board Diagnostic LEDs

The PROFIBUS DP board used with EPSON RC+ has two status display LEDs. The layout of the LEDs is shown in the following figure.

PCU-DPIO



The Communication Status LED is on the left and the Physical Error LED is on the right seen from the rear panel.

The Communication Status LED is referred to as the ST LED (ST) in this section.

The Physical Error LED is referred to as the BF LED (BF) in this section.

4.2.1.2 Check Network Status

As a first step, check the current condition of the network. There are different specifications of status display LED on a device in the PROFIBUS DP standard. This section explains how to check the network status assuming that EPSON RC+ is configured as a master or slave.

(1) Master Status: BF/ST LEDs

LED	Col	or	Light Condition				
BF (Physical error)	□ Green	□ Red	ON Blinking OFF				
ST (Communication Status)	□ Green	□ Red	ON Blinking OFF				

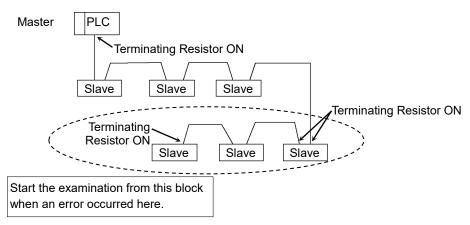
(2) Station Number of Absent Slaves

Absent slaves are disconnected from or not added to the network.

- 1. See the status flag regarding to the removal and addition if the master has status information.
- 2. See the BF/ST LEDs of all slaves if the master has no status information.
- (3) Absent Slave Status: BF/ST LEDs

LED Color Light Condition		Color		า	
BF (Physical error)	□ Green	□ Red	□ ON	Blinking	□ OFF
ST (Communication Status)	□ Green	□ Red	□ ON	Blinking	□ OFF

(4) Physical Node Location of Absent Slave



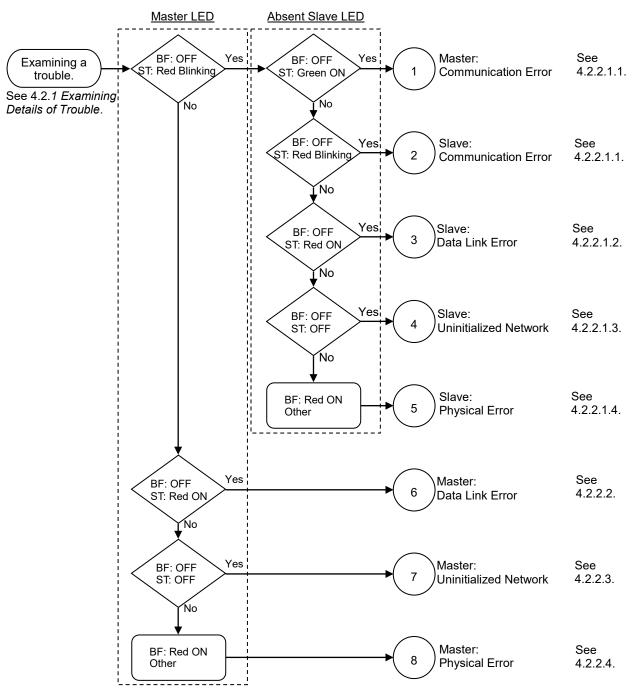
(5) Error Occurrence Condition

□ Immediate occurrence (high reproducibility)

□ Rare occurrence (low reproducibility)

4.2.2 Problems and Countermeasures

Master Unit LED		F ana a	
BF	ST	Error Description [Reference]	
Light OFF	Green Light Blinking	Normal communication	- Normal condition
Light OFF	Green Light ON	Ready for communication	- Normal condition
Light OFF	Red Light Blinking	Communication error	 [Refer to the section 4.2.2.1 Master Communication Error.] Slave disconnected from the network (Remote I/O communication error) Slave not added to the network (Scan list collation error)
			- Nonstandard wiring
			- No or too many terminating resistors
			- Noise intrusion
Light OFF	Red Light ON	Data link layer error	[Refer to the section 4.2.2.2 Master: Data Link Layer Error.]
			- Nonstandard wiring
			- Noise intrusion
Light OFF	Light OFF	Uninitialized network	[Refer to the section 4.2.2.3 Master: Uninitialized Network.]
			- Master unit power error
			- Master unit configuration error
Red Light ON	No Matter	Physical error	[Refer to the section 4.2.2.4 Master: Configuration Error.]
			- Nonstandard wiring
			- Signal wire connection failure
			- Signal wire short circuit

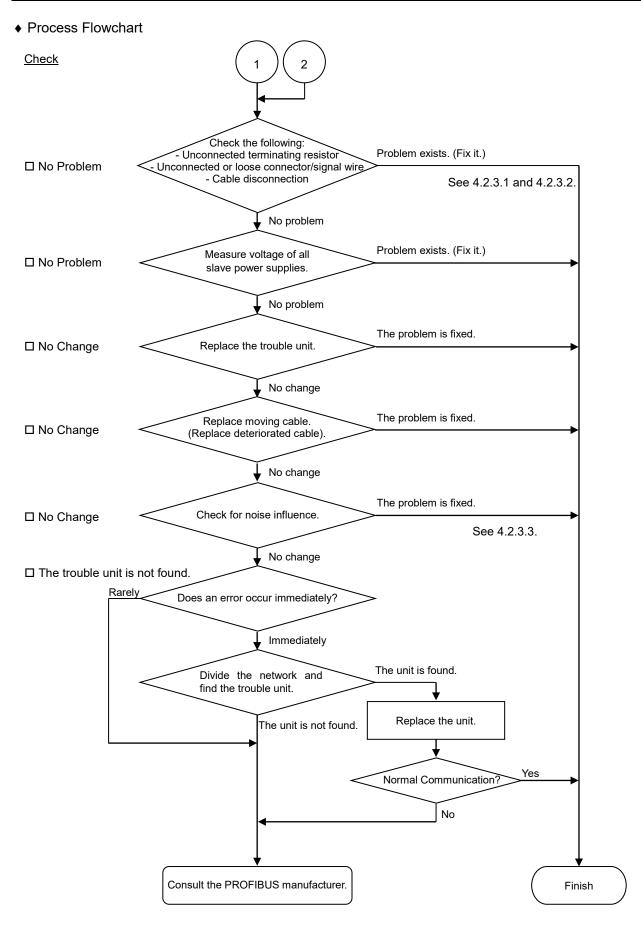


4.2.2.1 Master: Communication Error

Master I	Jnit LED	Error	Description	
BF	ST	Enor	Description	
Light OFF	Red Light Blinking	Communication error	 Slave disconnected from the network (Remote I/O communication error) Slave not added to the network (Scan list collation error) Nonstandard wiring No or too many terminating resistors Noise intrusion 	

Master/Slave: Communication Error

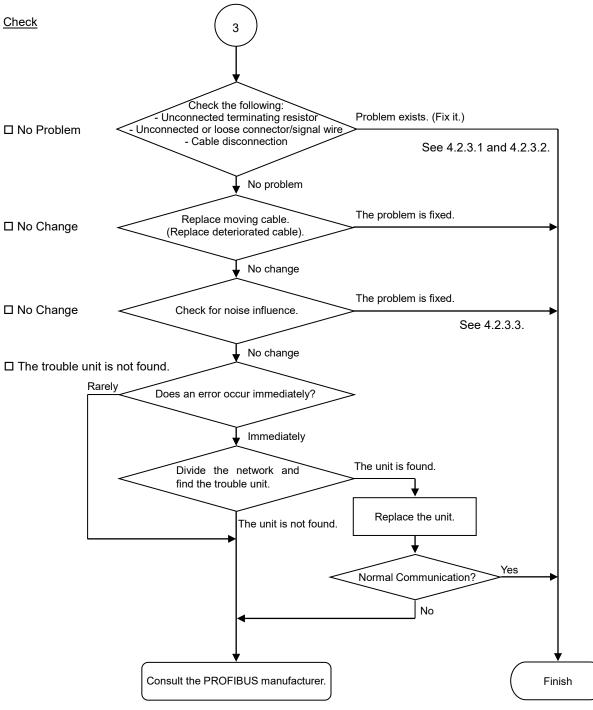
	BF	ST
Master LED Condition	Light OFF	Red Light Blinking
Absent Slave LED Condition	Light OFF	Green Light Blinking
(Communication error)	Light OFF	Red Light Blinking



Causes of Error Possible Cause	Examination Method	Countermeasure
O Disconnected	(1) Check that terminating	Fix the problem.
terminating	resistors are connected to	
resistors	both ends of the network.	How to find the trouble
O Cable	(2) Measure resistance between	point:
disconnection	signal wires with device	Remove the terminating
O Disconnected	power supply OFF.	resistor on one end of the
connector	\rightarrow Normal: 100 to 120 Ω	network.
O Disconnected	• Measuring point: Connection	The trouble point is where
signal wire	of the trouble unit	resistance changes from
	• For details, refer to the section	220 Ω.
	4.2.3.1 Connection Problem.	
O Loose connector	Check for the connection of	Connect the connectors and
O Loose signal wire	connectors and signal wires.	signal wires again.
	\rightarrow The connectors and signal	
	wires should be firmly	
	connected.	
	• Checkpoint: all stations and all	
	branch taps	
	• For details, refer to the section	
	4.2.3.2 Loose Connector and	
0.51	Signal Wire.	
O Electrical surges of	Measure voltage of the device	Check voltage of the device
device power	power supply at the trouble unit.	power supply.
supply	\rightarrow It should be within the range	
	of sufficient voltage for device	
O Noise	operation. Check the noise intrusion via the	Talas a service service a
		Take countermeasures
(external cause)	following paths (1) to (3).	against noise.
	(1) Noise via shield	
	(2) Induced noise via	
	communication cable	
	(3) Device power supply	
	\rightarrow For details, refer to the section 4.2.3.3 Noise	
O Broken unit	<i>Intrusion.</i> Replace the trouble unit with a	Replace the unit with a new
	-	1
	new one.	one.
	\rightarrow Verify whether the problem is fixed.	
• No cause is	Identify the trouble point by	
identified.	dividing the network.	
iuciitiiteu.	\rightarrow For details, refer to the	
	\rightarrow For details, refer to the section 4.2.3.4 Broken Unit	
	Examination.	

4. Troubleshooting (PROFIBUS DP)

Slave	e: Data Link Error		
		MS	NS
	Master LED Condition	Light OFF	Red Light Blinking
	Absent Slave LED Condition (Data link error)	Light OFF	Red Light ON

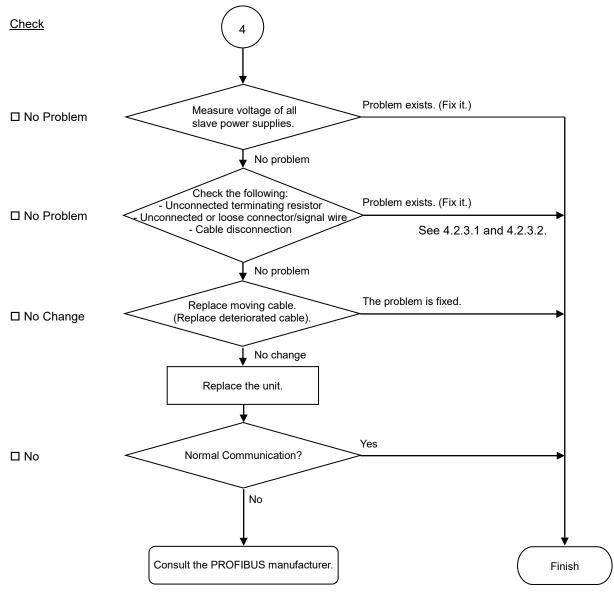


 Causes of Error 	1	r
Possible Cause	Examination Method	Countermeasure
O Disconnected terminating resistors	(1) Check that terminating resistors are connected to	Fix the problem.
O Cable disconnection	both ends of the network.	How to find the trouble
O Disconnected	(2) Measure resistance between	point:
connector	signal wires with device	Remove the terminating
O Disconnected signal	power supply OFF.	resistor on one end of the
wire	\rightarrow Normal: 100 to 120 Ω	network. The trouble
	• Measuring point: Connection	point is where resistance
	of the trouble unit	changes from 220 Ω .
	• For details, refer to the section	
	4.2.3.1 Connection Problem.	
O Loose connector	Check for the connection of	Connect the connectors
O Loose signal wire	connectors and signal wires.	and signal wires again.
C C	\rightarrow The connectors and signal	
	wires should be firmly	
	connected.	
	• Checkpoint: all stations and all	
	branch taps	
	• For details, refer to the section	
	4.2.3.2 Loose Connector and	
	Signal Wire.	
O Noise	Check the noise intrusion via the	Take countermeasures
(external cause)	following paths (1) to (3) .	against noise.
	(1) Noise via shield	
	(2) Induced noise via	
	communication cable	
	(3) Device power supply	
	\rightarrow For details, refer to the	
	section 4.2.3.3 Noise	
	Intrusion.	
O Broken unit	Replace the trouble unit with a	Replace the unit with a
	new one.	new one.
	\rightarrow Verify whether the problem is	
	fixed.	
• No cause is	Identify the trouble point by	
identified.	dividing the network.	
	\rightarrow For details, refer to the	
	section 4.2.3.4 Broken Unit	
	Examination.	

4. Troubleshooting (PROFIBUS DP)

ave: Uninitialized Network		
	BF	ST
Master LED Condition	Light OFF	Red Light Blinking
Absent Slave LED Condition (Uninitialized Network)	Light OFF	Light OFF

Slave: Uninitialized Network



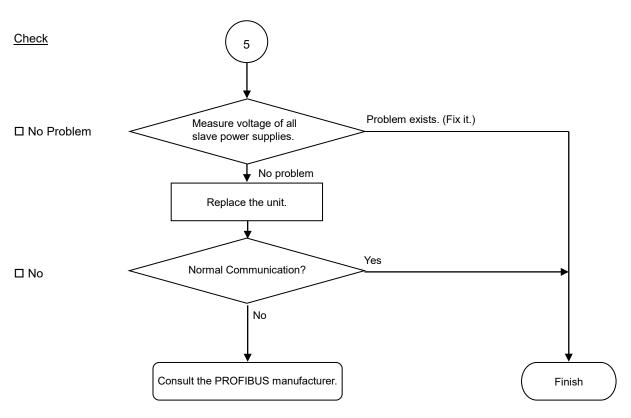
 Causes of Error 		
Possible Cause	Examination Method	Countermeasure
O Electrical surges of device power	Measure voltage of the device power supply at the trouble unit.	Check voltage of the device power supply.
supply	 → It should be within the range of sufficient voltage for device operation. 	
O Disconnected terminating	(1) Check that terminating resistors are connected to	Fix the problem.
resistors O Cable	both ends of the network.(2) Measure resistance	point:
disconnection O Disconnected connector	between signal wires with device power supply OFF. → Normal: 100 to 120 Ω	Remove the terminating resistor on one end of the network.
O Disconnected signal wire	 Measuring point: Connection of the trouble unit For details, refer to the section 4.2.3.1 Connection Problem. 	The trouble point is where resistance changes from 220 Ω .
O Loose connector O Loose signal wire	 Check for the connection of connectors and signal wires. → The connectors and signal wires should be firmly connected. Checkpoint: all stations and all branch taps For details, refer to the section 4.2.3.2 Loose Connector and Signal Wire. 	Connect the connectors and signal wires again.
O Broken unit	Replace the trouble unit with a new one. → Verify whether the problem is fixed.	Replace the unit with a new one.

Causes of Error

4. Troubleshooting (PROFIBUS DP)

Physical Error		
	BF	ST
Master LED Condition	Light OFF	Red Light Blinking
Absent Slave LED Condition (Physical error)	Red Light ON	No Matter

Process Flowchart

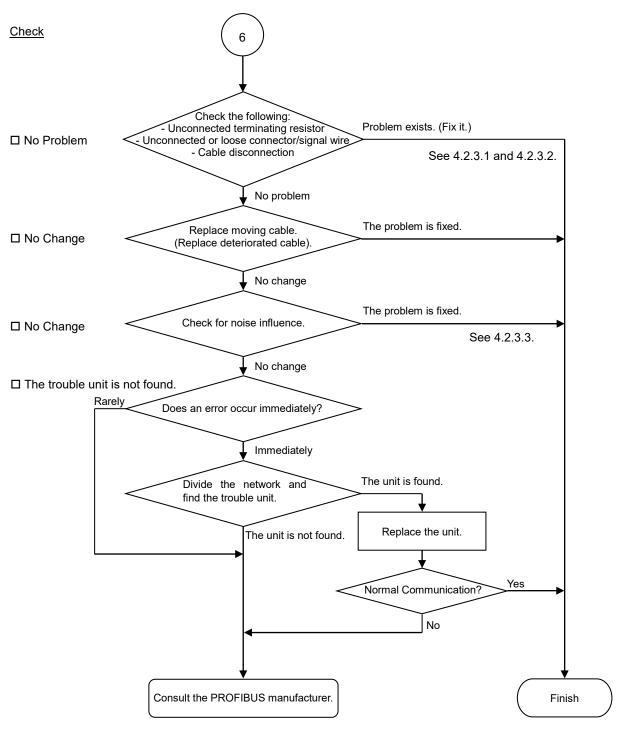


Causes of Error

Possible Cause	Examination Method	Countermeasure
O Electrical surges of	Measure voltage of the device	Check voltage of the device
device power supply	power supply at the trouble	power supply.
	unit.	
	\rightarrow It should be within the range	
	of sufficient voltage for	
	device operation.	
O Broken unit	Replace the trouble unit with a	Replace the unit with a new
	new one.	one.
	\rightarrow Verify whether the problem	
	is fixed.	

4.2.2.2 Master: Data Link Layer Error

Master l	ster Unit LED Error		Description	
BF	ST	LIIU	Description	
Light OFF	Red Light ON	Data link layer error	- Nonstandard wiring - Noise intrusion	



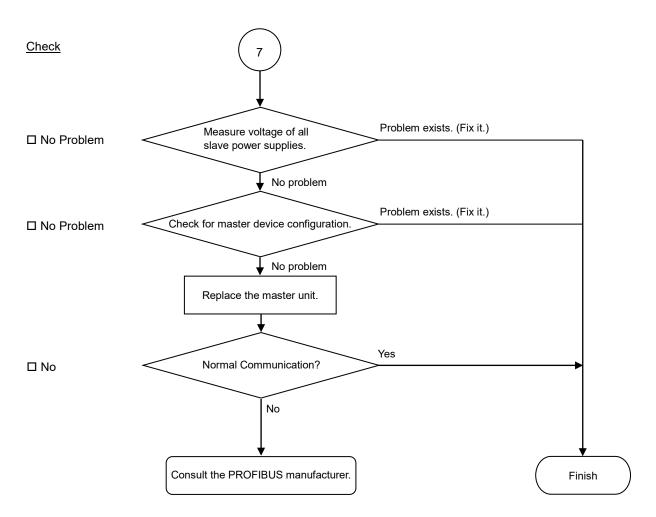
♦ Causes of Error

Causes of Error		
Possible Cause	Examination Method	Countermeasure
O Disconnected	(1) Check that terminating	Fix the problem.
terminating	resistors are connected to	
resistors	both ends of the network.	How to find the trouble
O Cable	(2) Measure resistance between	point:
disconnection	signal wires with device	Remove the terminating
O Disconnected	power supply OFF.	resistor on one end of the
connector	\rightarrow Normal: 100 to 120 Ω	network.
O Disconnected	 Measuring point: Connection 	The trouble point is where
signal wire	of the trouble unit	resistance changes from
	• For details, refer to the section	220 Ω.
	4.2.3.1 Connection Problem.	
O Loose connector	Check for the connection of	Connect the connectors
O Loose signal wire	connectors and signal wires.	and signal wires again.
	\rightarrow The connectors and signal	
	wires should be firmly	
	connected.	
	• Checkpoint: all stations and all	
	branch taps	
	• For details, refer to the section	
	4.2.3.2 Loose Connector and	
	Signal Wire.	
O Noise	Check the noise intrusion via the	Take countermeasures
(external cause)	following paths (1) to (3).	against noise.
	(1) Noise via shield	
	(2) Induced noise via	
	communication cable	
	(3) Device power supply	
	\rightarrow For details, refer to the section	
	4.2.3.3 Noise Intrusion.	
O Broken unit	Replace the trouble unit with a	Replace the unit with a
	new one.	new one.
	\rightarrow Verify whether the problem is	
	fixed.	
• No cause is	Identify the trouble point by	
identified.	dividing the network.	
	\rightarrow For details, refer to the section	
	4.2.3.4 Broken Unit	
	Examination.	

4.2.2.3 Master: Uninitialized Network

Master Unit LED		Error	Description	
BF	ST	LIIU	Description	
Light OFF	Light OFF	Uninitialized network	 Master unit power error Master unit configuration error 	

Process Flowchart



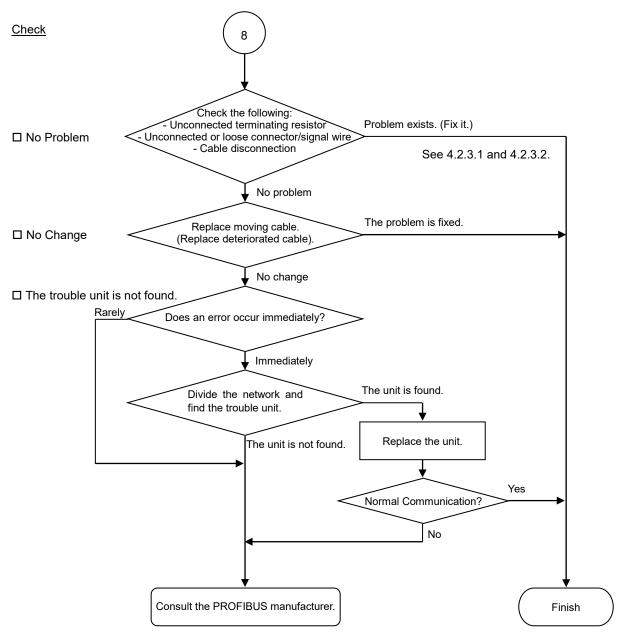
♦ Causes of Error

Possible Cause	Examination Method	Countermeasure
O Electrical surges of master device power supply	Measure voltage of the device power supply at the master unit. →It should be within the range of sufficient voltage for device operation.	Check voltage of the device power supply.
O Master device configuration error	Check that the master device was configured properly. →After changing the configuration, verify whether the problem is fixed.	Check the master unit configuration.
O Broken master unit	Replace the broken master unit with a new one. →Verify whether the problem is fixed.	Replace the master unit with a new one.

4. Troubleshooting (PROFIBUS DP)

4.2.2.4 Master: Configuration Error

Master Unit LED		F ara a	Description	
BF	ST	Error	Description	
Red Light ON	No Matter	Physical error	 Nonstandard wiring Signal wire connection failure Signal wire short circuit 	

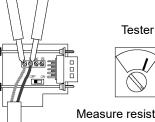


 Causes of Error 		
Possible Cause	Examination Method	Countermeasure
O Disconnected terminating resistors	(1) Check that terminating resistors are connected to both	Fix the problem.
O Cable disconnection	ends of the network.	How to find the trouble
O Disconnected connector	(2) Measure resistance between signal wires with device power	point: Remove the terminating
O Disconnected signal	supply OFF.	resistor on one end of
wire	\rightarrow Normal: 100 to 120 Ω	the network.
	• Measuring point: Connection of	The trouble point is
	the trouble unit	where resistance
	• For details, refer to the section 4.2.3.1 Connection Problem.	changes from 220 Ω .
O Loose connector	Check for the connection of	Connect the connectors
O Loose signal wire	connectors and signal wires.	and signal wires again.
	\rightarrow The connectors and signal wires	
	should be firmly connected.	
	 Checkpoint: all stations and all 	
	branch taps	
	• For details, refer to the section	
	4.2.3.2 Loose Connector and	
	Signal Wire.	
O Broken unit	Replace the trouble unit with a new	Replace the unit with a
	one.	new one.
	\rightarrow Verify whether the problem is	
	fixed.	
• No cause is	Identify the trouble point by	
identified.	dividing the network.	
	\rightarrow For details, refer to the section	
	4.2.3.4 Broken Unit	
	Examination.	

Causes of Error

4.2.3 Procedures for Examining Possible Causes

- 4.2.3.1 Connection Problem (Disconnected Terminating Resistors, Cable Disconnection, Disconnected Connector, and Disconnected Signal Wire)
- (1) Ensure that two terminating resistors are connected to both ends of the network.
- (2) Turn OFF all device power supplies.
- (3) Measure resistance between A1 and B1 wires of the absent slave using the tester.

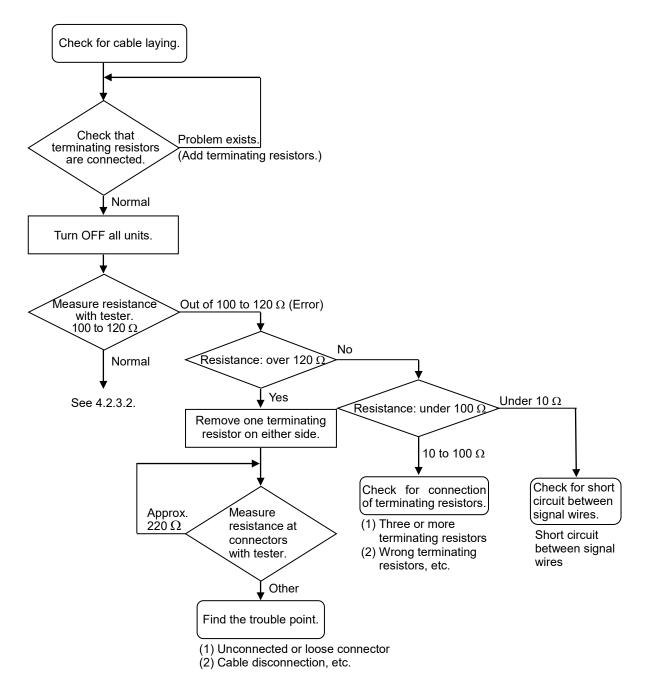


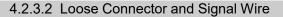
Measure resistance between signal wires with tester.

Resistance	Determination	
0 Ω	Short circuit	
Under 100Ω	Three or more terminating resistors on one network	
100 to 120 Ω	Normal	
Over 120 Ω	Error (cable disconnection, disconnected signal wire, one or	
	zero terminating resistor)	

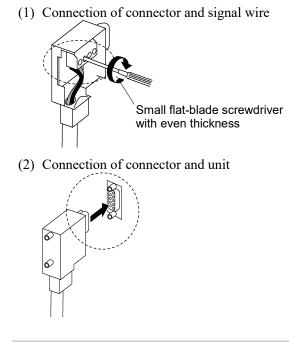
(4) How to find the trouble point:

- Remove the terminating resistor on one end of the network. (The resistance at the point where the terminating resistor is connected is 220Ω .)
- Measure resistance at branch taps of all units.
- The trouble point is where resistance changes from 220Ω .
- After finding the trouble point, verify the connector and cable conditions.





Check for the connections of the following parts on the connector and cable.

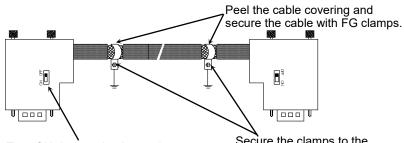


4.2.3.3 Noise Intrusion

Verify how error occurrence condition changes while taking the following countermeasures.

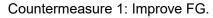
Ground of FG wire

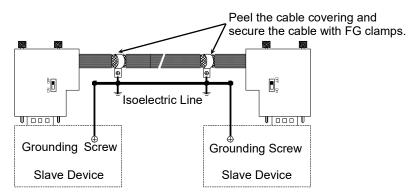
Normal Grounding: Peel the cable covering and ground the FG wire.



Turn ON the terminating resistor at the end of the network.

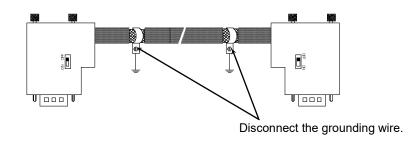
Secure the clamps to the intermediate plate of the board with screws to ground the shield.





Countermeasure 2: Disconnect the FG wire to isolate it from the ground.

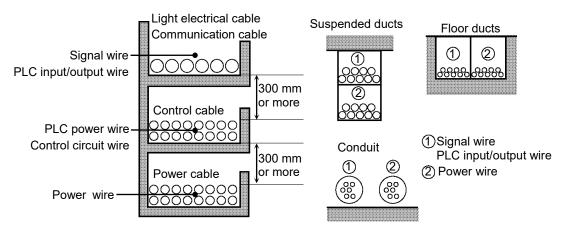
When noise intrudes the ground line due to a noise source such as an inverter installed near the grounding point, disconnect the shield wire of the signal cable and isolate it from the ground to restrain noise intrusion.



Induced noise via communication cable

Separate the PROFIBUS DP signal wire from the other wires (especially power wires).

* Separate the signal wire from the power wires 300 mm or more.



During site inspection, bypass the wire that is possibly affected by induced noise with other cables and then lay the cables. Establish the communication under no induced noise condition and verify whether an error occurs.

4.2.3.4 Broken Unit Examination (Dividing Network Examination)

When you cannot quickly find the trouble point due to broken unit, connection failure including loose connector, or cable partial disconnection, divide the network to find the trouble point. Verify how error occurrence conditions change while taking the following countermeasures.

How to Examine

Divide the network to find which station is a cause of a trouble.

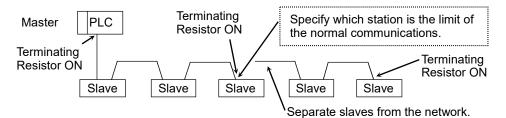
Verify that a master can establish communications with the slaves even though one slave is separated from the network.

After finding the trouble station, check the cables connected to it and replace the unit.

How to Divide

Divide the network by block and check each block.

- 1. Ensure that the master has no problem by connecting it to its slaves one by one. (BF/ST: light OFF/green light ON or blinking)
- 2. Divide the network in the middle of it and check for the communication condition. (BF/ST: light OFF/green light ON or blinking)
 Normal: The trouble point is on the other half of the network.
 Error: The trouble point is on the current half of the network.
 (Continue dividing the half of the network further to distinguish error part from normal part.)
- 3. Check for communication on the block to specify the trouble point.



4.2.3.5 Network Configuration and Specifications

(1) Maximum Cable Length

Check that the cables used on the network meet the following specifications.

Baud Rates	Max. Cable Length
12 Mbps	100 m
6 Mbps	100 m
3 Mbps	100 m
1500 kbps	200 m
500 kbps	400 m
187.5 kbps	1000 m
93.75 kbps	1200 m
19.2 kbps	1200 m
9.6 kbps	1200 m

(2) Terminating Resistor

Ensure that two terminating resistors are connected to both ends of the network. The terminating resistor should be connected as shown below.

(3) Cable

The cables should meet the PROFIBUS specifications.

Item	Property
Impedance	135 to 165 Ω
Capacity	< 30 pf/m
Loop resistance	110 Ω/km
Wire diameter	0.64 mm
Core cross-section	> 0.34mm ²

4.2.3.6 EPSON RC+ Master Configuration

For details of EPSON RC+ master configuration, refer to the section 2.2.3 Installing PROFIBUS-DP Master Board Manufactured by molex.

The following section describes the procedure for verifying the scanner board condition with the applicomIO Console application.

Verifying applicomIO Console application condition

The status bar at the bottom of the window shows the applicomIO Console application status. The status bar varies as shown below:

Character : The address number of the scanner board is indicated with characters. When the character "F" appears, the flash memory on the board initialized the scanner board.

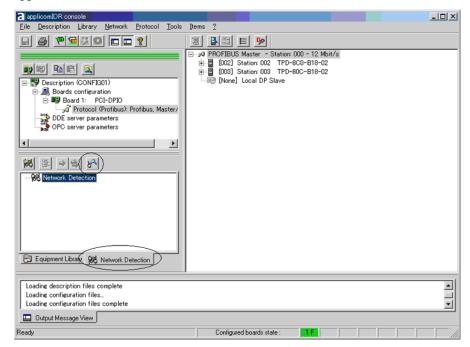
Background color : The background color indicates the scanner board status. For details, refer to the table below.

Background	Character	Status
Gray	Black	Access to scanner board was failed.
		After that, the status bar will not be renewed
		automatically. To renew the status bar, right-click
		the status bar and select [Refresh].
Magenta	Black	The scanner board was initialized with the earlier
		version applicomIO Console application.
		It is recommended that the scanner board be written
		into the flash memory (reinitializing the scanner
		board) again with the current version applicomIO
		Console application.
Red	Black	The scanner board was not initialized.
		Initialize the scanner board to use it.
Yellow	Black	The scanner board was partially initialized.
		This status happens only during network detection and on-line actions.
Deep green	White	Although the scanner board was initialized, it is
		different with the currently opened configuration.
		(Different version, etc.)
		It is recommended that the scanner board be written
		into the flash memory (reinitializing the scanner
		board) again with the current version applicomIO
		Console application.
		This status happens only during network detection,
Career	Black	on-line actions, and diagnostic.
Green	Бласк	The scanner board was initialized properly and it is no different with the currently opened configuration.
		This status happens only during network detection,
		on-line actions, and diagnostic.
L	I	on mie actions, and diagnostic.

Verifying the PROFIBUS DP network condition

The applicomIO Console application has the following functions:

- Network Monitor function: Monitoring error condition detected on the networkDiagnostic function: Network diagnosis
- (1) Select the [Network Detection] tab in the left center of the applicomIO Console application.



(2) Click the <Online Action> icon. The [Network Monitor] dialog box appears.

Online Ac <mark>tio</mark> n						? ×
Network M	onitor Set	Slave Address				
000 0	02 003					
Token E	rror :	þ			-	1 🔤
Address	Error :	0			-40	
Timeout	Error:	1	Network Cycle :	61689		
Frame E	rror :	0	Bus Fault :	1		∎ ∎- <u>∎</u>
				<u>H</u> elp	<u>O</u> K	<u>C</u> ancel

You can check the conditions of the following errors on this dialog box.

Token Error	Address Error	Timeout Error
Frame Error	Network Cycle	Bus Fault

When an error occurs on the network, it is added to the corresponding error counter.

(3) Select [Protocol]-[Diagnostic] from the applicomIO Console application menu. Click the magnifying grass icon on the [Diagnostic] dialog box.

Then, select the slave you want from the device tree in the left side of the window. The window changes as shown below.

Diagnostic Board : 1	
Board 1 PCI_DPIO Channel 0 : PRDFIBUS Slave N*:2 ->DP Slave N*:3 ->DP	Equipment information Slave Information Master Address : 0 SYNC Mode FREEZE Mode Vatchdog Control Slave Device Identification Number : Decimal : [1562 Hexadecimal : [61A Configuration Display modules
applicom	

To check the device condition in detail, click <Diagnostic> in [Equipment information] in the right side of the window. If an error occurs, the information is displayed in red.

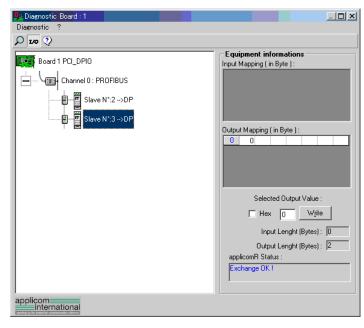
<u></u> Dia	gnostic Slave N° :2>DP			<u>? ×</u>
00000000	Master Lock Parameter Fault Invalid Slave Response Not Supported Extended Diag Configuration Fault Station not Ready Station non Existent	0	Slave Deactivated Reserved SYNC Mode FREEZE Mode Watchdog On Slave Device Static Diag Parameter Reg Used	Ext Diag Overflow Reserved Reserved Reserved Reserved Reserved Reserved Reserved Reserved
	<u>ended Diag</u> ice Related Diagnostic : 0x00	0×00 0>	x00 0x00 0x00 0x00	X
applic Cld Ext	com international ented Status : 0			

(4) When you click the $\langle I/O \rangle$ icon, the window changes as shown below.

Piagnostic Board : 1	
Diagnostic ?	
P 10 ?	
Board 1 PCI_DPI0	Equipment information
	0 1 2 3 4 5 6 7
Channel 0 : PROFIBUS	0000000
Slave N*:2>DP	8 9 10 11 12 13 14 15
	16 17 18 19 20 21 22 23
Slave N*:3>DP	
	24 25 26 27 28 29 30 31
	00000000
	32 33 34 35 36 37 38 39
	00000000
	40 41 42 43 44 45 46 47
	56 57 58 59 60 61 62 63
	00000000
	<< Previous Next >>
applicom international	

The status of each slave device is shown in the right side of the window. A green circle indicates that the communication of the corresponding device is normal, and a red circle indicates that there is a communication error. A gray circle indicates that the corresponding device does not exist.

(5) When you select the slave from the device tree in the left side of the window, the window changes as shown below.



The input and output statuses of the selected device are shown in the right side of the window.

If you want to change output data, click the bite number you want to change in [Output Mapping]. Then, enter a value in [Write] in the "Selected Output Value" and click <Write>.

4.3 EtherNet/IP Troubleshooting

Exclusion

Every system has its special environment, conditions, specifications, and usages. This guide is provided as a general reference for troubleshooting a EtherNet/IP network. Every effort has been made to ensure the information is accurate. However, we do not guarantee the complete accuracy of the information and thus we decline any liability for damages or costs incurred by the use of this troubleshooting.

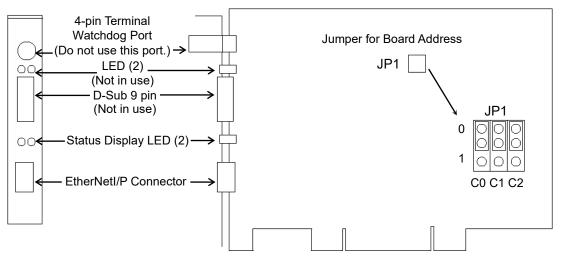
Before examining a problem on the network, please ensure that your established DeviceNet system satisfies network specifications. (Refer to this troubleshooting and the section 2.3.2 EtherNet/IP Network Construction.)

4.3.1 Examining a Problem

4.3.1.1 Scanner Board Diagnostic LEDs

The EtherNet/IP board used with EPSON RC+ has two status display LEDs. The layout of the LEDs is shown in the following figure.

PCU-ETHIO



The Module/NetWork LED is on the left and the IO LED is on the right seen from the rear panel. These LED names are used in applicomIO Console application and this manual. Only in this troubleshooting section, general names of the status display of the DeviceNet device are used instead.

The Network Status LED is referred to as the NS LED (NS) in this section.

The Module Status LED is referred to as the MS LED (MS) in this section.

4.3.1.2 Checking Network Status

(1) Master Status: MS/NS LEDs

LED	Color		Color Light Condition		ı
MS (Module Status)	Green	□ Red	□ ON	🗖 Blinking	□ OFF
NS (Network Status)	Green	□ Red	□ ON	Blinking	□ OFF

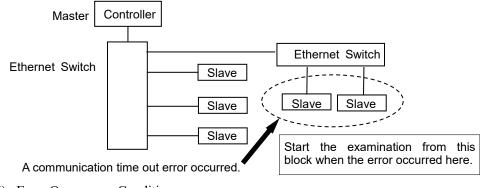
(2) Node Number of Absent Slaves

Absent slaves are disconnected from or not added to the network.

- 1. See the status flag regarding to the removal and addition if the master has status information.
- 2. See the MS/NE LEDs of all slaves if the master has no status information.
- (3) Absent Slave Status: MS/NS LEDs

LED	Color		Light Condition		n
MS (Module Status)	□ Green	□ Red	□ ON	🗖 Blinking	□ OFF
NS (Network Status)	□ Green	□ Red	□ ON	Blinking	□ OFF

(4) Physical Node Location of Absent Slave



(5) Error Occurrence Condition

□ Immediate occurrence (high reproducibility)

□ Rare occurrence (low reproducibility)

4.3.2 Problems and Countermeasu	res
---------------------------------	-----

Master Unit LED		Frrer	Description [Deference]
MS	NS	Error	Description [Reference]
Green	Green	Normal	- Normal condition
Light ON	Light ON	communication	
Green	Green	During connection	- Processing connection establishment
Light ON	Light	establishment	(The NS LED will be ON in green in a few
	Blinking		seconds.)
			- Master function in stop state
			(Communication does not start.)
Green	Red Light	Communication	- Network channel error
Light ON	Blinking	timeout	
Green	Light OFF	IP address not	- The IP address is not defined
Light ON		defined	
Red Light	No Matter	Critical error	[Refer to the section 4.3.3 Tests and diagnostics.]
Blinking			- Unrecoverable critical error
Red Light	No Matter	Module error	[Refer to the section 4.3.3 Tests and diagnostics.]
ON			- Recoverable error occurred
Light OFF	Light OFF	Not initialized status	[Refer to the section 2.3.3 Installing EtherNet/IP
			Master Board Manufactured by molex - Master
			Mode.]
			- The communication board is not initialized
			Check the configuration

4.3.3 Tests and Diagnostics

4.3.3.1 Diagnostic Tool

After configuring the EtherNet/IP master, adding and configuring the devices of your network and downloading your configuration in the board, the statuses of all devices can be tested with the diagnostic tool.

Start this tool by selecting the menu command [Protocol/Diagnostic...] or selecting the < > icon.

See also: To display the help, select [Start]-[Program]-[Direct-Link]-[applicomIO 2.3]-[Help].

Ethernet/IP channel on Ethernet diagnostics

The EtherNet/IP on Ethernet channel diagnostic information can be displayed by selecting the MULTI-MSG ETH channel.

Canal 0 : MULTI-MSG ETH

All devices in the configuration are visualized by a LED corresponding to the applicomIO device number.

The LED may be red or green depending on the device error status.

1. Diagnostic of the TCP/IP layer

This dialog box displays the status of the TCP/IP layer.

) vo 🖉 😲	Informations TCP/IP
Board 2 PCLETHIO Channel 0 : ETHERNET/IP Channel 0 : ETHERNET/IP Layer TCP/IP S Server Equipments S Server Equipments 31: [128.127.56.31] [EtherN	Configuration Type : Static Address From : Configuration IP Address : 128.127.56.122 Sub-Network Mask : 255.255.255.0 Gateway IP Address : 0.0.00 Primary DNS Address: 0.0.00 Secondary DNS Address: 0.0.00 Host Name : Domain Name : TEP TEP TABLE Address

Configuration Type	Mode type selected in the configuration: DHCP,
Adda a Fusue	BOOTP, Static
Address From	How the IP address has been obtained: from the server,
	flash memory or factory address.
IP address	IP address of the applicomIO master on this channel.
Sub-Network Mask	Sub-network address of the applicomIO master on this
	channel.
Gateway IP Address	Address of the gateway configured on the applicomIO
	master on this channel.
Primary DNS Address	IP Address of the primary DNS server.
Secondary DNS Address	IP address of the secondary DNS server.
Host Name	Host name of the applicomIO master on this channel.
Domain Name	Domain name of the applicomIO master on this channel.

TCP tab

	0	
Actives cor	nnections :	
	1	
Currents co	nnections :	
	1	
Bytes recei	ved.	
	674	
Bytes trans	mited :	
	1034	
Time-out re	transmitted :	
	0	

Passive connections Active connections Current connections Bytes received Bytes transmitted Retries on time-out

Number of passive connections. Number of active connections. Number of current connections. Number of bytes received. Number of bytes transmitted. Number of retries on reception of a time-out.

IP tab

Packets rece	aived : 13080	
Packets tran		
	13124	
Errors :	0	
TCP	Meter [Address

Packets received Packets transmitted Errors Number of packets received. Number of packets transmitted. Number of IP errors.

iagnostic Tools ?	
) vo 🛱 😲	
Board 2 PCL_ETHIO Channel 0 : ETHERNET/IP Channel 0 : ETHERNET/IP Layer TCP/IP Server Equipments 11: [128.127.56.31][1	EtherN
	Error requests : 0
	Advanced

2. Diagnostic of server devices

Requests	Number of requests.
Requests / s	Number of requests per second.
Useful bytes	Number of useful data bytes.
Useful bytes / s	Number of useful data bytes per second.
Requests in error	Number of requests in error.

3. Overall device diagnostics

View the diagnostic information on a device in the configuration by selecting the node which corresponds to the device.

💯 Diagnostic Board : 2	
Diagnostic Tools ?	
Q 1/0 Ø 🕄	
Board 2 PCLETHID Channel 0 : ETHERINET/IP Layer TCP/IP Server Equipments 31: [128.127.56.31] [EtherN	Equipment informations IP Address : 128.127.56.31 From : Configuration Request : 65154 Request /s : 200,00 Data bytes : 911924 Data bytes : 911924 Data bytes : 2800,00 Connections : 1 Time-out errors : 0 Frame errors : 0 Reject errors : 0 Advanced
<	

IP Address	IP address of the device.
From	How the IP address of the device was obtained:
	from the configuration
	from the DNS server (IP address of the device has been resolved)
Requests	Number of requests.
Requests / s	Number of requests per second.
Useful bytes	Number of useful data bytes.
Useful bytes / s	Number of useful data bytes per second.
Connections	Number of connections created for this device.
Time-out errors	Number of time-outs received for this device.
Frame errors	Number of frame errors for this device.
Refusal errors	Number of errors excluding time-out and frame errors.

TCP/IP tool

By clicking in the *icon* and selecting [TCP/IP layer], the [services] window displays the following options.

DNS

ICMP (ping)

See also: To display the help, select [Start]-[Program]-[Direct-Link]-[applicomIO 2.3]-[Help].

1. Resolution of IP address or name

DNS functionality can be enabled by selecting the applicomIO menu-[Protocol/Diagnostic…]-the [DNS] tab.

Diagnostic Board : 2	
Diagnostic Tools ?	
₽ vo ₽ Q	
Board 2 PCI_ETHIO	Services Address IP Address: IP Time Status Clear Ping Loop: Status: Stop On Error:
< <u>></u>	DNS ICMP

(1) Selects the type of resolution to be carried out.

IP Address : the host name is obtained from the IP address.

- Host Name : the IP address is obtained from the host name.
- (2) Carries out a resolution.
- (3) Status: Status of resolution carried out
 - 0 : No error
 - 33 : Response time-out exceeded
 - 132 : Negative reply from DNS server (SERVER FAILURE, etc.)

2. Ping

ICMP ECHO "PING" functionality can be enabled by selecting the applicomIO menu-[Protocol/Diagnostic…]-the [ICMP] tab.

Diagnostic Board : 2	
Diagnostic Tools ? 🔎 🕫 🧊 😲	
Board 2 PCI_ETHIO Channel 0 : ETHERNET/IP Layer TCP/IP Server Equipments 	Services Address IP Address : 128.127.56.31 Host Name : I28.127.56.31 128.127.56.31 128.127.56.31 128.127.56.31 128.127.56.31 128.127.56.31 128.127.56.31 128.127.56.31 128.127.56.31 128.127.56.31 Clear Ping Clear Status : Stop On Error :
<	DNS ICMP

- (1) Entry field for the IP address or name of the remote station.
- (2) Field showing result obtained:

Status 0	: The station is present and has responded
	(the response time is given in the Time column)
Status 33	: The station is not present

(3) Command field:

Clear	: Clears the list of results
Ping	: Sends a PING command
Loop	: Executes PING command in a loop
Stop on Error	: If Loop has been selected, stops if an error has occurred
Status	: Status of the PING request
	0 :OK

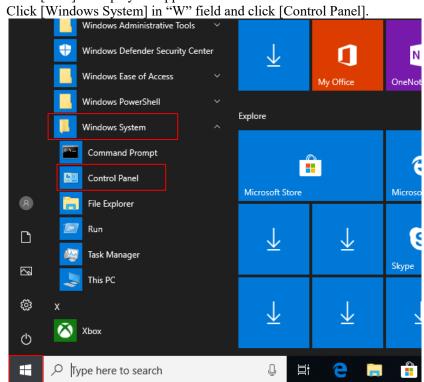
- 33 : TIME-OUT
- 132: Resolution error

4.4 How to Disable Fast Startup in Windows 10

How to Disable Fast Startup

Follow the steps below to disable the fast startup function.

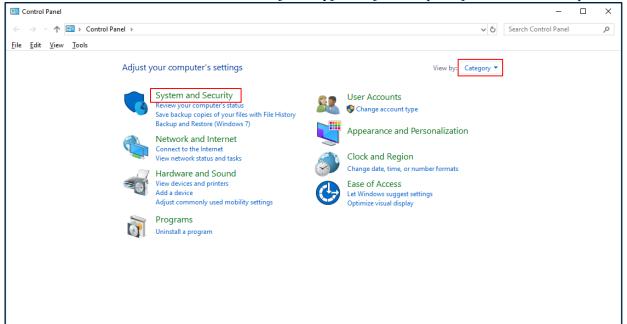
- * After performing this operation, the fast startup function remains disabled unless the setting is enabled again.
- (1) Click [Start] to display the application list.



4. Troubleshooting

(2) [Control Panel] is displayed.

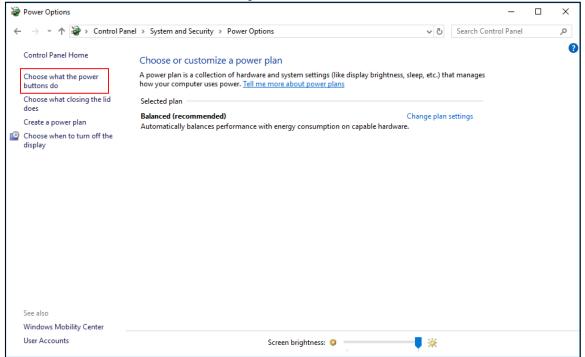
Make sure that "Category" is selected in [View by] and click [System and Security]. * If Icon is selected in [View by], click [Power Options] and move to the step 4.



(3) [System and Security] is displayed. Select "Power Options".

🌜 System and Security			-	X
🗧 🔶 👻 🛧 🍤 > Contro	Panel > System and Security >	~ Ū	Search Control Panel	P
ile <u>E</u> dit <u>V</u> iew <u>T</u> ools				
Control Panel Home System and Security Network and Internet	Security and Maintenance Review your computer's status and resolve issues Schange User Account Control settings Troubleshoot common computer problems			
Hardware and Sound Programs	Windows Defender Firewall Check firewall status Allow an app through Windows Firewall			
User Accounts Appearance and Personalization	System View amount of RAM and processor speed I View amount of RAM and processor speed See the name of this computer			
Clock and Region Ease of Access	Power Options Change battery settings Change what the power buttons do Change when the computer sleeps			
	File History Save backup copies of your files with File History Restore your files with File History Mathematical Backup and Restore (Windows 7)			
	Backup and Restore (Windows 7) Restore files from backup BitLocker Drive Encryption			
	Manage BitLocker Storage Spaces Manage Storage Spaces			
	Work Folders Manage Work Folders			
	Administrative Tools Free up disk space Defragment and optimize your drives 😵 Create and format hard disk partitions			

(4) [Power Options] is displayed.Select "Choose what the power buttons do"



(5) [System Settings] is displayed.

Select "Change settings that are currently unavailable".

🗃 System Settings	-	×
\leftarrow \rightarrow \checkmark \bigstar > Control Panel > Hardware and Sound > Power Options > System Settings \checkmark \eth	Search Control Panel	P
Define power buttons and turn on password protection Choose the power settings that you want for your computer. The changes you make to the settings on th page apply to all of your power plans. Change settings that are currently unavailable Power and sleep buttons and lid settings On battery Plugged in	is	
When I press the power button: 🗸 🗸 🗸		
When I press the sleep button:		
When I close the lid: 🗸 🗸 🗸		
Shutdown settings Turn on fast startup (recommended) This helps start your PC faster after shutdown. Restart isn't affected. <u>Learn More</u> Hibernate Show in Power menu. Lock Show in account picture menu.		
Save changes Cance	el	

4. Troubleshooting

(6) Deselect the checkmark of "Turn on fast startup" of [Shutdown settings] and click <Save changes>.

😺 System Settings	_	×
← → ▼ 🏠 > Control Panel > Hardware and Sound > Power Options > System Settings 🗸 👌 Search Control	ol Panel	P
Define power buttons and turn on password protection Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans. Power and sleep buttons and lid settings Power and sleep buttons and lid settings On battery Image Plugged in		
When I press the power button:		
When I press the sleep button:		
See When I close the lid:		
Shutdown settings Turn on fast startup (recommended) This helps start your PC faster after shutdown. Restart isn't affected. <u>Learn More</u> Hibernate Show in Power menu. Lock Show in account picture menu.		
Save changes Cancel		

Now, the setting is complete.

PC will turn ON with fast startup disabled from the next time.

4.5 How to Disable Fast Startup in Windows 8 or 8.1

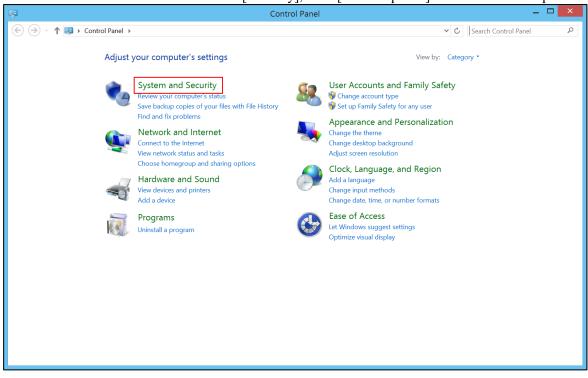
How to Disable Fast Startup

Follow the steps below to disable the fast startup function.

- * After performing this operation, the fast startup function remains disabled unless the setting is enabled again.
- (1) Press the Windows key while holding down the X key. Click [Control Panel] from the displayed list.

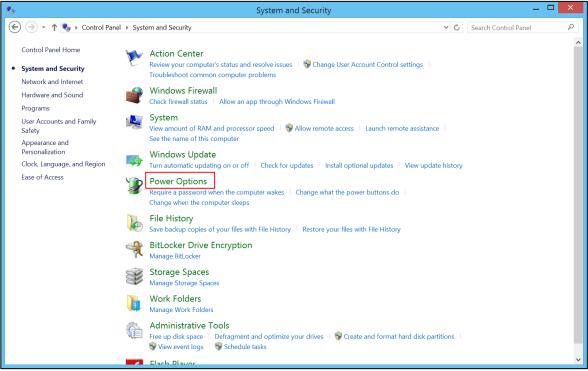


- (2) [Control Panel] is displayed.
 - Make sure that "Category" is selected in [View by] and click [System and Security].
 - * If Icon is selected in [View by], click [Power Options] and move to the step 4.



4. Troubleshooting

(3) [System and Security] is displayed. Select "Power Options".



(4) [Power Options] is displayed.Select "Choose what the power buttons do".

8		Power Options		-	х
¢) 🌛 👻 🕇 🍞 🕨 Control Panel	→ System and Security → Power Options	~ ¢	Search Control Panel	ρ
	Control Panel Home	Choose or customize a power plan			?
	Require a password on wakeup	A power plan is a collection of hardware and system settings (like display brightness, sleep, etc.) that man how your computer uses power. <u>Tell me more about power plans</u>	ages		
	Choose what the power buttons do	Preferred plans			
	Create a power plan	Balanced (recommended) Automatically balances performance with energy consumption on capable hardware.			
æ	Choose when to turn off the display	Automatically balances performance with energy consumption on capable nartware. O Power saver Change plan setting:			
۲	Change when the computer sleeps	Saves energy by reducing your computer's performance where possible.			
		Show additional plans	\bigcirc		
	See also Personalization				
	User Accounts				

(5) [System Settings] is displayed.

Select "Change settings that are currently unavailable".

3	System Settings			 ×
🗲 🌛 ▾ ↑ 🍞 ▸ Control Panel →	▶ Hardware and Sound ▶ Power Options ▶ System Settings	~ Ċ	Search Control Panel	ρ
	Define power buttons and turn on password protection Choose the power settings that you want for your computer. The changes you make to the settings on thi page apply to all of your power plans. Change settings that are currently unavailable Power and sleep button settings When I press the power button: Shut down Sleep When I press the sleep button: Sleep Require a password (recommended) When your computer wakes from sleep, no one can access your data without entering the correct password to unlock the computer. Create or change your user account password Don't require a password When your computer wakes from sleep, anyone can access your data because the computer isn't locked. 	5		~
	Shutdown settings			
	✓ Turn on fast startup (recommended) This helps start your PC faster after shutdown. Restart isn't affected. Learn More			
	Show in Power menu.			
	Hibernate			~
	Save changes Canc	el		

(6) Scroll the window and deselect the checkmark of "Turn on fast startup" of [Shutdown settings], then click <Save changes>.

System Settings		_ 🗆 🗙
(→ ↑) → Control Panel → Hardware and Sound → Power Options → System Settings	Search Control F	Panel P
Define power buttons and turn on password protection Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans. Power and sleep button settings Image apply to all of your power plans. Power and sleep button settings Image apply to all of your power plans. Power and sleep button settings Image apply to all of your power plans. Power and sleep button settings Image apply to all of your power plans. Power and sleep button settings Image apply to all of your power plans. Power and sleep button settings Image apply to all of your power plans. Power apply to all of your power plans. Power apply to all of your power plans. Image apply to all of y	-	~
 ○ Don't require a password When your computer wakes from sleep, anyone can access your data because the computer isn't locked. Shutdown settings ✓ Turn on fast startup (recommended) This helps start your PC faster after shutdown. Restart isn't affected. Learn More Show in Power menu. ✓ Sleep Show in Power menu. ✓ Hibernate 	-	
Show in Power menu.		~
Save changes Cancel		

Now, the setting is complete.

5. Maintenance Parts List

Slave (Board)

			Supported Model		
Part Name	Code	Old Code	RC700, RC700-	T/VT	
			A, RC90/90-B	series	
DeviceNet board	R12NZ9004F	R12B040727	1	_	
PROFIBUS-DP	R12NZ9004H	R12B040729	1	_	
board					
CC-Link board	R12NZ9004J	R12B040730	1	—	
EtherNet/IP board	R12NZ900A7	R12N747061	✓	_	
PROFINET board	R12NZ900A6	R12N747051	1	_	
EtherCAT board	R12NZ910CL	-	1	—	

Slave (Module)

		Supported Model		
Part Name	Code	RC700, RC700-A,	T/VT	
		RC90/90-B	series	
DeviceNet board	R12NZ900TE	-	1	
PROFIBUS-DP board	R12NZ900TF	-	1	
CC-Link module	R12NZ900TD	-	1	
EtherNet/IP board	R12NZ900TH	-	✓	
PROFINET board	R12NZ900TG	-	1	
EtherCAT board	R12NZ900TX	_	1	

laster	Γ	
Part Name	Board	Code
PROFIBUS-DP board		2174735
DeviceNet board manufactured by molex		2174734
EtherNet/IP board manufactured by molex		2174736
DeviceNet board manufactured by Hilscher		2208434
EtherNet/IP board manufactured by Hilscher		2208435

Master