HITACHI PROGRAMABLE CONTROLLER

HIDIC EH-150

DeviceNet Master Module(EH-RMD)/ Slave Controller(EH-lOCD)/ Discrete I/O slave unit (RDX16D,RDY16TP,RDY16R) APPLICATION MANUAL

NJI-364A(X)

○ Warranty period and coverage

The warranty period is the shorter period either 18 months from the date of manufacture or 12 months from the date of installation.
However within the warranty period, the warranty will be void if the fault is due to;

(1) Incorrect use as directed in this manual and the application manual.
(2) Malfunction or failure of external other devices than this unit.
(3) Attempted repair by unauthorized personnel.
(4) Natural disasters.

The warranty is for the PLC only, any damage caused to third party equipment by malfunction of the PLC is not covered by the warranty.

○ Repair

Any examination or repair after the warranty period is not covered. And within the warranty period any repair and examination which results in information showing the fault was caused by any of the items mentioned above, the repair and examination cost are not covered. If you have any questions regarding the warranty please contact either your supplier or the local Hitachi Distributor. (Depending on failure part, examination might be impossible.)

○ Ordering parts or asking questions

When contacting us for repair, ordering parts or inquiring about other items, please have the following details ready before contacting the place of purchase.

(1) Model
(2) Manufacturing number (MFG no.)
(3) Details of the malfunction

Safety Precautions

Read this manual and related documents thoroughly before installing, operating, performing preventive maintenance or performing inspection, and be sure to use the unit correctly. Use this product after acquiring adequate knowledge of the unit, all safety information, and all cautionary information. Also, make sure this manual enters the possession of the chief person in charge of safety maintenance.

Safety caution items are classified as “Danger” and “Caution” in this document.

DANGER	: Cases where if handled incorrectly a dangerous circumstance may be created, resulting in possible death or severe injury.
CAUTION	: Cases where if handled incorrectly a dangerous circumstance may be created, resulting in possible minor to medium injury to the body, or only mechanical damage.

However, depending on the circumstances, items marked with CAUTION may result in major accidents.

In any case, they both contain important information, so please follow them closely.

Icons for prohibited items and required items are shown below:

: Indicates prohibited items (items that may not be performed). For example, when open flames are prohibited, is shown.

: Indicates required items (items that must be performed). For example, when grounding must be performed, is shown.

1. About installation

⚠ CAUTION

- Use this product in an environment as described in the catalogue and this document.
  If this product is used in an environment subject to high temperature, high humidity, excessive dust, corrosive gases, vibration or shock, it may result in electric shock, fire or malfunction.
- Perform installation according to this manual.
  If installation is not performed adequately, it may result in dropping, malfunction or an operational error in the unit.
- Do not allow foreign objects such as wire chips to enter the unit.
  They may become the cause of fire, malfunction or failure.

2. About wiring

REQUIRED

- Always perform grounding (FE terminal).
  If grounding is not performed, there is a risk of electric shocks and malfunctions.

⚠ CAUTION

- Connect power supply that meets rating.
  If a power supply that does not meet rating is connected, fire may be caused.
- The wiring operation should be performed by a qualified personnel.
  If wiring is performed incorrectly, it may result in fire, damage, or electric shock.

3. Precautions when using the unit

⚠ DANGER

- Do not touch the terminals while the power is on.
  There is risk of electric shock.
- Structure the emergency stop circuit, interlock circuit, etc. outside the programmable controller (hereinafter referred to as PLC).
  Damage to the equipment or accidents may occur due to failure of the PLC.
  However, do not interlock the unit to external load via relay drive power supply of the relay output module.

⚠ CAUTION

- When performing program change, forced output, RUN, STOP, etc., while the unit is running, be sure to verify safety.
  Damage to the equipment or accidents may occur due to operation error.
- Supply power according to the power-up order.
  Damage to the equipment or accidents may occur due to malfunctions.

4. About preventive maintenance

DANGER
• Do not connect the ⊕, ⊖ of the battery in reverse. Also, do not charge, disassemble, heat, place in fire, or short circuit the battery. There is a risk of explosion or fire.

PROHIBITED
• Do not disassemble or modify the unit. These actions may result in fire, malfunction, or malfunction.

CAUTION
• Turn off the power supply before removing or attaching module/unit. Electric shock, malfunction or failure may result.

Revision History

No.	Description of Revision	Date of Revision	Manual Number
1	First edition.	2001/04	NJI-364(X)
2	Explicit messaging function for EH-RMD was added. [Chapter 5.7, 5.8] Discrete I/O power supply specification is corrected. [Chapter 7.2] Remote mode of EH-RMD was added. [Chapter 2.2, 2.3, 5.1, 10, 11.4] EH-RMDCFG for configuration tool wad added. [Chapter 3.2, 8]	2004/11	NJI-364A(X)

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Chapter 1 Introduction

1.1 Before Using the Products

This manual provides instructions on how to use the EH series programmable controllers (hereinafter abbreviated as PLC), DeviceNet master module (EH-RMD), DeviceNet slave controller (EH-IOCD), and distributed I/O slave unit (RDX16D, RDY16TP, RDY16R).
Please read this manual thoroughly and refer to it during installation and operation as well as during maintenance and inspection.
In addition, refer to the relevant manual of the PLC main unit when actually using the PLC system.

Table 1.1 List of related manual

Item	Related manual name	Manual number
Main system of EH-150	EH-150 Application Manual	NJI-281*(X)
Programming Software	LADDER EDITOR for Windows® (Windows®95/98/2000/NT/XP)	NJI-342*(X)
Configuration Software	EH-150 DeviceNet Master Configuration Software Application Manual	NJI-455*(X)

Please refer to the manual with the appropriate manual number, where "*" is A or higher. ("*" indicates the version of the applicable manual; the version number increases in alphabetic sequence, i.e., starting with A, B, C, and so on.)

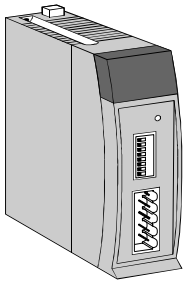
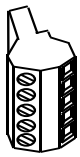
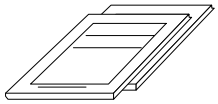
⚠ Caution

- Use a CPU module of the type EH-CPU308/308A/ 316/316A/448/448A/516/548.

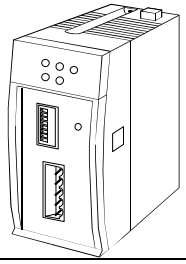
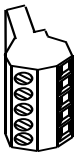
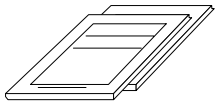
  When using a CPU module of the type EH-CPU104/104A/208/208A, the EH-RMD doesn't start the DeviceNet communication.
- Please read this manual thoroughly when using EH-RMD/EH-IOCD, and use and handle the module as directed.
- When using the other vendor's slaves with EH-RMD, refer to the manual of the slaves.
- When using the other vendor's master with EH-IOCD or distributed I/O slave unit, refer to the manual of the master.
- Please note that the information contained in this manual may change without prior notice.

1.2 Items Packaged with the Module

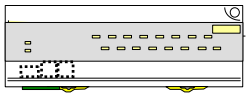
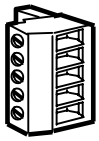
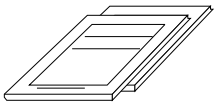
The following items are packaged with the DeviceNet master module (EH-RMD). Please verify that each item is included in the package.

No.	Item name	Type	External appearance	Number	Remark
1	DeviceNet master module	EH-RMD		1	Note: Use a CPU module of the type EH-CPU308/308A/ 316/316A/448/448A/ 516/548.
2	Communication connector (cable side)			1	Use this connector to connect to the network.
3	Instruction manual	NJI-362: Japanese		1	—
		NJI-362 (X): English		1	
	EMC regulation	NJI-380 (X): English		1	

The following items are packaged with the DeviceNet slave controller (EH-IOCD). Please verify that each item is included in the package.

No.	Item name	Type	External appearance	Number	Remark
1	DeviceNet slave controller	EH-IOCD		1	—
2	Communication connector (cable side)			1	Use this connector to connect to the network.
3	Instruction manual	NJI-363: Japanese		1	—
		NJI-363 (X): English		1	
	EMC regulation	NJI-380 (X): English		1	

The following items are packaged with the distributed I/O slave unit (RDX16D,RDY16TP, RDY16R).
Please verify that each item is included upon opening the package.

No.	Item name	Type	External appearance	Number	Remark
1	Distributed I/O slave unit	RDX16D, RDY16TP, RDY16R		1	—
2	Communication connector (cable side)			1	Use this connector to connect to the network.
3	Instruction manual	NJI-319: Japanese		1	—
		NJI-320 (X): English		1	

Chapter 2 Features

2.1 Features of DeviceNet

1. Multi-Vendor Network

Since the EH series PLCs conform to the DeviceNet standard, which is an open field network standard, it is possible to connect master/slave devices provided by Hitachi as well as by other companies.

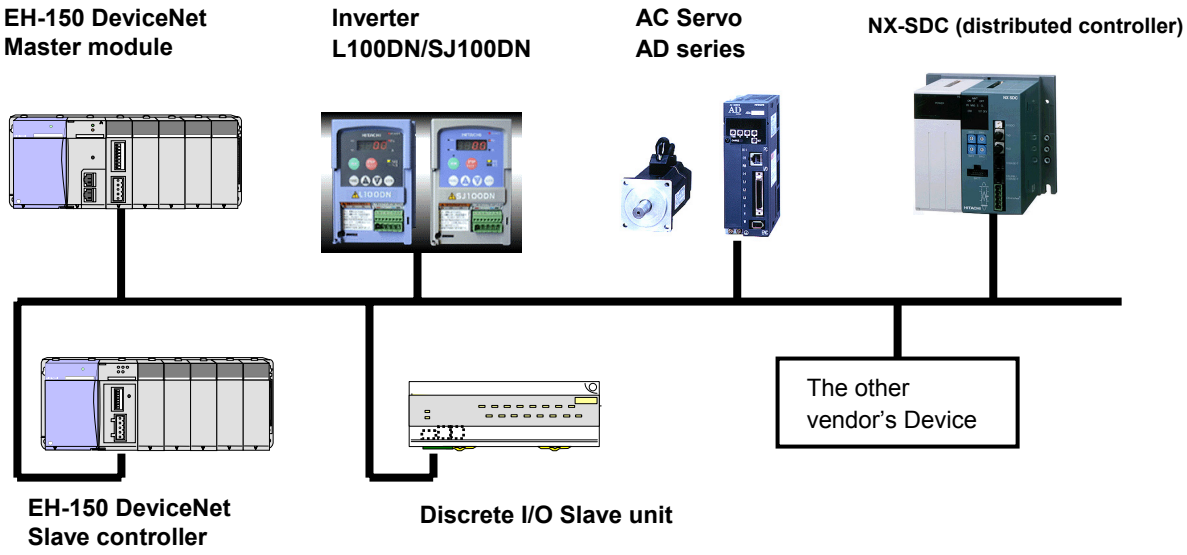


Figure 2.1 Hitachi made DeviceNet products

2. Versatile Connection Methods

Besides using Multidrop of the trunk line, it is possible to use Multi-branch and Multidrop of drop lines by means of Device Tap.

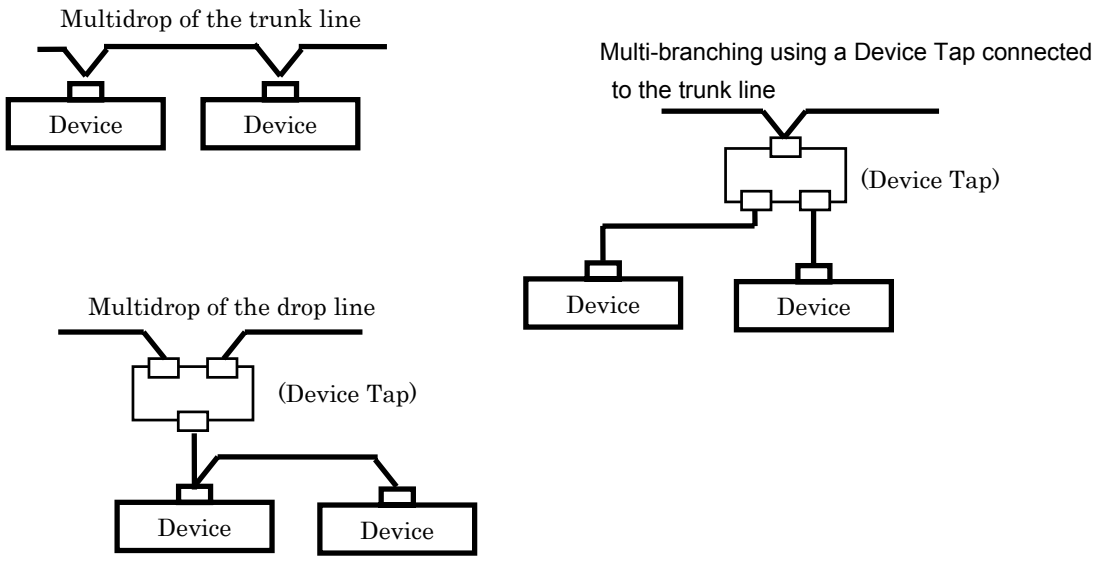


Figure 2.2 Connection methods for DeviceNet

3. Four Types of I/O Message Communication Protocol

It is possible to select the optimal communication mode for a given network configuration according to the features of each device.
Please choose the communication method which is appropriate to the good point of each device.
But each device may not support a partial communication method.
Therefore, for the details, refer to the manual of each device.

Table 2.1 DeviceNet I/O communication method

I/O communication	Features	EH-RMD	EH-IOCD	Discrete I/O
Polling	Used when transferring any size of I/O data between the master and a slave. In this mode, data is communicated between the master and a single specific slave (point to point). Most of the devices are supporting this method.	○	○	○
Bit Strobe	Used when transferring small amounts of input data between the master and a slave. It is possible to return up to 8 bytes of input data in response to a request from the master, from each slave to the master.	○	○	×
Cyclic	Used when transferring any size of I/O data between the master and a slave. In this mode, data is communicated between the master and a single specific slave at fixed time intervals specified by the user. This mode makes it possible to alleviate the traffic in the network in this way.	○	○	×
Change of State (COS)	Used when transferring any size of I/O data between the master and a slave. In this mode, data is communicated between the master and a single specific slave when the data is updated or at fixed time intervals specified by the user. This mode makes it possible to alleviate the traffic in the network in this way.	○	○	×

○: supported

×: not supported

2.2 Features of EH-RMD/EH-IOCD

The EH-RMD and EH-IOCD modules conform to the DeviceNet standard, release 2.0.
This product has been tested by ODVA's authorized Independent Test Lab and found to comply with ODVA Conformance Test Software Version A-13.

DeviceNet Features					
Device type	Communication adapter		Master/Scanner		Yes
Explicit peer-to-peer message		Yes *1	I/O slave message		
I/O peer-to-peer message		No	• Bit strobe		Yes
Configuration consistency value		Yes	• Polling		Yes
Fault node recovery		No	• Cyclic		Yes
Communication speed	125/250/500 kbps		• Change of state (COS)		Yes

1. EH-RMD supports both LINK and REMOTE mode.

ITEM	LINK mode	REMOTE mode
Communication Protocol	DeviceNet standard Release 2.0	
Supporting connection	Polling、Bit Strobe、Cyclic、COS、Explicit Message	
Assignment number	2 pcs / CPU	4 pcs / CPU
IO number	256 words Input 256 words Output	1024points IN/OUT
IO assignment	CPU Link	Remote 2
Configuration	From Configurator	From Configurator

By supported remote mode, 2pcs of CPU link modules and 4pcs of DeviceNet masters can be built.

2. Total 16 modules can be mounted in EH-IOCD.
   EH-BS11A has not supported for EH-IOCD.
   Please use EH-BS3A/5A/8A for EH-IOCD.

3. The EH-IOCD supports digital I/O and analogue I/O modules, as well as some of the more high function modules.
4. Sending and receiving an Explicit message are possible from ladder program.

The function of EH-RMD is different by SOFTWARE VER.

EH-RMD SOFTWARE VER.	Supporting function		
	Explicit message send/receive	Remote mode	Configuration software (EH-RMDCFG)
01	✓		
02	✓	✓	
03	✓	✓	✓

2.3 I/O Number of EH-RMD(Remote mode)

In remote mode, input and output data is treated in a X/Y address.
IO number is decided according to IO assignment by Ladder Editor for Windows®.
However, IO assignment of remote stations should set up by reading real IO assignment, after configuration from configurator.

The assignment rule in remote mode

(1) The output data on DeviceNet is assigned "Y16" and input data is assigned "X16."
(2) Output data is assigned to a head in the slot 0 of a station 0. "Y16" is assigned by the data size registered from confgurator.
(3) When EH-RMD is SOFTWARE VER.02, Input data is assigned from immediately after output data.
”X16” is assigned by the data size registered from configurator.
(4) When EH-RMD is SOFTWARE VER.03, Output data is assigned to a head in the slot 0 of a station 4.
”X16” is assigned by the data size registered from configurator.

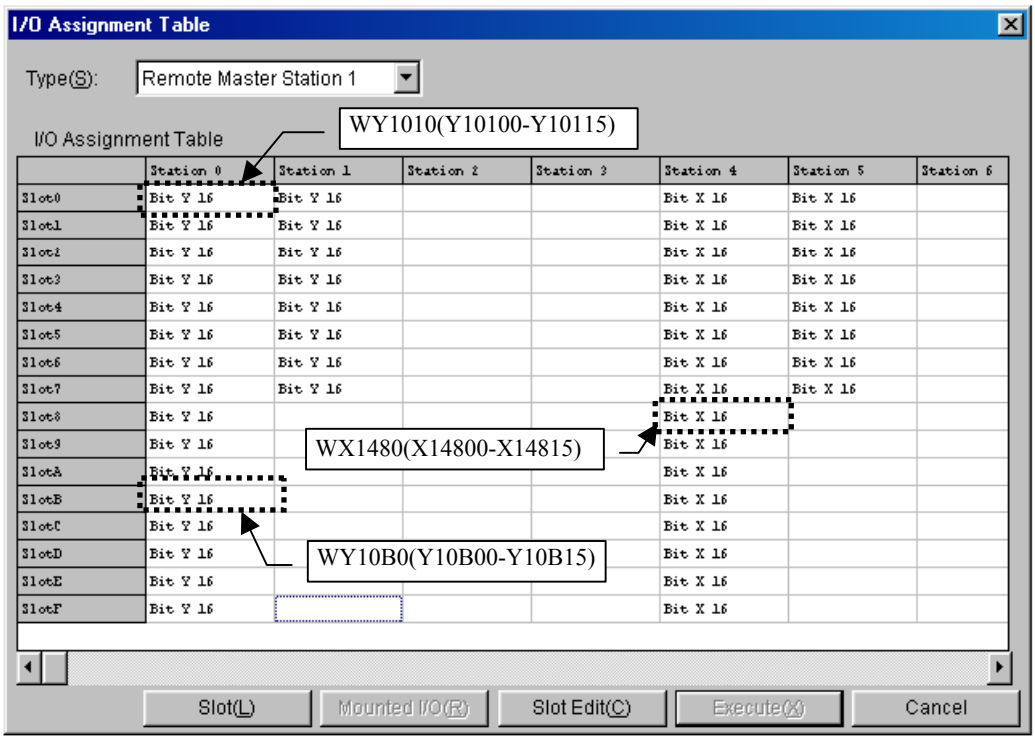


Figure 2.3 Ex. IO assignment (SOFTWARE VER.03)

The rule of the IO number of remote stations in H series is shown.

Data Type	Numbering rule	In case of EH-RMD
Bit data	X □ □ □ □□ Y □ □ □ □□ Bit number (00 to 95) in the module Slot number (0-F) Station number (0-9) Remote Master number (1-4)	Bit number is 0 to 15, because “Y16” and ”X16” are used.
Word data	WX □ □ □ □ WY □ □ □ □ Word number (0 to 7) in the module Slot number (0-F) Station number (0-9) Remote Master number (1-4)	Word number is fixed 0, because “Y16” and ”X16” are used.
Double word data	DX □ □ □ □ DY □ □ □ □ Word number (0 to 7) in the module Slot number (0-F) Station number (0-9) Remote Master number (1-4)	Word number is fixed 0, because “Y16” and ”X16” are used.

The following composition is explained to an example in detail.

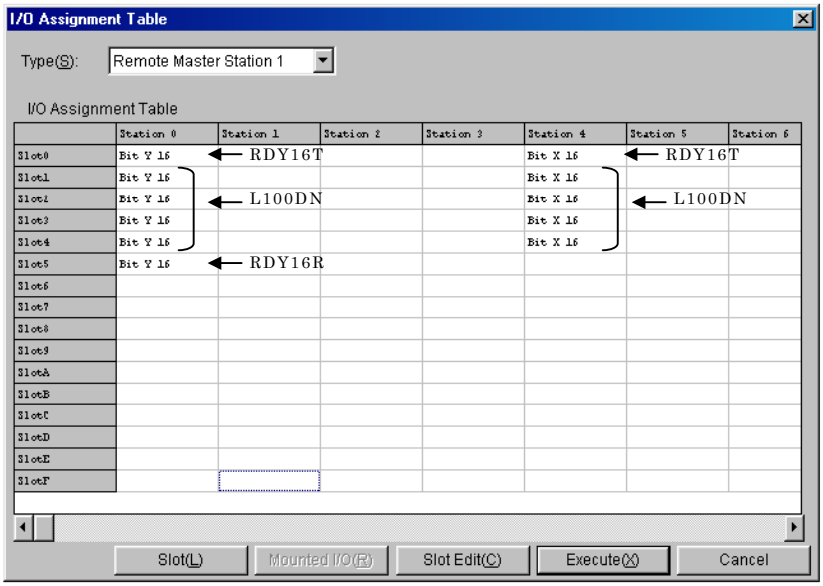
Node 1: Input 2Byte (RDX16D)
Node 2: Output 2Byte (RDY16T)
Node 3: Input 8Byte, Output 8Byte (L100DN)
Node 4: Output 2Byte (RDY16R)

The I/O mapping by configurator is as follows.

Offset Address	Output Data
0	02, RDY16T
1	03, L100DN (1st word)
2	03, L100DN (2nd word)
3	03, L100DN (3rd word)
4	03, L100DN (4th word)
5	04, RDY16R

Offset Address	Input Data
0	01, RDX16D
1	03, L100DN (1st word)
2	03, L100DN (2nd word)
3	03, L100DN (3rd word)
4	03, L100DN (4th word)
5	

If reading real IO assign is performed from Ladder Editor for Windows® after mapping IO data on DeviceNet by configurator, it can read as shown in the following figure.



Chapter 3 System Configuration

3.1 EH-150 System Configuration

The EH-150 is a module-type PLC and is configured as shown in Figure 3.1.
EH-RMD can be mounted in the communication slot of a basic base unit.
The slot position which can be mounted is changed according to the CPU module and base unit.
Refer to the EH-150 application manual for details.

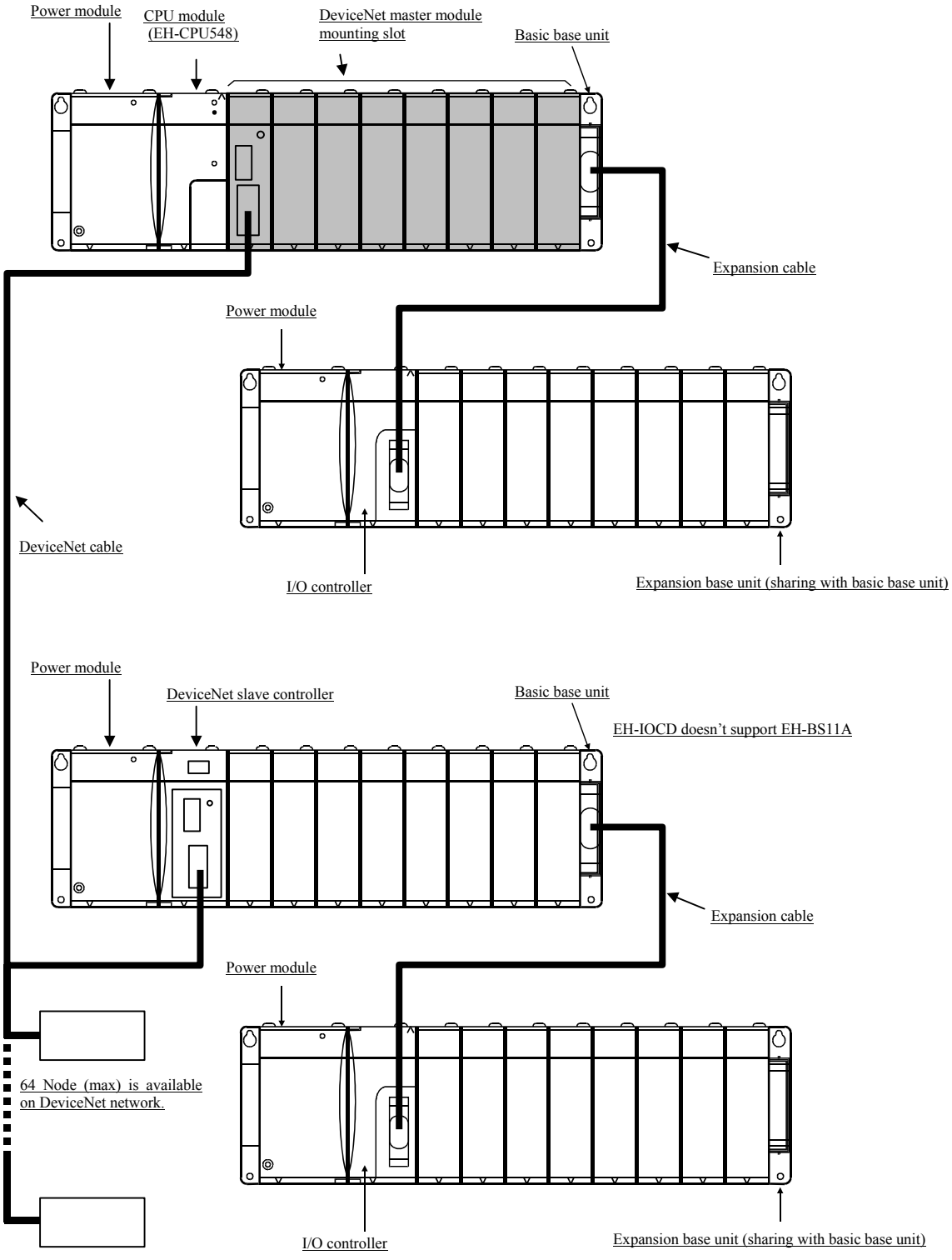


Figure 3.1 EH-150 system configuration diagram (ex. Using EH-CPU548)

3.2 Network Configuration

3.2.1 Overview

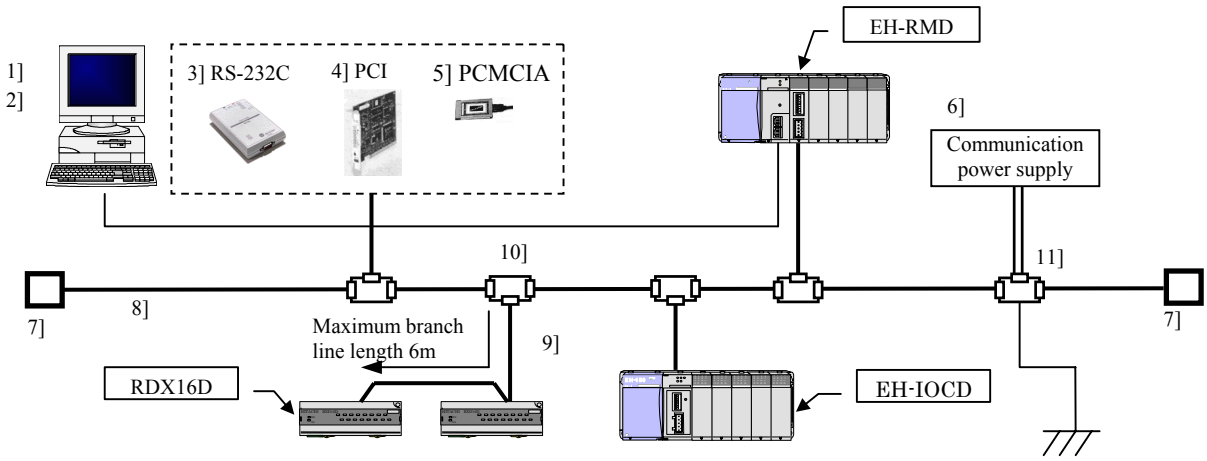


Figure 3.2 Device network configuration

DeviceNet configuration devices are shown in table 3.1 .
These products must be prepared separately when using the EH-RMD/EH-IOCD and distributed I/O slave units on DeviceNet.

Table 3.1 Network configuration devices

No.	Device	Usage	Remark
1]	PC	Used as a platform for the configurator.	Windows 95/98/2000/NT/XP
2]	Configurator	Creates a scan list and downloads to the master module. Or issuing the Explicit message to the slave device. Uses either 3], 4], or 5] to communicate with each device via the network in case of using “RSNetWorx for DeviceNet” (made by Rockwell Software). In case of EH-RMDCFG (made by Hitachi), it communicates with each device via a CPU module.	.
3]	RS-232C interface	Communicates with DeviceNet using the serial port. “1770-KFD” (made by Rockwell Automation)	Use one of these interfaces, when using the Rockwell configurator.
4]	PCI card interface	Communicates with DeviceNet using the PCI card. “1784-PCID” (made by Rockwell Automation)	
5]	PCMCIA interface	Communicates with DeviceNet using the IC card. “1784-PCD” (made by Rockwell Automation)	
6]	Communication power supply	24 V DC network power supply	—
7]	Termination resistor	Attached to both ends of the trunk line. (121 Ω, 1% metal coating, 1/4 W)	—
8]	Trunk line	DeviceNet dedicated cables can be thick cable and/or thin cable. The wiring length of the network varies depending on the cable used.	Thick cable cannot be used for a drop line.
9]	Drop line		
10]	Device tap	Used as a connection between the trunk line and a drop line as well as between two drop lines.	—
11]	Power supply tap	Used for supplying power to the network.	—

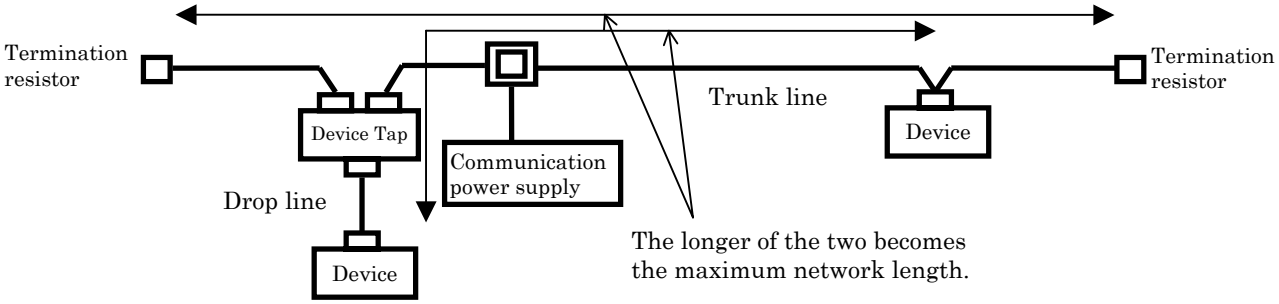
No.	Device	Usage	Remark
—	Network connector	A separate connector is necessary if not attached to each device.	—
—	Clamp terminal	Used when wiring a cable to a connector.	—
—	EDS files	The information of each device must be registered on configurator. As for the way of obtaining, refer to 8th chapter " Starting Up ".	—

For more information on the products of DeviceNet, contact to the following ODVA webpage.
http://www.odva.org/

3.2.2 Restrictions on Connection Configuration

1] Restrictions on maximum network length

The maximum network length refers to the distance between the devices that are farthest apart or the longest of the trunk line distances (between termination resistors).



The communication cables in the network can be either of the two types: thick cable (trunk cable) or thin cable (drop cable).
There is only a slight signal damping in a thick cable, thus it can be used for communication over relatively long distances.
On the other hand, the signals tend to be attenuated in a thin cable; this type of cable is thus not suited for communication over long distances.
The following tables list each cable specification and the restriction values corresponding to the communication speeds.
Refer to the page 3-4 and 3-5 for definition of drop line length , total drop line length.

Table 3.2 Cable specification

Thick cable

Recommended manufacturer		Showa Electric Wire & Cable Co., Ltd.	
Specification	Type	TDN18	
	Configuration	Signal pair	Power supply pair
	Size (AWG)	18	14
	Standard outer diameter (mm)	Approx. 11.6	

Thin cable

Recommended manufacturer		Showa Electric Wire & Cable Co., Ltd.	
Specification	Type	TDN24	
	Configuration	Signal pair	Power supply pair
	Size (AWG)	24	22
	Standard outer diameter (mm)	Approx. 7.0	

Table 3.3 Restriction values by the baud rates

Baud Rates	Maximum network length		Drop line length	Total drop line length
	Thick cable	Thin cable		
125 kbps	500 m max.	100 m max.	6 m max.	156 m max.
250 kbps	250 m max.	100 m max.	6 m max.	78 m max.
500 kbps	125 m max.	100 m max.	6 m max.	39 m max.

2] Restrictions when the trunk line is composed of both thick and thin cable

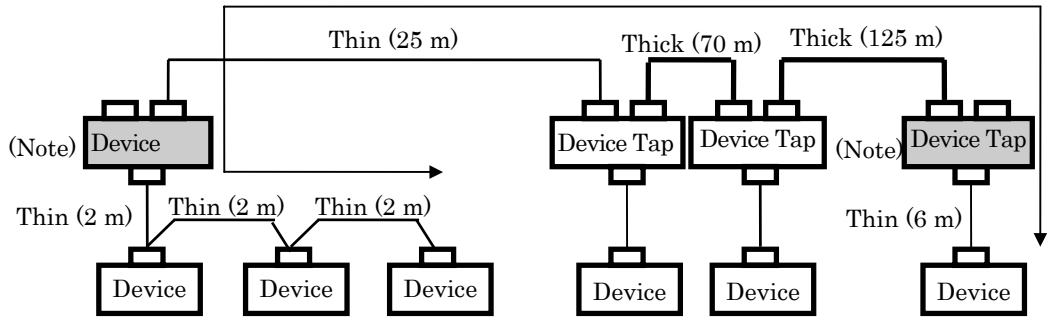
It is possible to combine both thick and thin cables to construct the trunk line.
However, the length of each cable type must satisfy the following relations.
In addition, if both types of cables are used, note that the value should not exceed the maximum current capacity of each cable (Refer to the chapter 12).

Table 3.4 Maximum network length

Baud Rates	Maximum network length
125 kbps	L (thick) + 5 × L (thin) ≦ 500 m
250 kbps	L (thick) + 2.5 × L (thin) ≦ 250 m
500 kbps	L (thick) + L (thin) ≦ 100 m

L (thick): Length of thick cable
L (thin): Length of thin cable

(Example)



(Note) With a terminal resistor

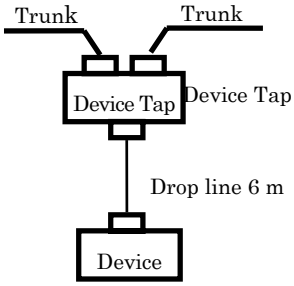
L (thin): 2 m + 2 m + 2 m + 25 m + 6 m = 37 m
L (thick): 70 m + 125 m = 195 m
From Table 3.4:
195 + (5 x 37) = 380 m ≦ 500 m ⇒ 125 Kbits/s OK
195 + (2.5 x 37) = 287.5 m ≧ 250 m ⇒ 250 Kbits/s Not allowed
195 + 37 = 232 m ≧ 100 m ⇒ 500 Kbits/s Not allowed

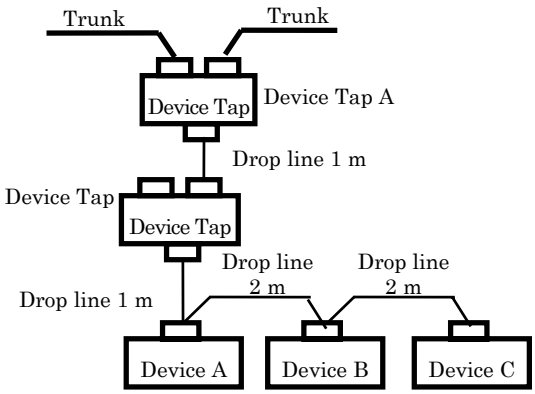
From the result of the calculations above, it is determined that it is only possible to communicate at 125 kbps with this configuration.
Even if the above conditions are met, however, the current that flows in each cable must not exceed the maximum current capacity of each cable.

[3] Restrictions on drop line length

The drop line length refers to the length from the beginning of the drop line to the position in the drop line farthest away from the trunk line.
The maximum drop line length is 6 m.

(Example)





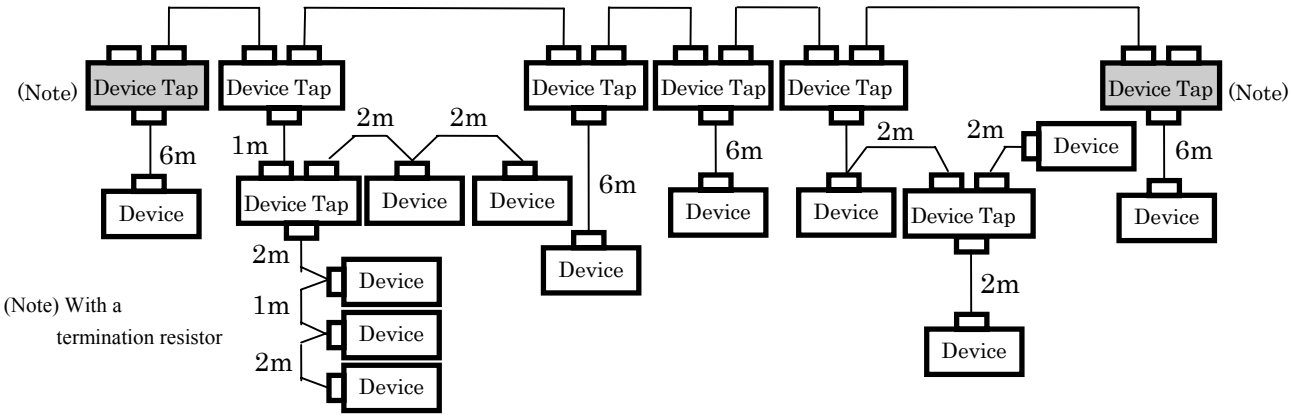
2 m from Device Tap A to device A
4 m from Device Tap A to device B
6 m from Device Tap A to device C

[4] Restrictions on total drop line length

The total drop line length refers to the length obtained by adding up the length of all the drop lines within one network.

The following restrictions are applied are on the total drop line length depending on the communication speed:

125 kbps: 156 m max.
250 kbps: 78 m max.
500 kbps: 39 m max.



In the configuration example above, the length of each drop line is within 6 m and causes no problem, but the total length of all the drop lines becomes 42 m. This is longer than the restriction on the total drop line length of 39 m at a communication speed of 500 kbps. Therefore, a communication speed of 125 kbps or 250 kbps should be used.

Chapter 4 General/Communication Specifications

4.1 General Specifications

Table 4.1 General Specifications

Item	Specification
Power voltage	+5 V DC (Master module, Slave controller) +24 V DC (Distributed I/O slave unit)
Communication power supply	24 V DC (supplied via the communication connector) Prepare the communication power supply by the user. (Refer to the chapter 12)
Operating ambient temperature	0 to 55 °C (storage ambient temperature -10 to 75 °C)
Operating ambient humidity	20 to 90 % RH (no condensation), storage ambient humidity 10 to 90 % RH (no condensation)
Environment used	No corrosive gases, no excessive dust
Vibration resistance	Conforms to JIS C0911 (16.7 Hz double amplitude 3 mm X,Y and Z each direction)
Structure	Open, wall-mounted type
Cooling method	Natural air cooling

4.2 Communication Specifications

Table 4.2 Communication Specifications

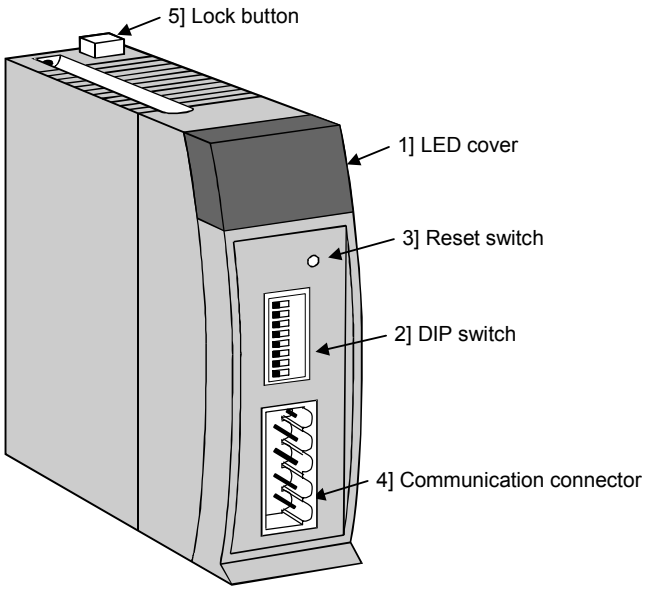
<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Communication protocol</td><td>Conforms to DeviceNet release 2.0 (Master module and Slave controller)
Conforms to DeviceNet release 1.4 (Discrete I/O slave unit)</td></tr>
<tr><td>Supported connections</td><td>1] Poll I/O connection
2] Bit strobe I/O connection (only for master module and slave controller)
3] Cyclic I/O connection (only for master module and slave controller)
4] Change of state (COS) I/O connection (only for master module and slave controller)
5] Explicit message connection</td></tr>
<tr><td>Connection style</td><td>1] Multi-drop connection
2] Multi-branch connection using Device Tap</td></tr>
<tr><td>Baud Rates</td><td>500k/250k/125kbps (switched by DIP switches)</td></tr>
<tr><td>Cable</td><td>Dedicated DeviceNet cable</td></tr>
<tr><td>Communication distance</td><td>
<table>
<tr><th>Baud Rates</th><th>Maximum network length</th><th>Each drop line length</th><th>Total drop line length</th></tr>
<tr><td>500 kbps</td><td>100 m max.</td><td>6 m max.</td><td>39 m max.</td></tr>
<tr><td>250 kbps</td><td>250 m max.</td><td>6 m max.</td><td>78 m max.</td></tr>
<tr><td>125 kbps</td><td>500 m max.</td><td>6 m max.</td><td>156 m max.</td></tr>
</table>
The maximum network length shows the value when a thick trunk cable is used.
For more information, see Tables 3.3 and 3.4 in Chapter 3.
</td></tr>
</table>

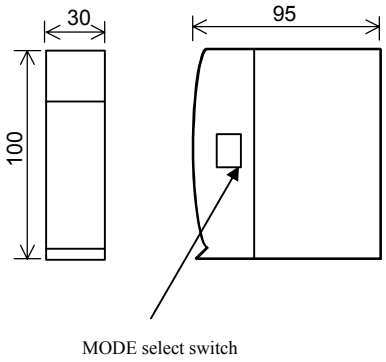
Chapter 5 Master Module Specifications

5.1 Outlook/Shape

Name and function of each part

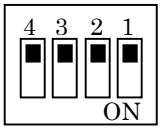
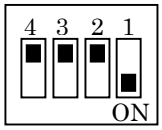
Type	EH-RMD
Weight	Approx. 0.13 kg
Dimensions (mm)	





No.	Name	Function	Remark
1]	LED cover	This is the cover for the LEDs that display the network status and error information.	-
2]	DIP switch	Sets the node address and communication speed.	-
3]	Reset switch	Resets the module.	-
4]	Communication connector	Connects to the network.	Use the packaged connector.
5]	Lock button	This is used when removing the module from the base unit. After it is mounted on the base unit, the attachment can be reinforced using screws. In this case, use M4 x 10 mm (0.39 in.) screws.	-
-	-	The DIP switch on the side of the module is covered by a protective cover, as it is not used. Do not remove the cover.	-

MODE select
EH-RMD is possible to select the LINK mode or REMOTE mode.
EH-RMD supports REMOTE mode from SOFTWARE VER.02 or more.
Less SOFTWARE VER.02, it supports only LINK mode. Please do not change this mode select switch.
And the CPU module which supports remote mode is EH-CPU 516/548.

MODE	LINK mode	REMOTE mode	Note
MODE select switch			Please turn off the power for changing mode.

5.2 Function Specification

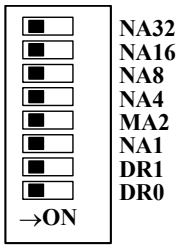
Table 5.1 EH-RMD Function Specifications

No.	Item	Specification	
		LINK mode	REMOTE mode
1	No. of installed units	2 modules/basic base	4 modules/basic base
2	No. of slave- connected units	63 units	
3	I/O assignment	CPU link	REMOTE 2
4	Output data	256 words	1024 points(64 words) IN&OUT
5	Input data	256 words	
6	Internal current consumption	450 mA (max)	
7	Current consumption on communication side	80 mA (max)	
8	Self-diagnosis	System ROM/RAM check, watchdog timer check	

5.3 Settings of Node Address/Baud Rate

The node addresses and baud rate should be set as follows.

Table 5.2 Node Address/Baud Rate setting



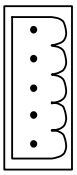
Node address	NA1	NA2	NA4	NA8	NA16	NA32	
0	OFF	OFF	OFF	OFF	OFF	OFF	← Default
1	**ON**	OFF	OFF	OFF	OFF	OFF	
2	OFF	**ON**	OFF	OFF	OFF	OFF	
⋮	⋮	⋮	⋮	⋮	⋮	⋮	
62	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	
63	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	

Baud Rate	DR0	DR1	
125 kbps	OFF	OFF	← Default
250 kbps	**ON**	OFF	
500 kbps	OFF	**ON**	
Setting prohibited	**ON**	**ON**	

When setting the DIP switches, turn off the power supply of the PLC and disconnect the module from the network. The setting isn't reflected until the module is reset (Refer to the section 5.6).
Set the baud rate in such a way that all the devices on the network communicate at the same speed.
Set the node addresses for the other devices in such a way that they do not overlap.

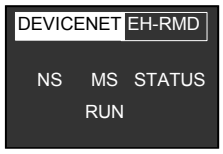
5.4 Communication Connector

Table 5.3 Communication connector terminal arrangement

Terminal layout	Number	Signal	Wire color
	5	V+	Red
	4	CAN_H	White
	3	Drain	Bare wire
	2	CAN_L	Blue
	1	V-	Black

5.5 LED Specification

Table 5.4 LED Specification

Outlook of LED	Symbol	Description	Color
	NS	Indicates the status of the network.	Green/red
	MS	Indicates the status of the communication interface board	Green/red
	RUN	Indicates the operation mode.	Green
	STATUS	Indicates the status of the PLC interface board.	Green/red

(1) MS/NS

Table 5.5 MS/NS LED Specification

MS \ NS	Lit in Green	Flashing in Green	Lit in Red	Flashing in Red	Turned off
Lit in Green	1	2	4	5	3
Lit in Red	-	-	-	-	6
Turned off	-	-	-	-	7

Table 5.6 MS/NS LED detail

No.	Display status	Description	Action to take
1	MS lit in green NS lit in green	I/O connection established	-
2	MS lit in green NS flashing in green	I/O connection not established	Check all connected slaves. Check the scan list from the configurator.
3	MS lit in green NS turned off	Checking node address overlap/no power supply to the network	Check the communication speed of each device. Check that 24 V DC is supplied.
4	MS lit in green NS lit in red	Node address overlaps/it is detected that the bus is not functioning	Check the node address and communication speed of each device. Check to see if a cable is broken. Check that the terminal resistor is connected properly. Check that the cable length is within the specification range.
5	MS lit in green NS flashing in red	Communication timeout/ Scan List unmatched	Check the communication speed of each device. Check to see if a cable is broken. Check that the terminal resistor is connected properly. Check that the cable length is within the specification range. Please check that the node registered into the Scan list is connected.
6	MS lit in red NS turned off	Communication board hardware error	Replace the module.
7	MS turned off NS turned off	No power supply to the PLC/waiting for module initialization	Check that the specified voltage is supplied to the power module of the PLC. Please check that I/O assignment is done.

(2) RUN

Table 5.7 RUN LED Specification

Display status	Description	Action to take
Lit in green	RUN status Synchronized with the RUN status of the EH-CPU.	-
Flashing in green	Idle status. Output data will not be updated.	Output data will be updated when EH-CPU is RUN.
Turned off	No power supply to the PLC/waiting for module initialization	Check that the specified voltage is supplied to the power module of the PLC. Please check that I/O assignment is done.

(3) STATUS

Table 5.8 STATUS LED Specification

Display status	Description	Action to take
Lit in green	Normal operation	-
Flashing once in green	Waiting for initialization	Perform the I/O assignment for the CPU.
Flashing twice in green	PLC fault There is an error in the CPU.	Cancel the error of the CPU.
Flashing four times in green	Link parameter error/ I/O assignment unmatched for REMOTE station	Check the transmission area and transmission size. Read real I/O assignment.
Flashing five times in green	Module error	Turn the power supply off and then on again. If the error persists, replace the module.
Lit in red	Internal microcomputer WDT error	
Flashing in red	Module internal device error The position of the device is indicated by the number of flashes.	
Flashing in red & green	Node information unmatched	Please improve the information on Scan list and each node.
Turned off	No power supply to the PLC.	Check that the specified voltage is supplied to the power module of the PLC.

5.6 Reset Specification

To reset this module, execute either of the following procedures.

Table 5.9 Reset procedures

No.	Type	Explanation
1	Hardware	Turn on this system again.
2	Hardware	Push the reset switch of from of the module. Only EH-RMD is reset.
3	Software	Operate the reset function from the user program Only EH-RMD is reset.

In this chapter, it mentions about the way of operating the reset function from the user program of the above No.3 .
To execute the above No.3, the version of EH-CPU and EH-RMD must become as follows.

Table 5.10 Resetting function supporting EH-CPU

CPU type	Version	Note
EH-CPU308/316	-	Not supported
EH-CPU308A	ROM VER. A2** (** ≥ "00 ")	
EH-CPU316A	ROM VER. B2** (** ≥ "00 ")	
EH-CPU448	ROM VER. C3** (** ≥ "26 ") ROM VER. C4** (** ≥ "08 ")	
EH-CPU448A	All version	
EH-CPU516		
EH-CPU548		

Table 5.11 Resetting function supporting EH-RMD

Version	Note
HARDWARE REV.02 and later	mentioned in main name plate (left side of the module)

5.6.1 Reset command specification

It uses FUN201 command to reset EH-RMD from the rudder program.
The specification of the **S parameter** to use in the FUN201 command is as follows.
And for the details of this command, refer to EH-150 application manual (NJI-280*(X)).

The details of the **S parameter**

s+0	1] Error Code
s+1	2] System area
s+2	(not available to user)
s+3	3] Control type
s+4	4] Header of target area
s+5	5] Read/write control bit I/O No.
s+6	6] Transfer source (destination) header I/O No.
s+7	7] Size

1] Error code:
The result of FUN201 command execution is set.
Normal end → =0
Abnormal end → ≠0
The details of the error code, refer to the EH-150 application manual.

2] System area:
This is used by the system processes of the FUN201 command when the FUN201 command is executed.
This area cannot be used by the user.

3] Control type:
Specifies the control type.
HA55A:Software reset

4] Header of target area:

b15	b11	b7	b0
Unit No.	Slot No.	Word location	

Unit No. : Sets "0"
Slot No. : Sets the loading slot of the EH-RMD(0 –2)
Word location : Sets "0"

5] Read/write control bit I/O No. :
Sets the actual address of R,L, and M in this area using the ADRIO command.

6] Transfer source (destination) header I/O number :
In the software reset, this area isn't used.
Sets "0".

7] Size :
In the software reset, this area isn't used.
Sets "0".

Description of read/write control bit table

+0	1] Execution flag
+1	2] Normal end flag
+2	3] Abnormal end flag

1] Execution flag :
Set to "1" using a user program when performing software reset using FUN201 command. When this command is complete, the FUN201 command resets this to "0".

2] Normal end flag :
This flag is set to "1" when FUN201 command is normally completed. When the Execution flag is set to "1", the FUN201 command resets this to "0".

3] Abnormal end flag :
This flag is set to "1" when FUN201 command is abnormally completed. When the Execution flag is set to "1", the FUN201 command resets this to "0".

* Description of borders

User setting area
User write prohibited area

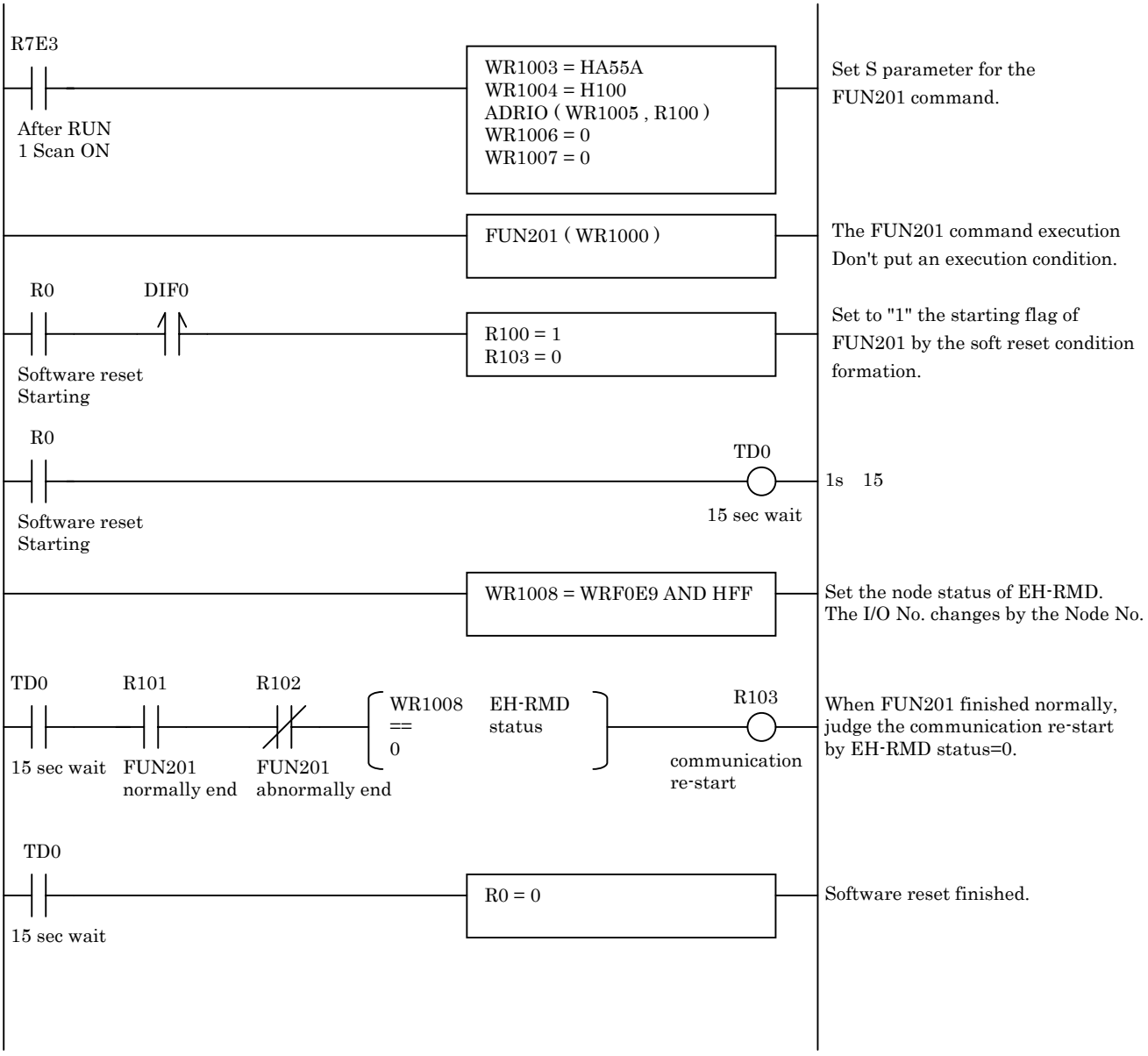
5.6.2 Sample program

This sample program shows a way of resetting from the user program to this module.
So it is not the one to have considered an interlock and so on.
Before use, test sufficiently and use safety after the confirmation.

In this program, it uses the following internal output.

Table 5.12 Internal output

Internal output	Use	Note
R0	The software reset starting flag. This flag is reset after 15 sec.	
WR1000 - WR1007	Used as the S parameter area to use in the FUN201 command.	
WR1008	Set the node status of EH-RMD.	
R100 - R102	Used as the execution flag, the normal end flag, the abnormal end flag of the FUN201 command.	
R103	Uses as the flag which shows that the communication re-start.	



5.7 Explicit message communication (for LINK mode)

EH-CPU can send or receive of the Explicit message to each slave on DeviceNet.
This chapter explains in link mode. In the case of remote mode, please refer to Chapter 5.8.

5.7.1 The outline

(1) Supporting module

When communicating the Explicit message from the EH-CPU, please use the EH-RMD of the following version.

Table 5.13 The supporting version for Explicit message (from main name plate)

Supporting version	Note
SOFTWARE VER.01 and later	mentioned in main name plate (left side of the module)

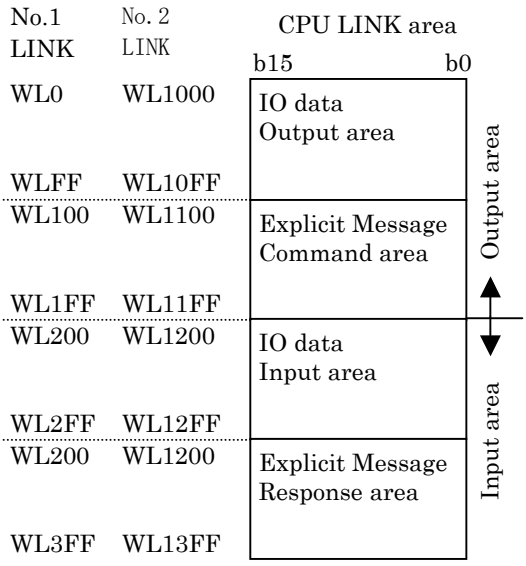
And EH-CPU displays the detailed software version of EH-RMD in the special internal output. The supporting version can be confirmed from the value, too.

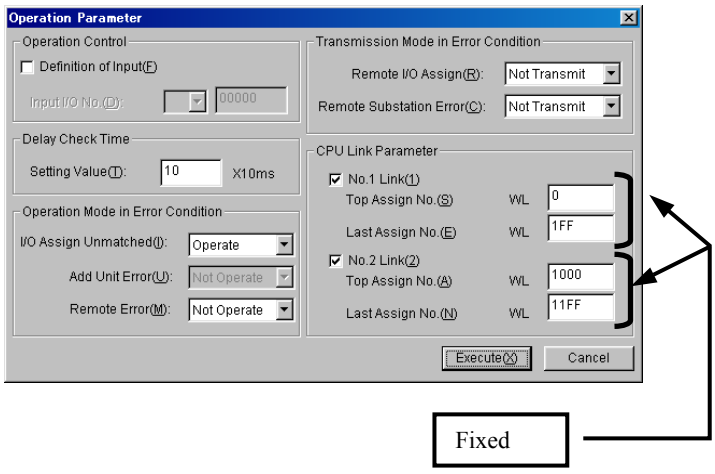
Table 5.14 The supporting version for Explicit message (from special internal output)

Supporting version	Note
WRF020 = 0121H and later WRF021 = 0103H and later	for Slot0
WRF022 = 0121H and later WRF023 = 0103H and later	for Slot1
WRF024 = 0121H and later WRF025 = 0103H and later	for Slot2

(2)CPU LINK area assignment

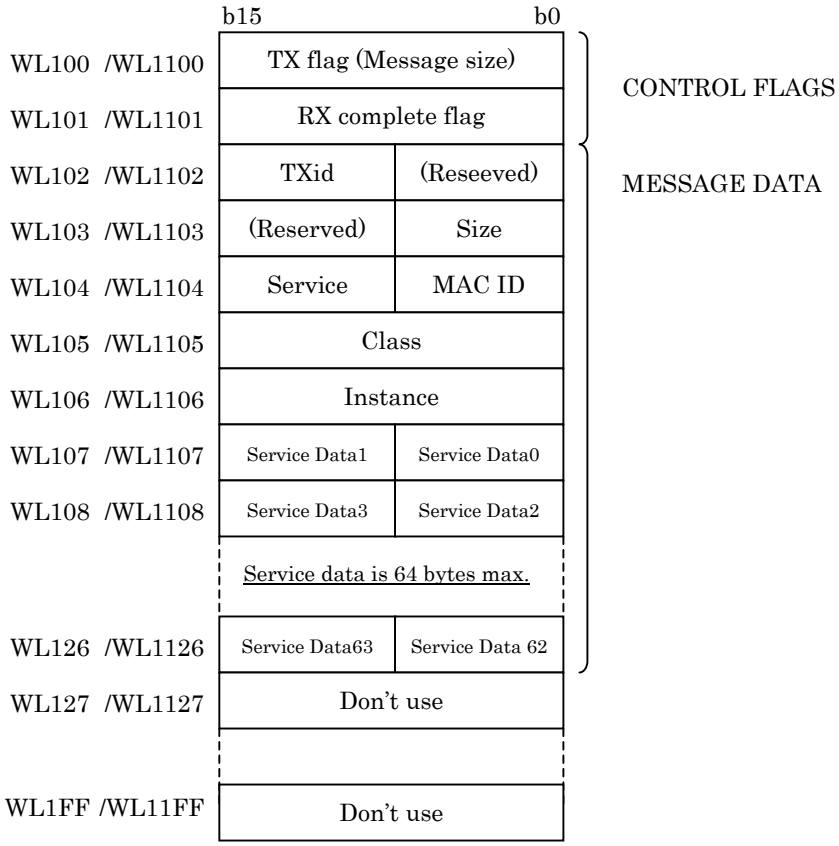
The OUTPUT area from the EH-CPU is fixed 512 words from top of CPU LINK area.
Please set correctly from the using programming tool.
When not correctly set, STATUS LED repeats a blink four times at green.



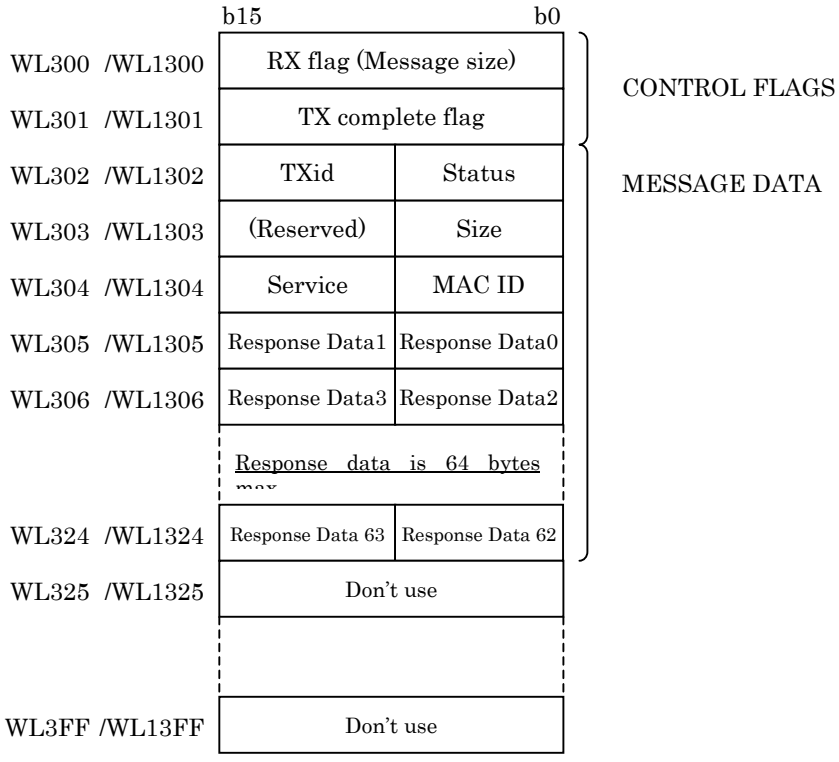


5.7.2 Message format

The format of the Explicit command message is shown.



The format of the Explicit response message is shown.



Details in each field are shown.

Status:(Only for response)

Table 5.15 Status Information (Only for response)

Code	Meaning
0	Ignore Transaction Block (Block empty)
1	Transaction Completed Successfully
2	Transaction in progress (Not ready)
3	(Reserved)
4	Error – Node offline
5	Error – DeviceNet port disabled/offline
6	Error – Transaction TXid unknown
7	Error – Duplicate Txid
8	(Reserved)
9	Error – Scanner out of buffers
10-11	(Reserved)
12	Error – Response data too large for block
13	(Reserved)
14	Error – Invalid size specified
15	Error – Device Timed out
16-255	(Reserved)

TXid: When sending command, set 1 byte data from 0 to 255 in this area.
When receiving response, the data which is the same as TXid of the command is set.
By checking both TXid, it is possible to relate the command message and the response message.

Size: When sending command, set the size of Service Data by byte unit. Maximum is 64 bytes.
When receiving response, the size of Response Data is set by byte unit. Maximum is 64 bytes.

MAC ID: When sending command, set the destination node address.
When receiving response, the source node address which send response message is set

Service: When sending command, set the service code which is defined by DeviceNet standard.

Table 5.16 Service Information (when sending)

Service	Service Name
H01	Get_Attributes_All
H02	Set_Attributes_All
H0E	Get_Attribute_Single
H10	Set_Attribute_Single

When receiving response, the service code which is defined by DeviceNet standard is set.

Table 5.17 Service Information (when receiving)

Service	Service Name
H81	Success response of Get_Attributes_All
H82	Success response of Set_Attributes_All
H8E	Success response of Get_Attribute_Single
H90	Success response of Set_Attribute_Single
H94	Error response

When the received response message is error response (Service=H94), error code is stored in Response Data area. Error code is prescribed by the appendix H of the DeviceNet Standard specification (Vol. 1, release 2.0). The typical error code is shown in the table below.

Table 5.18 The detail of Error code

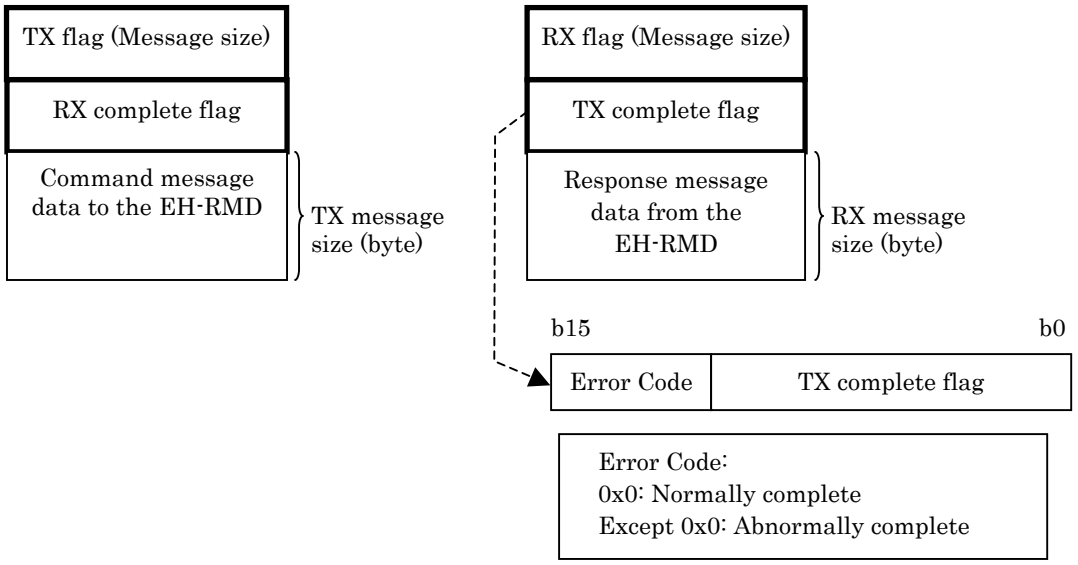
Error code	Error name	Description
H08	Service not supported	The requested serivce was not inplemented or was not defined for this Object Class/Instance.
H09	Invalid attribute value	Invalid attribute data detected
H0E	Attribute not settable	A request to modify a non-modifiable attribute was received.
H10	Device state conflict	The device's current mode/state prohibits the execution of the requested service.
H11	Reply data too large	The data to be transmitted in the response buffer is larger than the allocated response buffer
H13	Not enough data	The service did not supply enough data to perform the specified operation.
H14	Attribute not supported	The attribute specified in the request is not supported
H15	Too much data	The service supplied more data than was expected
H16	Object does not exist	The object specified does not exist in the device.
H20	Invalid parameter	A parameter associated with the request was invalid.

For the detail of the parameter of Explicit message, please refer to the DeviceNet Standard specifications release 2.0.
As for the acquirement of the specifications, inquire of following ODVA.

The Open DeviceNet Vendor Association (ODVA)
URL: http://www.odva.org/

5.7.3 Procedure of the message sending/receiving

It uses four flags which are shown in the following when sending/receiving a message between EH-CPU and EH-RMD.



The command message transmission procedure

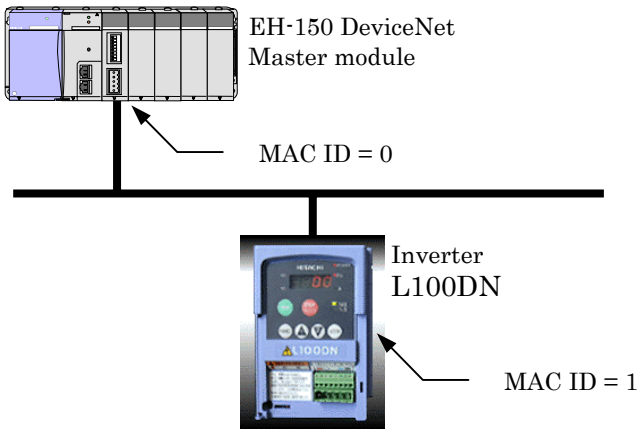
EH-CPU(User program)		EH-RMD	
(1)	If (TX complete flag == 0) Set the command message header and command message data		
(2)	Set the TX message size into the TX flag		
		(3)	If(TX flag != 0) Get the message
		(4)	Set the TX message size into the TX complete flag
(5)	If (TX flag == TX complete flag) TX flag = 0		
		(6)	If (TX flag == 0) TX complete flag = 0

The response message reception procedure

EH-CPU(User program)		EH-RMD	
		(1)	If (RX complete flag == 0) Set the response message header and response data.
		(2)	Set the RX message size into the RX flag
(3)	If (RX flag != 0) Get the message		
(4)	Set the RX message size into the RX complete flag		
		(5)	If (RX flag == RX complete flag) RX flag = 0
(6)	If (RX flag == 0) RX complete flag = 0		

5.7.4 Sample program

The ladder program which sends and receives Explicit message with HITACHI inverter L100DN is shown.

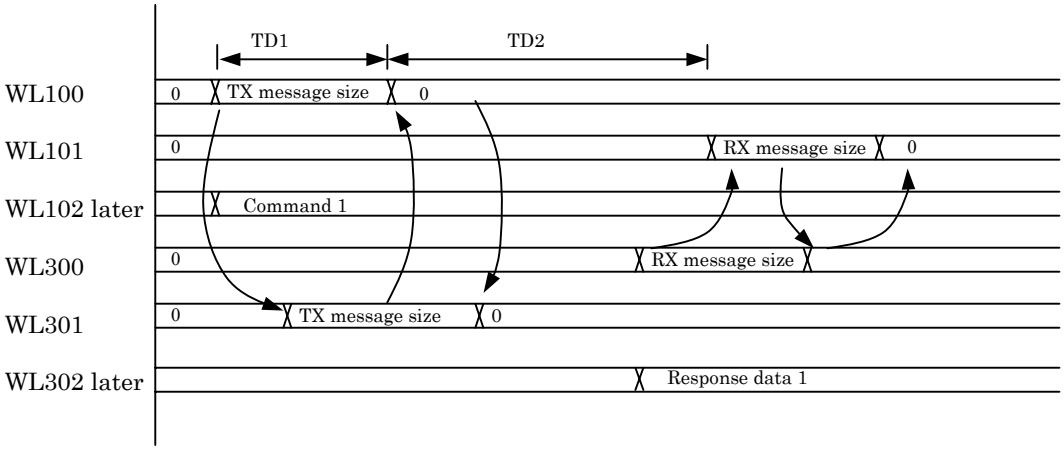


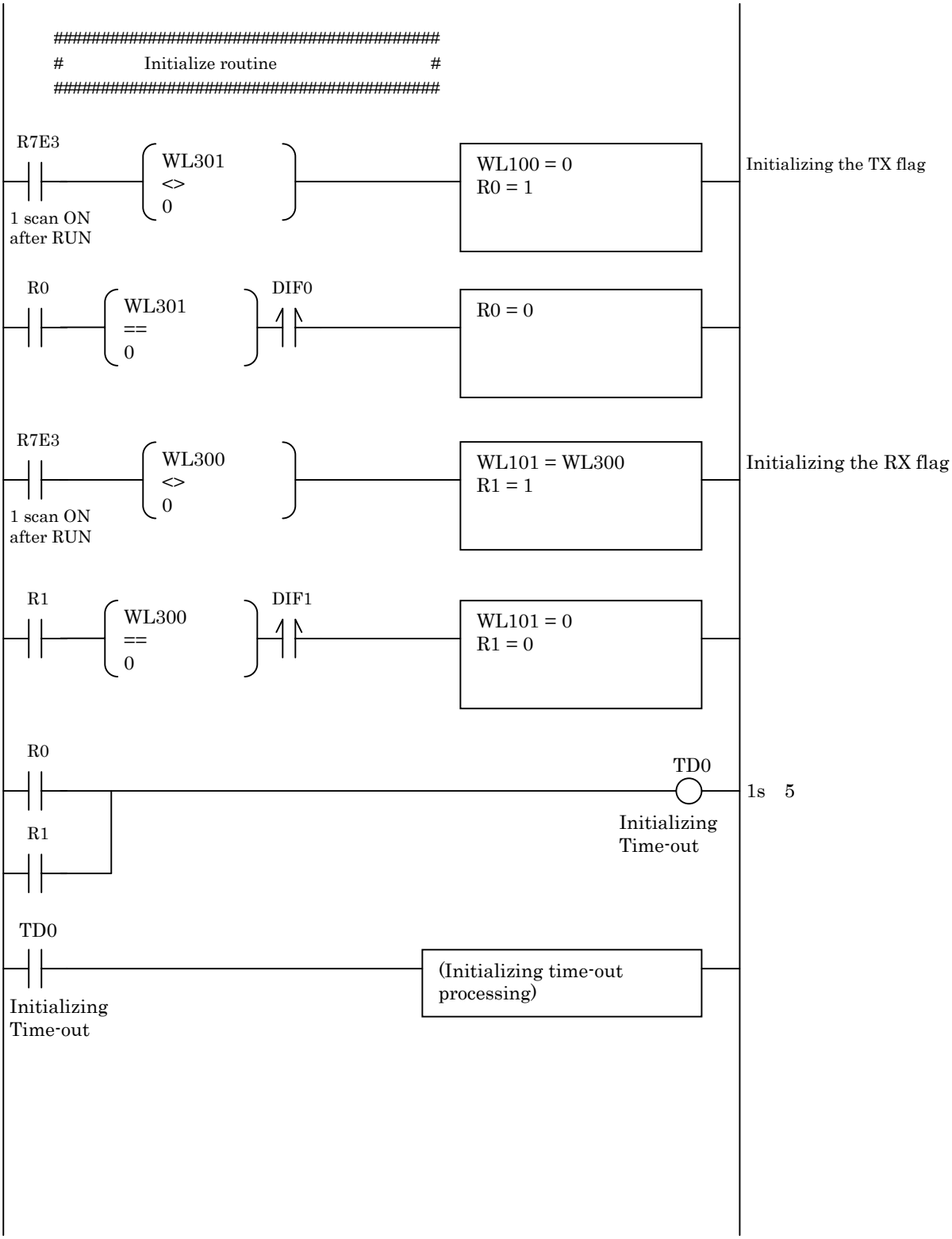
(1) The sample program operation outline
It issues the command of two kinds of the following to the inverter.

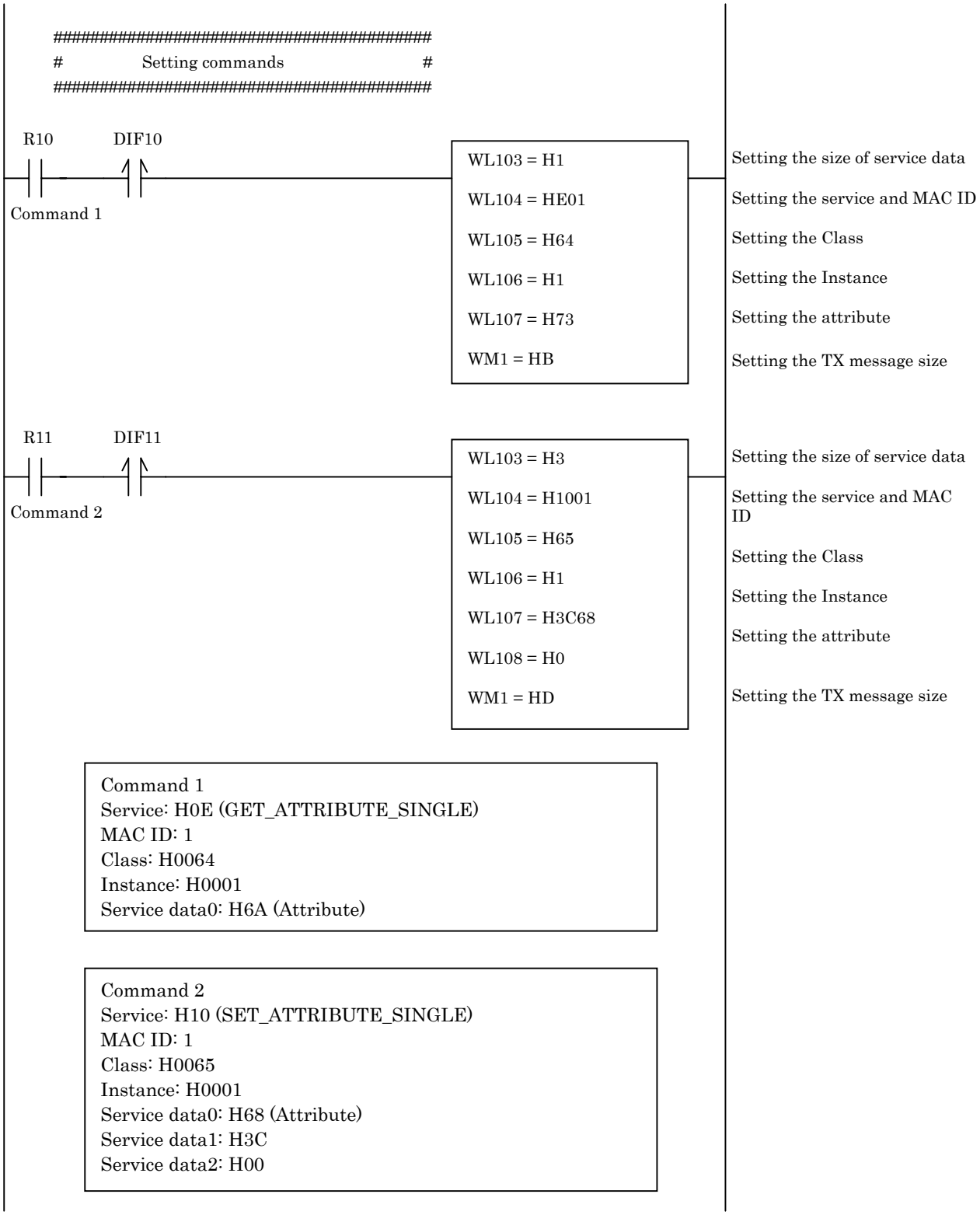
Command 1: It monitors accumulation operation time.
Class = 100(H0064)
Instance = 1(H0001)
Attribute = 115(H73)
Service = H0E(Get_Attribute_Single)

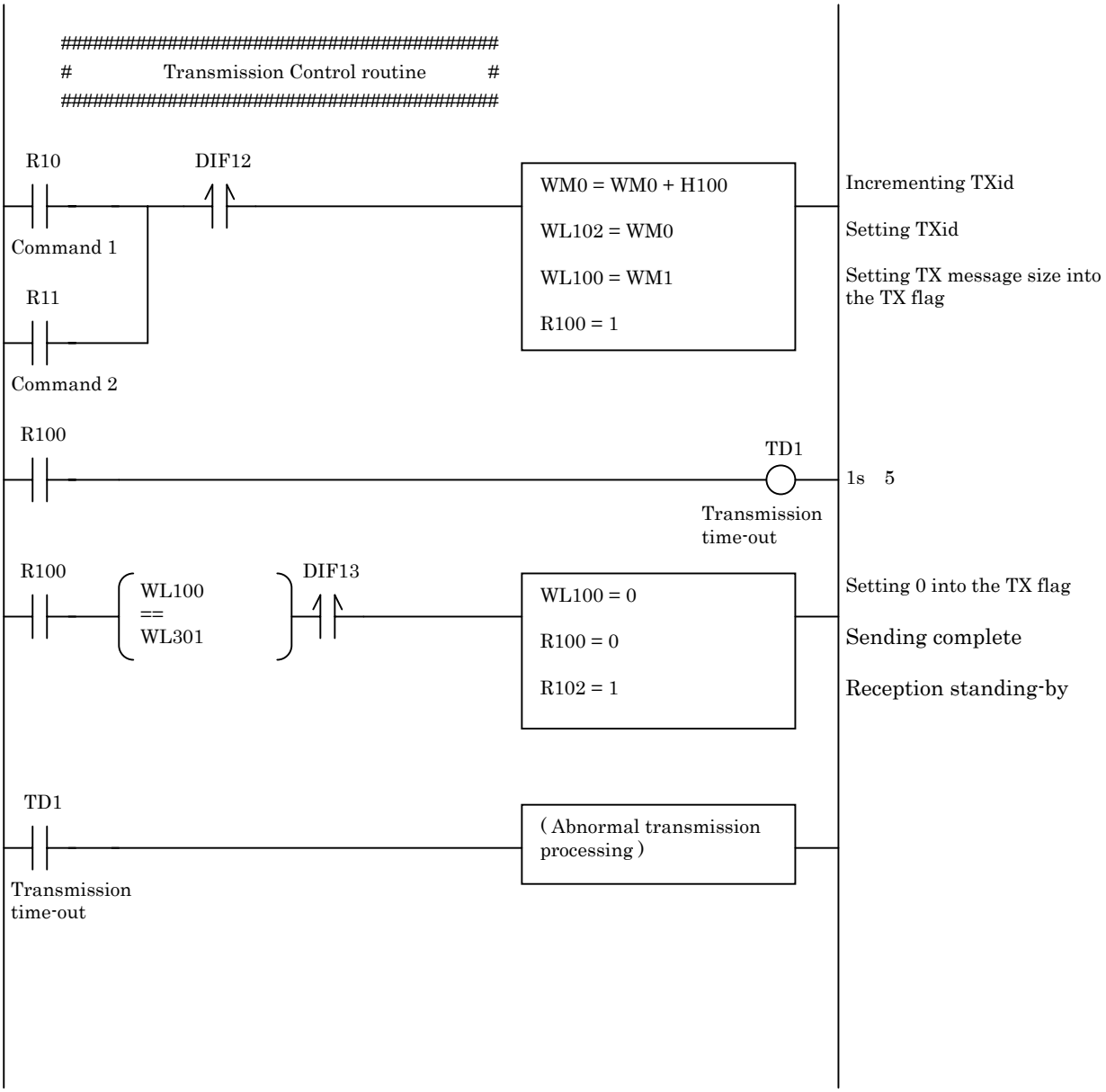
Command 2: It sets a maximum frequency to 60 Hz.
Class = 101(H0065)
Instance = 1(H0001)
Attribute = 104(H68)
Data = 60(H003C)
Service = H10(Set_Attribute_Sibgle)

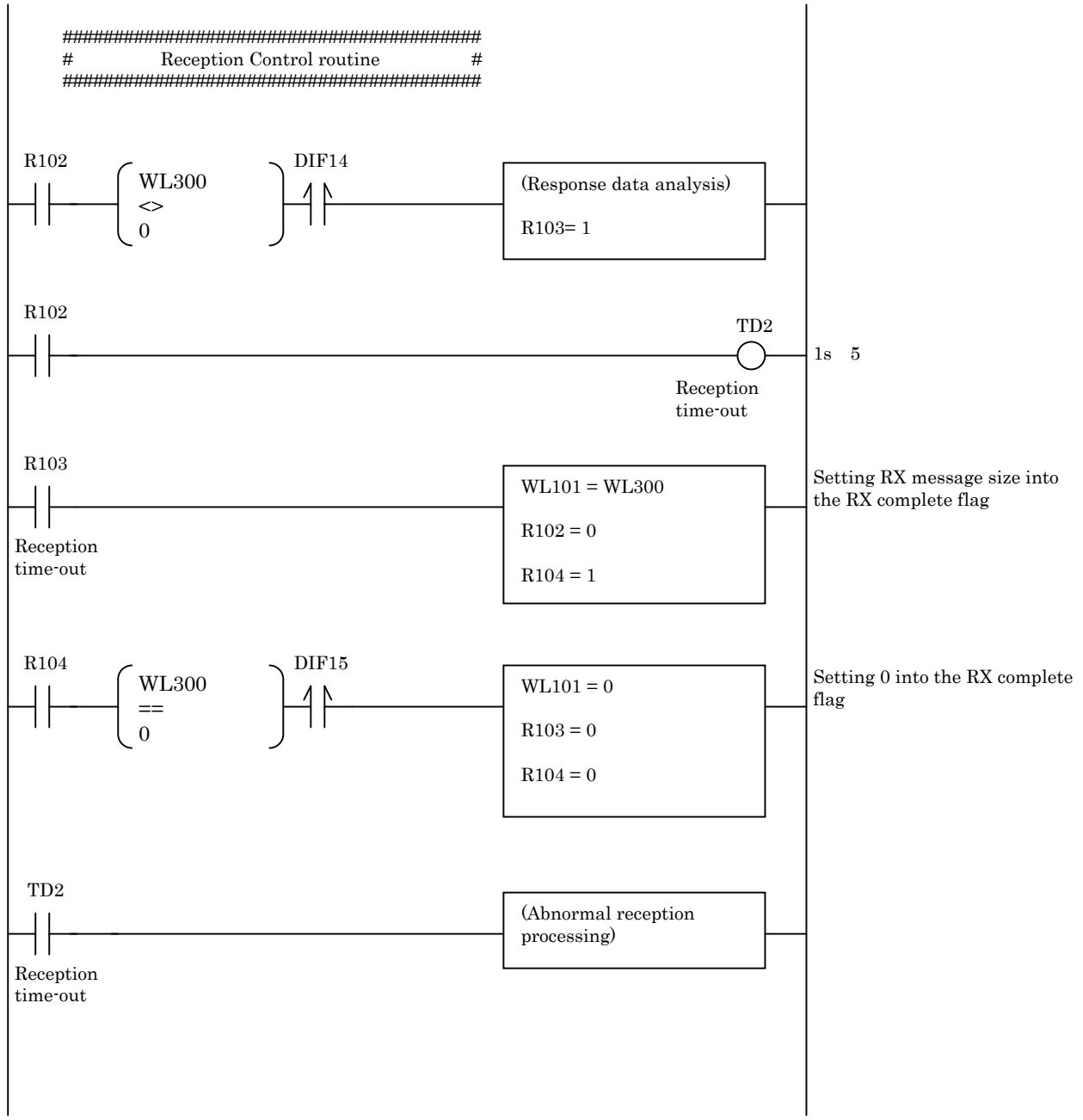
(2)The operation time chart




##
Initialize routine
##
R7E3
1 scan ON after RUN
WL301 <> 0
WL100 = 0
R0 = 1
Initializing the TX flag
R0
WL301 == 0
DIF0
R0 = 0
R7E3
1 scan ON after RUN
WL300 <> 0
WL101 = WL300
R1 = 1
Initializing the RX flag
R1
WL300 == 0
DIF1
WL101 = 0
R1 = 0
R0
R1
TD0
1s 5
Initializing Time-out
TD0
Initializing Time-out
(Initializing time-out processing)


##
Setting commands
##
R10
DIF10
Command 1
WL103 = H1
WL104 = HE01
WL105 = H64
WL106 = H1
WL107 = H73
WM1 = HB
Setting the size of service data
Setting the service and MAC ID
Setting the Class
Setting the Instance
Setting the attribute
Setting the TX message size
R11
DIF11
Command 2
WL103 = H3
WL104 = H1001
WL105 = H65
WL106 = H1
WL107 = H3C68
WL108 = H0
WM1 = HD
Setting the size of service data
Setting the service and MAC ID
Setting the Class
Setting the Instance
Setting the attribute
Setting the TX message size
Command 1
Service: H0E (GET_ATTRIBUTE_SINGLE)
MAC ID: 1
Class: H0064
Instance: H0001
Service data0: H6A (Attribute)
Command 2
Service: H10 (SET_ATTRIBUTE_SINGLE)
MAC ID: 1
Class: H0065
Instance: H0001
Service data0: H68 (Attribute)
Service data1: H3C
Service data2: H00


##
Transmission Control routine
##
R10
DIF12
Command 1
R11
Command 2
WM0 = WM0 + H100
WL102 = WM0
WL100 = WM1
R100 = 1
Incrementing TXid
Setting TXid
Setting TX message size into the TX flag
R100
TD1
1s 5
Transmission time-out
R100
WL100 == WL301
DIF13
WL100 = 0
R100 = 0
R102 = 1
Setting 0 into the TX flag
Sending complete
Reception standing-by
TD1
Transmission time-out
(Abnormal transmission processing)


##
Reception Control routine
##
R102
WL300
<>
0
DIF14
(Response data analysis)
R103= 1
R102
TD2
1s 5
Reception
time-out
R103
Reception
time-out
WL101 = WL300
R102 = 0
R104 = 1
Setting RX message size into the RX complete flag
R104
WL300
==
0
DIF15
WL101 = 0
R103 = 0
R104 = 0
Setting 0 into the RX complete flag
TD2
Reception
time-out
(Abnormal reception processing)

5.8 Explicit message communication (for Remote mode)

EH-CPU can send or receive of the Explicit message to each slave on DeviceNet.
This chapter explains in remote mode. In the case of link mode, please refer to Chapter 5.7.

5.8.1 The outline

(1) Supporting module

When communicating the Explicit message from the EH-CPU, please use the EH-RMD of the following version.

Table 5.19 The supporting version for Explicit message (from main name plate)

Supporting version
SOFTWARE VER.02 and later

And EH-CPU displays the detailed software version of EH-RMD in the special internal output. The supporting version can be confirmed from the value, too.

Table 5.20 The supporting version for Explicit message (from special internal output)

Supporting version	Note
WRF020 = 0128H and later WRF021 = 0105H and later	for Slot0
WRF022 = 0128H and later WRF023 = 0105H and later	for Slot1
WRF024 = 0128H and later WRF025 = 0105H and later	for Slot2

(2) Supporting CPU module

EH-CPU516/548 is available. The other CPU modules don't support the remote mode.
It is used "Explicit message" command. (FUN162,163)

To use this command in remote mode, it can send/receive the explicit message without the complicated ladder program.

5.8.2 FUN 162 command specification

Item number	Fun commands-68	Name	Explicit message execution †

Ladder format	Condition code					Processing time (μs)		Remark
FUN 162 (S)	R7F4	R7F3	R7F2	R7F1	R7F0	EH-CPU5**		
	DER	ERR	SD	V	C	Ave	Max	
		●	●	●	●	127	388	

Command format	Number of steps	
FUN 162 (S)	Condition	Steps
	—	3

Usable I/O		Bit				Word				Double word			Constant	Other
		X	Y	R, L, M	TD, SS, CU, CT	WX	WY	WR, WL, WM	TC	DX	DY	DR, DL, DM		
s	Argument							○						

Function

・This is to execute explicit command for EH-RMD module.
・Put this command without any contact together with FUN 163 command.

Caution

・Argument "s" is dummy parameter. Assign to WR, WM or WL. Actual address is not influenced anything by this command.
・If EH-RMD module is not mounted, operation is not executed with DER=”1”.
・Do not use any contact with this command.
・Use this command in normal scan cycle.

†: Supported by EH-CPU 516/548 only.

5.8.3 FUN 163 command specification

Item number	Fun commands-69	Name	Explicit message configuration (DeviceNet) †

Ladder format	Condition code					Processing time (μs)		Remark
FUN 163 (s)	R7F4	R7F3	R7F2	R7F1	R7F0	EH-CPU5**		
	DER	ERR	SD	V	C	Ave	Max	
		●	●	●	●	37	150	

Command format	Number of steps	
FUN 163 (s)	Condition	Steps
	—	3

Usable I/O	Bit				Word				Double word			Constant	Other
	X	Y	R, L, M	TD, SS, CU, CT	WX	WY	WR, WL, WM	TC	DX	DY	DR, DL, DM		
s Argument							○						s uses up to s+5

Function

・Flag table and sending/receiving area address for explicit message are configured in this command.

・Since 4 times of EH-RMD can be used in case of remote assignment, this command has parameter area for 4 modules.

S parameter

+0	[0] Number of EH-RMD modules
+1	[1] Slot No. for 1st EH-RMD
+2	[2] Control flag address [ADRIO command]
+3	[3] Sending area address [ADRIO command]
+4	[4] Receiving area address [ADRIO command]
+5	[5] Sending error code
+6	[6] Receiving error code
+7	[1] Slot No. for 2nd EH-RMD
–	–
+H13	[1] Slot No. for 4th EH-RMD
+H14	[2] Control flag address [ADRIO command]
+H15	[3] Sending area address [ADRIO command]
+H16	[4] Receiving area address [ADRIO command]
+H17	[5] Sending error code
+H18	[6] Receiving error code

1st

4th

[0] Number of EH-RMD modules. Maximum is 4.
[1] Slot number for 1st EH-RMD (0 to 7)
[2] Control flag address configured by ADRIO command.
(Possible I/O type : R, L and M.)
[3] Sending area address configured by ADRIO command.
(Possible I/O type : WR, WL and WM)
[4] Receiving area address configured by ADRIO command.
(Possible I/O type : WR, WL and WM)
[5] Sending error code set by CPU
[6] Receiving error code set by CPU

Caution

・Parameter tables are addressed by ADRIO command for [2] to [4].

・If I/O address of "s" does not exist in CPU, the command is not executed with DER=1.

・Be careful to map each table since area overlapping is not checked by system.

†: Supported by EH-CPU 516/548 only.

Control flag details

+0	[0] Send data flag
+1	[1] Initializing flag

[0] Send data flag :
Set 1 by user program to send explicit message. This flag is cleared after communication completed.

[1] Initializing flag :
Set 1 by user program to initialize the FUN command or to clear timeout. Received message is cleared as well.

Sending area details

+0	Size	
+1	Service	MACID
+2	Class	
+3	Instance	
+4	Service data 1	Service data 0
	Max. 64 byte for service data	
	Service data 63	Service data 62

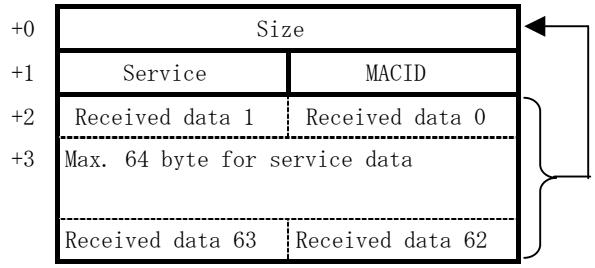
Size :
Service data (sending area from s+4 to s+n) size with byte unit
*) If the byte size is odd number, the last byte is stored in lower byte.

Sending error code

Error code

Error code	Name	Remarks
0001H	Timeout error	Detected by EH-RMD (timeout 3 sec.)
0002H	Data size error	Detected by EH-RMD
0003H	Mail box error	Detected by EH-RMD
0101H	Timeout error	Detected by CPU (timeout 5 sec.)
0202H	Range error	Data size exceeds configured sending area.
0203H	Slot number error	Slot number must be 0 to 7.
0204H	No module error	EH-RMD is not mounted on configured slot.

Receiving area details



Size :

Service data (receiving area from s+4 to s+n) size with byte unit

*) If the byte size is odd number, the last byte is stored in lower byte.

Receiving error

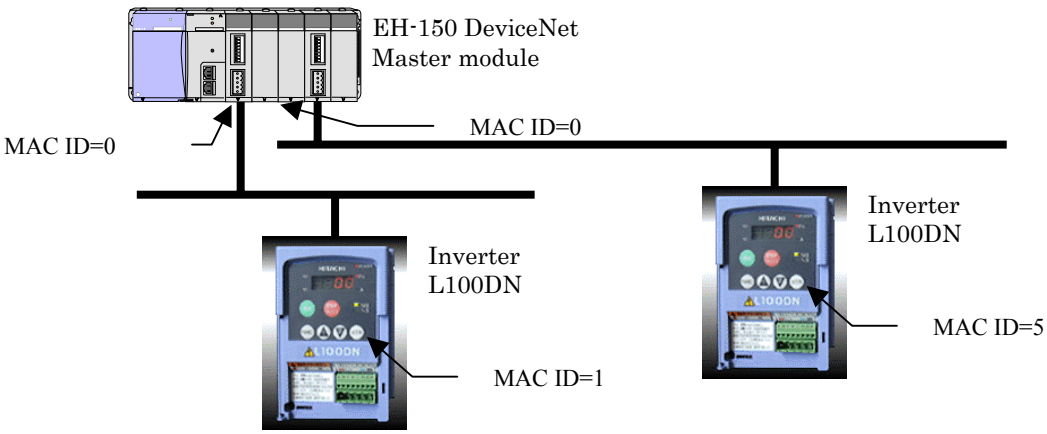
Error code

Error code	Description	Remarks
0000H	Command message sending ready	
0001H	Command message sending completed properly.	
0002H	Message being sent.	
0004H	Node off line error	Detected by EH-RMD
0005H	DeviceNet port off line	Detected by EH-RMD
0006H	Invalid Txid	Detected by EH-RMD
0007H	Txid duplicated	Detected by EH-RMD
0009H	sending/receiving buffer full	Detected by EH-RMD
000CH	Response data size over	Detected by EH-RMD
000EH	Size error	Detected by EH-RMD
000FH	Response time out error	Detected by EH-RMD (Timeout : 3 sec.)
0101H	Time out error	CPU←→EH-RMD timeout 5 sec.
0102H	Receiving time out error	Timeout 5 sec.
0201H	Txid unmatch	
0202H	Area range error	Receiving data is out of receiving range *1

*1) Data kept in receiving area is set

5.8.4 Sample program

The ladder program which sends and receives Explicit message with HITACHI inverter L100DN is shown.

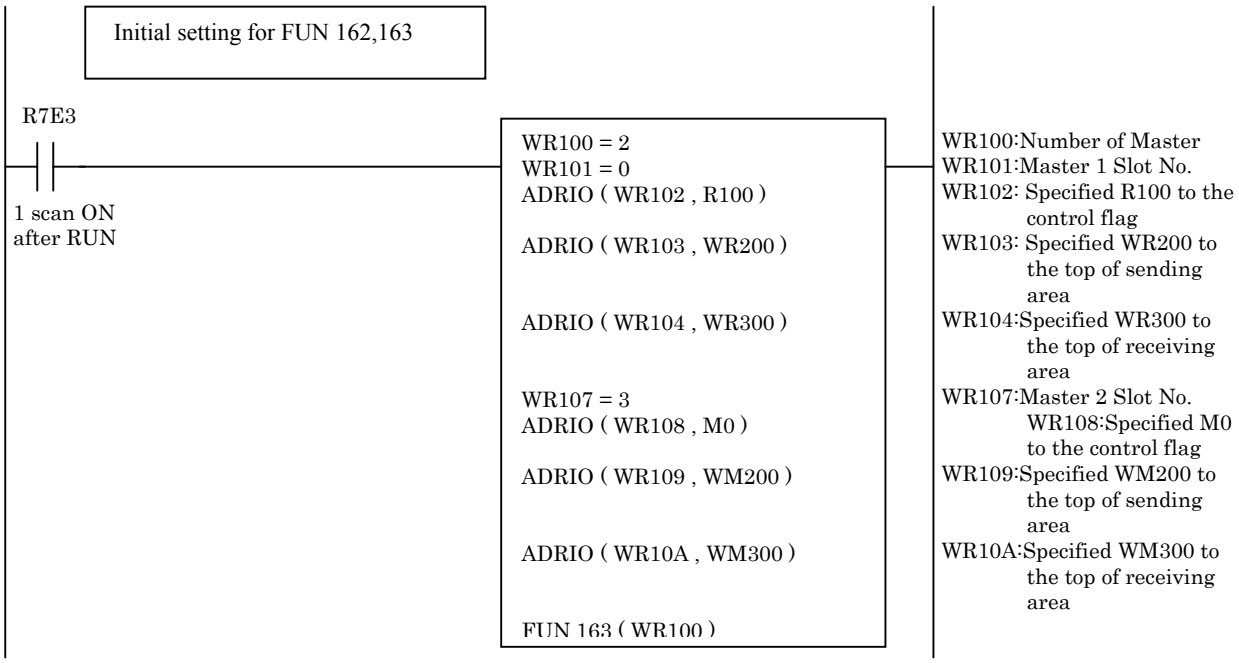


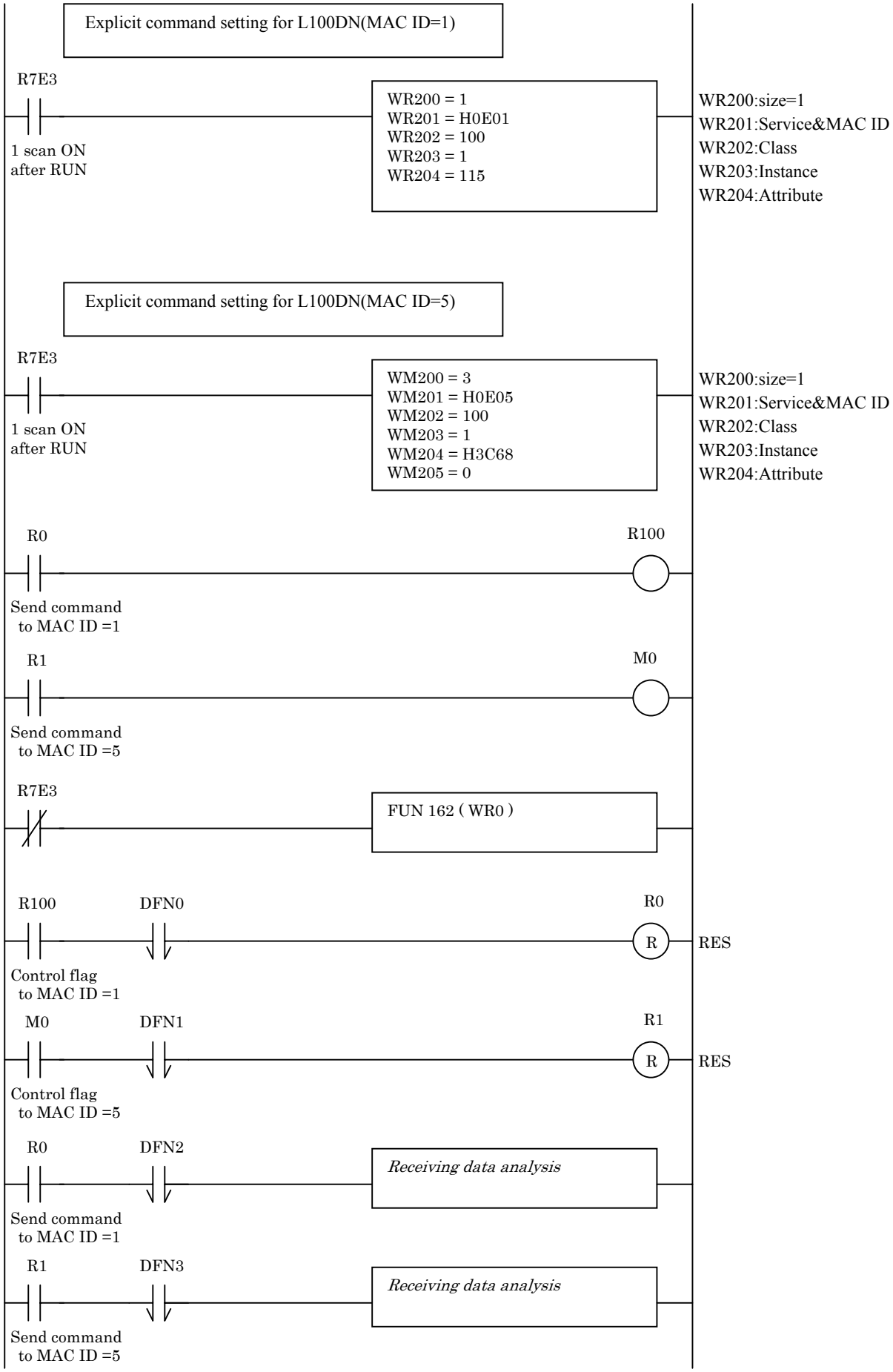
The sample program operation outline
The following command is sent to the inverter (MAC ID=1).

Command: It monitors accumulation operation time.
Class = 100(H0064)
Instance = 1(H0001)
Attribute = 115(H73)
Service = H0E(Get_Attribute_Single)

The following command is sent to the inverter (MAC ID=5).

Command: It sets a maximum frequency to 60 Hz.
Class = 101(H0065)
Instance = 1(H0001)
Attribute = 104(H68)
Data = 60(H003C)
Service = H10(Set_Attribute_Sibgle)

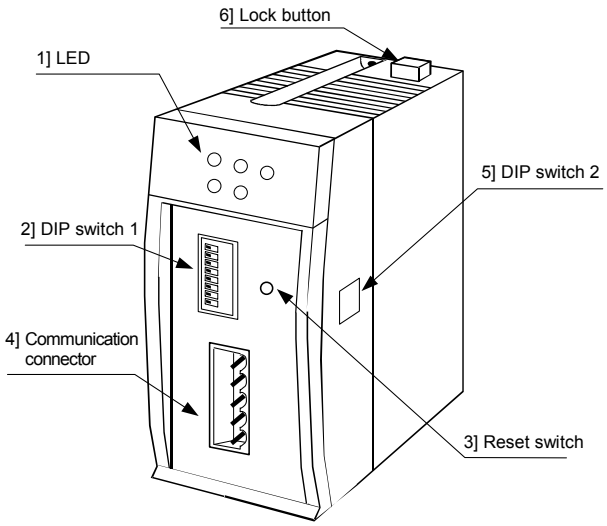



Explicit command setting for L100DN(MAC ID=1)
R7E3
1 scan ON
after RUN
WR200 = 1
WR201 = H0E01
WR202 = 100
WR203 = 1
WR204 = 115
WR200:size=1
WR201:Service&MAC ID
WR202:Class
WR203:Instance
WR204:Attribute
Explicit command setting for L100DN(MAC ID=5)
R7E3
1 scan ON
after RUN
WM200 = 3
WM201 = H0E05
WM202 = 100
WM203 = 1
WM204 = H3C68
WM205 = 0
WR200:size=1
WR201:Service&MAC ID
WR202:Class
WR203:Instance
WR204:Attribute
R0
R100
Send command
to MAC ID =1
R1
M0
Send command
to MAC ID =5
R7E3
FUN 162 (WR0)
R100
DFN0
R0
R
RES
Control flag
to MAC ID =1
M0
DFN1
R1
R
RES
Control flag
to MAC ID =5
R0
DFN2
Receiving data analysis
Send command
to MAC ID =1
R1
DFN3
Receiving data analysis
Send command
to MAC ID =5

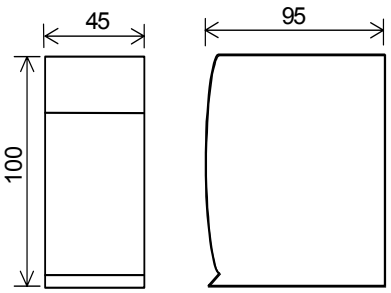
Chapter 6 Slave Controller Specifications

6.1 Outlook/Shape

Name and function of each part



Type	EH-IOCD
Weight	Approx. 0.16 kg
Dimensions (mm)	



No.	Name	Function	Remark
1]	LED	Displays the network status and error information.	
2]	DIP switch 1	Sets the node address and baud rate.	
3]	Reset switch	Resets the module.	
4]	Communication connector	Connects to the network.	Use the packaged connector.
5]	DIP switch 2	Sets to Hold/Clear output for the output module on the EH-IOCD.	
6]	Lock button	This is used when removing the module from the base unit. After it is mounted on the base unit, the attachment can be reinforced using screws. In this case, use M4 x 10 mm (0.39 in.) screws.	

6.2 Function Specification

Table 6.1 EH-IOCD function Specification

No.	Item	Specification
1	No. of installed modules	16 modules (use the EH-IOC to install nine or more units.)
2	Support modules	See the following table.
3	Output data	256 words (255 bytes : when connecting with the EH-RMD)
4	Input data	256 words (255 bytes : when connecting with the EH-RMD)
5	Internal current consumption	450 mA (max)
6	Current consumption on communication side	80 mA (max)
7	Self-diagnosis	System ROM/RAM check, watchdog timer check

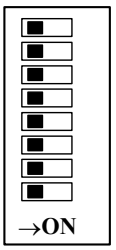
Table 6.2 Supporting module list

Type	Input size		Output size		I/O assign (reference)
	Word	Byte	Word	Byte	
EH-XD8	1	2	0	0	X16
EH-XD16					
EH-XA16					
EH-XAH16					
EH-XD32	2	4	0	0	X32
EH-XD64	4	8	0	0	X64
EH-PT4	4	8	0	0	WX4W
EH-AX44	8	16	0	0	WX8W
EH-AX8V/EH-AX8H					
EH-AX8I					
EH-YT8	0	0	1	2	Y16
EH-YT16					
EH-YTP8					
EH-YTP16/EH-YTP16S					
EH-YS4					
EH-YR12/EH-YR16					
EH-YT32	0	0	2	4	Y32
EH-YTP32					
EH-YT64	0	0	4	8	Y64
EH-YTP64					
EH-AY22	0	0	8	16	WY8W
EH-AY2H					
EH-AY4V					
EH-AY4H					
EH-POS	4	8	4	8	4W/4W
EH-CU	5	10	3	6	FUN0
EH-CUE					

6.3 Settings of Node Address/Baud Rate

The node addresses and baud rate should be set as follows.

Table 6.3 Node Address/Baud Rate setting



Node address	NA1	NA2	NA4	NA8	NA16	NA32	
0	OFF	OFF	OFF	OFF	OFF	OFF	← Default
1	**ON**	OFF	OFF	OFF	OFF	OFF	
2	OFF	**ON**	OFF	OFF	OFF	OFF	
⋮	⋮	⋮	⋮	⋮	⋮	⋮	
62	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	
63	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	

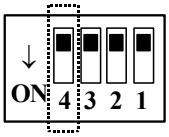
Baud Rate	DR0	DR1	
125 kbps	OFF	OFF	← Default
250 kbps	**ON**	OFF	
500 kbps	OFF	**ON**	
Setting prohibited	**ON**	**ON**	

When setting the DIP switches, turn off the power supply of the PLC and disconnect the module from the network. The setting isn't reflected until the module is reset.
Set the baud rate in such a way that all the devices on the network communicate at the same speed.
Set the node addresses for the other devices in such a way that they do not overlap.

6.4 Setting of Output Status

The output status is set by the DIP switches on the side of the module.
This status specifies whether to clear or hold the output data to the output module in case of a communication error or when the EH-CPU stops.
Bits 1, 2, and 3 are reserved by the system. They must always be set to OFF.

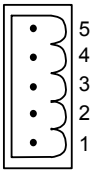
Table 6.4 Output Status setting



Output status	Bit 4	Bit 3	Bit2	Bit1	
Clear	OFF	OFF	OFF	OFF	← Default
Hold	**ON**				

6.5 Communication Connector

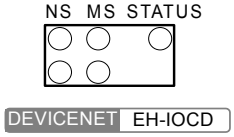
Table 6.5 Communication connector terminal arrangement



Terminal layout	Number	Signal	Wire color
	5	V+	Red
	4	CAN_H	White
	3	Drain	Bare wire
	2	CAN_L	Blue
	1	V-	Black

6.6 LED Specification

Table 6.6 LED Specification

Outlook of LED	Symbol	Description	Color
	NS	Indicates the status of the network.	Green/red
	MS	Indicates the status of the communication interface board.	Green/red
	STATUS	Indicates the status of the PLC interface board.	Green/red
	None	Not used	—

(1) MS/NS

Table 6.7 MS/NS LED Specification

MS \ NS	Lit in Green	Flashing in Green	Lit in Red	Flashing in Red	Turned off
Lit in Green	1	2	4	5	3
Lit in Red	—	—	—	—	6
Turned off	—	—	—	—	7

Table 6.8 MS/NS LED detail

No.	Display status	Description	Action to take
1	MS lit in green NS lit in green	I/O connection established	
2	MS lit in green NS flashing in green	I/O connection not established	Confirm that the DeviceNet master is working normally.
3	MS lit in green NS turned off	Checking node address overlap/ no power supply to the network	Check the communication speed of each device. Check that 24 V DC is supplied.
4	MS lit in green NS lit in red	Node address overlaps/ it is detected that the bus is not functioning	Check the node address and communication speed of each device. Check to see if a cable is broken. Check that the terminal resistor is connected properly. Check that the cable length is within the specification range.
5	MS lit in green NS flashing in red	Communication timeout	Check the communication speed of each device. Check to see if a cable is broken. Check that the terminal resistor is connected properly. Check that the cable length is within the specification range.
6	MS lit in red NS turned off	Communication board hardware error	Replace the module.
7	MS turned off NS turned off	No power supply to the PLC/ waiting for module initialization	Check that the specified voltage is supplied to the power module of the PLC. Check that the LINK is assigned in the I/O assignment for the CPU.

(2) STATUS

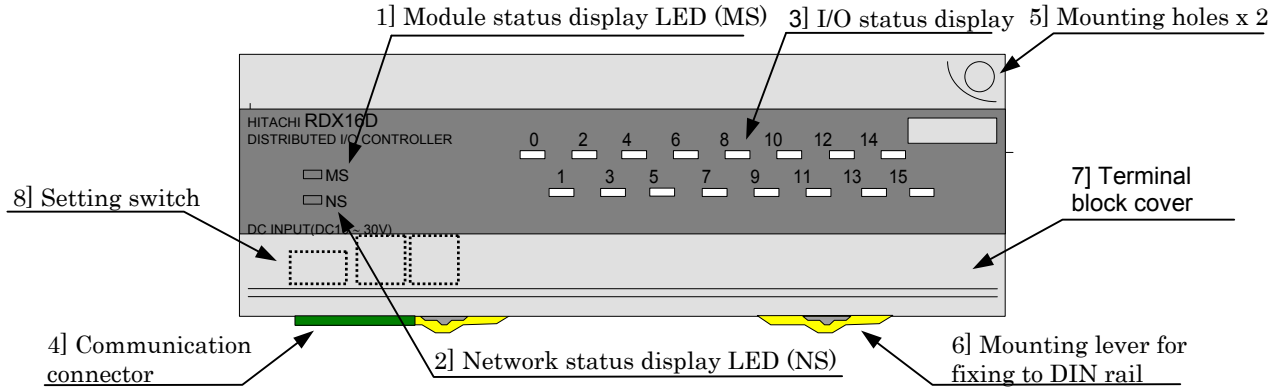
Table 6.9 STATUS LED Specification

Display status	Description	Action to take
Lit in green	Normal operation	
Lit in red	Internal microcomputer WDT error	Turn the power supply off and then on again. If the error persists, replace the module.
Flashing once in red	I/O module error The slot number is indicated by the number of flashes in green.	Replace the faulty module.
Flashing twice in red	I/O module not supported	Remove the module that is not supported.
Flashing three times in red	Incorrect number of I/O points	Set the input/output data so that it is 256 words or less.
Flashing four times or more in red	Module internal device error	Turn the power supply off and then on again. If the error persists, replace the module.
Turned off	No power supply to the PLC.	Check that the specified voltage is supplied to the power module of the PLC.

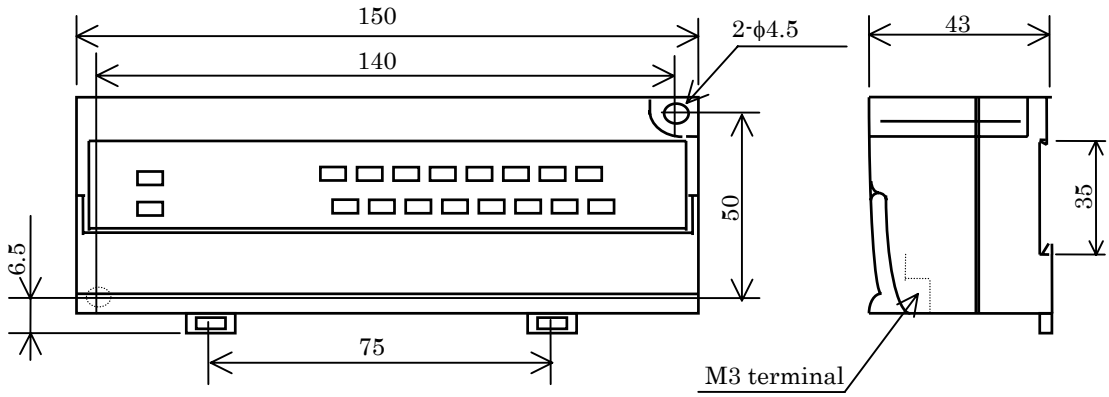
Chapter 7 Discrete I/O Slave Unit Specifications

7.1 Outlook/Shape

Name and function of each part



Type	RDX16D	RDY16TP	RDY16R
Weight	Approx. 0.22 kg	Approx. 0.23 kg	Approx. 0.25 kg
Dimensions (mm)			



No.	Name	Function
1]	Module status display LED (MS)	Indicates the status of the slave unit.
2]	Network status display LED (NS)	Indicates the status of the network.
3]	I/O status display LED	If an input/output signal is turned ON, the LED of the corresponding number turns on. The LEDs turn on only when the power is applied.
4]	Communication connector	This is a connector for connecting the DeviceNet communication cable.
5]	Mounting holes (2 locations)	These are used when the slave unit is attached to a panel, etc. Use M4 x 12 mm screws.
6]	Mounting lever for fixing to DIN rail	This is used when attaching the unit to a DIN rail.
7]	Terminal block cover	This is a cover attached to the terminal block area.
8]	Setting switch	This switch is used for setting the slave unit address and communication speed.

7.2 Function Specification

Table 7.1 Discrete I/O function Specification

Item		RDX16D	RDY16R	RDY16TP
Input/output specification		DC input	Relay output	Transistor output (source type)
Number of I/O points/common		16 points/2 common (8 points/1 common)	16 points/1 common	16 points/2 common (8 points/1 common)
Input voltage/current		19.2 V to 30 V DC Approx. 4mA	---	
Input impedance		Approx. 5.9 kΩ	---	
Operating voltage	ON voltage	15 V or more.	---	
	OFF voltage	5 V or less	---	
Minimum switching current		---	1 mA	
Leak current		---	None	0.1 mA
Rated load voltage Maximum load current		---	24 V DC, 100/240 V AC 2 A per circuit, 5 A per common	12/24 V DC 0.3 A per circuit, 2.4 A per common
Input/output response time	OFF→ON	5 ms or less	10 ms or less	0.3 ms or less.
	ON→OFF	5 ms or less	10 ms or less	1.0 ms or less
Surge removing circuit		---	None *3	Diode
Fuse		---	None *4	4 A/common *1
Insulation system		Photocoupler insulation		
Input/output display		LED display (green)		
External connection		Screw terminal block (M3)		
External dimensions		60 H × 150 W × 43 D		
Power supply voltage (for internal circuit)		24 V DC (+10%, -15%)	24 V DC (+10%, -5%)	24 V DC (+10%, -15%)
Internal circuit power consumption (24 V DC)		Approx. 100 mA or less	Approx. 200 mA or less	Approx. 100 mA or less
Communication power supply		Externally supplied power +11 to 25 V DC (ODVA standard) (supplied from the communication connector)		
Externally supplied power (for power supply to S terminal) *2		12/24 V DC (+10%, -5%) (maximum 30 mA)		

*1 It is necessary to have the unit repaired if the load is short-circuited resulting in the fuse melting down. Note that the fuse cannot be replaced by the user.

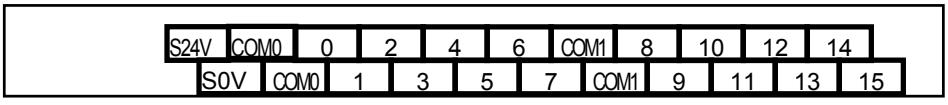
*2 It is necessary to supply 12/24 V DC to the S terminal externally.

*3 In case of an inductive load, a surge killer should be connected (0.1μF capacitance + approx. 100 Ω resistance) in parallel with the load. Also, in case the load contains a DC voltage component, a flywheel diode should be connected as well.

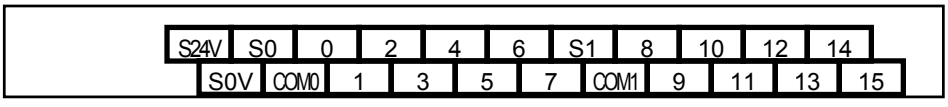
*4 A built-in fuse is not used in this unit. Install a 6 A fuse at the common terminal in order to prevent the external wiring from burning out.

7.3 Terminal Layout

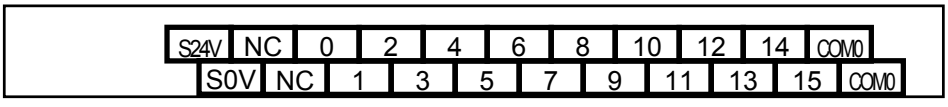
RDX16D



RDY16TP

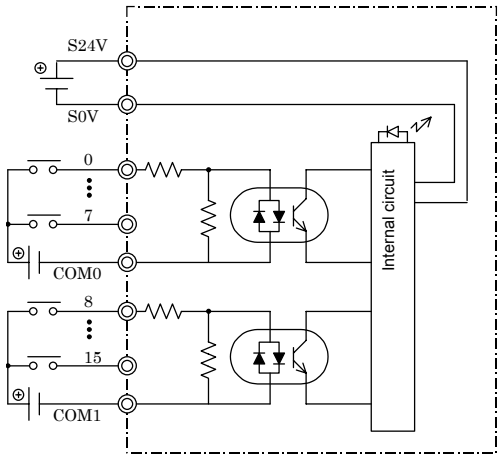


RDY16R

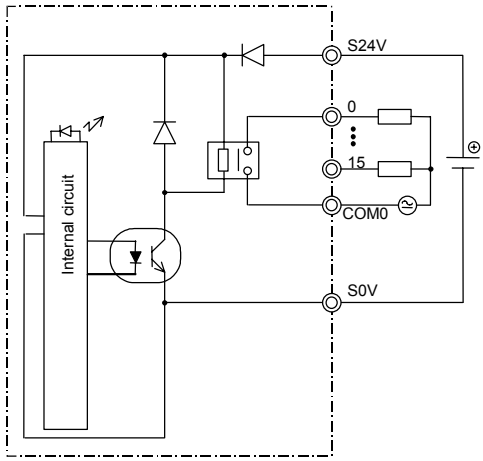


7.4 Internal Circuit

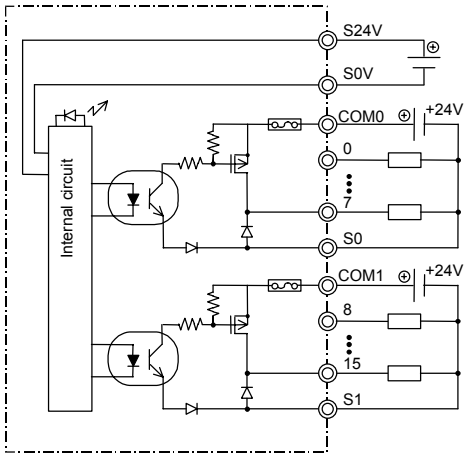
RDX16D



RDY16R



RDY16TP



7.5 Node Address Setting

This section describes how to set the node addresses.
The node addresses are determined as follows, according to the settings of the rotary switches (see Figure 7.1).

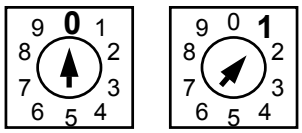
Table 7.2 Node Address setting

Rotary switch on the left side (×10)	Rotary switch on the right side (×1)	Node address	
0	0	0	← Default
0	1	1	
0	2	2	
•	•	•	
•	•	•	
1	0	10	
1	1	11	
•	•	•	
•	•	•	
6	2	62	
6	3	63	

When setting the rotary switches, turn off the power of the unit and disconnect the unit from the network.
The setting isn't reflected until the unit is reset.
Set the node addresses for the other devices in such a way that they do not overlap.

Example)

When the slave address is 1



When the slave address is 63

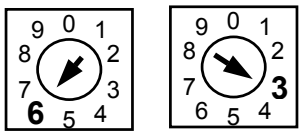
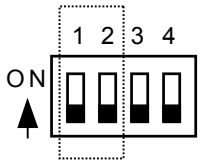


Figure 7.1 Setting the Node Address

7.6 Settings of Baud Rate and Output Status

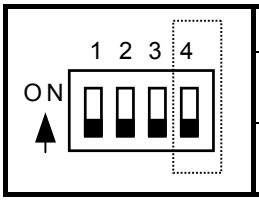
The baud rate is determined by bits 1 and 2 of the DIP switches (see Table 7.3) as follows.
Set the baud rate in such a way that all the devices on the network communicate at the same speed.
In addition, bit 4 of the DIP switches (see Table 7.4) is for setting whether the module should hold or clear the output when a communication error occurs.
Bit 3 is reserved for use by the system; it should always be set to OFF.

Table 7.3 Baud Rate setting



Baud Rate	Bit1	Bit2	
125 kbps	OFF	OFF	← Default
250 kbps	**ON**	OFF	
500 kbps	OFF	**ON**	
Setting prohibited	**ON**	**ON**	

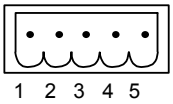
Table 7.4 Output Status setting



Output status	Bit4	
Clear	OFF	← Default
Hold	**ON**	

7.7 Communication Connector

Table 7.5 Communication connector terminal arrangement

Terminal layout	Number	Signal	Wire color
	5	V+	Red
	4	CAN_H	White
	3	Drain	Bare Wire
	2	CAN_L	Blue
	1	V-	Black

7.8 LED Specification

(1) MS/NS

Table 7.6 MS/NS LED Specification

MS \ NS	Lit in Green	Flashing in Green	Lit in Red	Flashing in Red	Turned off
Lit in Green	1	2	4	5	3
Flashing in Red	—	—	—	—	6
Lit in Red	—	—	—	—	7
Turned off	—	—	—	—	8

Table 7.7 MS/NS LED detail

No.	Display status	Description	Action to take
1	MS lit in green NS lit in green	I/O connection established	—
2	MS lit in green NS flashing in green	I/O connection not established	Confirm that the DeviceNet master is working normally.
3	MS lit in green NS turned off	Checking node address overlap/no power supply to the network	Check the communication speed of each device. Check that 24 V DC is supplied.
4	MS lit in green NS lit in red	Node address overlaps/it is detected that the bus is not functioning	Check the node address and communication speed of each device. Check to see if a cable is broken. Check that the terminal resistor is connected properly. Check that the cable length is within the specification range.
5	MS lit in green NS flashing in red	Communication timeout	Check the communication speed of each device. Check to see if a cable is broken. Check that the terminal resistor is connected properly. Check that the cable length is within the specification range.
6	MS flashing in red NS turned off	Illegal switch setting	Check the rotary and DIP switches. Once they are corrected, turn the power supply on again.
7	MS lit in red NS turned off	Slave unit failure WDT error	Turn the power supply off and then on again. If the error persists, replace the unit.
8	MS turned off NS turned off	No power supply to the PLC/ waiting for module initialization	Check that the specified voltage is supplied to the power module of the PLC.

(2) I/O status display

Table 7.7 I/O LED status

Unit	Description	Action
Input	LED stays lit.	Check whether or not the external device is continually on.
	LED does not turn on.	Check whether the terminal block has come loose, or check whether the external devices are functioning.
	LED stays lit although there is no input signal.	Replace the unit.
	LED does not turn on although there is an input signal.	
Output	LED stays lit.	Replace the unit.
	LED does not turn on.	
	The load is functioning although the output is not specified.	
	The load is not functioning although the output is specified.	Check whether the terminal block has come loose, or check whether the external load is functioning.

Chapter 8 Starting Up

In the configuration method of EH-RMD, it is mentioned the case of using Rockwell Automation configurator. Please refer to the "DeviceNet master configuration software application manual (NJI-455)" for using Hitachi configurator.

Table 8.1 Configuration software

No.	Product name	Type	Specification
1	RSNetWorx™ for DeviceNet	9357-DNETL3	Runs on Windows® 95/98 and Windows NT® 4.0. This application is an English version.

Table 8.2 Interface modules

No.	Product name	Type	Specification
1	PC Serial Interface	1770-KFD	Uses a serial port.
2	PCMCIA Interface Card	1784-PCD	Uses an IC card interface.
3	PCI Scanner Card	1784-PCID	Uses a PCI bus slot.

Use one of the interface modules above.

The products mentioned above are provided by Rockwell Automation.

- Please contact the following to obtain more information about the purchase and specifications of the above-mentioned products.

  http://www.automation.rockwell.com/

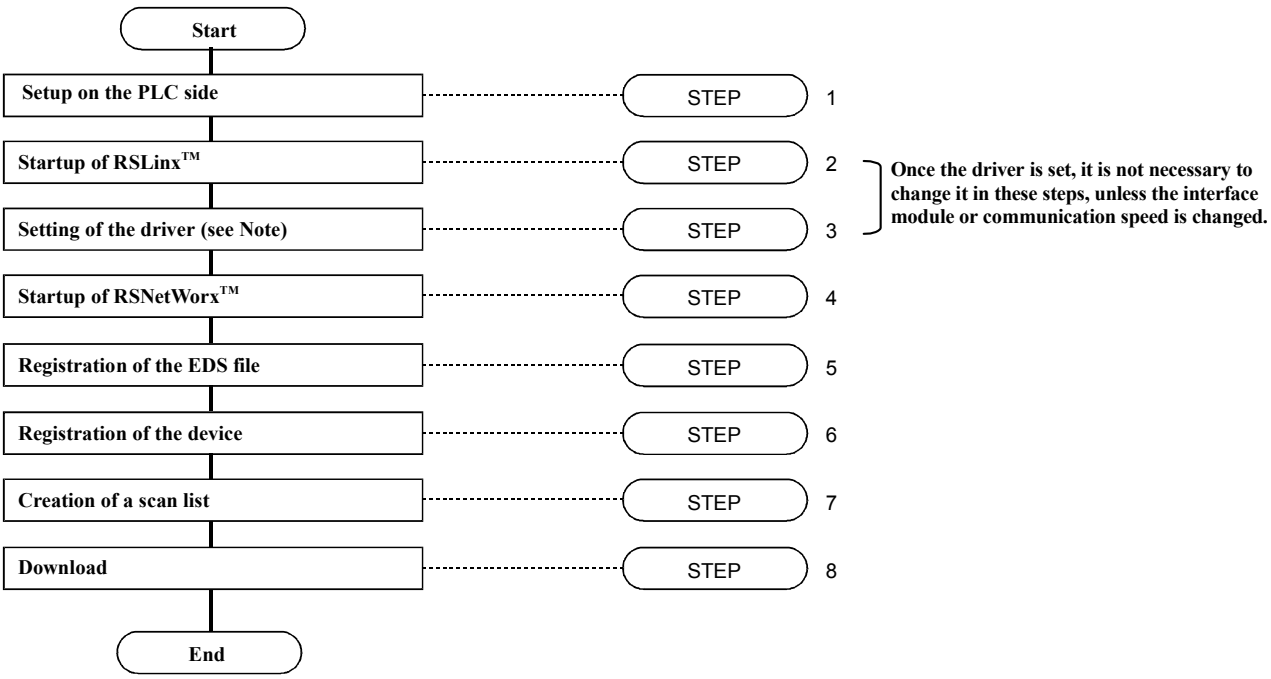
The local office in every country can be accessed from the above site.

- Please contact the following to obtain information about the installation and operation method of the above-mentioned products.

  http://www.automation.rockwell.com/support/

For information on the EH-RMD and PLCs in general, please contact the Hitachi dealer where you made the purchase.

This chapter explains the steps necessary in order to start up the system for the first time, using the flow chart shown below.
See the manual packaged with each product for the software installation method and other relevant details.

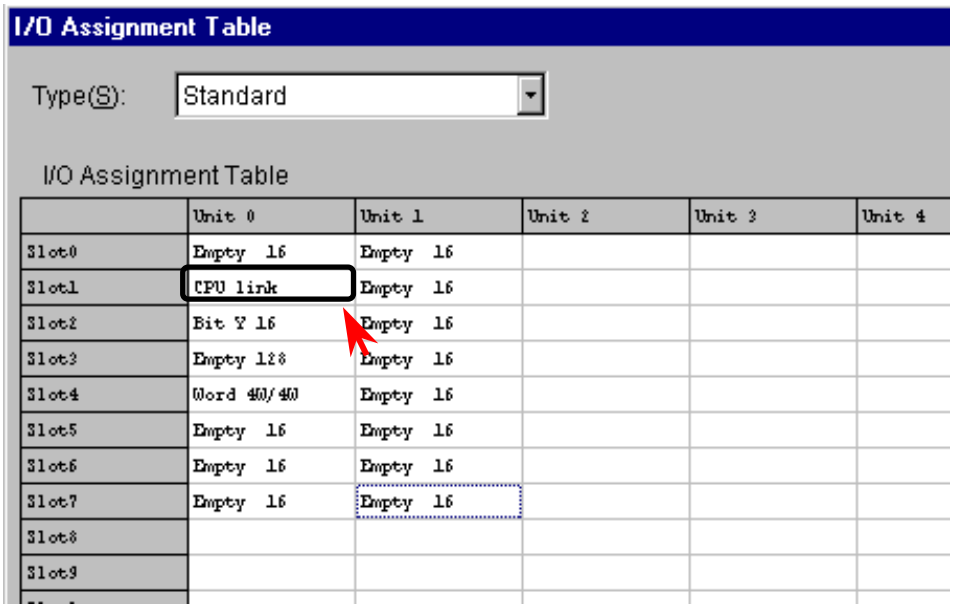


(Note) This manual explains the case where a *PC Serial Interface* is used as the interface module.

S T E P 1 Setup on the PLC side

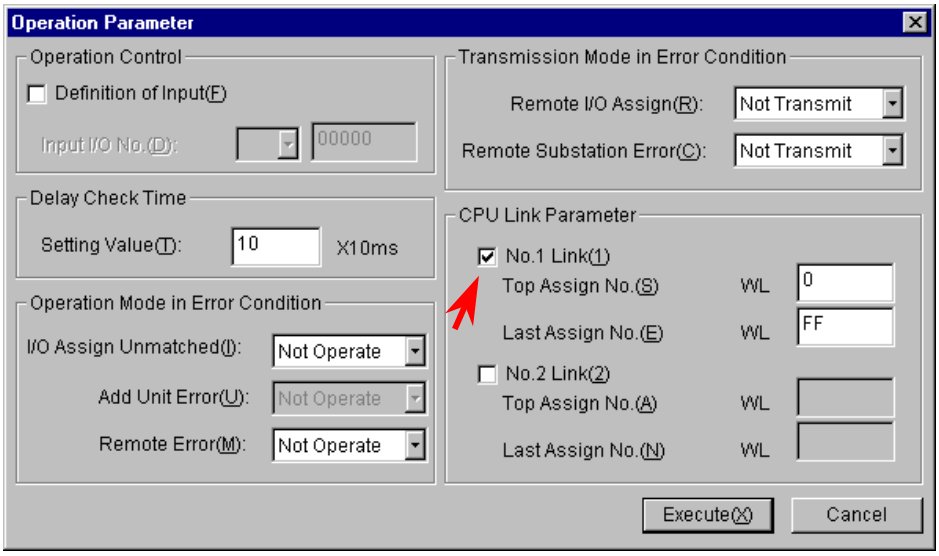
1. Perform the I/O assignment.

Start up the LADDER EDITOR for Windows® and assign the I/O assignment of EH-RMD.
I/O assignment of "CPU link" is for EH-RMD link mode, "Remote 2" is for EH-RMD remote mode..



2. Set the CPU link parameters.(LINK mode only)

Click the link No. to be used. Next, set the transmission area.
Top assign No. should be fixed to WL0/WL1000.(*1)
Please set **Last assign No.** according to the following table.



Last Assign No. setting

EH-RMD	Last Assign No.
SOFTWARE VER. 00	1 to FF (1000 to 10FF)
SOFTWARE VER. 01 or later	1FF Fixed (11FF Fixed)

*1: Top Assign No. of No.1 Link is WL0, and Top Assign No. of No.2 Link is WL1000.

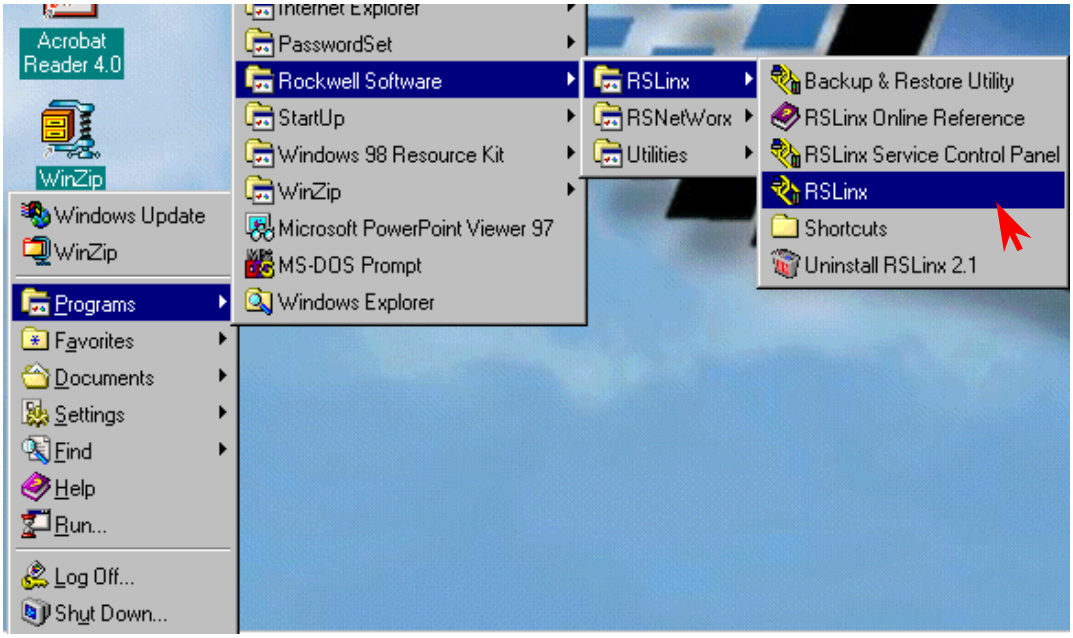
After downloading I/O assignment to CPU module, check the indication of "STATUS" LED on the EH-RMD.
Link mode : Solid Green
Remote mode : Solid Green or 4 times flash Green
In case of remote mode, after scan list is configured in RMDCFG, it is necessary to assign Remote stations again.
After downloading I/O assignment CPU module, close Ladder Editor for Windows® or enter off-line mode (GRS).

S T E P 2 Startup of RSLinx

1. Start up the PC and then RSLinx™.

   The power must be supplied to the network and each device; make sure to verify this in advance.

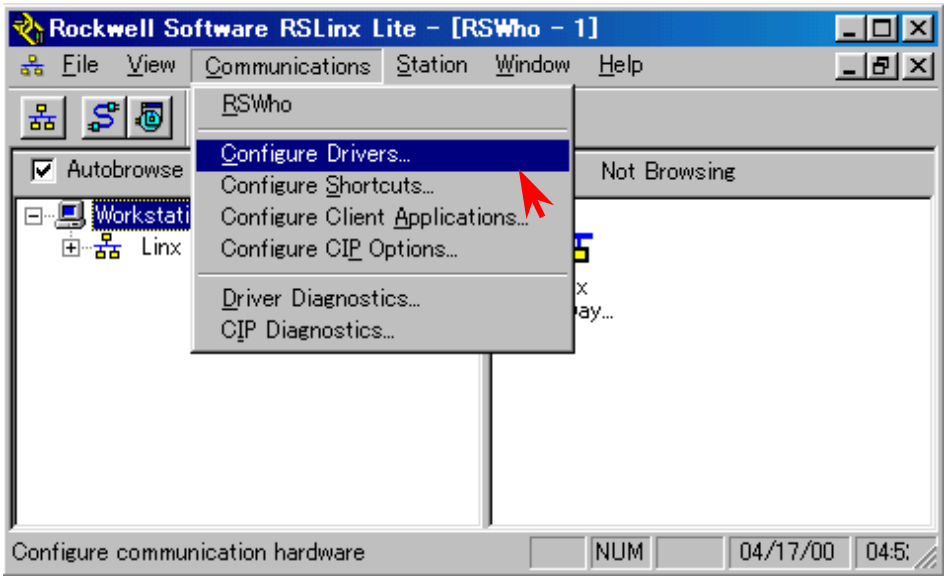
From the Start menu of Windows®, click **[Programs]** → **[Rockwell Software]** → **[RSLinx]** → **[RSLinx]**.



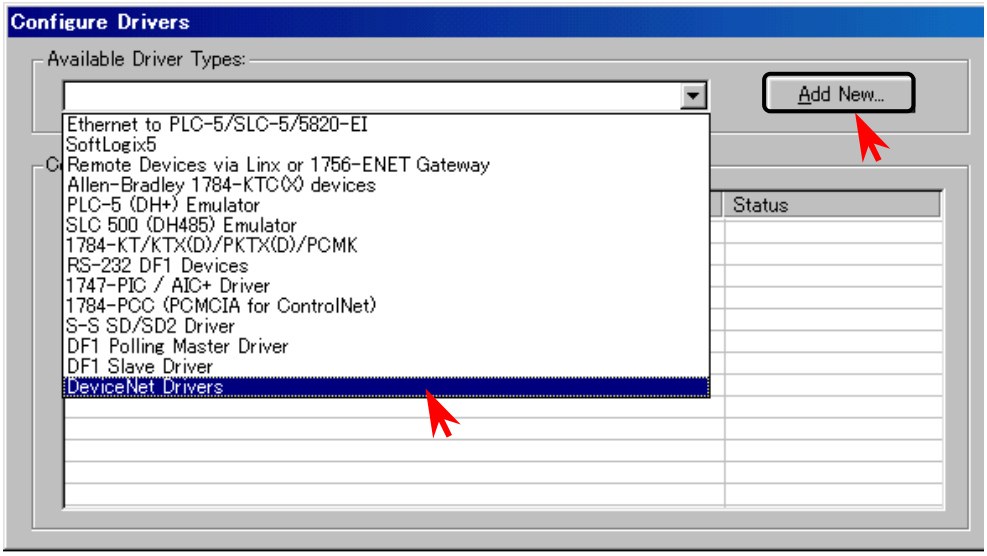
S T E P 3 Selection of the Driver

1. Select the driver for the interface module to be used.

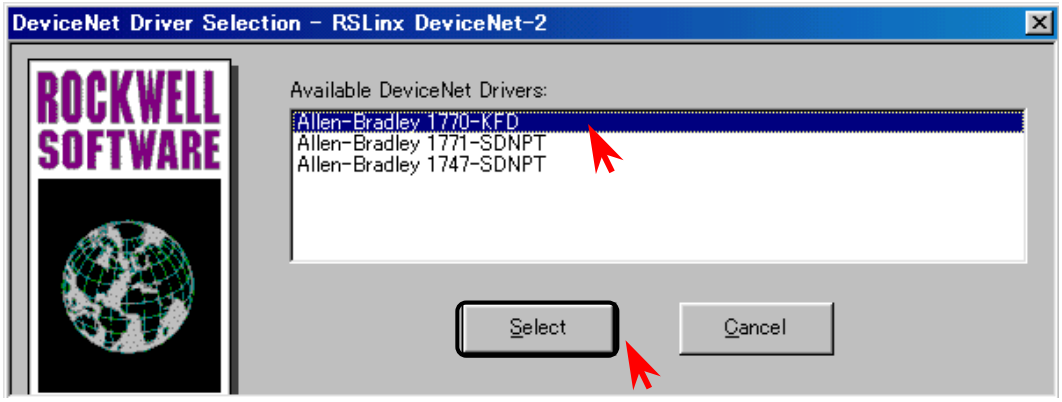
From the menu bar, click **[Communications]** → **[Configure Drivers]**.



The Configure Drivers dialogue box is displayed.
From the Available Driver Types pull-down menu, click **[DeviceNet Drivers]**.
Click **[Add New]**.

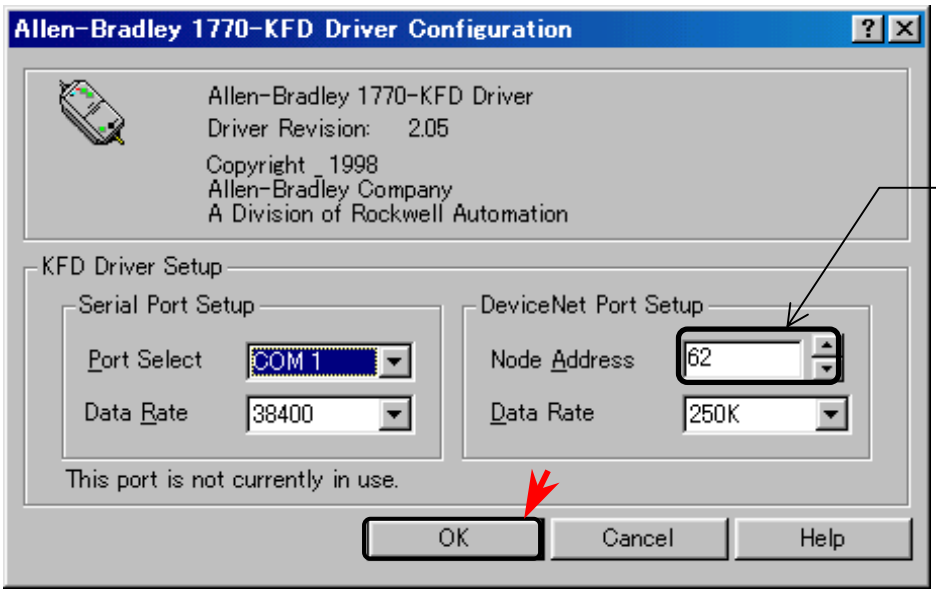


The DeviceNet Driver Selection dialogue box is displayed.
Click "Allen-Bradley 1770-KFD" and then **[Select]**.



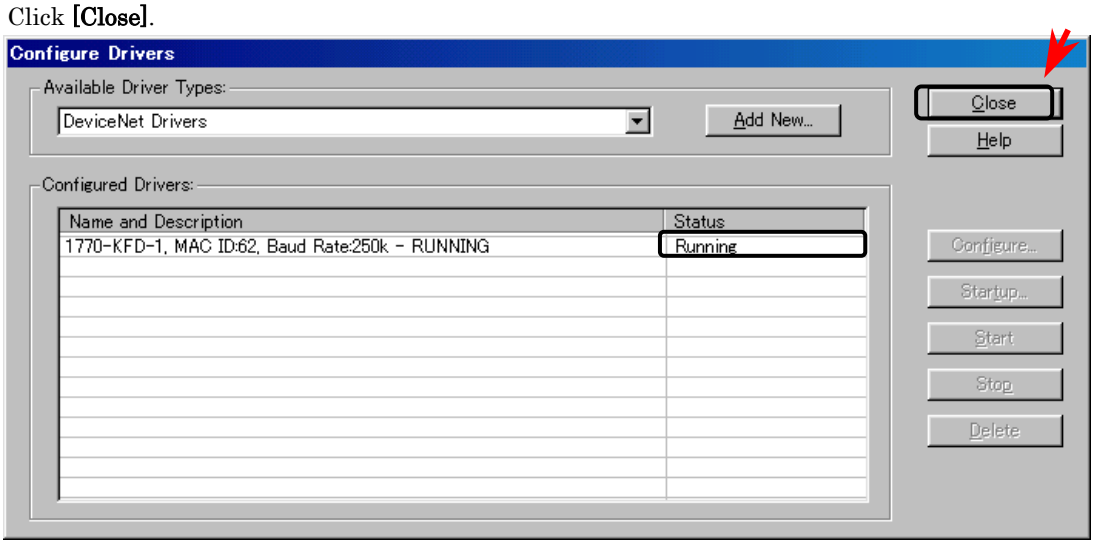
2. Set the serial port and DeviceNet port.

The setup dialogue box is displayed.
Perform the setting for both ports according to the actual system configuration.
Click **[OK]**.



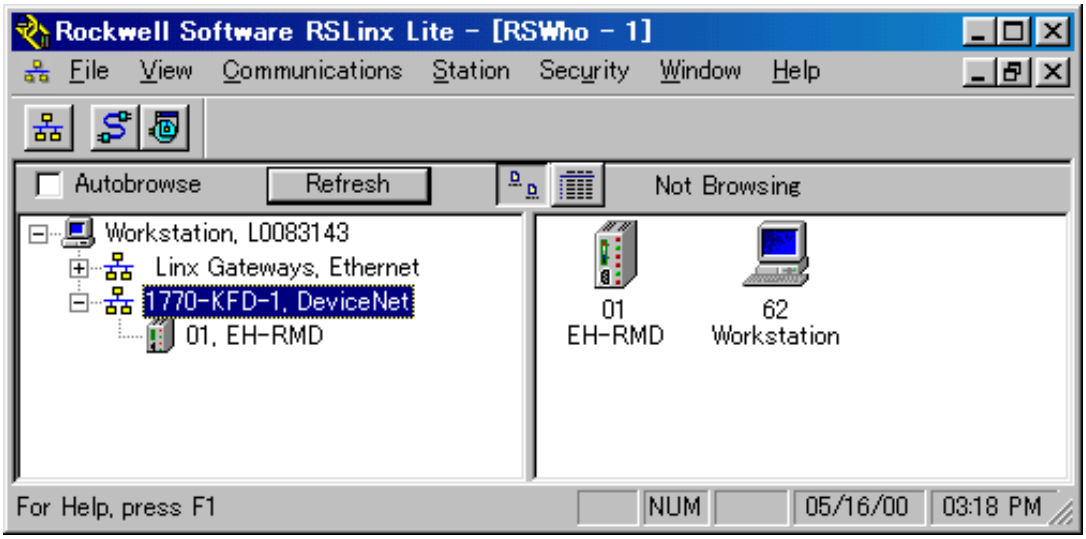
Default is 62. When using already by the other node, set the address which doesn't overlap.

If a display similar to the one to the following is shown, the driver setting is completed.
If **Status** becomes "**Running**" like the following display, the setting of the driver is completed.
Click **[Close]**.



3. Check the communication with the set driver.

Select the set driver and click **[Autobrowse]** at the upper left corner to search for devices on the current network. Check that the network devices other than the interface module are displayed and finish the search. If the message "Unrecognized Device" is displayed, perform the registration of the EDS file explained later. This is not a communication error.

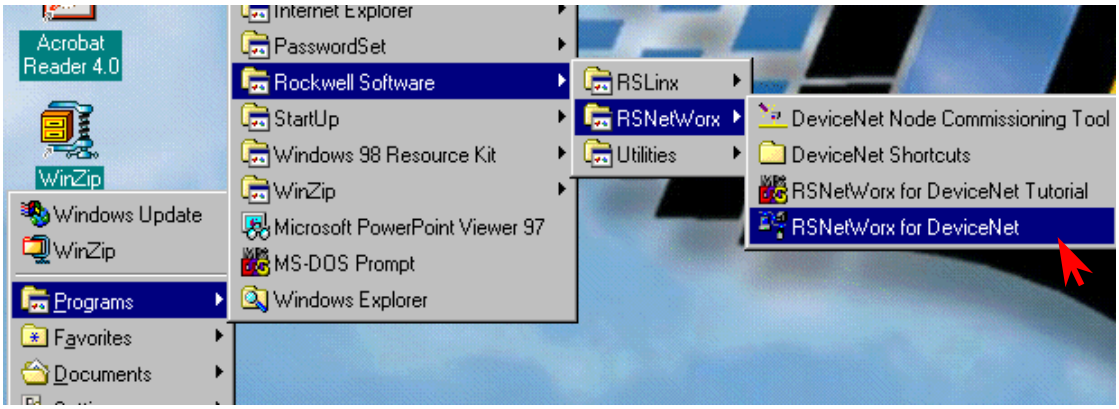


Once the driver is set, it is not necessary to change it in steps 2 and 3, unless the interface module or communication speed is changed.
When adding or deleting a slave device, start the operation from step 4.

STEP 4 Startup of RSNetWorx™

1. Start up RSNetWorx™.

From the Start menu of Windows®, click **[Programs]** → **[Rockwell Software]** → **[RSNetWorx]** → **[RSNetWorx for DeviceNet]**.



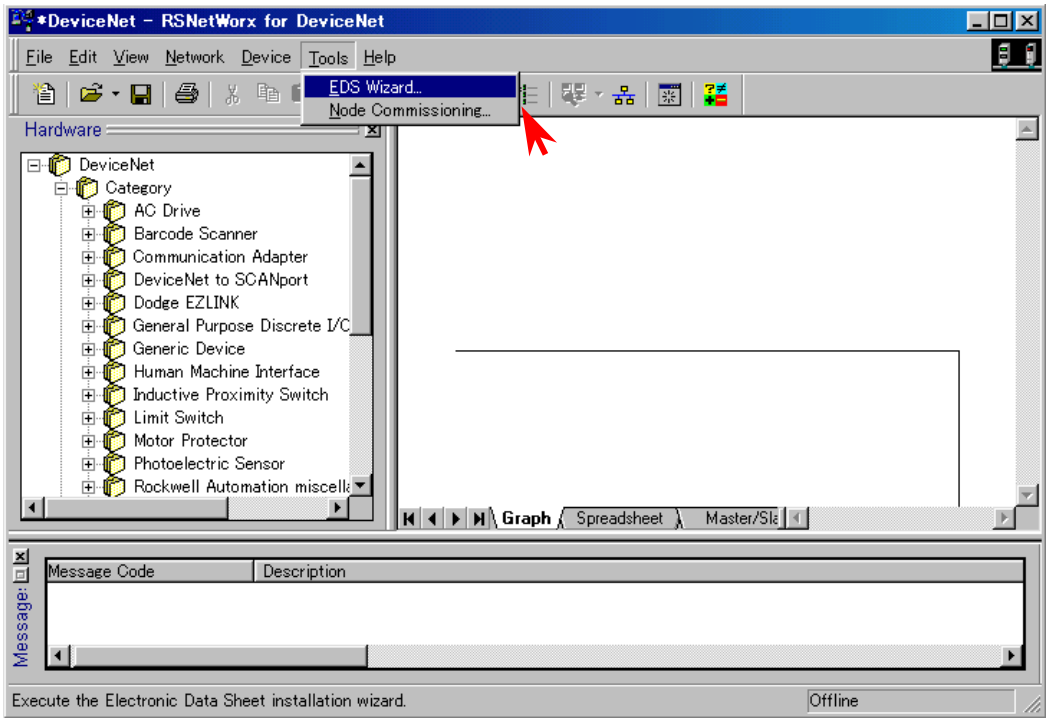
S T E P 5 Registration of the EDS file

1. Register the EDS file of the device to be used to the configurator.

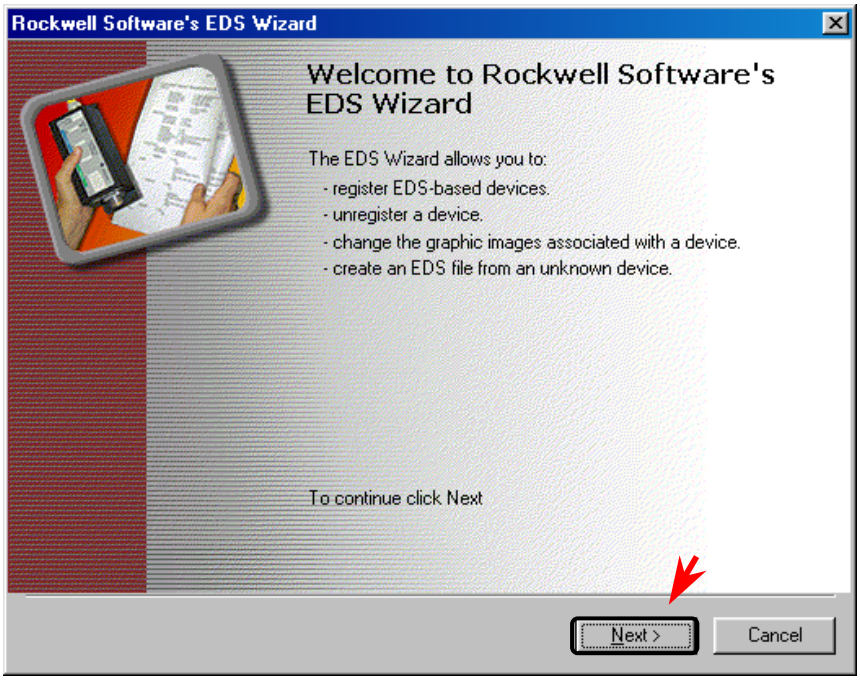
Click **[Tools]**, and then **[EDS Wizard]**.
For information on the EDS files for Hitachi made devices, contact Hitachi's Sales Dept. or download it from the following URL (ODVA Home page).

http://www.odva.org/

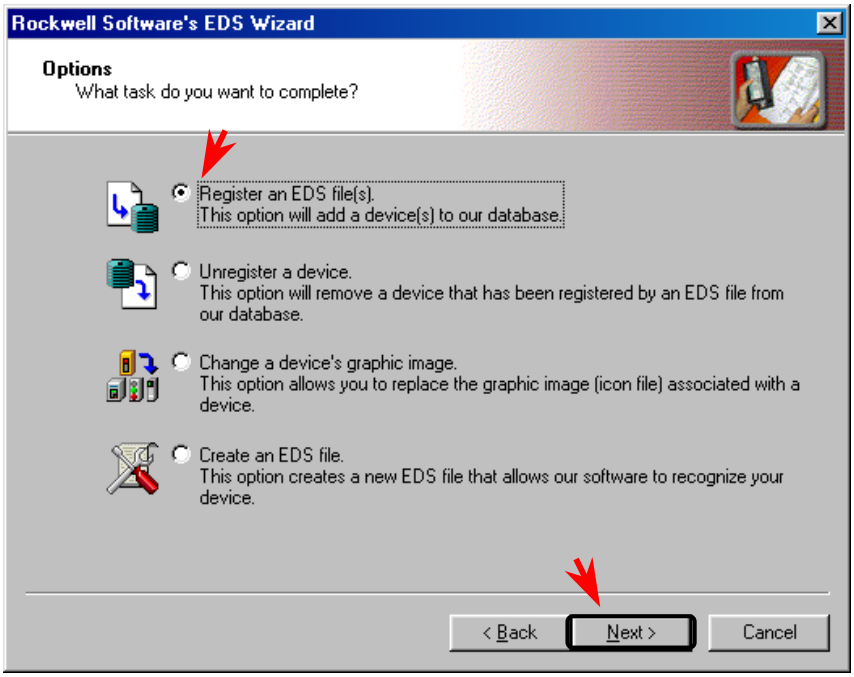
EH-RMD has changed the EDS file used from SFOTWARE VER.03.



The EDS Wizard will be displayed.
Click **[Next]**.

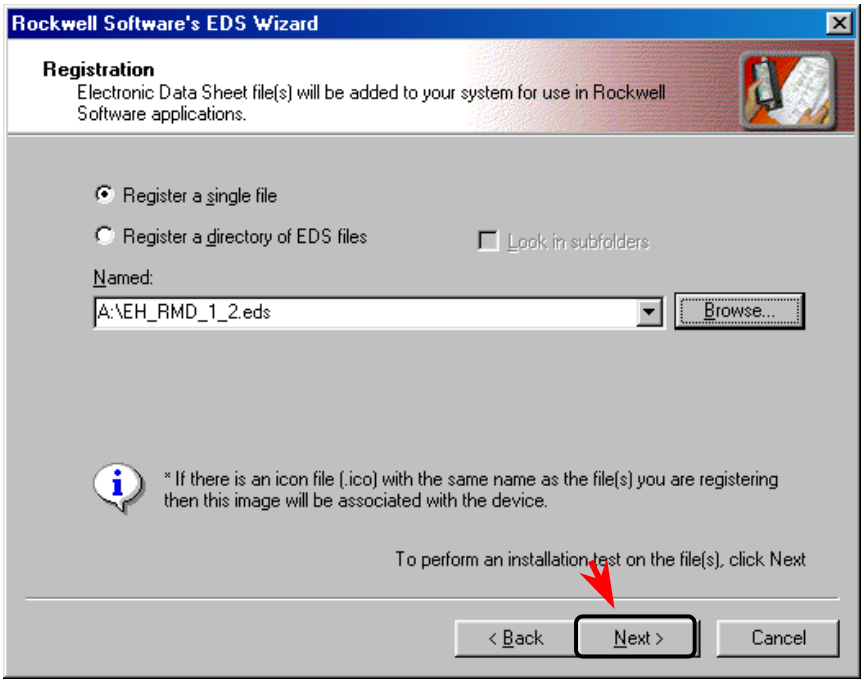


Click “Register an EDS file(s)” and then **[Next]**.

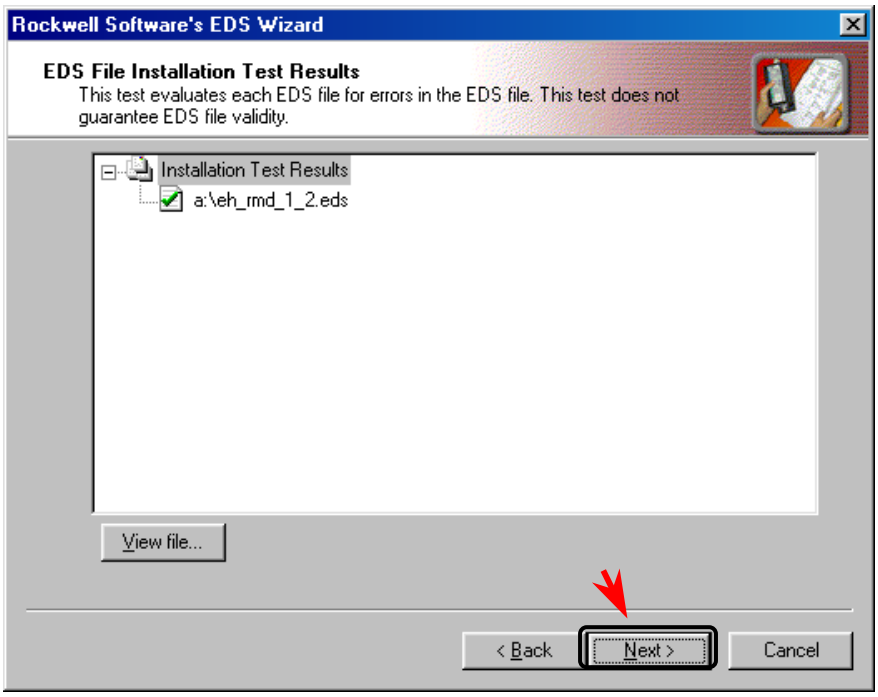


Select the EDS file to be registered.
Enter the path of the file in “Named” and click **[Next]**.

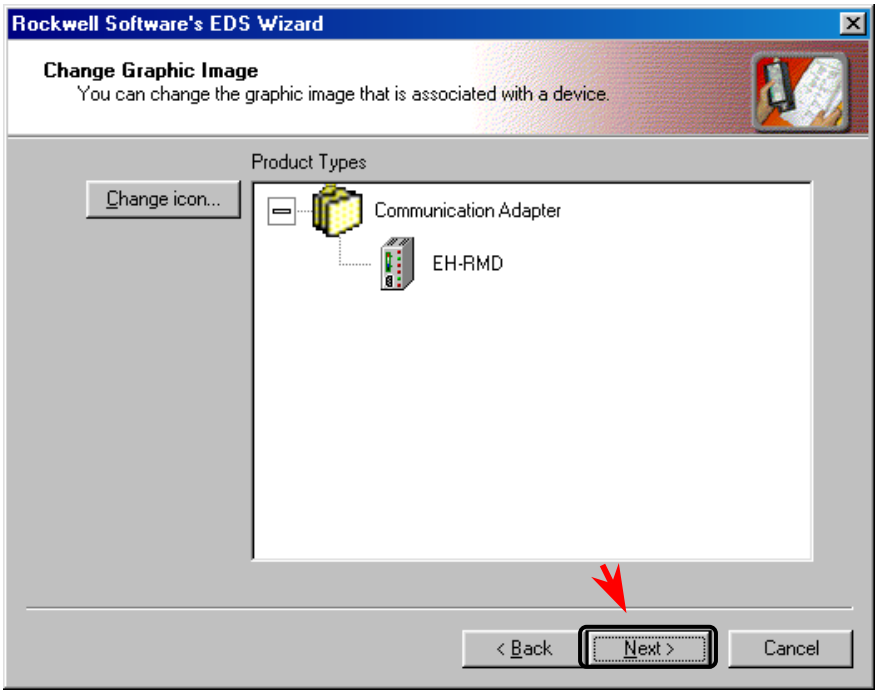
To register via a selected folder, check “Register a directory of EDS files” and enter the path to the folder in “Named,” then click **[Next]**.



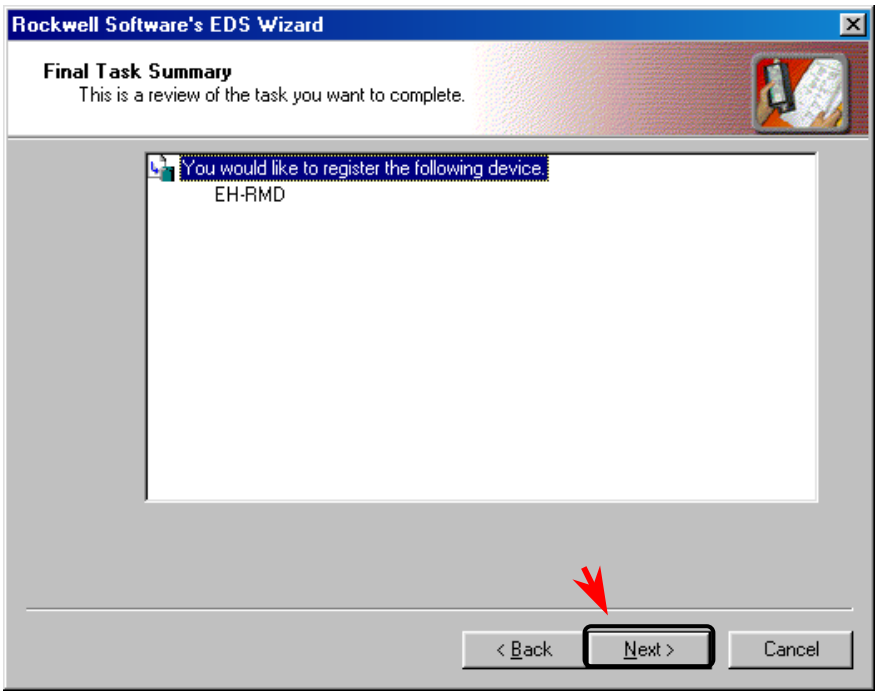
Perform a syntax check of the EDS file.
Contact the manufacturer if a syntax error or warning is displayed.
Click **[Next]**.



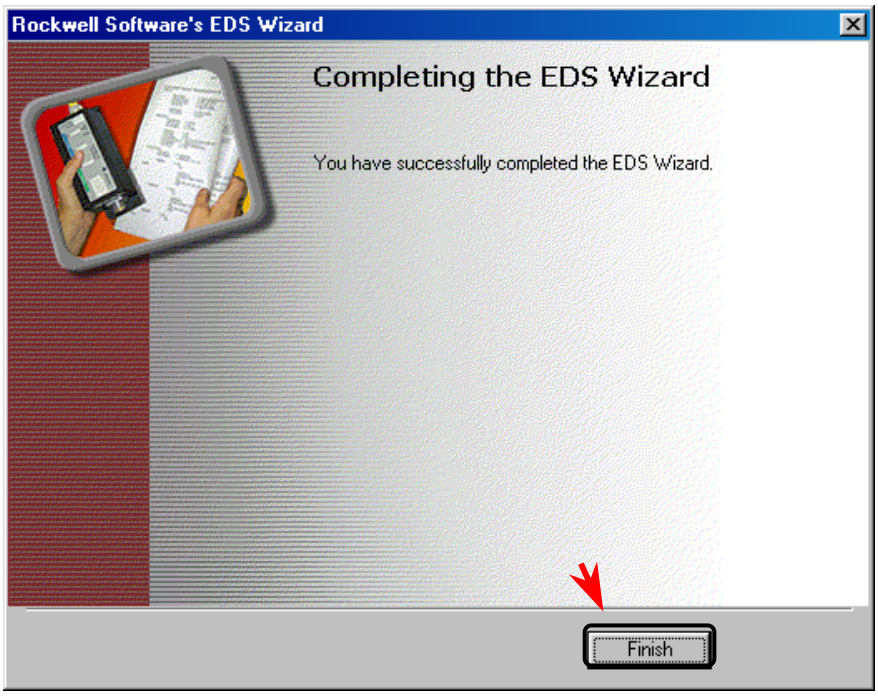
The icon used in the configurator is displayed.
In order to change the icon, click the icon and then **[Change icon]**.
Click **[Next]**.



Click **[Next]**.



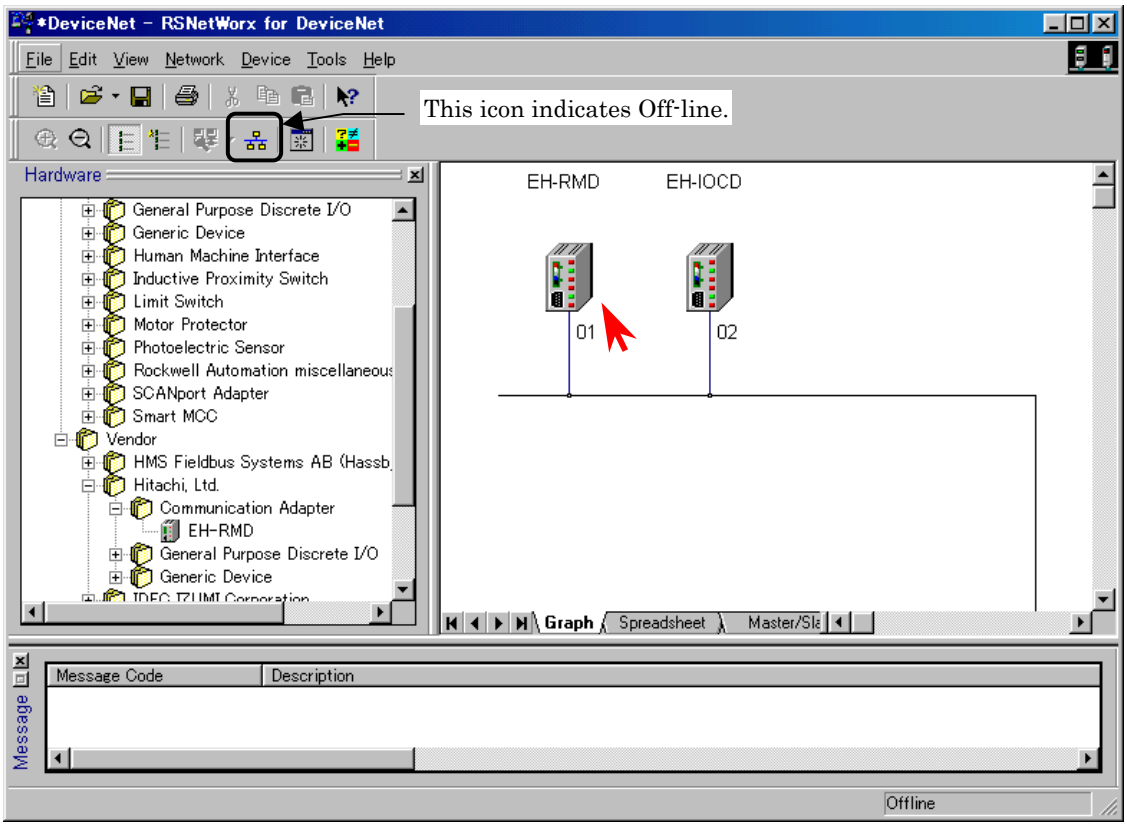
Click **[Finish]**.



S T E P 6 Registration of the device

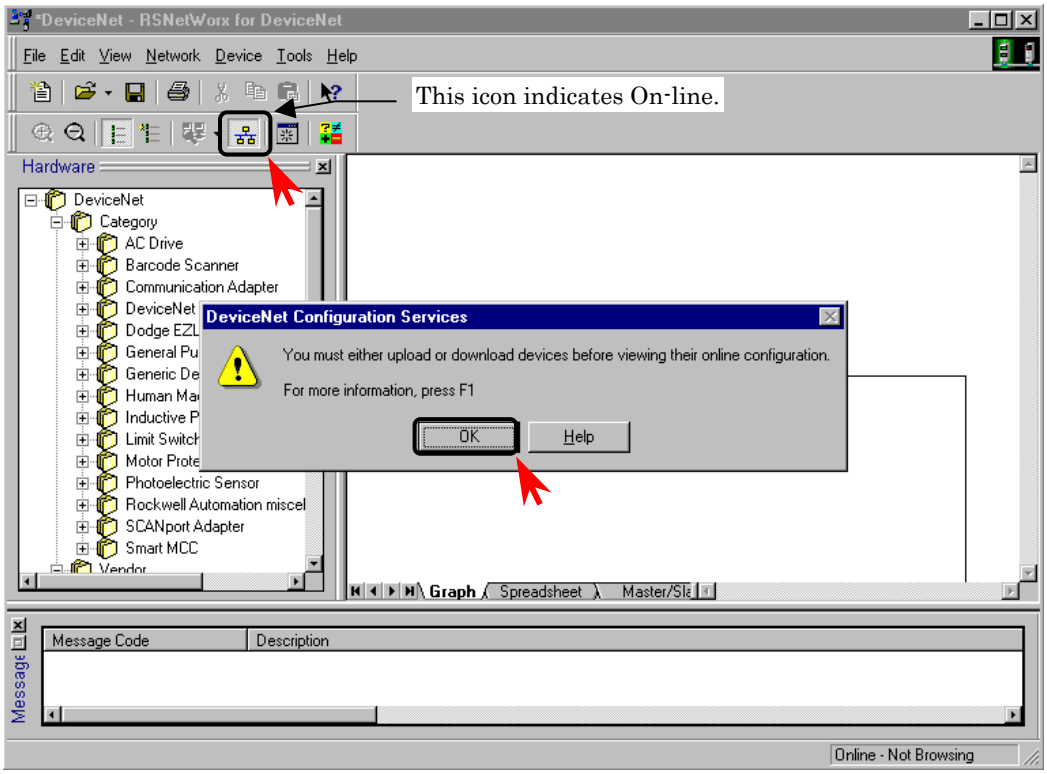
1. Off-line registration

Select the device to be used from the device list to the left, then double-click or drag and drop it.
Display the properties of the device and set the node address.
Interface modules are also treated as devices that have one node address, but it is not necessary to register them in this step.
Register master/slave devices that perform actual I/O communication.
When all devices are registered, proceed to Step 7.

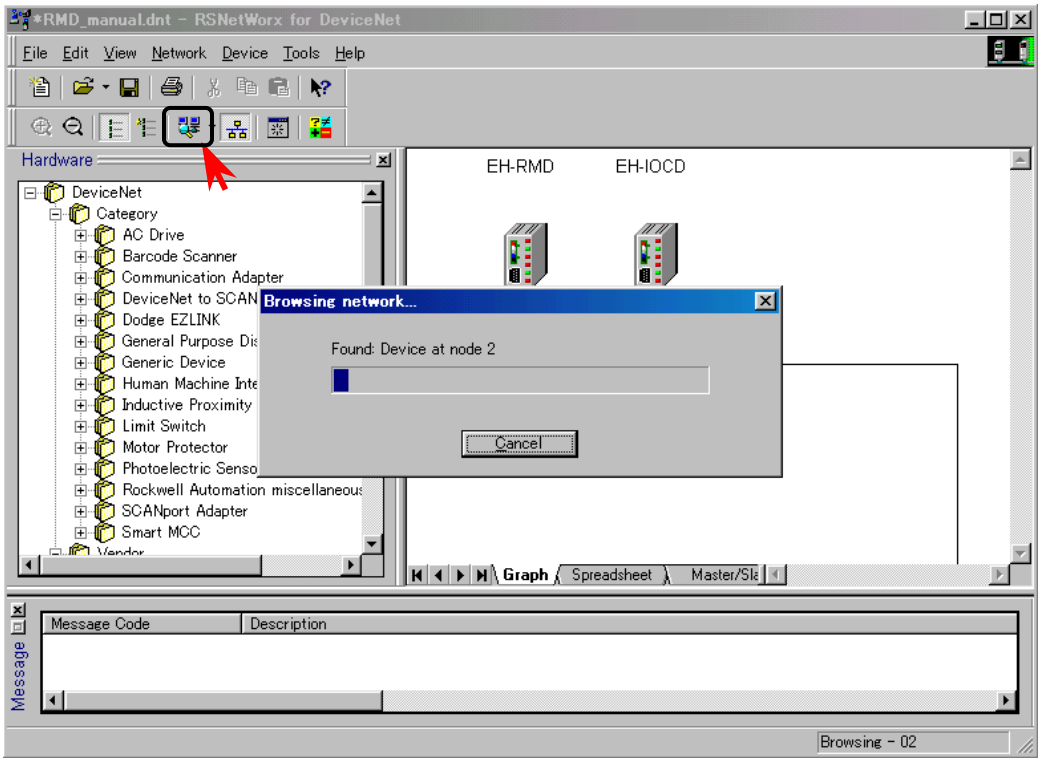


2. On-line registration

Click **[Network]** → **[Online]** or the online button.
The confirmation dialogue box is displayed; click **[OK]**.



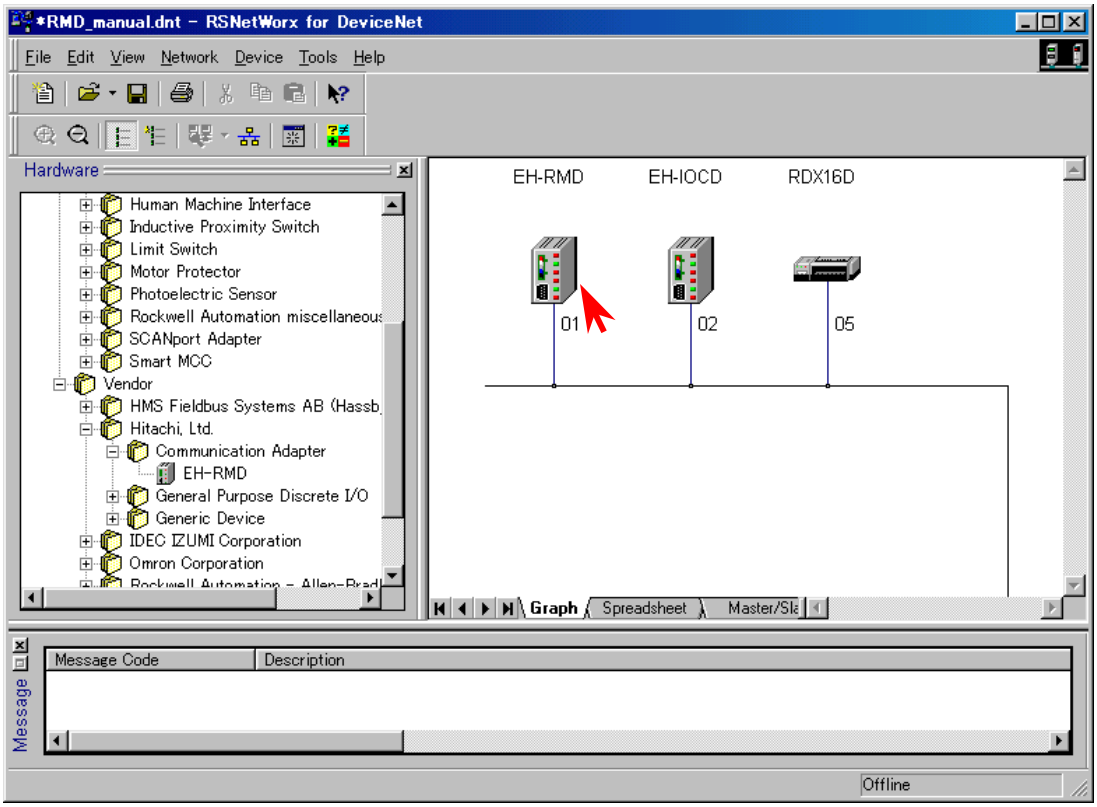
Click **[Network]** → **[Single Pass Browse]** and search for each device connected to the network.
It takes approximately 30 seconds to search for all the node addresses.
Click **[Cancel]** to end the search. This causes no problem even if the search for all node addresses has not been finished.
Interface modules are also treated as devices that have one node address, but it is not necessary to register them in this step.



S T E P 7 Creation of a scan list

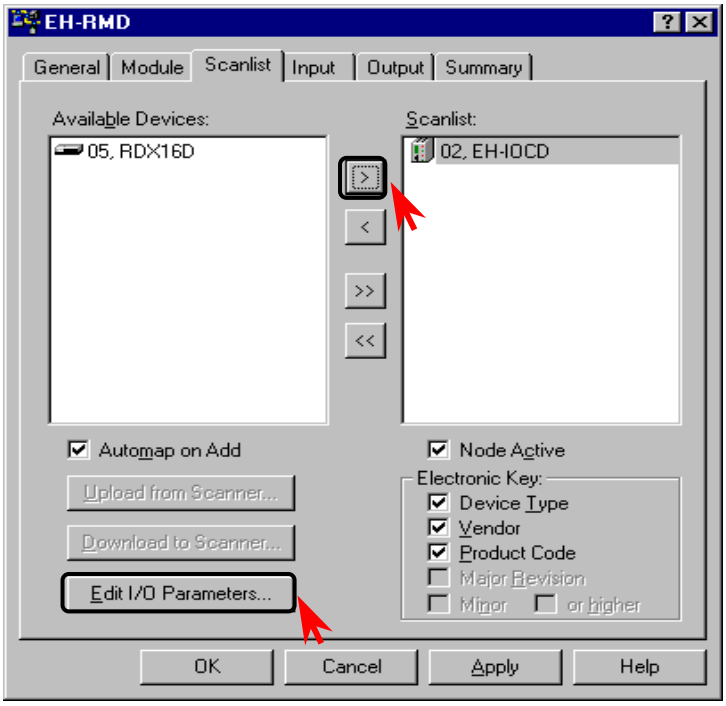
1. Register the master as well as all slaves with which the I/O communication is performed.

Set the mode to off-line if the on-line mode is set.
Right-click or double-click the EH-RMD to display the properties.



Click the **Scanlist** tag and move the device from **Available Devices** to **Scanlist**.
Highlight each device moved to Scanlist and click
[Edit I/O Parameters]. Set the I/O communication type and I/O data size.

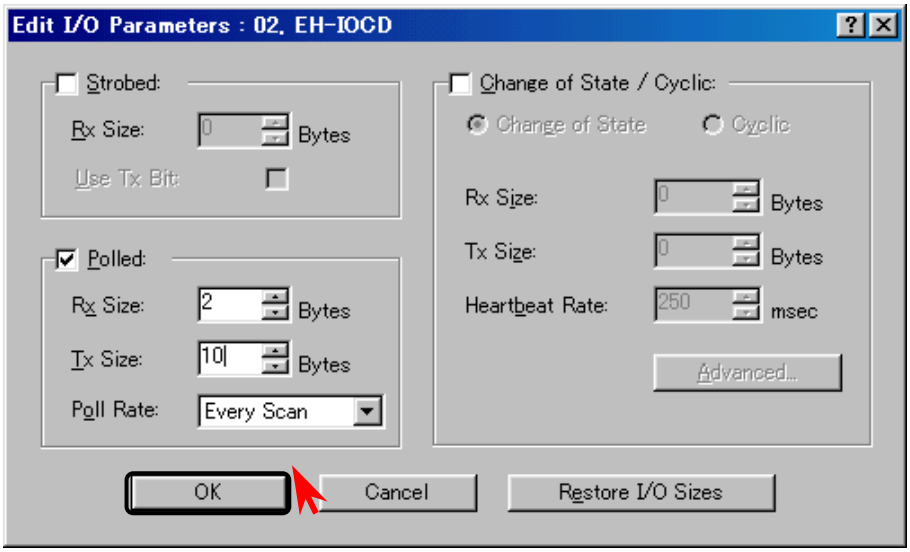
Check "Automap on Add" and move the devices to Scanlist in order to automatically map each device to the WL area.
If it is desired to map devices individually, map each device according to the steps in "Mapping of I/O data to WL" described later, without checking "Automap on Add."



2. Set the I/O communication type and I/O data size

Make sure to select an I/O communication type supported by the device.
I/O data size must be set up in the byte unit. (Refer to the Table 6.2)
The default I/O data size of the EH-IOCD is 8 bytes for both input and output.
Make sure to set the same size as for the mounted module.
It is shown on the following page how to calculate the I/O data size.

For devices whose default I/O communication type and data size are defined in the EDS file, it is not necessary to change the settings as far as they are in use.



How to calculate the I/O data size

Any I/O data size within the following range can be set for the EH-IOCD.

	Input (byte)	Output (byte)
Default	8	8
Allowable setting range	0-255	0-255

Set the size of input/output according to the module actually used.
See Section 6.2 for the I/O data size used by each module.

A calculation example is shown below.

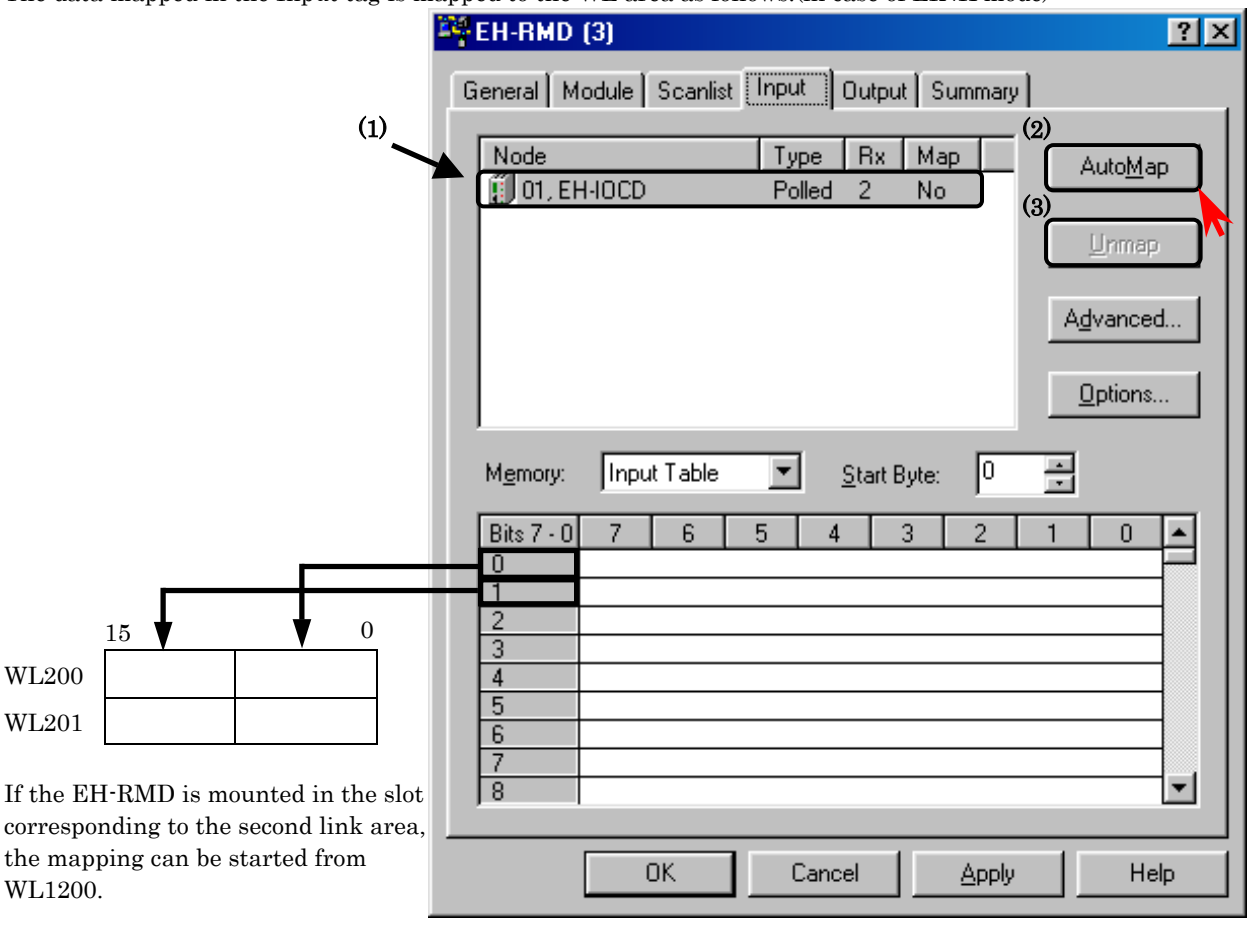
EH-PSA	EH-IOCD	EH-XD8	EH-YTP32		EH-CU	EH-AX44		EH-YTP64	

Input size: EH-XD8 + EH-CU + EH-AX44
2 + 10 + 16 = 28 bytes

Output size: EH-YTP32 + EH-CU + EH-YTP64
4 + 6 + 8 = 18 bytes

3. Mapping of input data

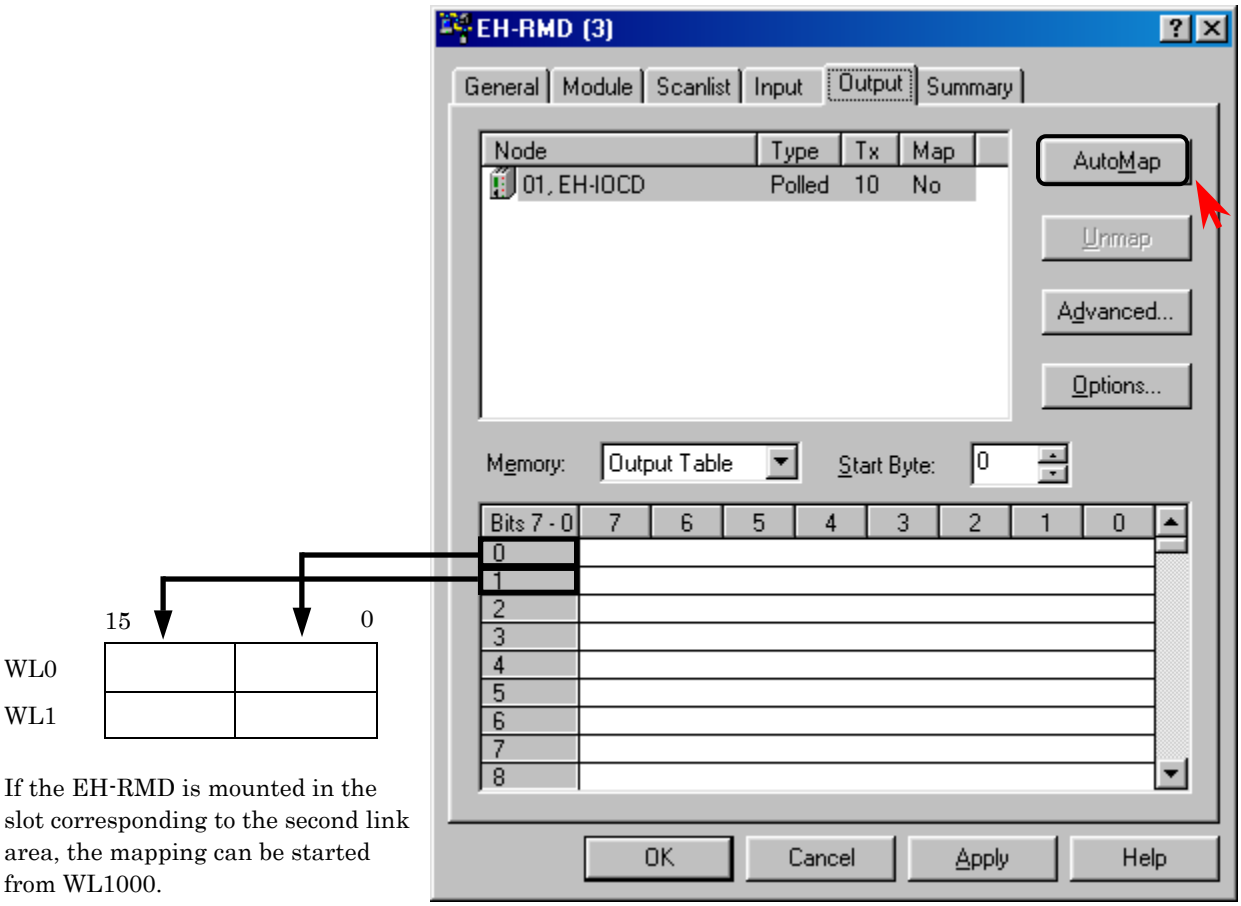
Display the Input tag, and (1)click each device followed by (2) **[AutoMap]**.
First enter the offset address in Start Byte; then it becomes possible to map the input data to the selected area.
(The maximum input size of the EH-RMD is 512 bytes. Set Start Byte in such a way that this size is not exceeded.)
The data mapped in the Input tag is mapped to the WL area as follows.(in case of LINK mode)



If the EH-RMD is mounted in the slot corresponding to the second link area, the mapping can be started from WL1200.

4. Mapping of output data

Display the Output tag, and click each device followed by **[AutoMap]**.
First enter the offset address in Start Byte; then it becomes possible to map the output data to the selected area. (The maximum output size of the EH-RMD is 512 bytes. Set Start Byte in such a way that this size is not exceeded.)
The data mapped in the **Output** tag is mapped to the WL area as follows.(in case of LINK mode)



If the EH-RMD is mounted in the slot corresponding to the second link area, the mapping can be started from WL1000.

This completes the creation of the scan list.
Click [OK] and exit the property screen of the EH-RMD.

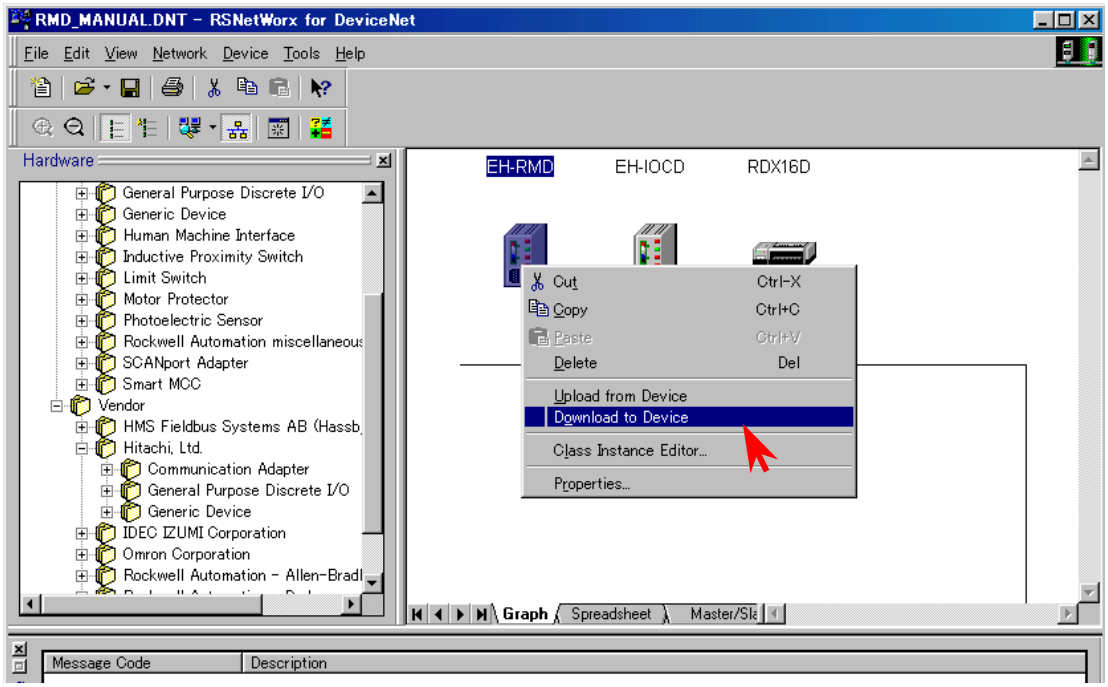
⚠ Caution

- When mapping the EH-IOCD, set the correct sizes of the I/O modules to be mounted. Data will not be input or output if the sizes are set incorrectly.
- Only the actually mounted modules are mapped even if modules are mounted on both sides of a vacant slot. For more information, see Section 11.3, “Mapping Specification of EH-IOCD.”

S T E P 8 Download

1. Download the configuration data to the EH-RMD.

Enable the on-line mode.
Right-click the EH-RMD and click **[Download to Device]**.
By clicking **[Network]** and then **[Download to Network]**, access is made to all the devices on the network.
In this case, depending on the device, there is a possibility that a warning or error may be generated; the data should therefore be downloaded directly to the EH-RMD by clicking **[Download to Device]**.
The confirmation dialogue box is displayed; click **[Yes]**.



This completes the setting in RSNetWorx.
Verify that the network status LED (NS) of the EH-RMD and each slave device is lit in green.
The configuration data is stored in the FLASH memory within the EH-RMD.
Please don't turn off the power for 10 seconds while updating Flash memory.

Chapter 9 Slave Mode

In addition to having the functions as a master/scanner that can perform I/O communication with one or more slaves, the EH-RMD supports the slave mode in which it can perform I/O communication with other EH-RMD modules and/or master modules made by other companies.
It is possible to use one EH-RMD as a master at one time and in the slave mode at another time.

9.1 Overview

This section shows an example of a system configuration where the EH-RMD is used in the slave mode.

Figure 9.1 shows an example of a system configuration where the EH-RMD is used as the master and performs I/O communication with the slaves, including an EH-RMD operating as a slave.
The I/O on PLC2 is controlled by the CPU module on PLC2. PLC1 exchanges the necessary information with PLC2 via the EH-RMD modules (both master and slave).
The I/O data size of the EH-RMD in the slave mode is set in the configurator.

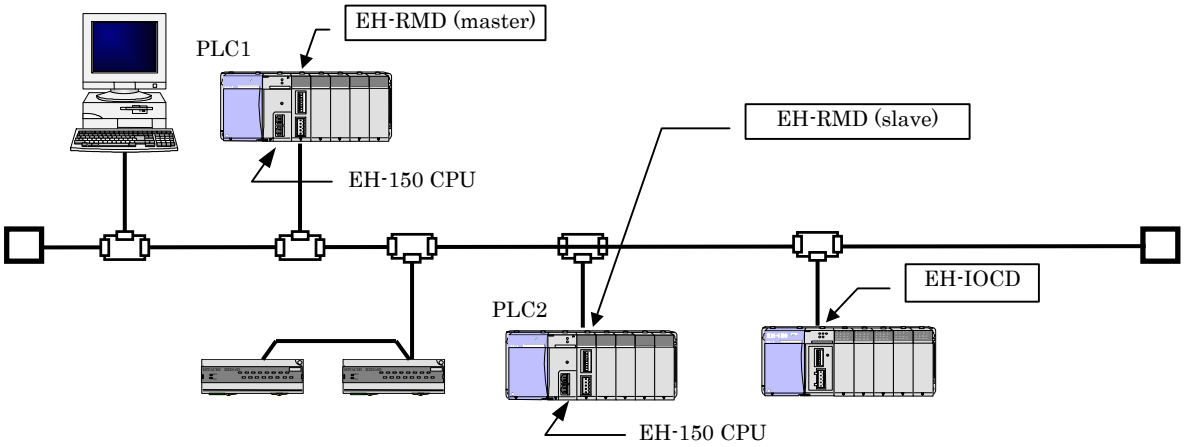


Figure 9.1 System configuration example 1 illustrating the use of the slave mode

Figure 9.2 illustrates a system example configured for the purpose of sharing information of each PLC by making each EH-RMD run as master and/or slave.
In DeviceNet, a slave device cannot communicate with multiple masters. Thus, unlike a common CPU link system, it cannot send data to multiple PLCs.
Figures 9.3 and 9.4 show how to use the link area of the H series CPU link module and the link area in a link system constructed by means of EH-RMD modules.

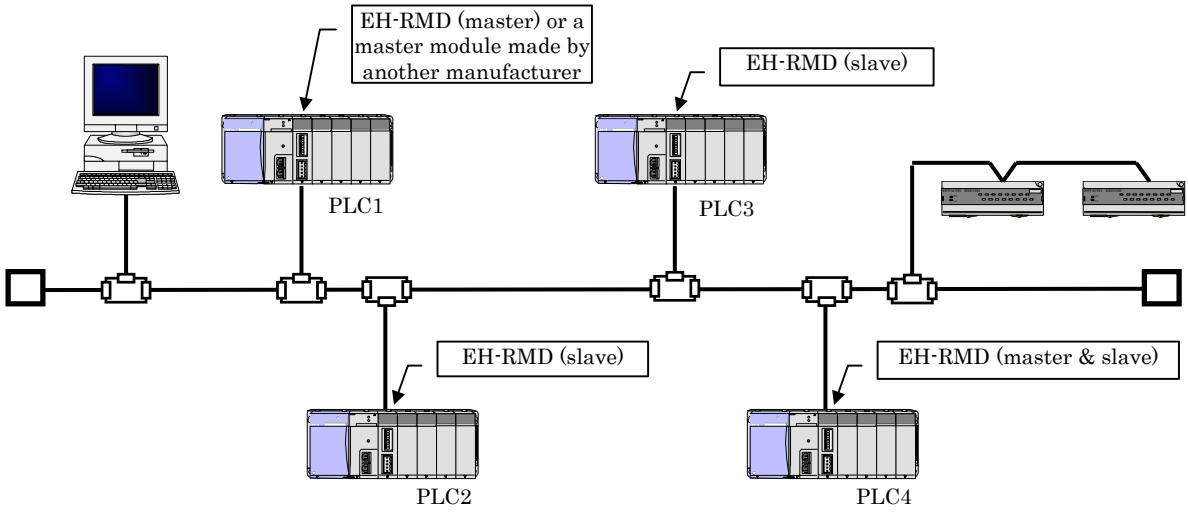


Figure 9.2 System configuration example 2 illustrating the use of the slave mode

9.2 Link System Using EH-RMD

This section describes the differences in how the link area is used in the H series CPU link module and in the EH-RMD.

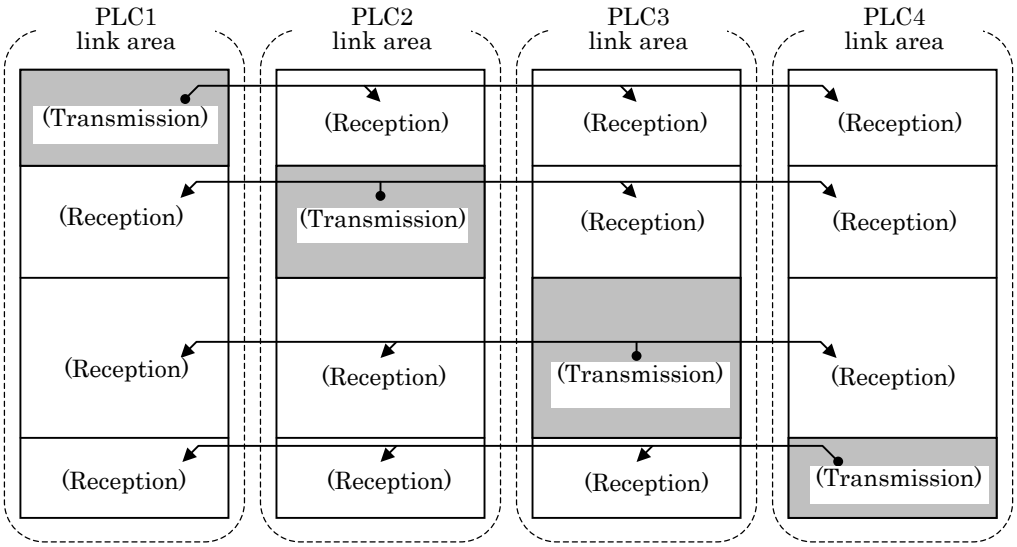


Figure 9.3 Link area in the H series CPU link

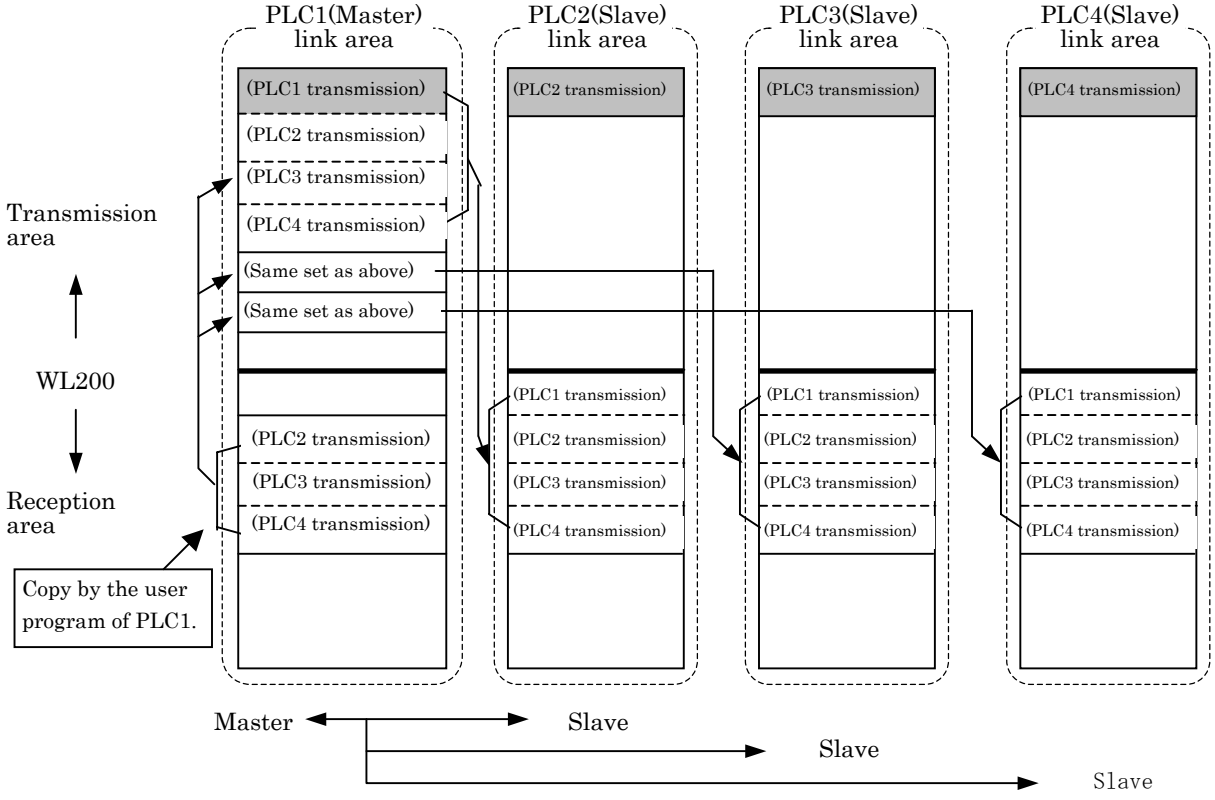


Figure 9.4 Link system using the slave mode

In the H series CPU link, transmission data output from any PLC is broadcast to the link areas of the other PLCs on the network. Thus, the same data is shared in identical WL areas from any CPU.
On the other hand, in the link system using the EH-RMD, the transmission data of each EH-RMD is collected in one master station. In this example, PLC1 is the master station.
Use the ladder program of PLC1 to copy the data to the transmission area in order to send it to PLCs 2, 3, and 4. It is noted that, in this method, a transmission area is required for each PLC.
Therefore, when sharing data using the EH-RMD, the data size will be limited to the value obtained from (formula 1).

256 words/number of (slave) EH-RMDs = number of words that can be shared by each EH-RMD (formula 1)

The transmission area for each EH-RMD must be assigned so that it does not exceed the value calculated by (formula 1).
In the configuration shown in Figure 9.2, the maximum data size that can be shared is 85 words (1 word left); thus the transmission size for each EH-RMD should be assigned within this range.
Note, however, that this is done in order to control the shared data centrally by the master station. It is also possible to configure an individual system where a slave station is used as the master to use its vacant area.

9.3 How to Set the Slave Mode

The setting of the slave mode is performed via the RSNetWorx configuration tool.
This section explains the specific setting method for achieving the system configuration introduced in the previous section.
It is assumed that the size of the transmission data for each PLC is 32 bytes (16 words) and 128 bytes (64 words) are shared. The link data specification of each PLC is shown in the figure 9.5.
See Chapter 8 for the basic operation method of RSNetWorx.

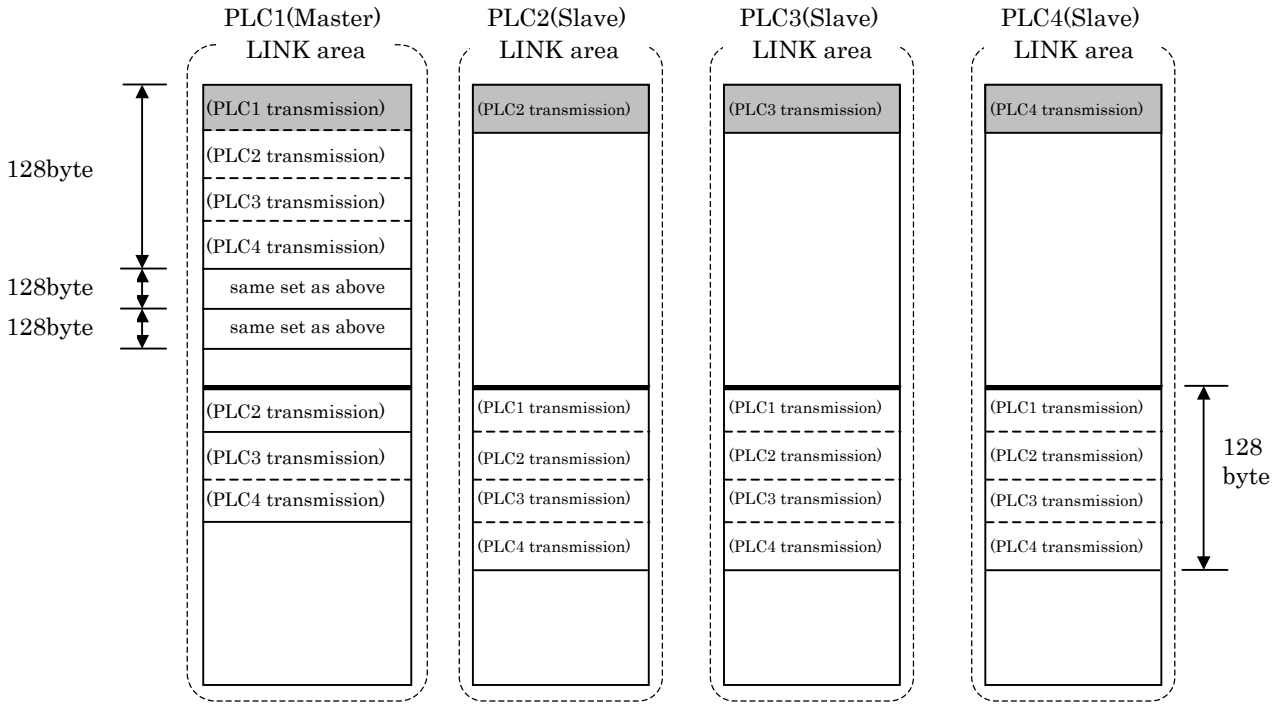
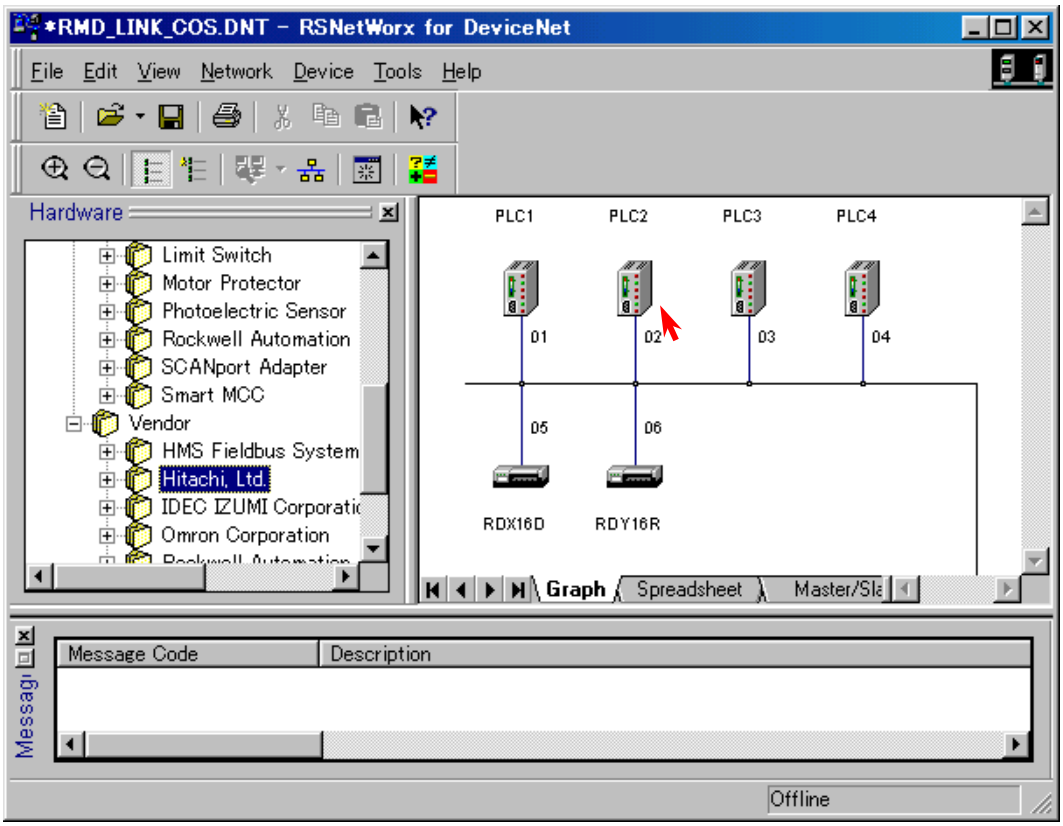


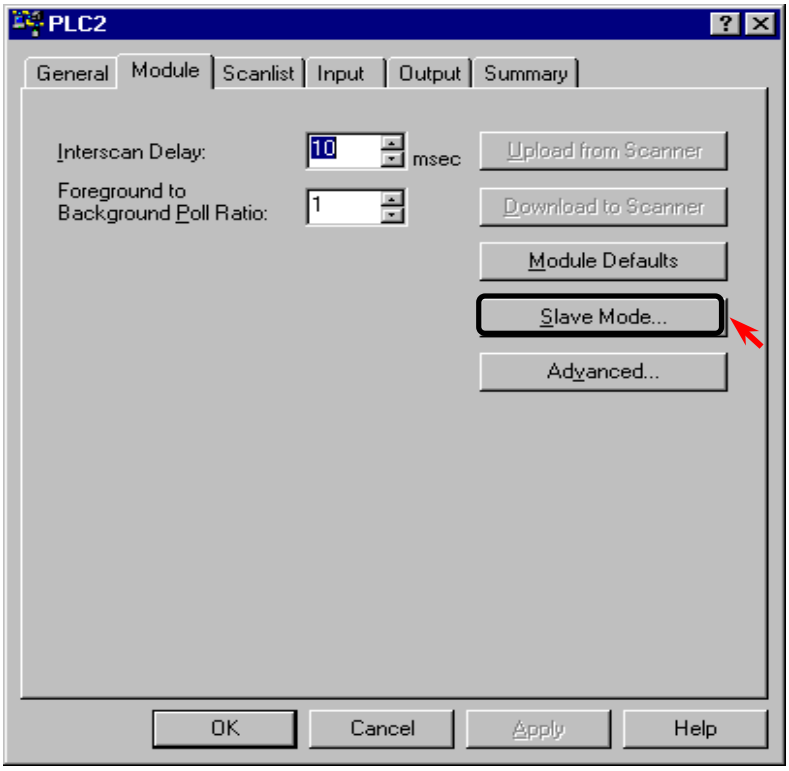
Figure 9.5 LINK system with slave mode (Example)

S T E P 1 Enabling the slave mode

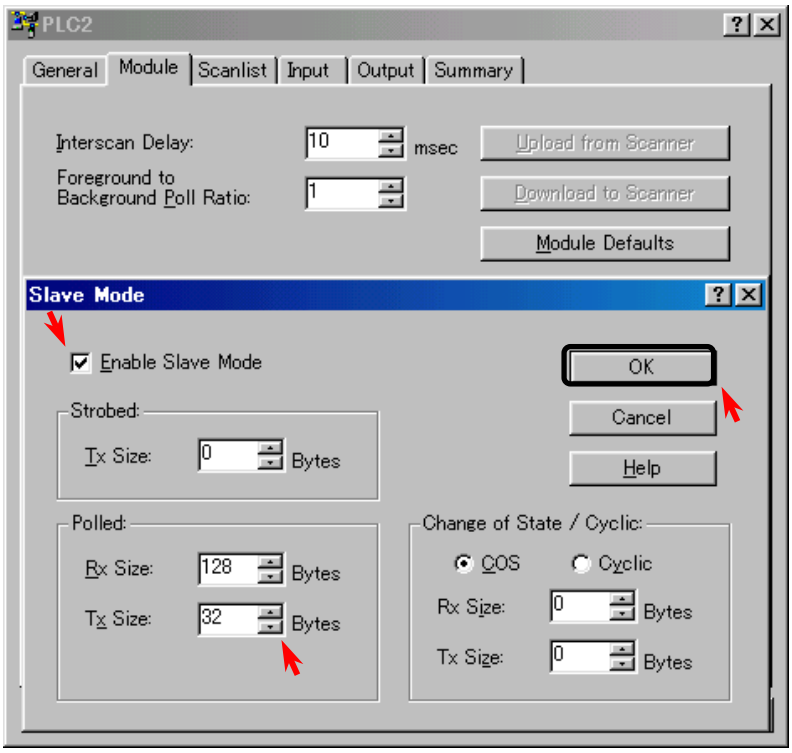
Double-click PLC2 and display **[Properties]**.



Display the [Module] tag
and click **[Slave Mode]**.

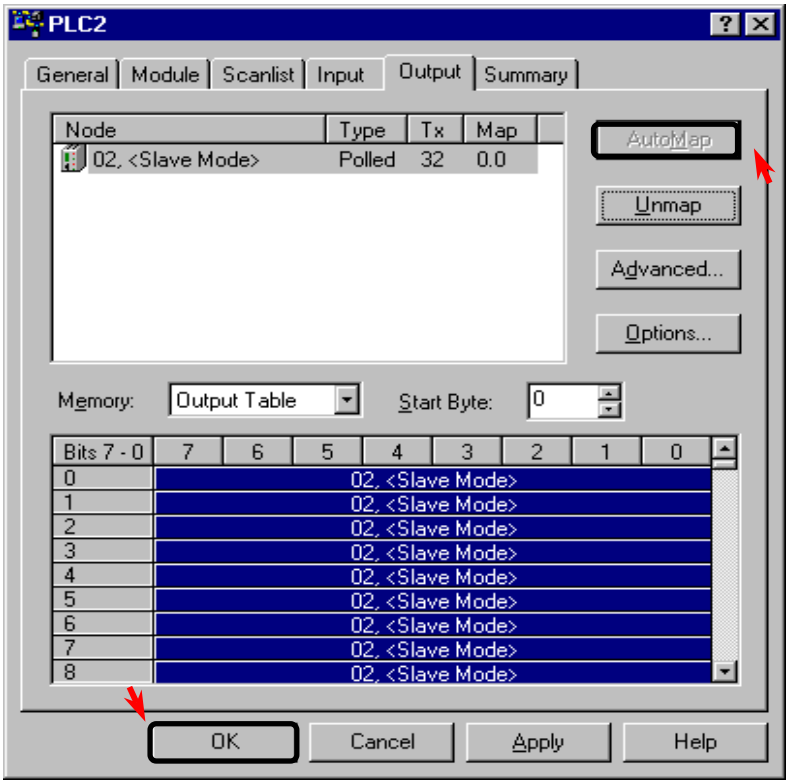


Enable the **[Enable Slave Mode]** option, specify the transmission/reception data sizes, and click **[OK]**.



Map the transmission/reception data in the **[Input]** and [Output] tags.
Select the device and click **[AutoMap]**.
Then click **[OK]** to finish the setting on the slave station side.

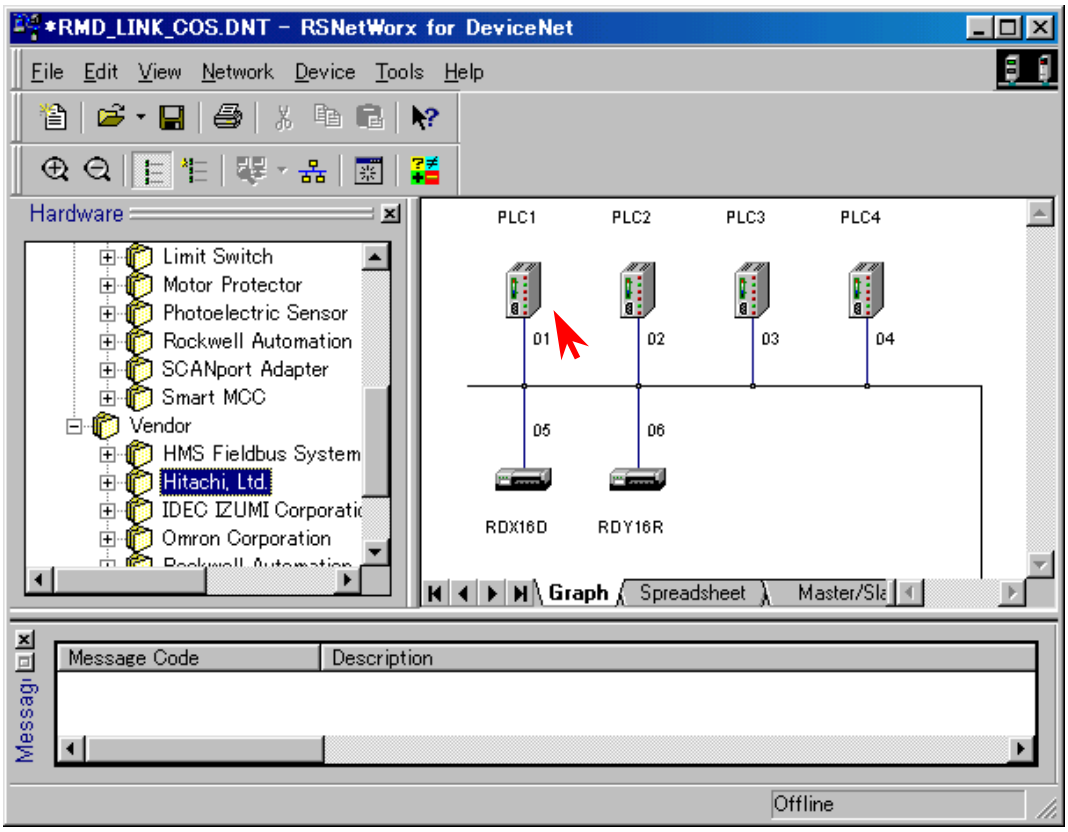
Specify the offset from WL0 for Start Byte in the **[Output]** tag.
Specify the offset from WL200 for Start Byte in the **[Input]** tag.



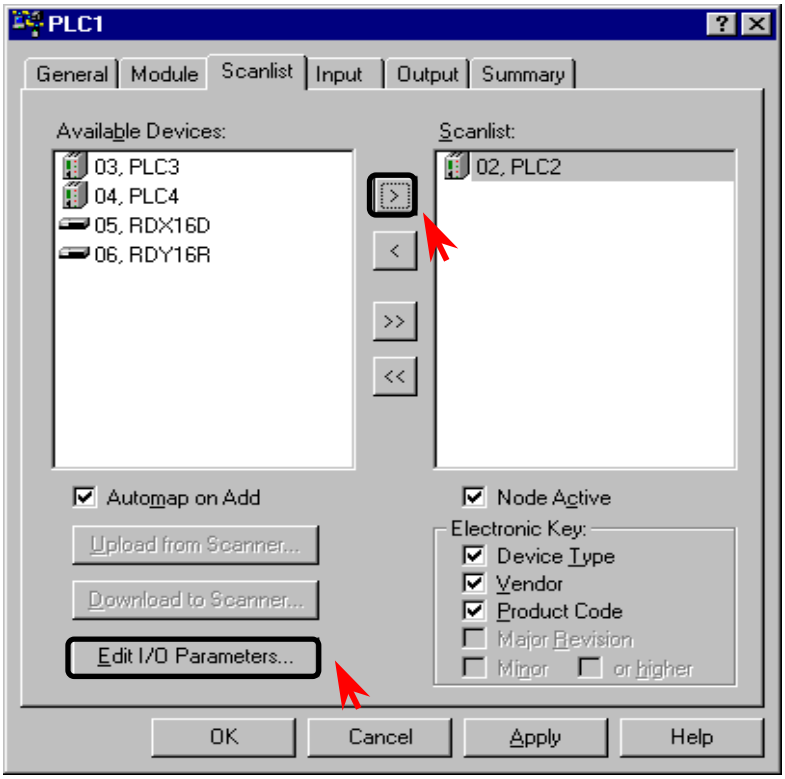
Repeat the operation above for PLCs 3 and 4.

S T E P 2 Creating a master station scan list

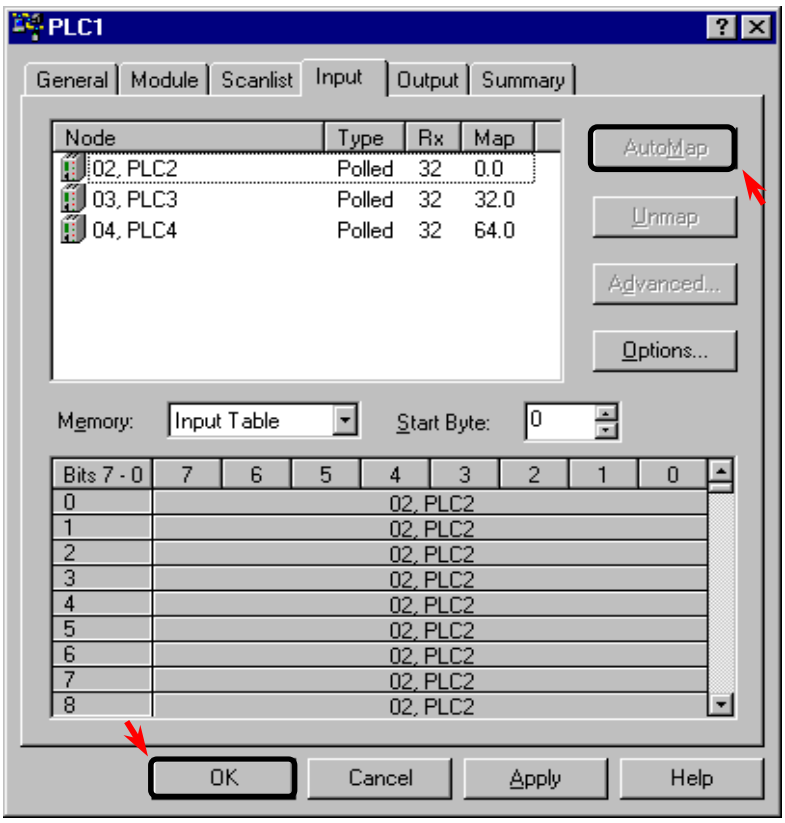
Double-click PLC1 and display **[Properties]**.



Display the **[Scanlist]** tag, and move the devices from Available Devices to Scanlist.
Click **[Edit I/O Parameters]** for each of the devices moved to Scanlist and check the I/O data size.
It is possible to view the information of each slave set in Step 1.



Map the transmission/reception data in the **[Input]** and **[Output]** tags.
Select a device and click **[AutoMap]**.
Then click **[OK]**.



Chapter 10 Special Internal Outputs

The various information on EH-RMD and a network are reflected in the special internal outputs.
Output area differs in remote mode and link mode.

Mode		Special Internal Outputs
Remote mode	Remote Master1 Error flag	WRF080 – WRF097
	Remote Master2 Error flag	WRF098 – WRF0AF
	Remote Master3 Error flag	WRF0B0 – WRF0C7
	Remote Master4 Error flag	WRF0C8 – WRF0DF
LINK mode	LINK1 Error flag	WRF0E0 – WRF13F
	LINK2 Error flag	WRF140 – WRF19F

10.1 Remote Error Flag

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
—								Error Code								+00
15	Active node														0	+01
31															16	+02
47															32	+03
63															48	+04
15	Faulty node														0	+05
31															16	+06
47															32	+07
63															48	+08
Node No.								Master Node status								+09
Node No.								Slave Node status								+0A
Node No.								Slave Node status								+0B
Node No.								Slave Node status								+0C
Node No.								Slave Node status								+0D
Node No.								Slave Node status								+0E
Node No.								Slave Node status								+0F
Node No.								Slave Node status								+10
Node No.								Slave Node status								+11
Node No.								Slave Node status								+12
Node No.								Slave Node status								+13
Node No.								Slave Node status								+14
Refresh time (maximum)																+15
Refresh time (minimum)																+16
Refresh time (current)																+17

Slave node status is possible to display maximum 11 nodes. The node status under normal communication does not display. When 12 or more unusual nodes exist, it displays sequentially from the small node No.

10.2 Link Error Flag

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
—								Error code								+00
15	Active node														0	+01
31															16	+02
47															32	+03
63															48	+04
15	Faulty node														0	+05
31															16	+06
47															32	+07
63															48	+08
Node 1 status								Node 0 status								+09
Node 3 status								Node 2 status								+0A
Node 5 status								Node 4 status								
⋮								⋮								⋮
Node 59 statu								Node 58 status								+26
Node 61 status								Node 60 status								+27
Node 63 status								Node 62 status								+28
⋮								⋮								⋮
Refresh time (maximum)																+5D
Refresh time (minimum)																+5E
Refresh time (current)																+5F

10.3 Detailed Explanation

10.3.1 Error Code

Table 10.1 List of Error Code

Error code	Description	Action
00	No error	—
01	Initialization error	Turn the power on again. Replace the module if the error still persists.
02	Link transmission area error	Set the link parameters again from the peripheral device.
03	Link transmission size error	
06	Module error	Turn the power on again. Replace the module if the error still persists.

10.3.2 Active Node

Node addresses of the slaves registered in the scan list of the EH-RMD are displayed.

10.3.3 Faulty Node

Among the slaves registered in the scan list of the EH-RMD, the node addresses of those that cannot be communicated with are displayed.

10.3.4 Node Status

Table 10.2 List of Node Status

Value	Description	Node	Description
0x00	OK or Not in scan list	0x54	NOT_YET_INITIALIZED
0x46	DUP_MAC_FAILURE	0x55	RECEIVE_BUFFER_OVERFLOW
0x47	SCANNER_CONFIG_ERROR	0x56	DEVICE_WENT_IDLE
0x48	DEVICE_COMM_FAILURE	0x57	SHARED_MASTER_ERROR
0x49	WRONG_DEV_TYPE	0x58	SHARED_CHOICE_ERROR
0x4A	PORT_OVERRUN_ERROR	0x59	KEEPER_FAILED
0x4B	NETWORK_FAILURE	0x5A	CAN_PORT_DISABLED
0x4C	NO_MESSAGE_FOR_SCANNER	0x5B	PORT_BUS_OFF
0x4D	WRONG_SIZE_DATA	0x5C	PORT_POWER_OFF
0x4E	NO_SUCH_DEVICE	0x5F	FLASH_UPDATE_IN_PROGRESS
0x4F	TRANSMIT_FAILURE	0x60	IN_TEST_MODE
0x50	IN_IDLE_MODE	0x61	HALTED_BY_USER_COMMAND
0x51	IN_FAULT_MODE	0x62	FIRMWARE_FAILURE
0x52	FRAGMENTATION_ERROR	0x63	SYSTEM_FAILURE
0x53	SLAVE_INIT_ERROR	—	—

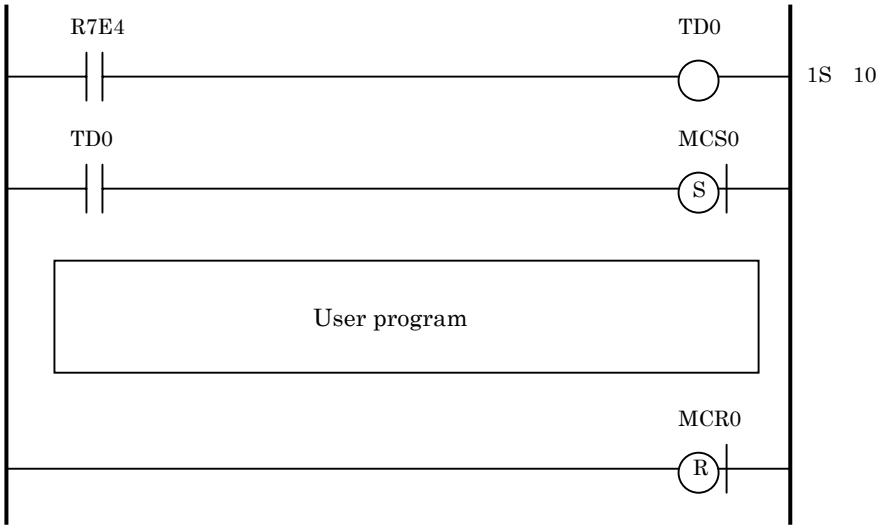
Chapter 11 Precautions for Use

This chapter lists some precautions that should be aware of when communicating data via the inputs/outputs between the EH-150 CPU module and each of the slaves on DeviceNet.

11.1 Startup Time of Master Module

It takes approximately 5 seconds for the EH-150 CPU module to start running from the point when the power is turned on.
On the other hand, it takes approximately 10 seconds before it becomes possible for the EH-RMD to carry out I/O communication with the slave devices registered in the scan list.

Therefore, it is necessary to wait with turning the RUN switch of the CPU module on until after the MS and NS LEDs on the EH-RMD turn on if input/output communication with the slaves is performed immediately after the RUN start using the user program.
In addition, if a ladder program is used, use the master control in such a way that the user program is not executed until after 10 seconds have passed.



Also, refer to the active node which is shown in the “activist node” field of the special inner output.
If these bits was ON, it shows that the EH-RMD have started communication with the slave devices registered in the scan-list.

11.2 Output Specifications at CPU Stop

If the EH-150 CPU module is in the STOP status (the same in case it is stopped due to ERR), the EH-RMD is put into the IDLE status and does not output data to the slaves.
The following lists the status of the output data of each slave:

Table 11.1 Output Specifications as CPU Stop

Slave device	Output status	Remark
EH-IOCD	Clear/Hold	It is possible to set this by the DIP switch. See Section 6.4.
RDY16R, RDY16TP	Clear	It is possible to specify either to clear or hold when a communication error occurred. See Section 7.6.
Other vendor's slave	Depends on the vendor's specification	Normally, it is possible to specify either to clear or hold when a communication error occurred.

⚠ Caution

When connecting with the other vendor's DeviceNet master, EH-IOCD and Discrete I/O sometimes can not detect IDLE status by the specification of the other vendor's DeviceNet master.

In this case, the DeviceNet master will send the Clear data or Hold data to all slaves.

When using an other vendor's DeviceNet master and Hitachi's slave, please use after sufficiently confirming.

11.3 Mapping Specifications of EH-IOCD

If I/O modules are mounted by setting a empty slot on the EH-IOCD, the empty slot is ignored when mapping to the link area. Only the mounted modules are mapped, for each input/output module.
The following shows an example:

Modules mounted on EH-IOCD

EH-PSA	EH-IOCD	EH-XD8	EH-YTP32		EH-CU	EH-AX44		EH-YTP64	

See Section 6.2 for the I/O data size of each module.

Input size : EH-XD8 + EH-CU + EH-AX44
2 + 10 + 16 = 28 bytes
Output size : EH-YTP32 + EH-CU + EH-YTP64
4 + 6 + 8 = 18 bytes

Result of mapping input data (without offset)

REMOTE	LINK	b15	b0
WX?400	WL200	Reserved (occupied by EH-XD8)	EH-XD8
WX?410	WL201		EH-CU (input least significant byte)
WX?420	WL202		
WX?430	WL203		
WX?440	WL204		
WX?450	WL205	EH-CU (input most significant byte)	
WX?460	WL206		EH-AX44 (least significant byte)
WX?470	WL207		
WX?480	WL208		
WX?490	WL209		
WX?4A0	WL20A		
WX?4B0	WL20B		
WX?4C0	WL20C		
WX?400	WL20D	EH-AX44 (most significant byte)	

Result of mapping output data (without offset)

REMOTE	LINK	b15	b0
WY?000	WL0	EH-YT32 (second least significant byte)	EH-YT32 (least significant byte)
WY?010	WL1	EH-YT32 (most significant byte)	EH-YT32 (second most significant byte)
WY?020	WL2		EH-CU (output least significant byte)
WY?030	WL3		
WY?040	WL4	EH-CU (output most significant byte)	
WY?050	WL5		EH-YT64 (least significant byte)
WY?060	WL6		
WY?070	WL7		
WY?080	WL8	EH-YT64 (most significant byte)	

?: Remote Master number (1 to 4)

11.4 Error check in Ladder Editor for Windows®

The error check of a CPU module, or a Link / Remote module can be performed from Ladder Editor for Windows®.
The error check of a Link / Remote is reflecting the data of the special internal output.
But in case of EH-RMD, the specification of the special internal output differs from the Link / Remote module of H series.
Therefore, if EH-RMD is mounted and an error check is performed, the check result is different from actual status of EH-RMD.

Chapter 12 Communication Power Supply

12.1 Requirements

1. Use 24 V DC as communication power supply.
2. The power must always be supplied via the trunk line.
3. The maximum current at the trunk line is 8A with the thick cable, and 3A with the thin cable.
4. Basically, one communication power supply is required per one network. However, it is possible to supply power from two or more communication power supplies to one network if the power supply specification cannot be satisfied by one communication power supply.
5. An error may occur in each device if the communication power supply is turned off during the operation without turning the modules off beforehand.
6. The maximum current capacity of a drop line becomes smaller as the length of a drop line becomes longer. Obtain the allowable current capacity Ic of a drop line from the following formula:
   Ic = 4.57/L
   (L: length of the drop line (m))

The following table is the power specification to recommend in DeviceNet.

Table 12.1 DeviceNet power supply specification

Item	Specification
Initial Tolerance	24 V DC +/- 1% or adjustable to 0.2 %
Line Regulation	0.3 % max
Load Regulation	0.3 % max
Temperature Coefficient	0.03 % ore deg C max
Output Ripple	250 mV p-p
Load Capacitance Capability	7000 uF max
Temperature Range	Operating * 0 to 60 °C Non-operating -40 to 85 °C * De-rating acceptable for 60 °C operation
Inrush Current Limit	less than 65 A peak
Over Voltage Protection	yes
Over Current Protection	yes (current limit 125 % max)
Turn-on Time (with full load)	250 ms max / 5 % of final value
Turn-on Overshoot	0.2 % max
Stability	0 to 100 % load (all conditions)
Isolation	output isolated from AC and Chassis fround
Output Voltage	24 V +/- 1 %
Output current	up to 16 A continous
Surge current capability	10 % reserve capability

12.2 Layout of Communication Power Supply

Follow the procedure shown below when determining the position and number of communication power supplies to be used.

1. Calculate the power consumption necessary for each device on the network.
2. Measure the total length of the network.
3. Calculate the maximum current capacity corresponding to the network distance and the cable type used. See Figures 12.1 and 12.2 for how to calculate it.
4. If the power consumption calculated in step 1 above is lower than the maximum current capacity, any of the positions to connect the power supply shown in Section 12.3 may be used.
5. If the power consumption calculated in step 1 above is greater than the maximum current capacity, it is necessary to examine the position in greater detail in order to connect the power supply. For more information, see Section 12.4.

Distance (m)	0	25	50	100	150	200	250	300	350	400	450	500
Maximum current (A)	8.00	8.00	5.42	2.93	2.01	1.53	1.23	1.03	0.89	0.78	0.69	0.63

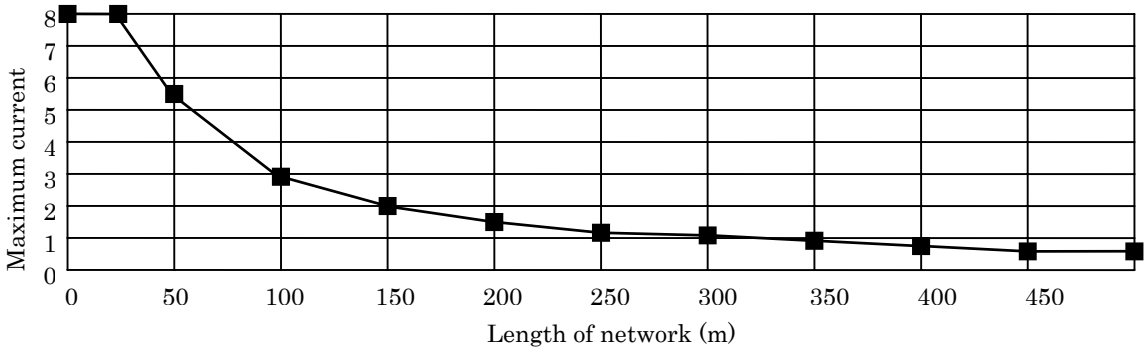


Figure 12.1 Maximum current capacity (thick cable)

Distance (m)	0	10	20	30	40	50	60	70	80	90	100
Maximum current (A)	3.00	3.00	3.00	2.06	1.57	1.26	1.06	0.91	0.80	0.71	0.64

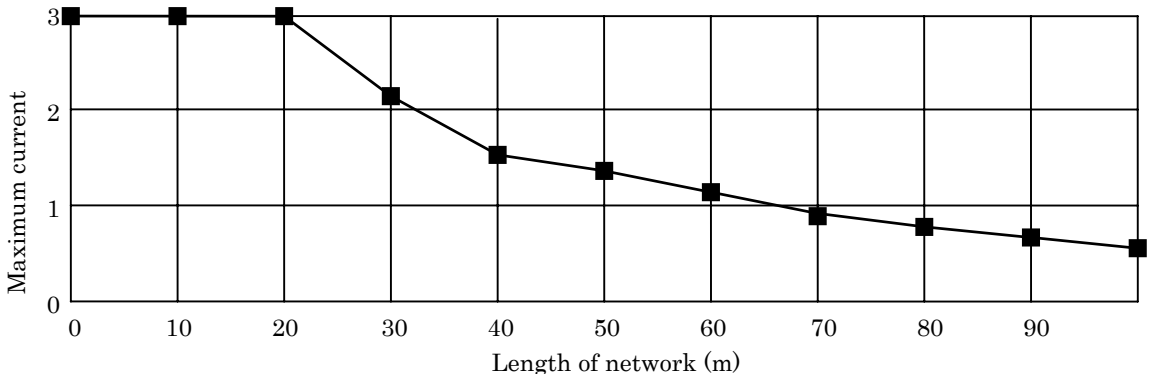
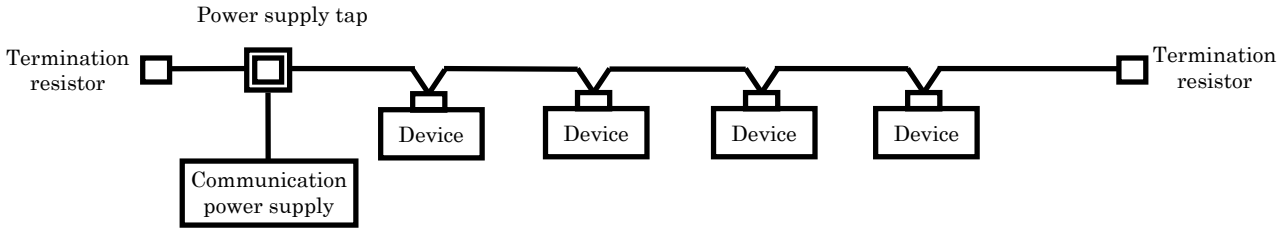


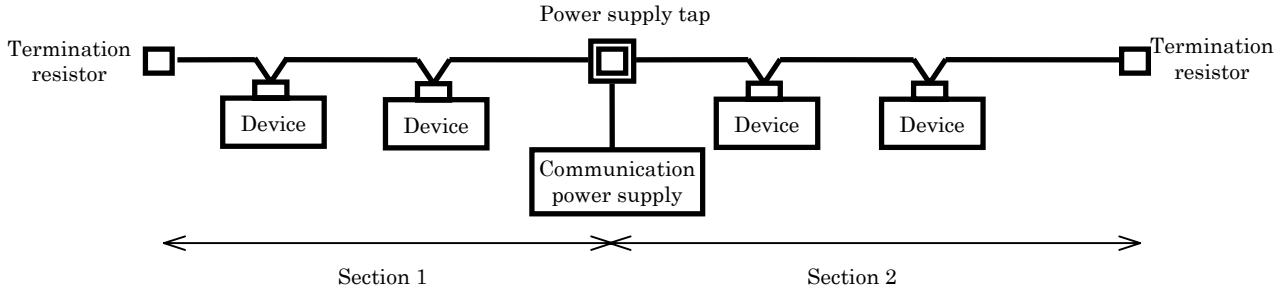
Figure 12.2 Maximum current capacity (thin cable)

12.3 Connection Positions of Communication Power Supply

- Single power supply termination connection



- Single power supply central connection

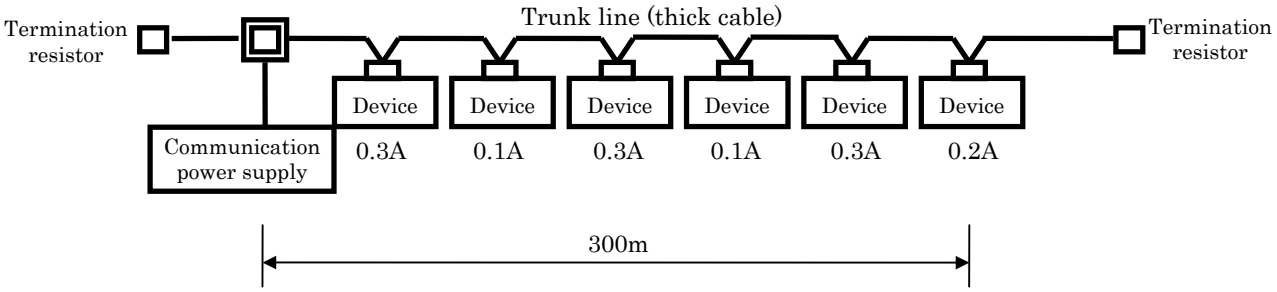


The single power supply central connection allows supplying a total power capacity twice that of the single power supply termination connection.
In this case, the maximum current capacity should be calculated in each section.

12.4 Examining Power Supply Connection Positions

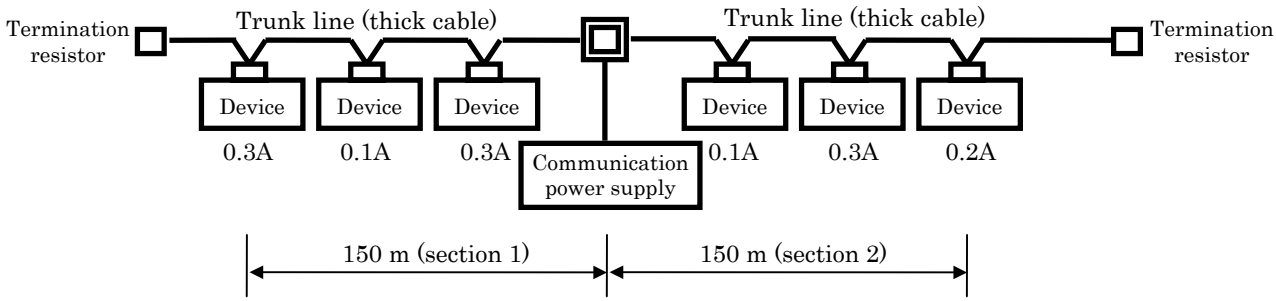
This section provides some suggestions for what can be done if the power consumption exceeds the maximum allowable current value, using the following configuration as an example.

(Example 1) If the communication power supply is connected at the end of the network



Total power consumption value = 0.3 A + 0.1 A + 0.3 A + 0.1 A + 0.3 A + 0.2 A = 1.3 A
Maximum allowable current value = 1.03 A (from Figure 12.1)
From the summation above, it seems that the total power consumption value (1.3 A) is greater than the maximum allowable current (1.03 A); i.e., the total power consumption value exceeds the maximum allowable current.

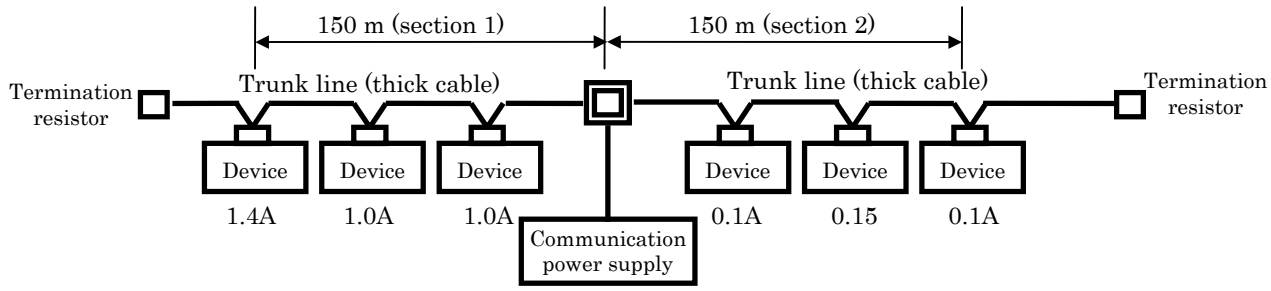
(Action 1) Connect the communication power supply at the center of the network



Total power consumption value of section 1 = 0.3 A + 0.1 A + 0.3 A = 0.7 A
Total power consumption value of section 2 = 0.1 A + 0.3 A + 0.2 A = 0.6 A
Maximum allowable current value of section 1 = 2.01 A (from Figure 12.1)
Maximum allowable current value of section 2 = 2.01 A (from Figure 12.1)

In this configuration, the total power consumption is within the maximum allowable current value in each section. Furthermore, it can be determined that power can be supplied to all the devices on the network.

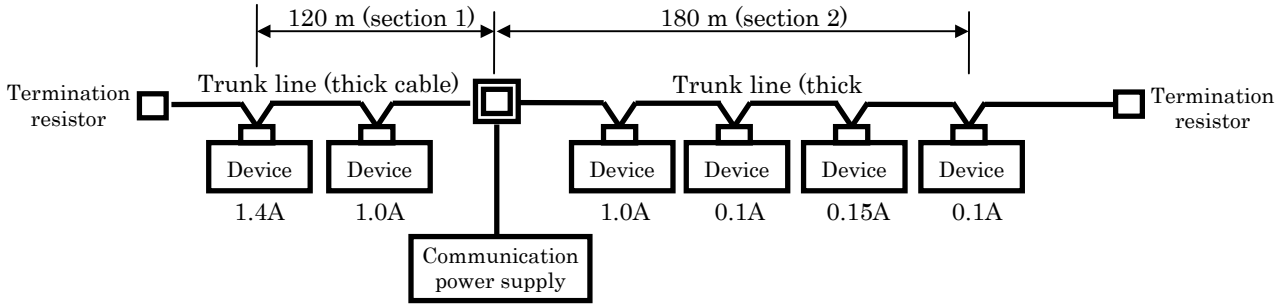
(Example 2) When the total power consumption value varies in each section



Total power consumption value of section 1 = 1.4 A + 1.0 A + 1.0 A = 3.4 A
Total power consumption value of section 2 = 0.1 A + 0.15 A + 0.1 A = 0.35 A
Maximum allowable current value of section 1 = 2.01 A (from Figure 12.1)
Maximum allowable current value of section 1 = 2.01 A (from Figure 12.1)

From the summations above, it can be determined that the current capacity is insufficient in section 1.

(Action 2) Connect the communication power supply so that the total power consumption is divided equally between each sections.

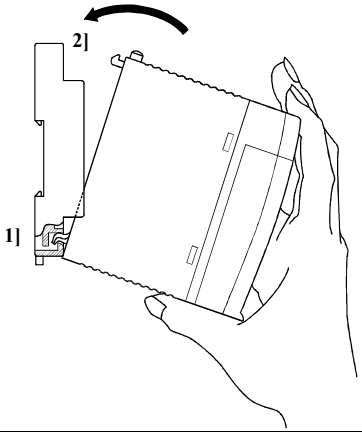


Total power consumption value of section 1 = 1.4 A + 1.0 A = 2.4 A
Total power consumption value of section 2 = 1.0 A + 0.1 A + 0.15 A + 0.1 A = 1.35 A
Maximum allowable current value of section 1 = 2.562 A (linear interpolation between 100 m to 150 m)
Maximum allowable current value of section 2 = 1.722 A (linear interpolation between 150 m to 200 m)

In this configuration, the total power consumption is within the maximum allowable current value in each section. Furthermore, it can be determined that power can be supplied to all the devices on the network.

Chapter 13 Mounting and Wiring

13.1 Mounting the Module

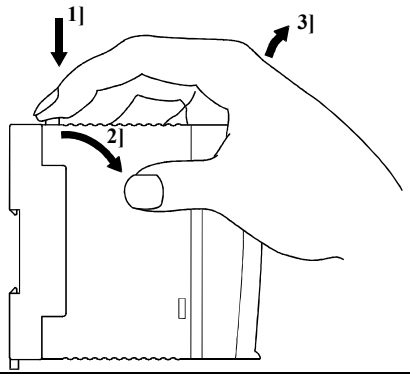


(1) Mounting

1] Hook the claw at the lower section of the module to the hole in the base.

2] Press in the upper side of the module until it clicks.

Note 1: After mounting the module, check to make sure it does not come out.



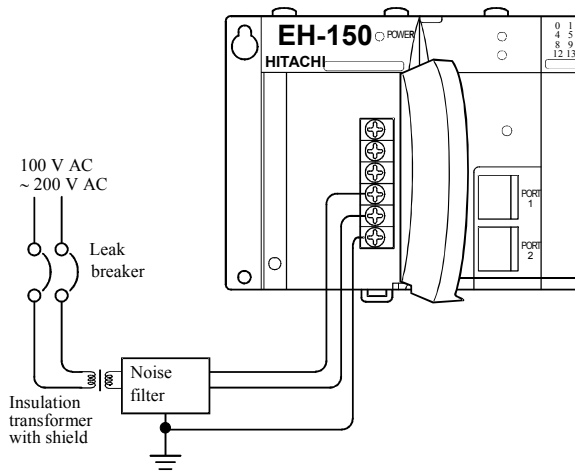
(2) Removing

1] Push in the lock button.

2] While the lock button pushed in, pull the top of the module toward the front.

3] Raise it toward the top and pull it out.

13.2 Wiring to the Power Module



(1) For power supply wiring, use a cable of 2 mm^2 or more to prevent a voltage drop.

(2) The function ground terminal (FE terminal) should use cable of 2 mm^2 or more and Class D grounding (100 Ω or less). The appropriate distance for ground cable is within 20 m.

1] Grounding of instrumentation panel and relay panel can be shared.

2] Avoid joint grounding with equipment that may generate noise such as high-frequency heating furnace, large scale power panel (several kW or more), thyristor exchanger, electric welders, etc.

3] Be sure to connect a noise filer (NF) to the power cable.

(3) The terminal screw is an M3. When wiring, tighten screws within a torque range of 0.49 to 0.78 N·m.

(4) Use the same power supply system for the basic and expansion units.

13.3 Mounting Discrete I/O Slave Units

(1) In case of fixing with screws

Check the dimension of the slave unit to be mounted and make appropriate installation holes on the control board. Then fix the slave unit using M4 screws. (Fix the slave unit at two places, at the upper right and bottom left when viewing from the front.)

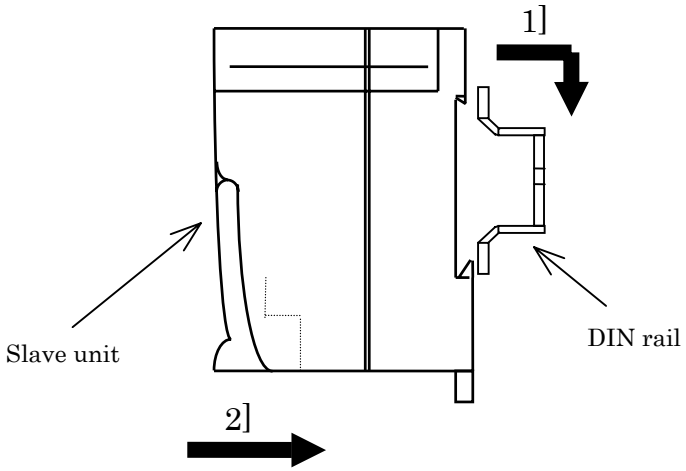
(2) In case of fixing on the DIN rail

Mount the backside of the slave unit onto the DIN 35 mm rail.

1] Hook the claw attached to the back of the slave unit onto the DIN rail.

2] Press the slave unit into the DIN rail until it clicks.

3] After mounting the module, check to make sure the slave unit is securely fixed.



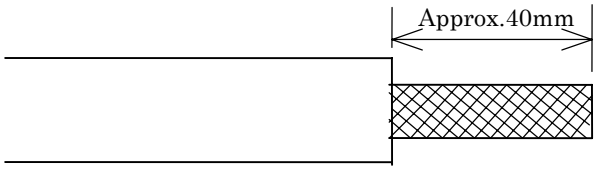
4] Secure the slave unit by installing commercially available DIN rail fixing brackets from both sides.

⚠ Caution
The slave unit may move out of place if not secured with the fixing brackets.

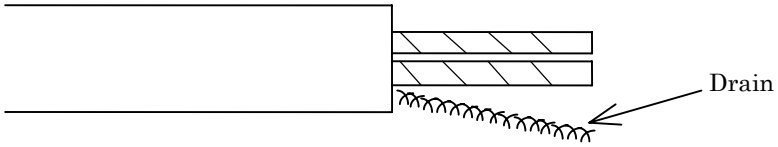
13.4 How to Prepare Communication Cables

Prepare the communication cables according to the procedure below and attach them to the connector.

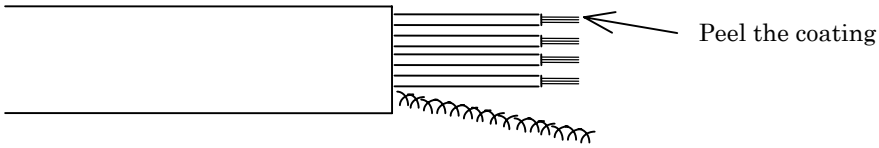
1] Peel approximately 40 mm of the coating off the end of the cable.



2] Loosen and remove the mesh of the shielding. There are two signal lines, two power supply lines, and a drain line inside the shielding.



3] Peel off the aluminum tape wrapping the signal and power supply lines, then strip off the signal lines (coating color: white and blue) and power supply lines (coating color: red and black) according to the solderless terminal.



13.5 How to Connect Communication Cables to Connectors

Do not perform the wiring until the cable has been attached to the clamp terminals.
It is recommended to use a thin cable, in case of multidrop connection.

Table 13.1 Applicable clamp terminals

Cable		Number of lines	
		1	2(Multidrop)
Thick Cable	Signal line	TMEVTC 1.25-11	-
	Power line	TMEVTC 2-11	-
Thin Cable	Signal line	TMEVTC 0.3-9.5	TMEVTC 1.25-11
	Power line	TMEVTC 0.3-9.5	TMCVTC 1.25-11

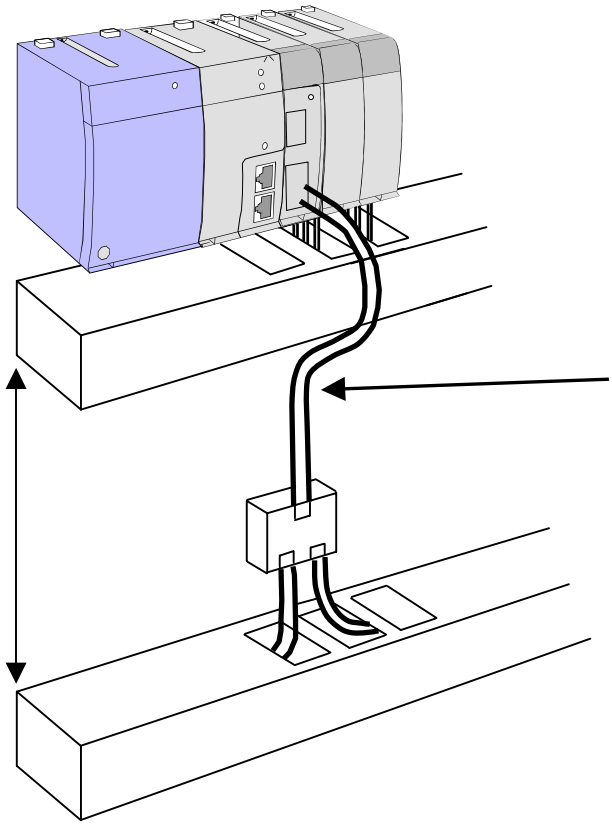
Table 13.2 Applicable clamp tools

Clamp terminal	Clamp tool
TMEVTC 0.3-9.5	NH-5,NH-32,NH-60
TMEVTC 1.25-11	NH-11,NH-32
TMEVTC 2-11	NH-12,NH-32
TMEVTC 3.5-11S	NH-13

<Contact>
Nichifu Co., Ltd. Tel 03-3452-7381 (Tokyo Sales Dept.)

13.6 Precautions when Connecting to the Network

- A device should be connected to the network through a drop line, by using a branch tap from the trunk line.
- When a multidrop connection to a drop line is made, be sure that the connector will not be pulled out by the weight of the cable.

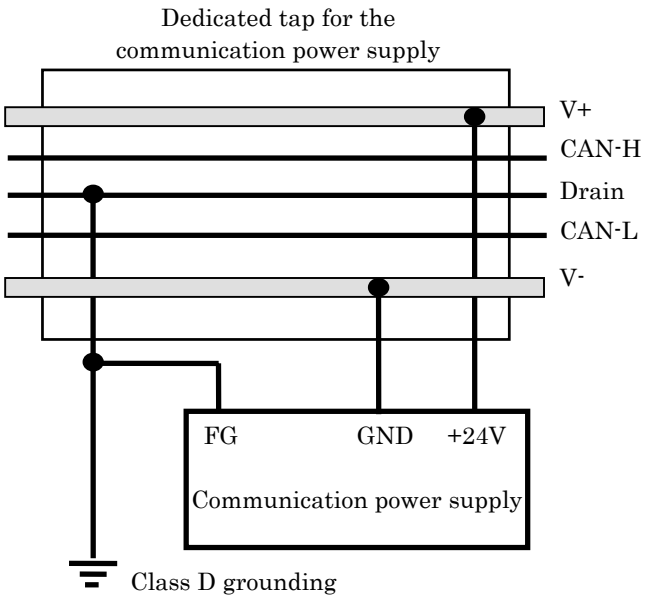


⚠ Caution

- Always turn off the power supply to all devices and the communication power supply itself when connecting a communication cable.
- It is recommended to use clamp terminals when plugging a communication cable into a connector.
  If the communication cable is connected simply by twisting the wires, it may result in malfunction or damage to the product due to cable disconnection.
- Make sure to make correct connection of signal lines, power supply lines, and shielding line.
- Pay full attention when wiring, so that neither signal lines, power supply lines, nor the shielding line will be pulled out during communication.
- After wiring the communication cable, be careful not to put excessive stress on the communication cable as well as the connector. It may cause the connector to be pulled out or a broken cable.
- Allow enough bending radius for the communication cable. If forcibly bent, the connector may be pulled out or a broken cable.
- Check the wiring of the communication cable thoroughly before turning on the communication power supply and the power supply to the internal circuit of each device.

13.7 How to Ground the Network

DeviceNet uses one-point grounding in order to prevent a ground loop.
Connect the drain line of the communication cable to the FG terminal of the communication power supply and provide Class D grounding as shown in the figure below.



If two or more communication supply units are used, only one of them should be grounded with the shielding line. Furthermore, do not connect other communication power supply units with the shielding line.

⚠ Caution

- Do not ground the shielding line of the communication cable at multiple places in the network. The grounding must be made at only one place.
- Make sure to provide Class D grounding.
- Provide a dedicated grounding, separated from the power system.

Chapter 14 Maintenance and Inspection

In order to use the functions of this module in the optimal condition and maintain the normal operation of the system, it is essential to conduct daily and periodical inspections.

14.1 Items for Daily Inspection

Verify the following items while the system is running.

Table 14.1 Items for daily inspection

Item	Inspection method	LED display	Normal status	Main cause of error
Module's LED display check	Visual check	STATUS	Lit in green	When lit or flashing in red: Microcomputer malfunction, module hardware error When flashing in green: CPU error, link parameter error, module hardware error
		MS	Lit in green	When flashing in red: Module hardware error
		NS	Lit in green Flashing in green	When lit or flashing in red: Node address overlap, Bus-off, communication timeout
		RUN	Lit in green Flashing in green	—

14.2 Items for Periodical Inspection

Turn off the power for the external I/O circuit and check the following items once every six months.

Table 14.2 Items for periodic inspection

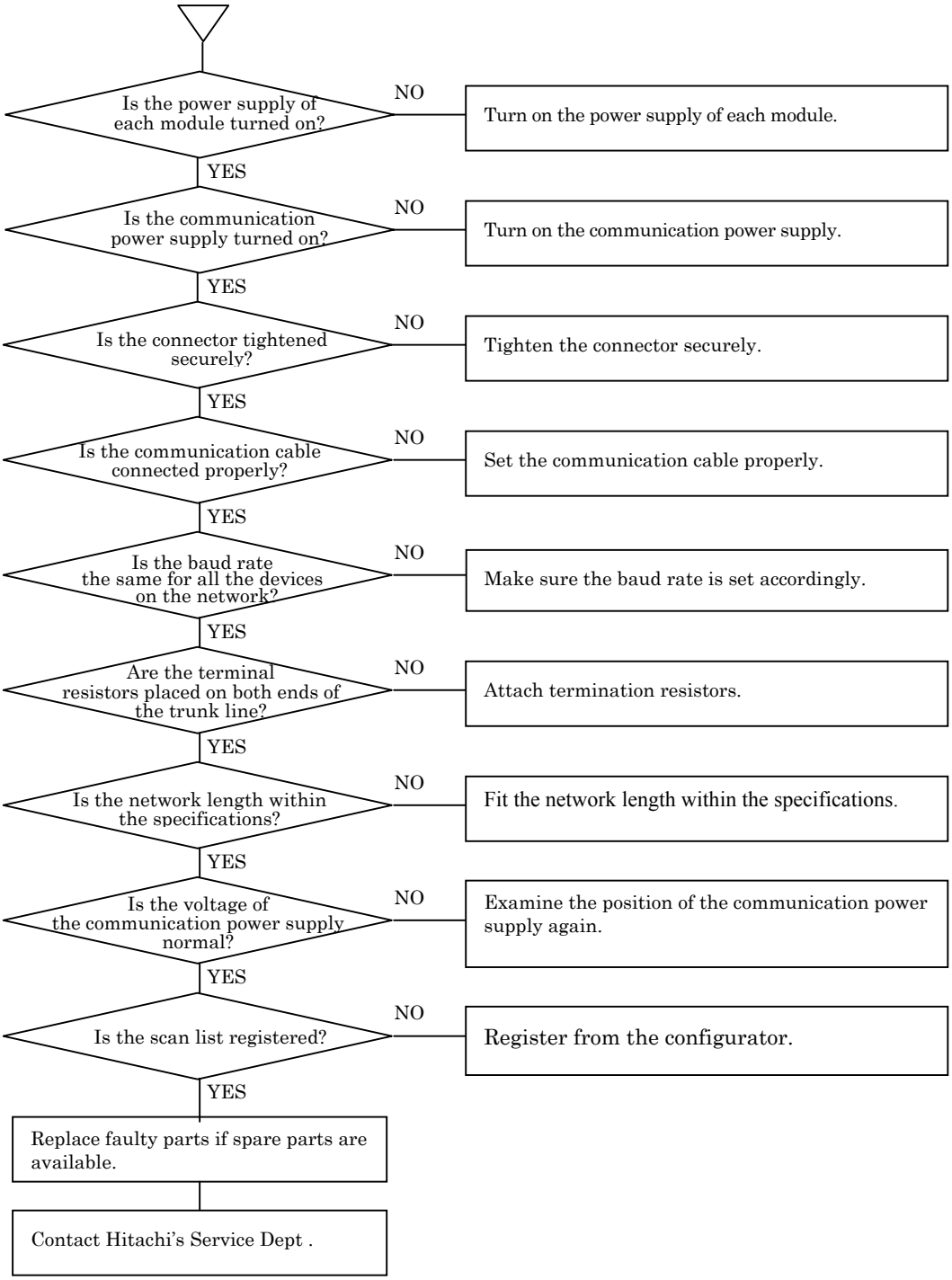
Part	Item	Check criteria	Remark
Configurator EH-RMD	Configuration data	Must be the same as the actual network environment	—
Power supply	Checking the power supply voltage	85 to 264 V AC (AC power module) 21.6 to 26.4 V DC (DC power module)	Tester
Communication power supply	Checking the power supply voltage	24.0 V DC ± 1 %	Tester
External power supply	Checking the power supply voltage	Within the specification of each device	Tester
Installation and connecting areas	1] Fixing of the module 2] Fitting of the connector 3] Connection of wiring	Must not have any problem.	—
Ambient environment	1] Temperature 2] Humidity 3] Others	0 to 55°C 20 to 90% RH (no condensation) No dust, foreign particles, or vibration	—

Chapter 15 Troubleshooting

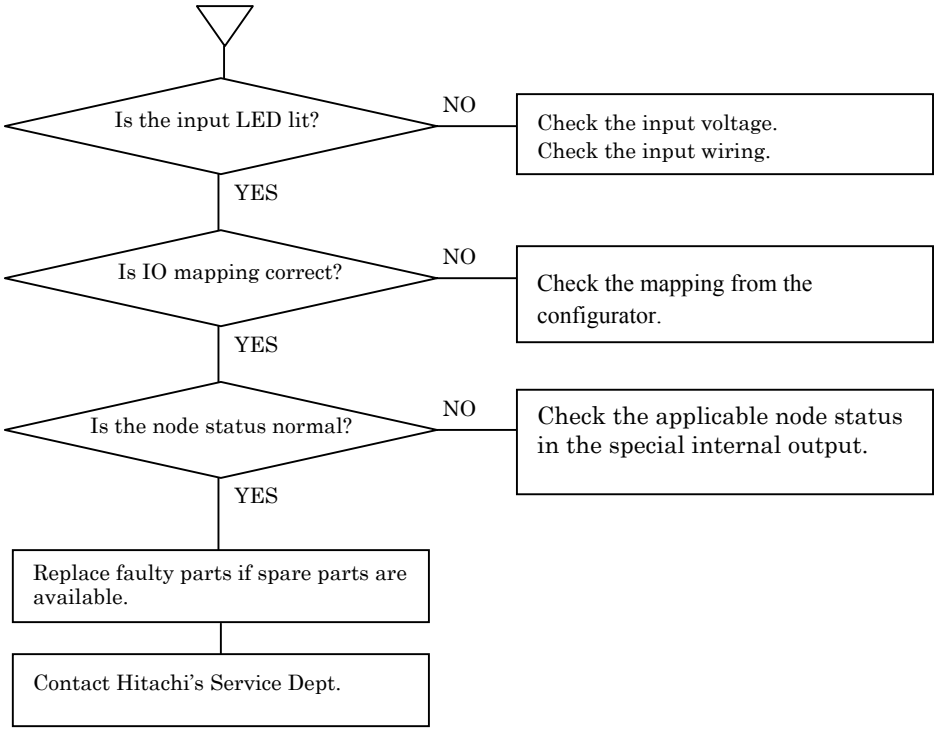
Table 15.1 Main phenomenon

Phenomenon	Main cause
No communication	Incorrect setting of the communication speed, node address overlap, improper fitting of connector, cable breakage, power supply voltage error
No input	Scan list not registered, Illegal IO addressing
No output	Scan list not registered, Illegal IO addressing

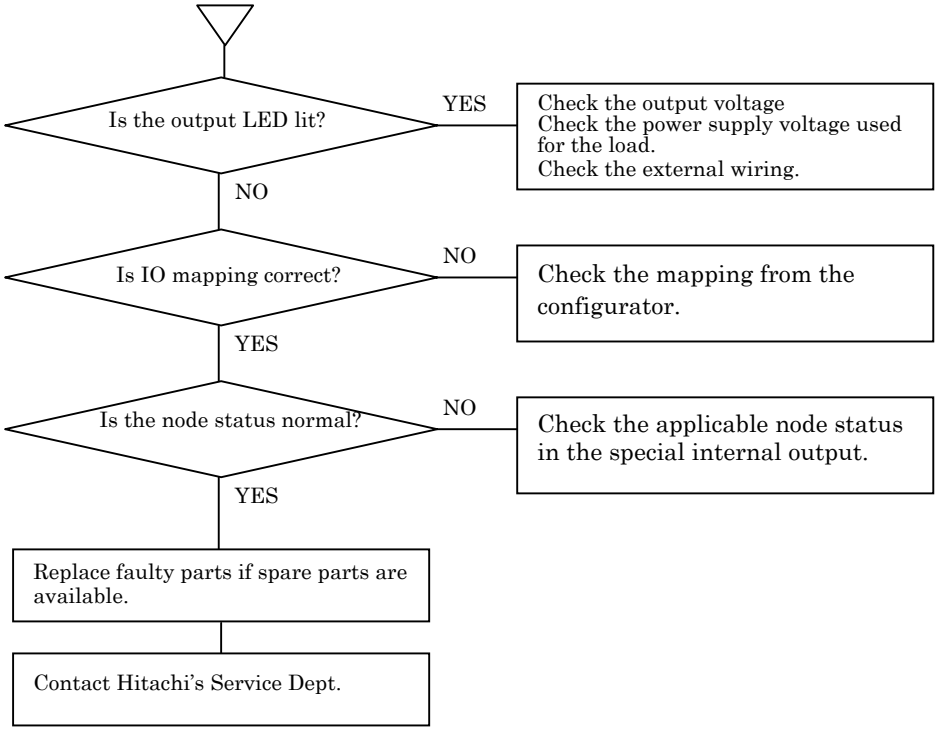
- **No communication**
  In this status, neither the MS nor the NS LED are lit in green



- **No input to WL**
  In this status, both the MS and NS LED of the slave are lit in green



- **No output from WL**
  In this status, both the MS and NS LED of the slave are lit in green



Appendix Device profile

■Master module

General Device Data	Conforme to DeviceNet Specification	Volume 1 Release 2.0 Volume 2 Release 2.0
	Vendor Name	Hitachi, Ltd.
	Device Profile Name	Communications Adapter
	Product Name	EH-RMD
	Product Catalog Number	NJI-362
	Product Revision	1.1
DeviceNet Physical Conformance Data	Network Power Consumption (Max)	0.08 A 11 V DC
	Connector Style	Open-Pluggable
	Isolated Physical Layer	Yes
	LEDs Supported	MS(Module),NS(Network)
	MAC ID setting	DIP Switch
	Default MAC ID	0
	Communication Rate Setting	DIP Switch
	Communication Rates Supported	125kbps,250kbps,500kbps
DeviceNet Communication Data	Device Network Behavior	Group 2 Client, Group 2 Server
	UCMM Explicit Messaging Supported	Yes
	Fragmented Explicit Messaging Supported	Yes

DeviceNet Required Object Implementation

IDentity Object 0x01						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		1	Revision			
		2	Max Instance			
		3	Number of Instances	○		
		4	Optional attributes list	○		
		5	Optional services list			
		6	Max ID of class attributes			
		7	Max ID of instance attributes			
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		1	Vendor	○		74
		2	Device type	○		12
		3	Product code	○		1584
		4	Revision	○		1.1
		5	Status(bits supported)	○		
		6	Serial number	○		
		7	Product name	○		EH-RMD
		8	State			
		9	Config. Consistency Value			
		10	Heartbeat Interval			
	Services	DeviceNet Services		Parameter options		
		○	Get_Attributes_All			
		○	Reset	1		
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Message Router Object 0x02						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		1	Object list			
		2	Maximum connections support	○		
		3	Number of active connections	○		
		4	Active connections list			
	Services	DeviceNet Services		Parameter options		
			Get_Attributes_All			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

DeviceNet Object 0x03						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		1	Revision			
		2	Max Instance	○		
		3	Number of Instances			
		4	Optional attributes list			
		5	Optional services list			
		6	Max ID of class attributes			
		7	Max ID of instance attributes			
	Services	DeviceNet Services		Parameter options		
		○	Get_Attributes_Single			
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		1	MAC ID	○		
		2	Baud rate	○		
		3	BOI	○		
		4	Bus-off counter	○		
		5	Allocation information	○		
		6	MAC ID switch changed			
		7	Baud rate switch changed			
		8	MAC ID switch value			
		9	Baud rate switch value			
	Services	DeviceNet Services		Parameter options		
		○	Get_Attributes_All			
			Get_Attributes_Single			
		○	Allocate M/S connection set			
		○	Release M/S connection set			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections	○	Explicit Message			
			Polled			
			Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		
		14	Produced connection path	○		
		15	Consumed connection path length	○		
		16	Consumed connection path	○		
		17	Production inhibit time	○		
	Services	DeviceNet Services		Parameter options		
		○	Reset			
			Delete			
			Apply_Attributes			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
		○	Polled			
			Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		
		14	Produced connection path	○		
		15	Consumed connection path length	○		
		16	Consumed connection path	○		
		17	Production inhibit time	○		
	Services	DeviceNet Services		Parameter options		
		○	Reset			
			Delete			
			Apply_Attributes			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
			Polled			
		○	Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		
		14	Produced connection path	○		
		15	Consumed connection path length	○ ○		
		16	Consumed connection path	○		
		17	Production inhibit time			
	Services	○ DeviceNet Services		Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
			Polled			
			Bit Strobed			
		○	Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		
		14	Produced connection path	○		
		15	Consumed connection path length	○		
		16	Consumed connection path	○		
		17	Production inhibit time	○		
	Services	DeviceNet Services		Parameter options		
		○	Reset			
			Delete			
			Apply_Attributes			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
			Polled			
			Bit Strobed			
			Change of State			
		○	Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		
		14	Produced connection path	○		
		15	Consumed connection path length	○ ○		
		16	Consumed connection path	○		
		17	Production inhibit time			
	Services	○DeviceNet Services		Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Peer to Peer Connections MAX Instance	○	Explicit Message	Total		
		5	Server	63	Client	
			Dynamic I/O	Total		
			Server		Client	
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○	○	
		13	Produced connection path length	○		
		14	Produced connection path	○		
		15	Consumed connection path length	○ ○		
		16	Consumed connection path	○		
		17	Production inhibit time			
	Services	○	viceNet Services	Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Assembly Object 0x04						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Instance Type			Instance Id (s)		
			Static Input			
			Static Output			
		○	Static I/O	100,101		
			Static Configuration			
			Dynamic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	Number of members in list			
		2	Member list			
		3	Data	○	○	
	Services	DeviceNet Services		Parameter options		
			Delete			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			
		○	Get_Member			
		○	Set_Member			
			Insert_Member			
			Remove_Member			

Acknowledge Handler Object 0x2B						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Instance Type					
		○	Static			
			Dynamic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	Acknowledge Timer	○	○	
		2	Retry Limit	○	○	
			COS Producing Connection Instance	○		
			Ack List Size			
			Ack List			
			Data with Ack Path List Size			
		3	Data with Ack Path List			
	Services	DeviceNet Services		Parameter options		
			Delete			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			
			Get_Member			
			Add_Ack_Data_Path			
			Delete_Ack_Data_Path			

■ Slave Controller

General Device Data	Conforme to DeviceNet Specification	Volume 1 Release 2.0 Volume 2 Release 2.0
	Vendor Name	Hitachi, Ltd.
	Device Profile Name	Communications Adapter
	Product Name	EH-IOCD
	Product Catalog Number	NJI-363
	Product Revision	1.3
DeviceNet Physical Conformance Data	Network Power Consumption (Max)	0.08 A 11 V DC
	Connector Style	Open-Pluggable
	Isolated Physical Layer	Yes
	LEDs Supported	MS(Module),NS(Network)
	MAC ID setting	DIP Switch
	Default MAC ID	0
	Communication Rate Setting	DIP Switch
	Communication Rates Supported	125kbps,250kbps,500kbps
DeviceNet Communication Data	Device Network Behavior	Group 2 Server
	UCMM Explicit Messaging Supported	Yes
	Fragmented Explicit Messaging Supported	Yes

DeviceNet Required Object Implementation

IDentity Object 0x01						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		1	Revision			
		2	Max Instance	○		
		3	Number of Instances	○		
		4	Optional attributes list			
		5	Optional services list			
		6	Max ID of class attributes			
		7	Max ID of instance attributes			
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		1	Vendor	○		74
		2	Device type	○		12
		3	Product code	○		1600
		4	Revision	○		1.1
		5	Status(bits supported)	○		
		6	Serial number	○		
		7	Product name	○		EH-IOCD
		8	State			
		9	Config. Consistency Value	○		
		10	Heartbeat Interval			
	Services	DeviceNet Services		Parameter options		
		○	Get_Attributes_All			
		○	Reset	1		
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Message Router Object 0x02						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		Not supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				

DeviceNet Object 0x03						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		1	Revision	○		
		2	Max Instance			
		3	Number of Instances			
		4	Optional attributes list			
		5	Optional services list			
		6	Max ID of class attributes			
		7	Max ID of instance attributes			
	Services	○	DeviceNet Services	Parameter options		
			Get_Attributes_Single			
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		1	MAC ID	○		
		2	Baud rate	○		
		3	BOI			
		4	Bus-off counter			
		5	Allocation information	○		
		6	MAC ID switch changed			
		7	Baud rate switch changed			
		8	MAC ID switch value			
		9	Baud rate switch value			
	Services	DeviceNet Services		Parameter options		
		○	Get_Attributes_All			
			Get_Attributes_Single			
			Allocate M/S connection set			
			Release M/S connection set			

Assembly Object 0x04						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Instance Type			Instance Id (s)		
			Static Input			
			Static Output			
		○	Static I/O	100,101		
			Static Configuration			
			Dynamic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	Number of members in list			
		2	Member list			
		3	Data	○	○	
	Services	DeviceNet Services		Parameter options		
			Delete			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			
		○	Get_Member			
		○	Set_Member			
			Insert_Member			
			Remove_Member			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections	○	Explicit Message			
			Polled			
			Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		0
		3	Transport Class trigger	○		0x83
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		512
		8	Consumed connection size	○		512
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		
		14	Produced connection path	○		0
		15	Consumed connection path length	○ ○		
		16	Consumed connection path	○		0
		17	Production inhibit time			
	Services	○ DeviceNet Services		Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
		○	Polled			
			Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		1
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		6
		14	Produced connection path	○		200424643003h
		15	Consumed connection path length	○ ○		6
		16	Consumed connection path			200424963003h
		17	Production inhibit time			
	Services	○ DeviceNet Services		Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
			Polled			
		○	Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		1
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		8
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		6
		14	Produced connection path	○		200424653003h
		15	Consumed connection path length	○ ○		6
		16	Consumed connection path			200424973003h
		17	Production inhibit time			
	Services	○	DeviceNet Services	Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
			Polled			
			Bit Strobed			
		○	Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		1
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		8
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		6
		14	Produced connection path	○		206624013003h
		15	Consumed connection path length	○		4
		16	Consumed connection path	○		202B2401h
		17	Production inhibit time			
	Services	DeviceNet Services		Parameter options		
		○	Reset			
			Delete			
			Apply_Attributes			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
			Polled			
			Bit Strobed			
			Change of State			
		○	Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		1
		3	Transport Class trigger	○		
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		
		7	Produced connection size	○		
		8	Consumed connection size	○		8
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○		
		13	Produced connection path length	○		6
		14	Produced connection path	○		206624013003h
		15	Consumed connection path length	○		4
		16	Consumed connection path	○		202B2401h
		17	Production inhibit time			
	Services	DeviceNet Services		Parameter options		
		○	Reset			
			Delete			
			Apply_Attributes			
		○	Get_Attributes_Single			
		○	Set_Attributes_Single			

Acknowledge Handler Object 0x2B						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Instance Type					
		○	Static			
			Dynamic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	Acknowledge Timer	○	○	16
		2	Retry Limit	○	○	1
			COS Producing Connection Instance	○		
			Ack List Size			
			Ack List			
			Data with Ack Path List Size			
		3	Data with Ack Path List			
	Services	DeviceNet Services		Parameter options		
		○	Delete			
		○	Get_Attributes_Single			
			Set_Attributes_Single			
			Add_Ack_Data_Path			
			Delete_Ack_Data_Path			

■Discrete Slave I/O unit

General Device Data	Conforme to DeviceNet Specification	Volume 1 Release 1.4 Volume 2 Release 1.4
	Vendor Name	Hitachi, Ltd.
	Device Profile Name	Discrete I/O
	Product Name	*1
	Product Catalog Number	00
	Product Revision	1.1
DeviceNet Physical Conformance Data	Network Power Consumption (Max)	0.03 A 24 V DC
	Connector Style	Open-Pluggable
	Isolated Physical Layer	Yes
	LEDs Supported	MS(Module),NS(Network)
	MAC ID setting	R0tary Switch
	Default MAC ID	00
	Communication Rate Setting	DIP Switch
	Communication Rates Supported	125kbps,250kbps,500kbps
DeviceNet Communication Data	Device Network Behavior	Group 2 Only Server
	UCMM Explicit Messaging Supported	No
	Fragmented Explicit Messaging Supported	No

DeviceNet Required Object Implementation

IDentity Object 0x01						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		1	Vendor	○		74
		2	Device type	○		7
		3	Product code	○		*1
		4	Revision	○		1.1
		5	Status(bits supported)	○		
		6	Serial number	○		
		7	Product name	○		*1
		8	State			
		9	Config. Consistency Value			
		10	Heartbeat Interval			
	Services	DeviceNet Services		Parameter options		
		○	Get_Attributes_All			
		○	Reset	1		
		○	Get_Attributes_Single			
			Set_Attributes_Single			

*1 :

Slave Device	Product Code	Product Name
DC 16 points Input	1602	RDX16D
Relay 16 points Output	1605	RDY16R
Transistor 16 points Output	1608	RDY16T

Message Router Object 0x02						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		Not supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				

DeviceNet Object 0x03						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Attributes	ID	Description	Get	Set	Value Limits
		1	MAC ID	○		
		2	Baud rate	○		
		3	BOI			
		4	Bus-off counter	○	○	
		5	Allocation information	○		
		6	MAC ID switch changed			
		7	Baud rate switch changed			
		8	MAC ID switch value			
		9	Baud rate switch value			
	Services	DeviceNet Services		Parameter options		
		○	Get_Attributes_All			
			Get_Attributes_Single			
			Allocate M/S connection set			
			Release M/S connection set			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections	○	Explicit Message			
			Polled			
			Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		00h
		3	Transport Class trigger	○		83h
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		21h
		7	Produced connection size	○		10
		8	Consumed connection size	○		7
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○	○	
		13	Produced connection path length	○		0
		14	Produced connection path	○		
		15	Consumed connection path length	○ ○		0
		16	Consumed connection path			
		17	Production inhibit time			
	Services	○	viceNet Services	Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			

Connection Object 0x05						
Object Class	Attributes	ID	Description	Get	Set	Value Limits
		Not Supported				
	Services	DeviceNet Services		Parameter options		
		Not supported				
Object Instance	Predefined M/S Connections		Explicit Message			
		○	Polled			
			Bit Strobed			
			Change of State			
			Cyclic			
	Attributes	ID	Description	Get	Set	Value Limits
		1	State	○		
		2	Instance type	○		01h
		3	Transport Class trigger	○		82h
		4	Produced connection ID	○		
		5	Consumed connection ID	○		
		6	Initial comm. characteristics	○		01h
		7	Produced connection size	○		
		8	Consumed connection size	○		
		9	Expected packet rate	○	○	
		12	Watchdog time-out action	○	○	
		13	Produced connection path length	○		0
		14	Produced connection path	○		
		15	Consumed connection path length	○ ○		0
		16	Consumed connection path			
		17	Production inhibit time			
	Services	○	DeviceNet Services	Parameter options		
			Reset			
			Delete			
		○	Apply_Attributes			
		○	Get_Attributes_Single			
			Set_Attributes_Single			