R-IN32M3 Module (RY9012A0)

Management Tool Instruction Guide

R30AN0390EJ0101
Rev.1.01
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Introduction

This application note explains the procedure for running Management Tool (ICE) produced by port industrial automation GmbH, which is include in the R-IN32M3 Module (RY9012A0) sample package.

Target Device

R-IN32M3 Module (RY9012A0)

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List of Abbreviations and Acronyms

In this document, the terms below are defined as follows:

Terms	Description
API	Application Programming Interface
GOAL	Generic Open Abstraction Layer See "R-IN32M3 Module User's Manual: Software API description" (R17US0002ED****)
uGOAL	Micro Generic Open Abstraction Layer, simplified and shrunk memory usage software package of GOAL

Related document

Document Type	Document Title	Document No.
Data Sheet	R-IN32M3 Module Datasheet	R19DS0109ED****
User's Manual	R-IN32M3 Module User's Manual: Hardware	R19UH0122ED****
User's Manual	R-IN32M3 Module User's Manual: Software	R17US0002ED****
Quick Start Guide	R-IN32M3 Module Application Note: Quick Start Guide	R12QS0042ED****
Application Note	R-IN32M3 Module (RY9012A0) User's Implementation Guide	R30AN0386EJ****
User's Manual	Adaptor Board with R-IN32M3 module YCONNECT-IT-I-RJ4501	R12UZ0094EJ****
Application Note	RA6M3/RA6M4 Sample application	R30AN0398EJ****
Application Note	RX66T Sample application	R30AN0399EJ****
Application Note	RL78 Sample application	R30AN0400EJ****
Application Note	Software PLC Connection Guide CODESYS for PROFINET	R30AN0377ED****
Application Note	Software PLC Connection Guide CODESYS for EtherNet/IP	R30AN0378ED****
Application Note	Software PLC Connection Guide CODESYS for EtherCAT	R30AN0379ED****
Application Note	Software PLC Connection Guide TwinCAT	R30AN0380ED****
Application Note	R-IN32M3 Module Firmware Update	R30AN0401EJ****
-	R-IN32M3 Module Sample package (uGOAL)	R18AN0064EJ****

1. Overview

This application note explains the procedure for running Management Tool ICE (Industrial Communication Explorer) for developing industrial Ethernet communication compatible devices using the R-IN32M3 module. The tool is supported a simple master function, which enables early start-up of industrial network communication development for PROFINET, EtherNet/IP, and EtherCAT.

The tool is produced by port industrial automation GmbH, which is include in the R-IN32M3 Module sample package [r18an0064xx0***].

1.1 Management Tool

The Management Tool is an accessory tool for developers of industrial Ethernet-compatible devices that use the R-IN32M3 module, and supports application development of the R-IN32M3 module. The tool does not support device detection, connection, or functionality with samples other than the R-IN32M3 module sample package [r18an0064xx0***].

note

The simple master (/ scanner) function is a simple function for evaluation and is partially different from the actual master specifications. To evaluate in a form closer to actual use, refer to the product PLC or software PLC connection guide and perform the evaluation with CODESYS or TwinCAT.

Functions

- PROFINET RT Simple Master
- EtherNet/IP Simple Scanner
- EtherCAT Simple Master
- Set Module configuration
- Load log data
- Firmware update

1.2 Tool Version

The application note based on Management Tool Version 1.4.0.

2. Environment Required

The environment required to run the Management Tool and setup.

2.1 Operating Environment

For details on the software environment and hardware environment, refer to the application note included in the sample package [r18an0064xx0***].

Table 2-1 Application Note

Application note	Number
R-IN32M3 Module Application Note RA6M3 / RA6M4	R30AN0398EJ****
R-IN32M3 Module Application Note RX66T	R30AN0399EJ****
R-IN32M3 Module Application Note RL78	R30AN0400EJ****

The connection procedure described in this manual assumes that the following environmental conditions are required. For the setup method of each evaluation board, refer to the application note corresponding to each sample software included in the sample package.

2.1.1 System

Management Tool run on Windows OS.

- OS：Windows® 10
- memory：8GB or higher
- LAN port

2.1.2 Software Environment

Table 2-2 shows the software operating environment used in this manual. First, install these environments. The Management Tool, sample software, and various documents are included in the R-IN32M3 module sample package.

Table 2-2 Software Environment

software	
R-IN32M3 module sample package	https://www.renesas.com/
Npcap [NMAP.ORG]	https://nmap.org/npcap/

Npcap is also included in the Wireshark installer, which is widely used for packet analysis.

Wireshark: https://www.wireshark.org/

Enable "**Install Npcap Winpcap API compatible Mode**" in the Npcap installation option selection.

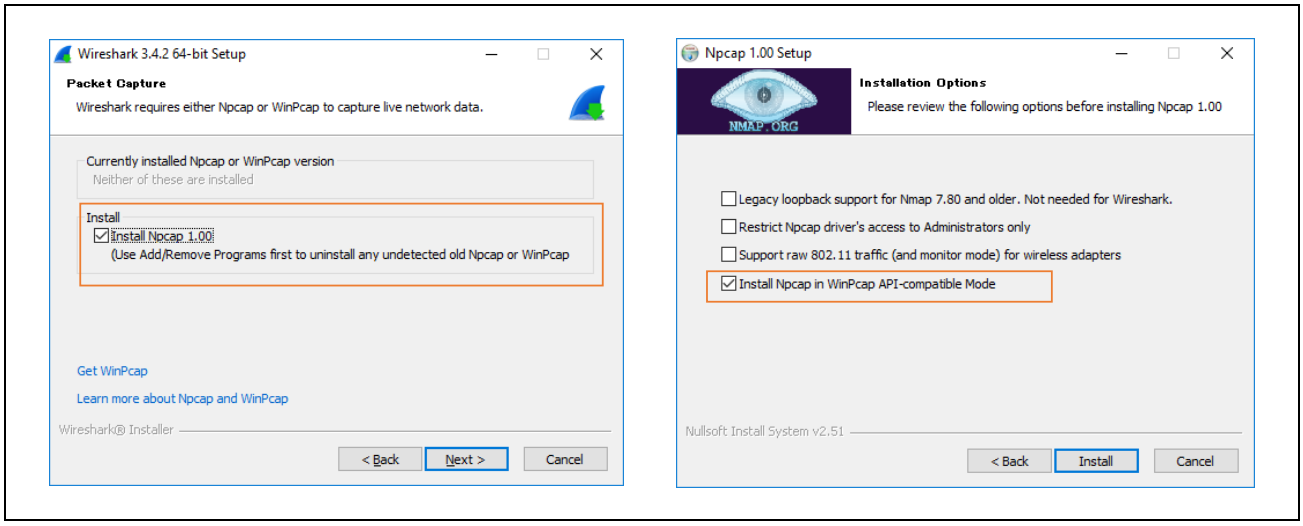


Fig. 2.1 Install Wireshark / Npcap

2.1.2.1 Management Tool Set-up

This section describes the setup required to use Management tool.

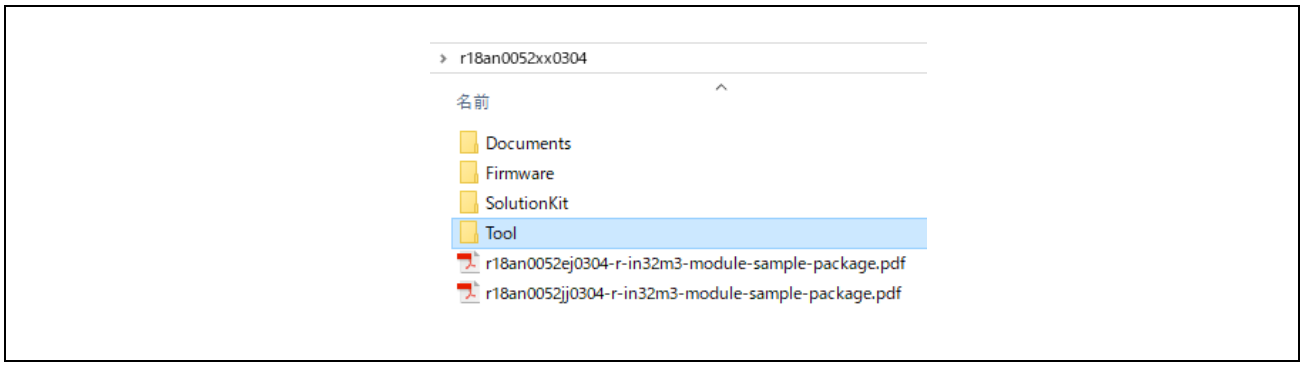


Fig. 2.2 Tool

1.) Windows Defender Firewall

In order to use Management tool, it is necessary to allow communication of tool with the Windows Defender firewall according to the following procedure. If communication is not permitted, the packet issued by tool will be judged as invalid, and module detection and protocol detection will fail.

Table 2-3 shows the UDP ports used Management tool. Module detection is also possible by opening these ports individually.

Table 2-3 UDP ports

protocol	port
UDP	19010
	19011
	2222

[NOTE]

On a PC that has introduced communication restrictions using anti-virus software, etc., it is necessary to allow communication with management tool as well. If communication is not permitted, the packet issued by tool will be judged as invalid, and module detection and protocol detection will fail.

Open “Allow an app through Windows Firewall” from windows search with search word “Windows Firewall”.

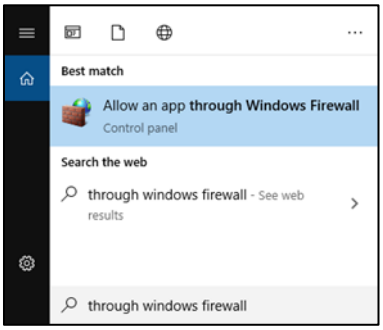


Fig. 2.3 Firewall set-up

click “Change settings” and then click “Allow another app..”.

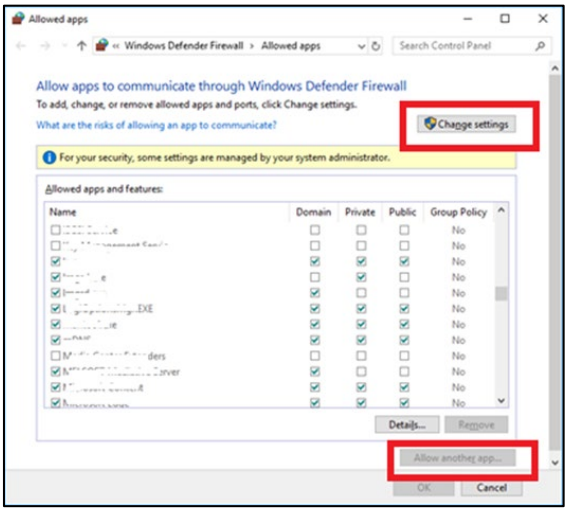


Fig. 2.4 Allowed apps

Click “Browse..” and select the “ice.exe” from Management tool folder.

Management Tool

r18an0064xx0*** \ Tool \ iCommExplorer \ **ice.exe**

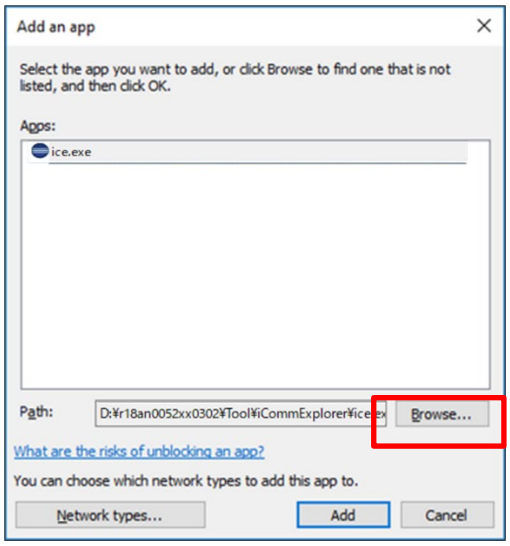


Fig. 2.5 Add an app

Enabled “Domain”, “Private” and “Public” and click “OK”. Then, clock “Add” and “OK” to complete the setting.

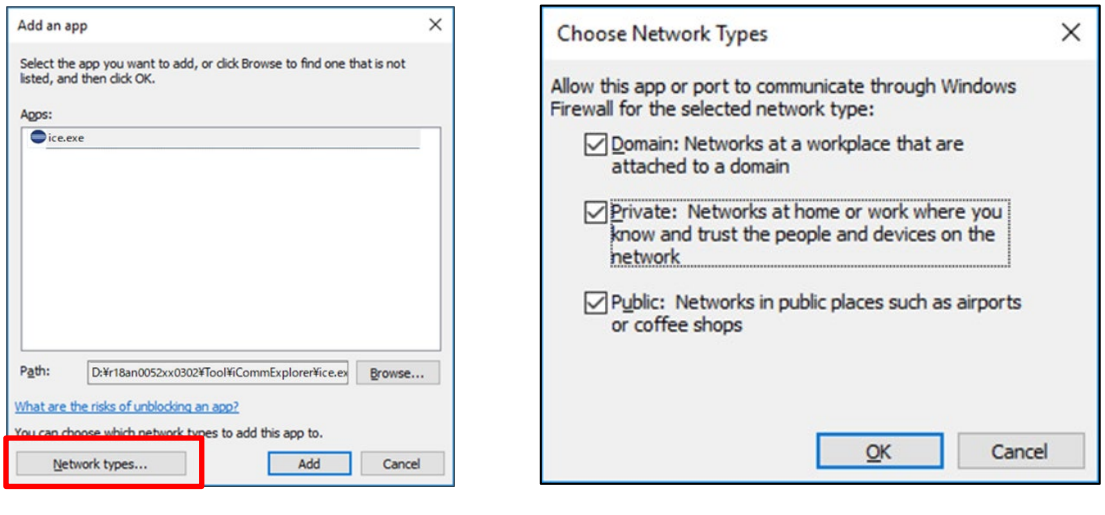


Fig. 2.6 set network types

“ice.exe” is registered in the Allowed apps and features list.

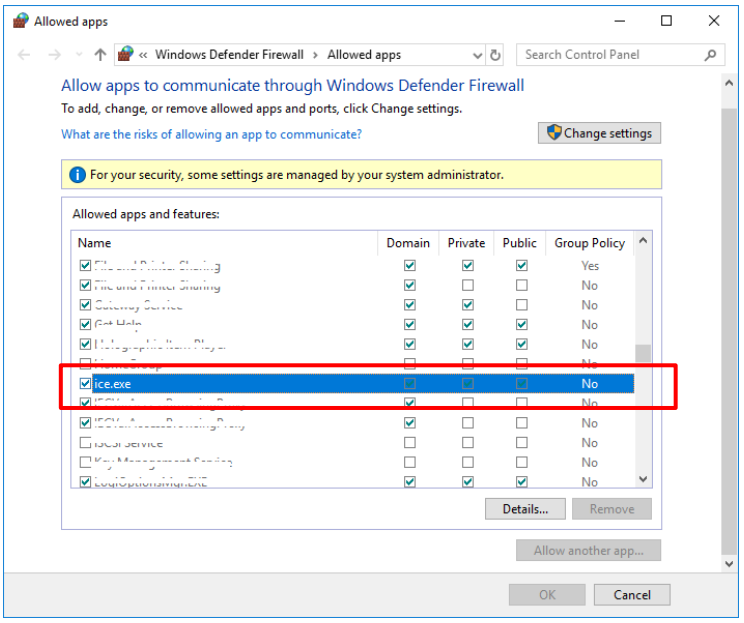


Fig. 2.7 Registered the List

“OK” to complete the setting.

2.) IP address

To connect the R-IN32M3 module to Management tool, need to set the IP address of the network adapter to an address in the same network as the R-IN32M3 module.

Open windows Network connections

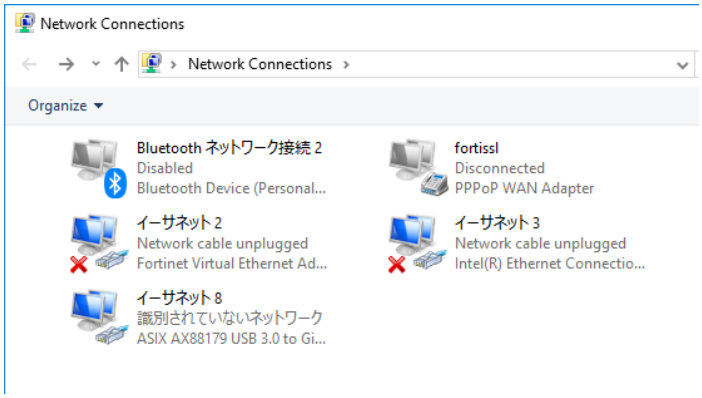


Fig. 2.8 Network connectors

Select the network adapter to connect to the R-IN32M3 module and open its properties.

Only the following drivers are enabled (☑), and the others are disabled (☐).

- ☑ **Npcap Packet Driver (NPCAP)**
- ☑ **Internet Protocol Version 4 (TCP/IPv4)**

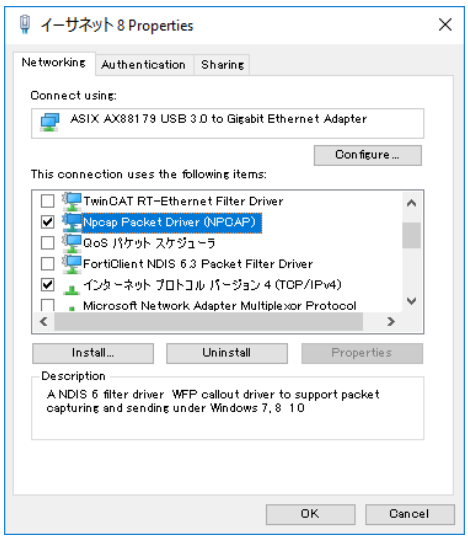


Fig. 2.9 Ethernet adapter properties

Select “Internet Protocol Version 4 (TCP / IPv4)” and open its properties.

Select "Use the following IP address" and set the IP address and subnet mask to the same network as the R-IN32M3 module.

In this document, the following conditions are used as setting examples.

PC

IP address	192.168.0.1
Subnet mask	255.255.255.0

R-IN32M3 module

IP address	192.168.0.100
Subnet mask	255.255.255.0

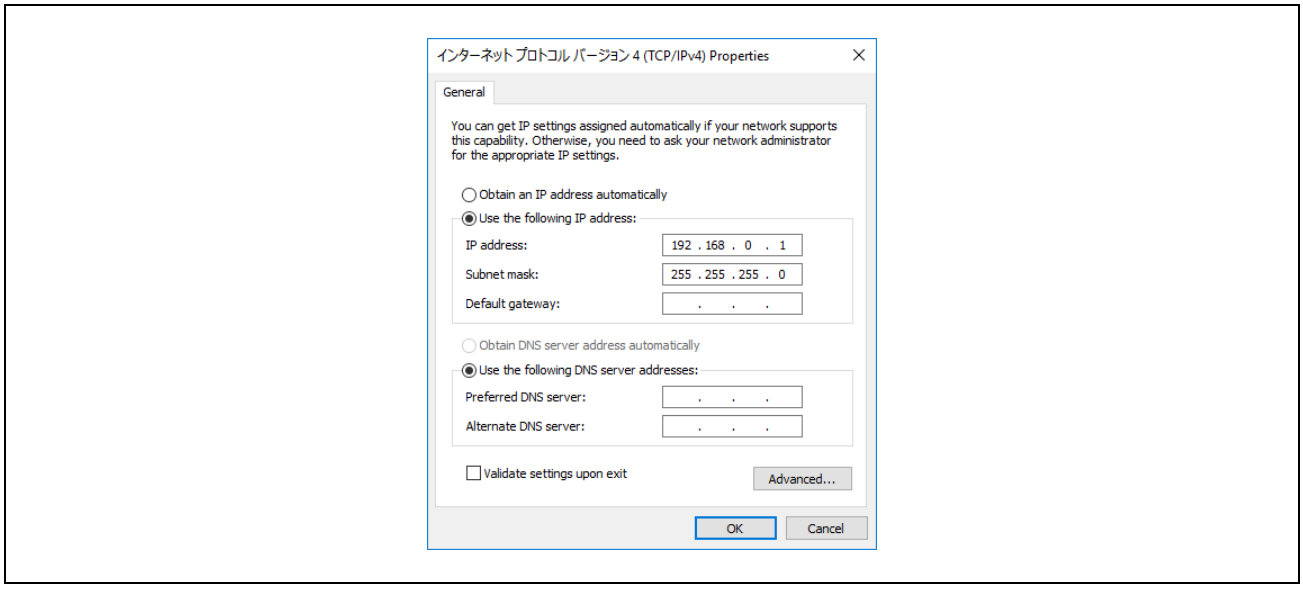


Fig. 2.10 Static IP address

“OK” to complete the setting.

2.1.3 Hardware Environment

The connection procedure described in this manual applies to one of the following configurations.

① R-IN32M3 module adapter board with EK-RA6M3 / EK-RA6M4

② R-IN32M3 module adapter board with RL78/G14 (RTK5RLG140C00000BJ)

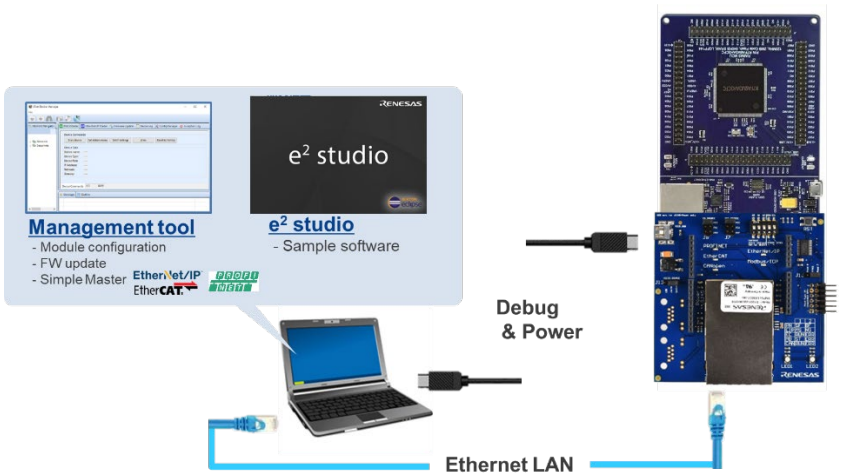
③ R-IN32M3 module with RX66T evaluation board SEMB1320

① R-IN32M3 module + EK-RA6M4 ② R-IN32M3 module + RL78/G14 ③ R-IN32M3 module with RX66T evaluation board [SEMB1320]

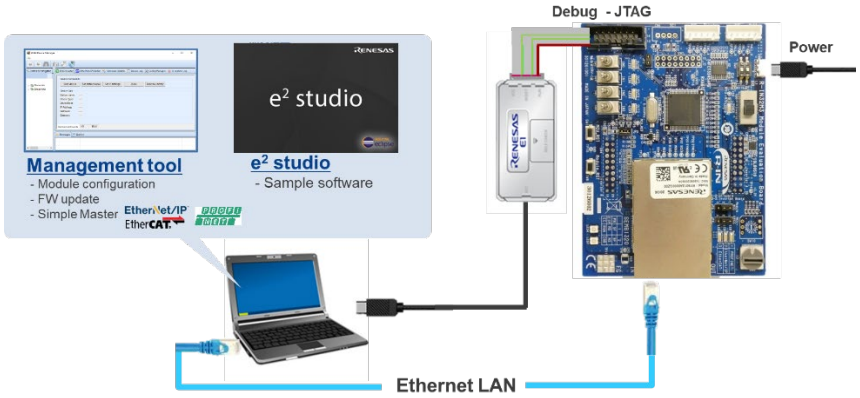
Fig. 2.11 Evaluation environments

Table 2-4 Evaluation environments

Name	Type
R-IN32M3 module adapter board	YCONNECT-IT-I-RJ4501
R-IN32M3 module with RX66T CPU card	SEMB1320
RA6M3 MCU group Evaluation kit.	EK-RA6M3
RA6M4 MCU group Evaluation kit.	EK-RA6M4
RL78/G14 Fast Prototyping Board	RTK5RLG140C00000BJ



R-IN32M3 module adapter board configuration (ex: with EK-RA6M3)



R-IN32M3 module with RT66T cpu card configuration

Fig. 2.12 Connection configuration

3. Management Tool

Execute ice.exe in the Tool folder to start the Management Tool.

If a Windows warning is displayed at the first startup. Please allow execution.

Management Tool

r18an0064xx0*** \ Tool \ iCommExplorer \ **ice.exe**

3.1 Overview

This section describes each window of the Management Tool.

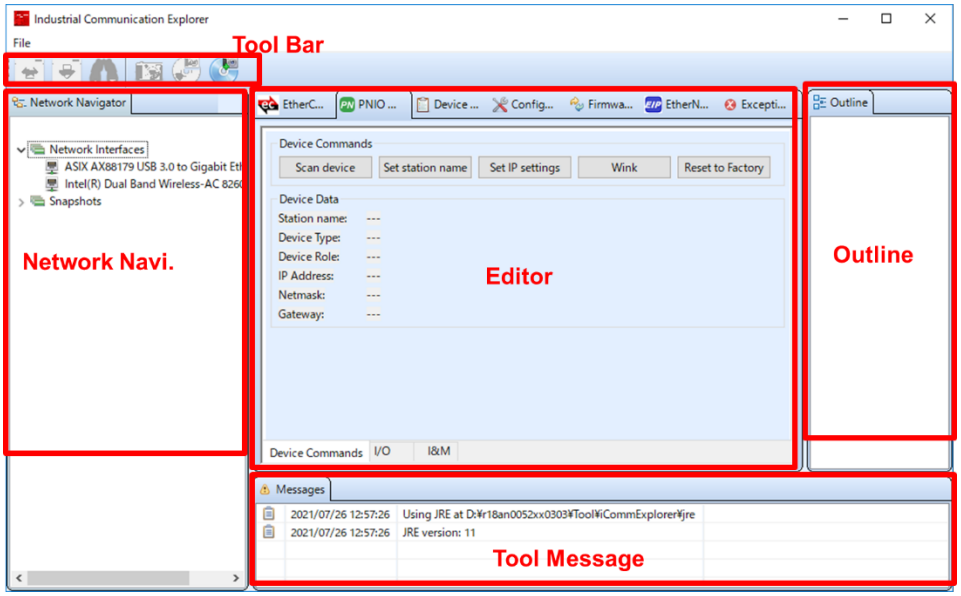


Fig. 3.1 Tool view

3.1.1 Toolbar

Detects modules and reads and writes module configurations.

The available actions depend on Network Navi. And the selection criteria in the editer window, and the icon will be grayed out if disabled.

Fig. 3.2 Toolbar

3.1.2 Network Navi.

The network interface (active link) available when the tool is started is displayed.

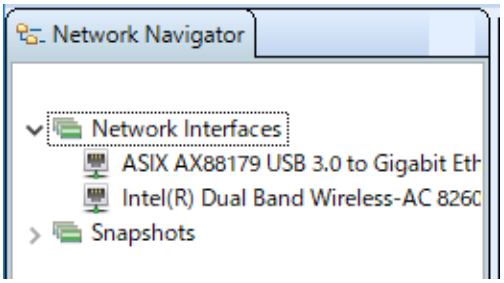


Fig. 3.3 Network Navi.

Select a network interface and perform a network search [Scan Network] to display the connected modules on the tree. See 3.2.1 Scan device for network search instructions.

3.1.3 Editor

Select the Features tab. See Table 3-2 Functions. The tab order can be changed arbitrarily by dragging.

3.1.4 Outline

Module configuration Displays the outline of the device configuration information read on "ConfigManager".

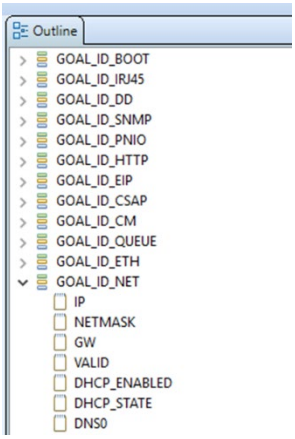


Fig. 3.4 Outline

3.1.5 Tool Message

The event information of Management tool is displayed. Event information is displayed as a message in three categories.

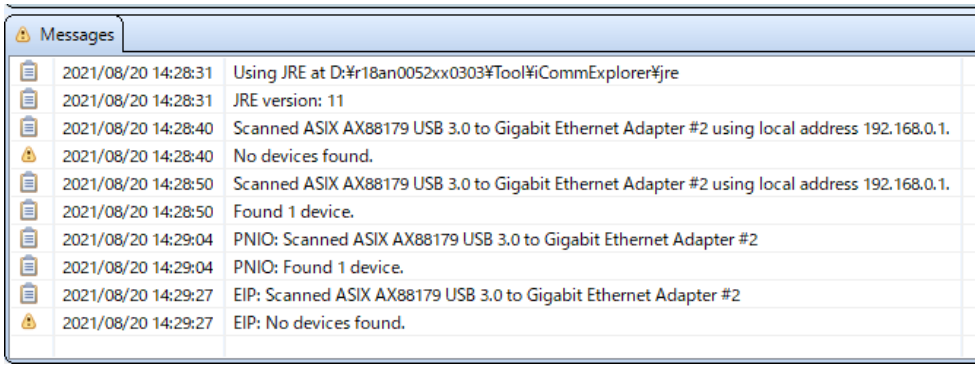


Fig. 3.5 Message

Table 3-1 Message

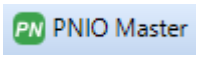
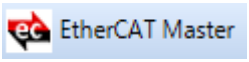
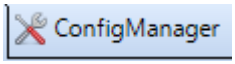
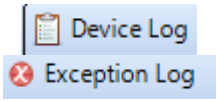
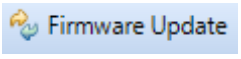
Log	icon	overview
Information		Normal event message
Warning		Action did not get the expected result
Error		Event fail or tool error

3.2 Functions

Describes the functions and usage of the Management Tool.

The management tool mainly has the functions shown in Table 3-2 Functions, and these can be selected in the tabs in the editor.

Table 3-2 Functions

Function	Tab	Overview
PROFINET Simple Master		・PROFINET cyclic communication ・Set Station Name / IP address ・wink command ・I&M 1-4 record
EtherNet/IP Simple Scanner		・EtherNet/IP cyclic communication
EtherCAT Simple Master		・EtherCAT cyclic communication ・Load object dictionary ・PDO mapping
Configuration management		・Read module configuration data
Logging		・R-IN32M3 module logs ・Host MCU logs
Firmware Update		・R-IN32M3 module Firmware update

3.2.1 Scan device

Scan the connected R-IN32M3 module.

If the EtherCAT program is executed on the host microcomputer, it is necessary to execute the module search according to the procedure of 3.5.1 EtherCAT Proxy execution in order to enable UDP packet reception.

Scan step

1. Select the network interface connected to the R-IN32M3 module
2. network search [Scan Network]

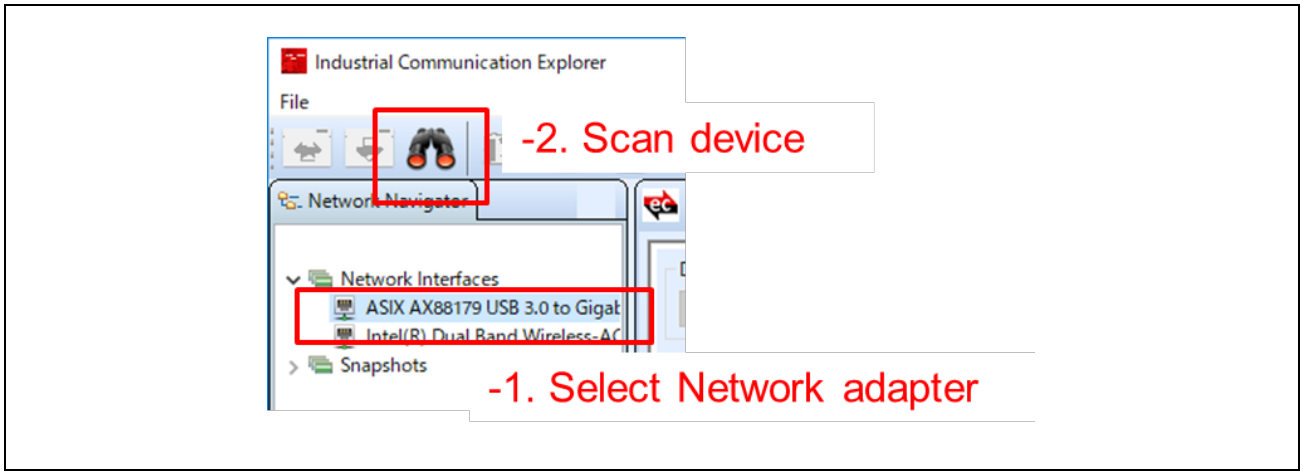


Fig. 3.6 Scan device

If the R-IN32M3 module is detected, it will be displayed under the network interface.

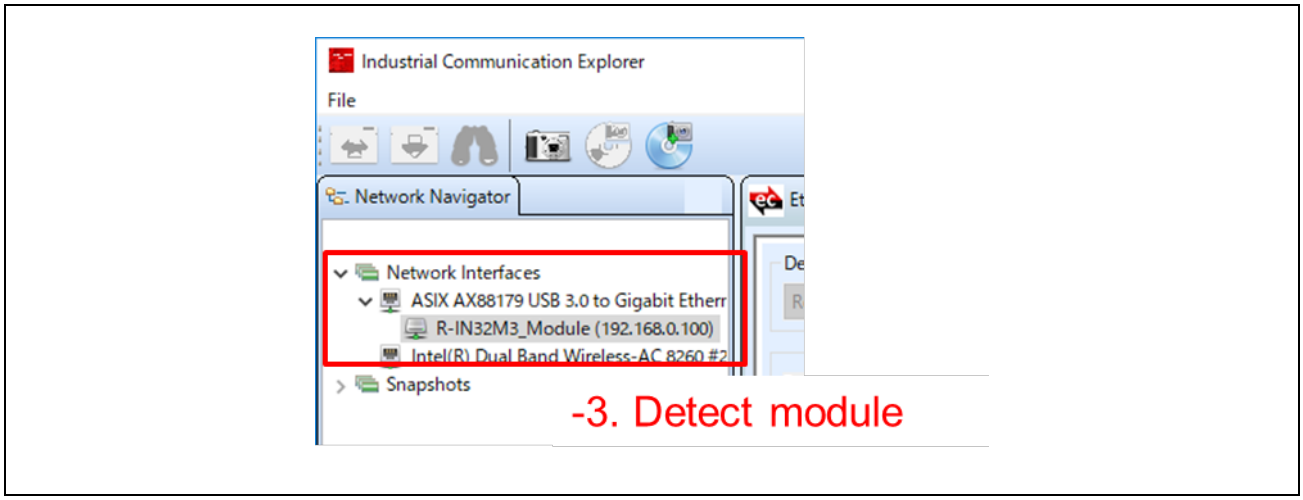


Fig. 3.7 Detected module

Hint
If the R-IN32M3 module detection fails, check if the Npcap installation in 2.1.2 Software Environment or Windows Defender Firewall are configured correctly.

If multiple R-IN32M3 modules are connected, all detected modules will be displayed below the network interface. You can also check the MAC address information of the connected module by hovering over the detected module.

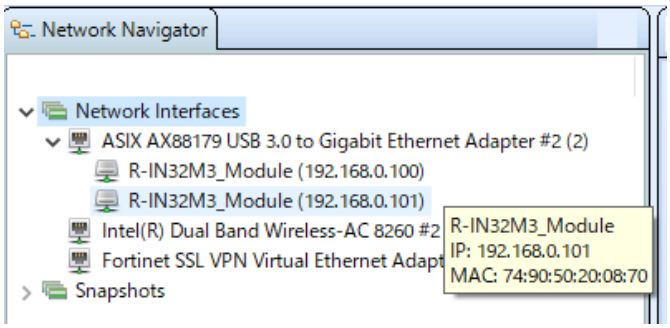


Fig. 3.8 Detected module Identify

3.2.2 Configuration management

Reads and writes module configuration data saved in the R-IN32M3 module.

The configuration data mainly contains the following information.

- FW version
- Device Name
- IP address

1.) Read

Reads the configuration data stored in the R-IN32M3 module.

[Reading Step]

1. Select the detected R-IN32M3 module
2. Select “Config Manager” tab
3. Read the module configuration information with [Read Configuration]

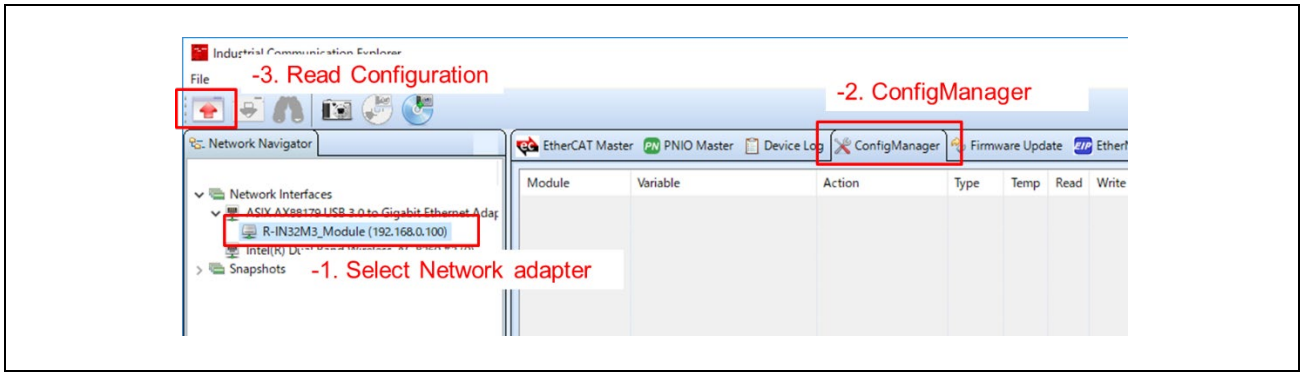


Fig. 3.9 configuration data

When the reading is completed, the configuration data will be displayed in the list.

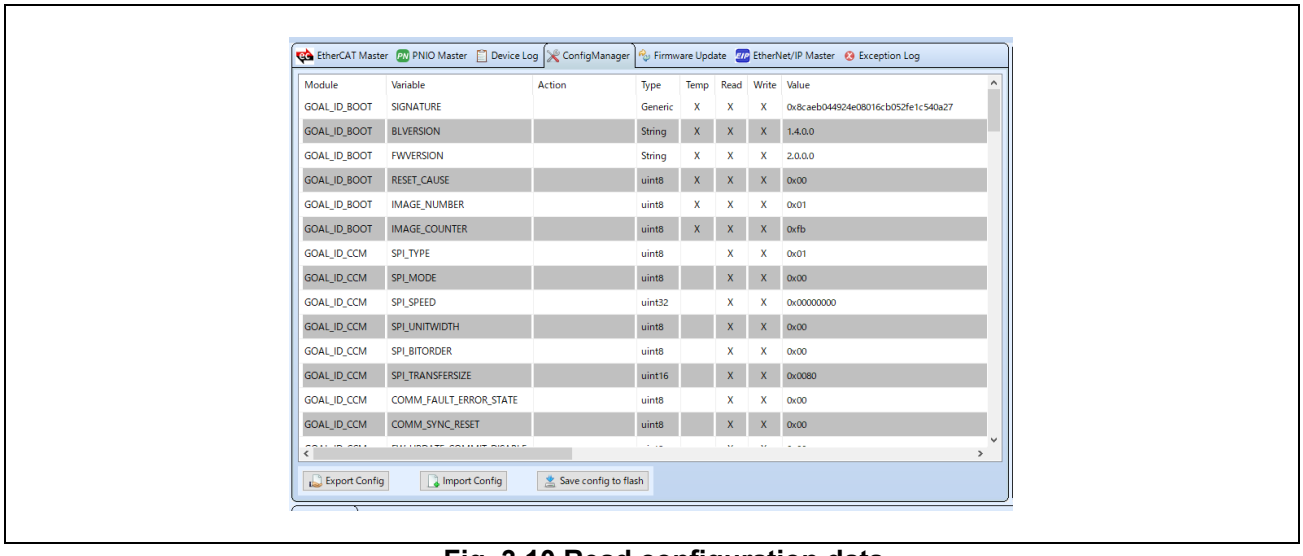


Fig. 3.10 Read configuration data

2.) Write

Write the configuration data to be saved in the R-IN32M3 module.

The only variables that can be rewritten by the user are those with Temp = X and Write = X. Enter [Value] according to the data type of [Type].

The procedure is described below using rewriting the IP address as an example.

[Writing Step]

1. Enter the value to be changed in [Value] of the variable to be rewritten, and set it with enter *
2. Value will be highlighted with a yellow background when the changes are applied
3. Write module configuration information with [Write Configuration]

* Enter on the numeric keypad is invalid

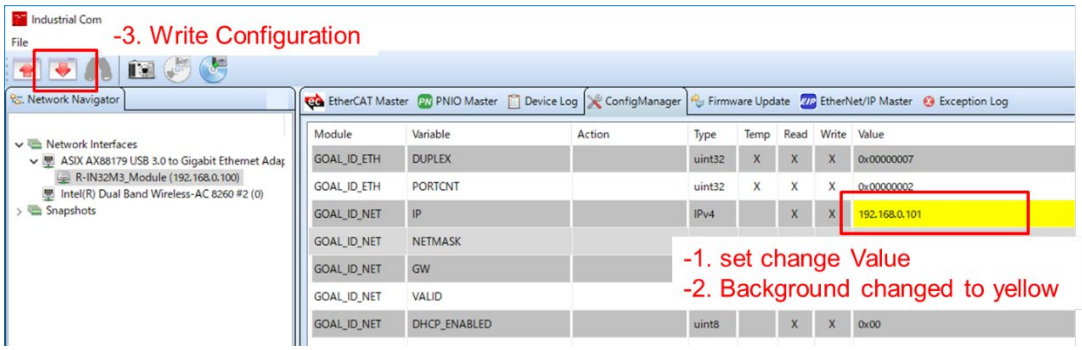


Fig. 3.11 Write configuration data

4. Select [Yes (③)] to reflect the changes in the non-volatile memory, and complete the writing.

   If you want to change the variable temporarily, select [No (③)] and complete the writing. This value is temporarily valid until the R-IN32M3 module is restarted.

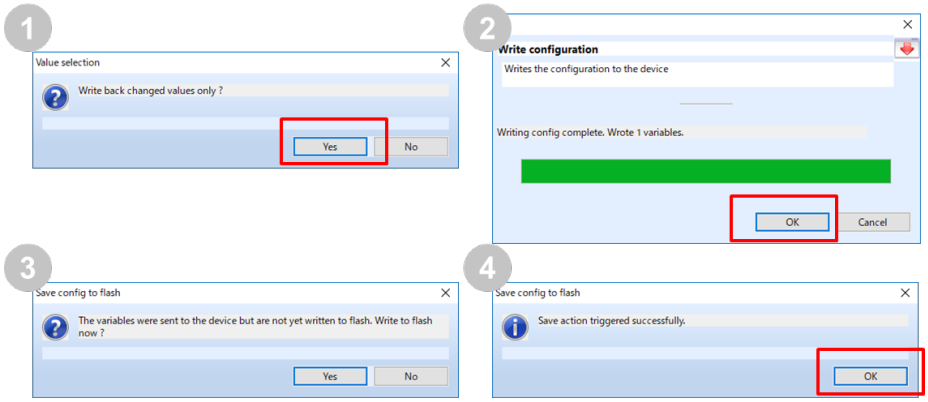


Fig. 3.12 Write Step

3.) Bundle configuration data management

Configuration data can be saved and read in a batch. It is assumed that it will be used when the configuration data of one R-IN32M3 module is reflected in another R-IN32M3 module.

[Export Config], all the configuration data stored in the R-IN32M3 module will be exported as an XML file (* .cfg).

The exported XML file can be read from [Import Config]. The read configuration data is written to the R-IN32M3 module in the procedure of 2.) **Write**.

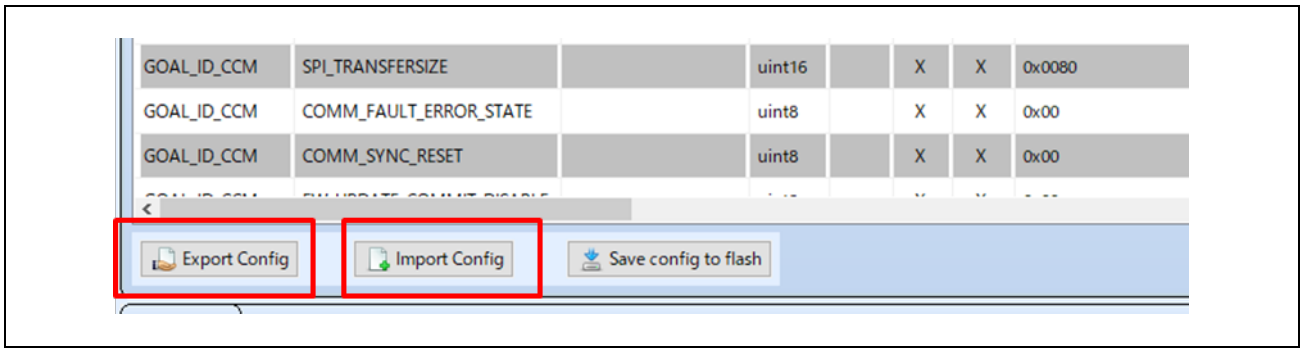


Fig. 3.13 Bundle configuration data

3.2.3 Logging

Get the log information of the R-IN32M3 module or the host microcomputer. There are two types of logging functions, Device Log and Exception Log.

Table 3-3 Logging functions

Log data	Target		
	R-IN32M3 module	Host MCU	
Device Log	✔	✔ *	Control Log *Initial setting is disabled for log output of sample software
Exception Log	✔	—	Exception error occurrence information including the past held in the module

3.2.3.1 Device Log

Get the device control log of the R-IN32M3 module or the host microcomputer. For debugging purposes, it outputs three types of information: "Normal control", "Warning", and "Error" of the device.

In the sample software for each platform provided as a sample package, the initial setting of the log get on the host microcomputer side is disabled. To output the log of the host microcomputer, refer to the application note "Logging" of each platform.

Device Log information can also be output to the terminal software directly from the evaluation board via serial communication. For details, refer to the application note "Logging" for each platform.

To get the log, select the Device Log tab and run Start Reading log to start logging. Press Stop Reading log to stop logging.

Network Navigator is grayed out during log acquisition, and you cannot select devices or search for modules again. To execute these, use [Stop Reading log] to stop log acquisition.

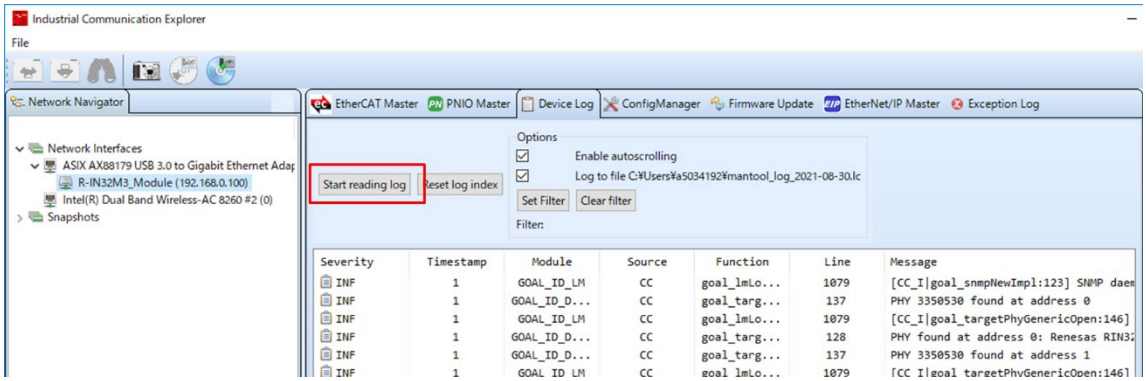


Fig. 3.14 Get device log

Table 3-4 Device log information

		overview
Severity		Normal control message
		Action did not get the expected result
		Event fail or error
Module		Module information
Source		Log source **CC**：R-IN32M3 module **AC**：host microcontroller
Function		Log out-put function
Line		Log out-put line
Message		Log information

<Optional function>

Filter：filter the output log message by module related information.

[Set Filter] Only selected log type is displayed as output

[Clear Filter] Clear filter setting

Auto save：The output log message is automatically saved.

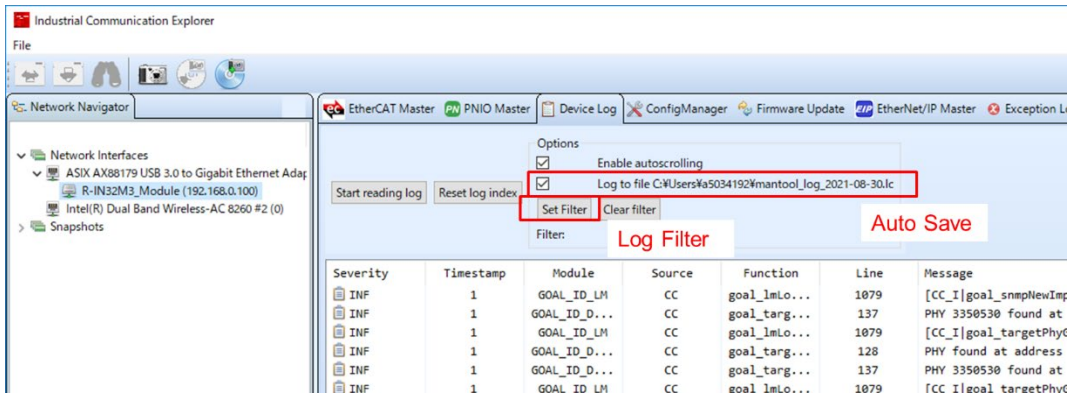


Fig. 3.15 optional function

3.2.3.2 Exception Log

Gets the exception error that occurred on the R-IN32M3 module. Exception errors are accumulated and retained until the user clears.

Network Navigator is grayed out during log acquisition, and you cannot select devices or search for modules again. To execute these, use [Stop Reading log] to stop log acquisition.

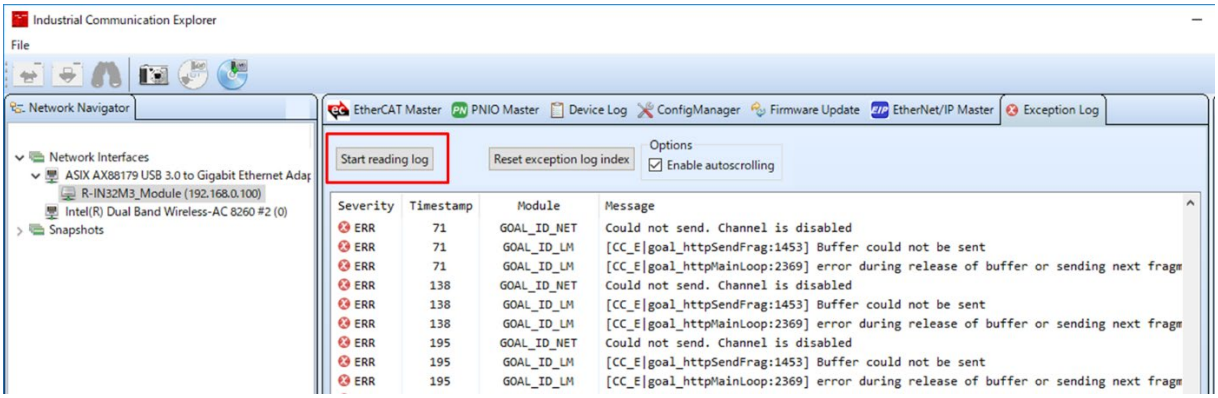


Fig. 3.16 Exception Log

Table 3-5 Exception Log information

		overview
Severity		Exception Error
Module		Module information
Message		Log message

The accumulated exception errors can be deleted from EXLOG_ERASE [Erase Exception Log] in the module configuration [ConfigManager].

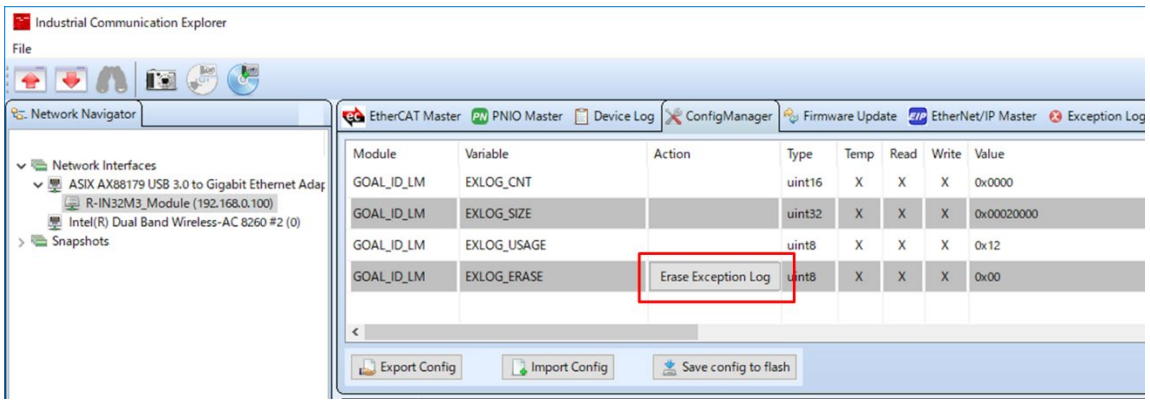


Fig. 3.17 Erase Exception Log

3.2.4 Firmware Update

Under control of the Management Tool, the firmware of the R-IN32M3 Module can be updated. The firmware file will be sent to R-IN32M3 Module via Ethernet connection.

Without connecting to host microcontroller, R-IN32M3 module starts in general TCP/IP mode and the firmware can be updated.

For more information about Firmware Update, see the application notes (Firmware Update Guide [R30AN0401EJ****]).

Update step

1. Select Firmware tab
2. Specify the firmware file "Irj45_**.pfw" from [Select FW bundle]
3. [Start update]

   Then start firmware updating. It takes about 2 minutes to complete. If Phase shows "FW Update completed successfully", it indicates that all firmware updates are complete.

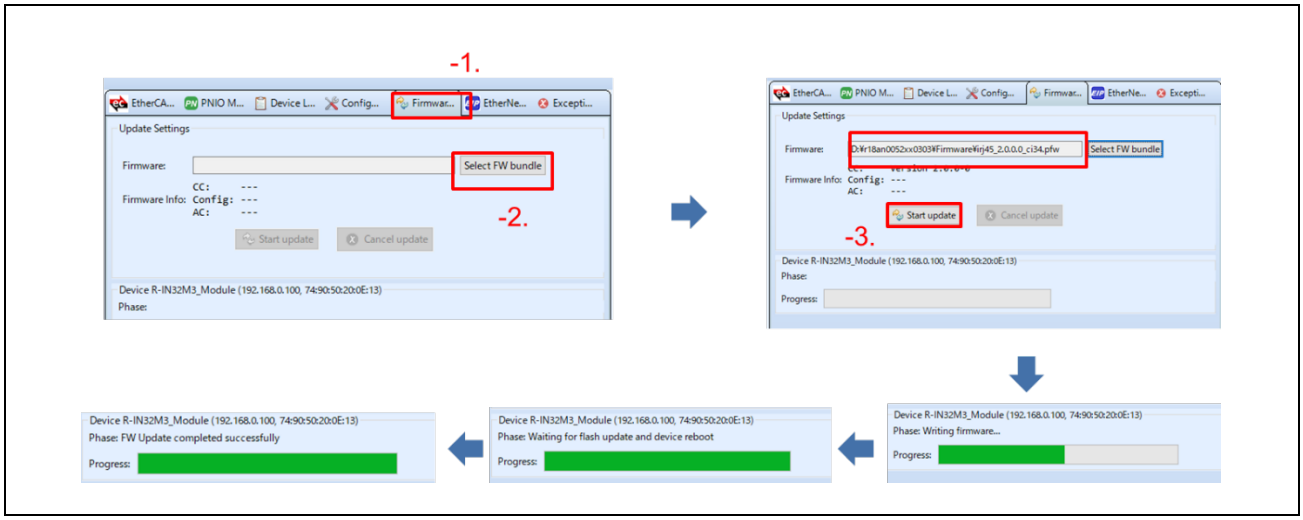


Fig. 3.18 Firmware Update

Check Firmware Version

To check the firmware version in the module configuration data. Refer to 3.2.2 Configuration management and read the configuration data.

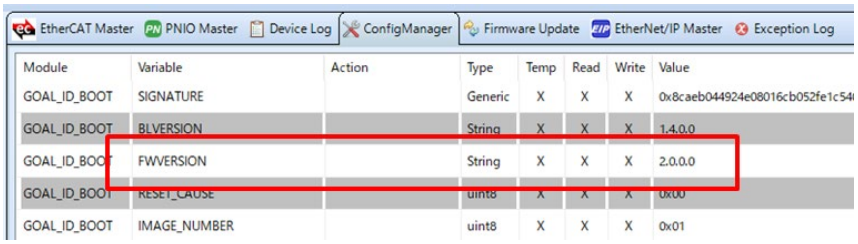


Fig. 3.19 Firmware version

3.3 PROFINET Simple Master

Management Tool supports the following functions as a PROFINET simple master that emulates the PROFINET RT (Real Time) master.

[NOTE]

The simple master function is a simple function for evaluation and is partially different from the actual master specifications. To evaluate in a form closer to actual use, refer to the product PLC or software PLC connection guide and perform the evaluation with CODESYS for PROFINET [R30AN0377EJ****].

The function consists of 4 tabs.

Table 3-6 PROFINET Simple Master function

Tab	Function
Device Command	DCP (Discovery and Configuration Protocol) ➢ PROFINET device scan ➢ Set device Identification (Station Name / IP address) ➢ Wink command
I/O	PROFINET RT cyclic communication
I&M	I&M 0-4 (Identification and Maintenance) Read device information
Alarm	Alarm information

3.3.1 Device Command

DCP communication to control the reading and writing of parameters required for PROFINET device detection and addressing.

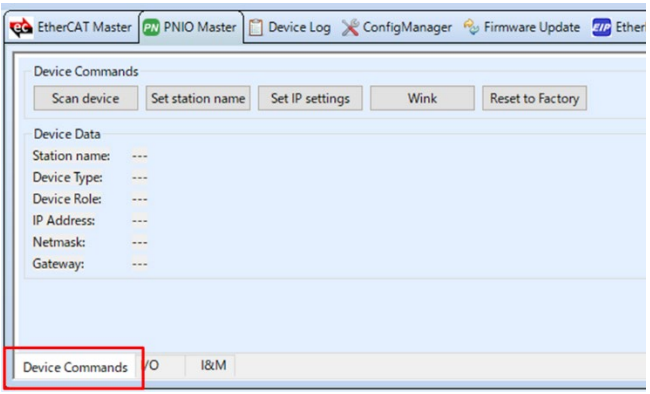


Fig. 3.20 Device Command

(1) PROFINET Scan device

Scan device PROFINET Select the R-IN32M3 module to be controlled and execute [Scan device] to detect the R-IN32M3 module as a PROFINET device. The detected device information is reflected in Device Data.

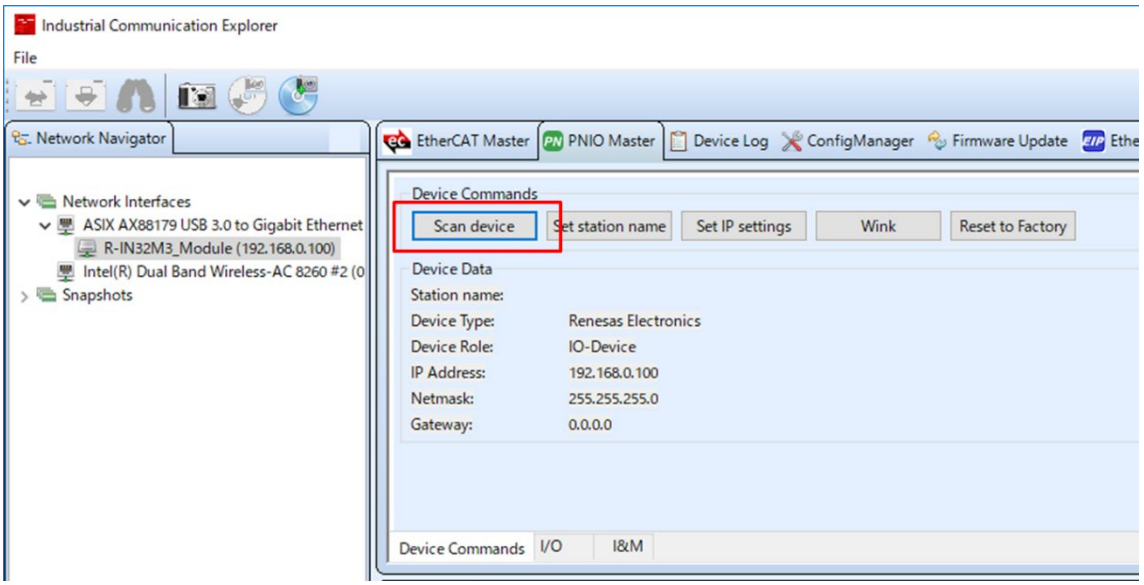


Fig. 3.21 PROFINET Scan device

(2) Device Identification (Station Name / IP address)

The Station Name and IP address of the R-IN32M3 module detected by the tool as a PROFINET device can be registered.

[Set Station name] and enter an arbitrary station name.

[Set IP settings] and enter IP address, netmask, and gateway.

Enabling [Permanent] at the time of registration, it is retained in the non-volatile memory of the R-IN32M3 module.

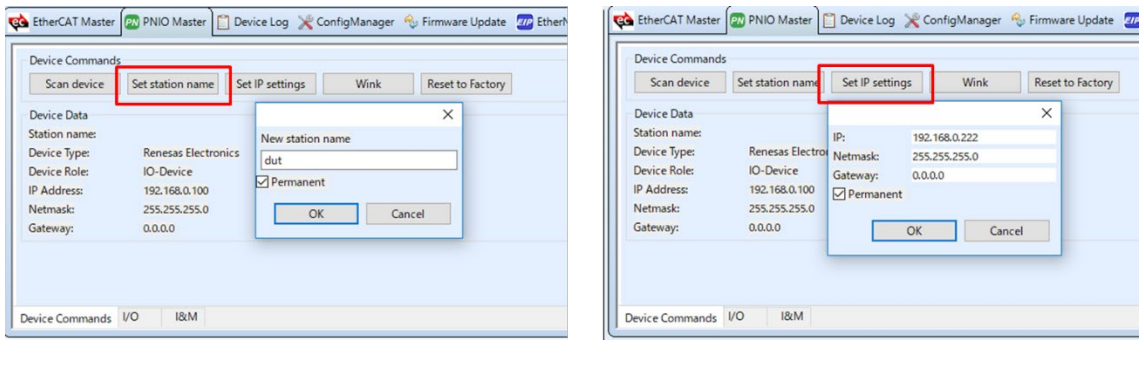


Fig. 3.22 Register device identification

Set IP settings

When [Set IP settings] is executed, the variables of IP, NETMASK, and GW of the module configuration [ConfigManager] GOAL_ID_NET are rewritten. Also, when [Permanent] is enabled, the variable of VALID is set to “0x01 (Stored IP = Enable)”.

(3) Wink command

When [Wink] is executed, the Wink command is issued to the R-IN32M3 module. On the R-IN32M3 module that receives the Wink command, the “Protocol Status LED2” on the board flashes three times.

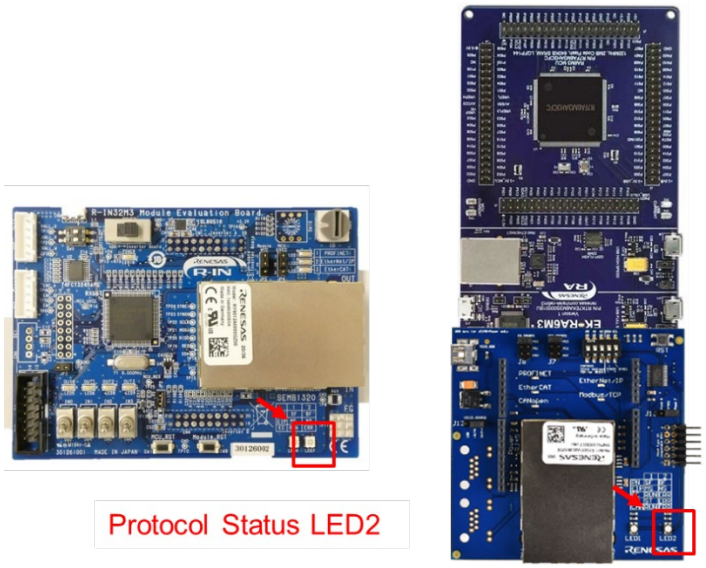


Fig. 3.23 Wink command

3.3.2 I/O

Controls ROFINET RT data communication with the R-IN32M3 module detected as a PROFINET device.

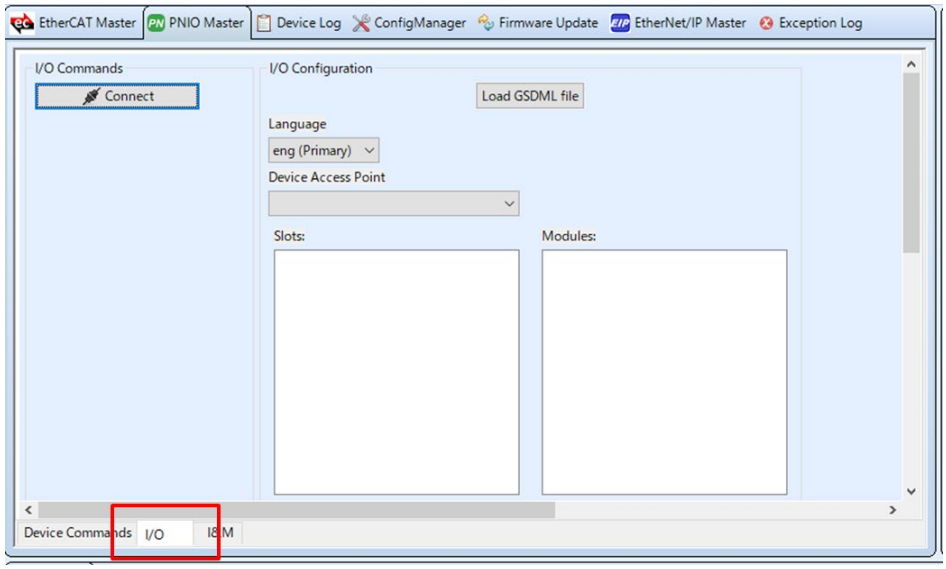


Fig. 3.24 Data communication

This section describes the procedure for establishing PROFINET RT communication using the R-IN32M3 module sample application.

1. **Load GSD (General Station Description) File**

   To establish communication with the PROFINET master, the GSD file that is the connected PROFINET slave device configuration information is required. From [Load GSDML file], select his GSD file according to the connected device environment.

Table 3-7 GSD file

Sample project	Application	GSDML
RA sample	Mirror	RA6_CCM_V***\appl\mirror_sample\01_pnio\gsdml
	Remote IO	RA6_CCM_V***\appl\remote_io_sample\01_pnio\gsdml
RL78 sample	Mirror	RL78_CCM_V***\appl\mirror_sample\01_pnio\gsdml
	Remote IO	RL78_CCM_V***\appl\remote_io_sample\01_pnio\gsdml
RX66T sample	Mirror	RX66T_CCM_V***\appl\mirror_io_sample\01_pnio\gsdml
	Remote IO	RX66T_CCM_V***\appl\remote_io_sample\01_pnio\gsdml

The following information can be confirmed when the GSD file is loaded.

Table 3-8 GSD loaded information

Inf.	
Language	Language of description. Only the default English is defined in the sample software
Device Access Point	Connect device name
Slots	Available slots
Module	Modules that can be connected to slots
Device Interval	Cycle interval time

Device interval

Since Management tool operates on Windows OS (non-real-time OS), the communication cycle is limited to the setting range of 32ms or more. If a communication error occurs, it may be due to insufficient performance due to the PC or network adapter. In that case, change the communication cycle time.

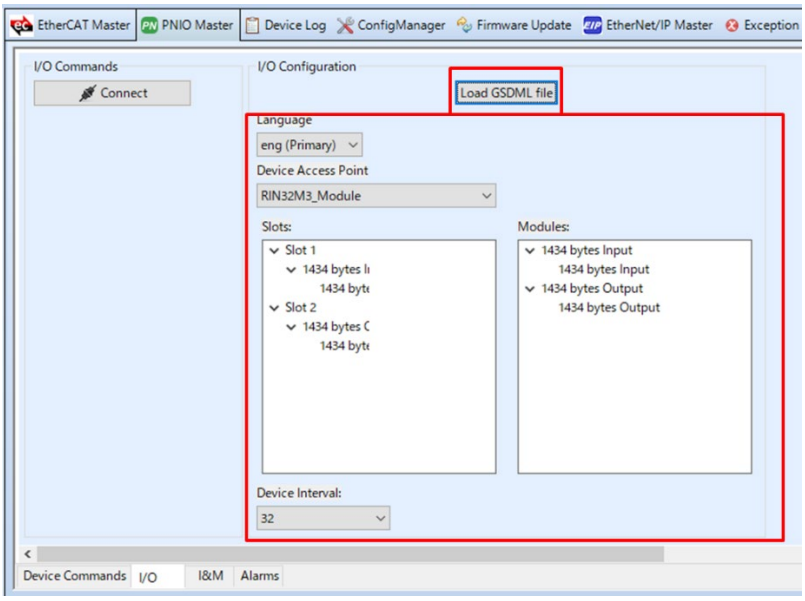


Fig. 3.25 application configuration Slot / Module

In the GSD file of the sample software, Modul is predefined in Slot.

In the mirror sample, Input data is defined in Slot-1 and output data is defined in Slot-2.

2. Connect

When I / O Commands [Connect] is executed, PROFINET RT cyclic communication is started. When communication is successfully established with the R-IN32M3 module and cyclic communication is initiated, the Network Navigator window will be grayed out and the [Connect] button will change to [Disconnect].

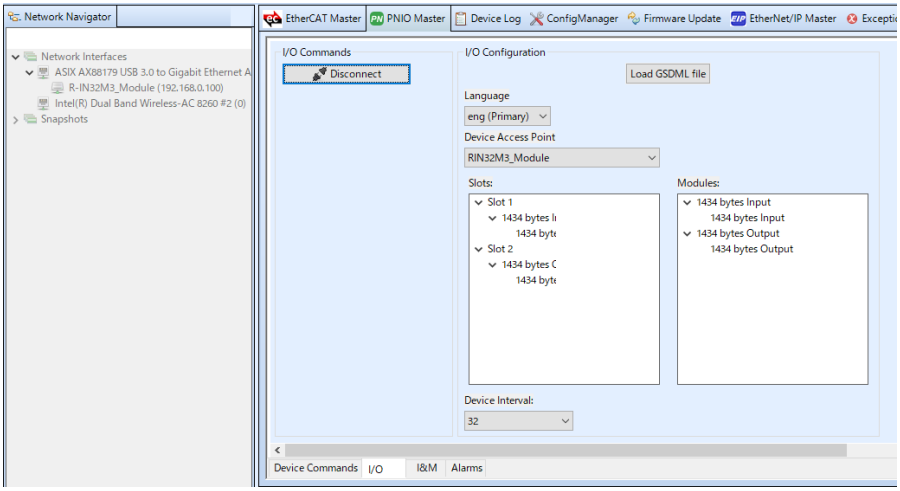


Fig. 3.26 Connect

3. Application

When cyclic communication is started, application data can be sent and received between Management tool (master) and the R-IN32M3 module (slave).

The application defined in Slot is registered in I/O Data.

Table 3-9 I/O Data information

Inf.	
Module / Submodule	Application information registered in Slot
Data Type	Application data type
PS / CS	Producer / Consumer state
Input Data	Input data (R-IN32M3 module to Management tool)
Output Data	Output data (Management tool to R-IN32M3 module)

In the sample app mirror sample (… \ appl \ mirror_sample \ 01_pnio… \ appl \ mirror_sample \ 04_pnio_largesize), the R-IN32M3 module mirrors the same data as the Output Data (Slot-2) sent from the tool and Input data. It will be reflected in Input Data (Slot-1).

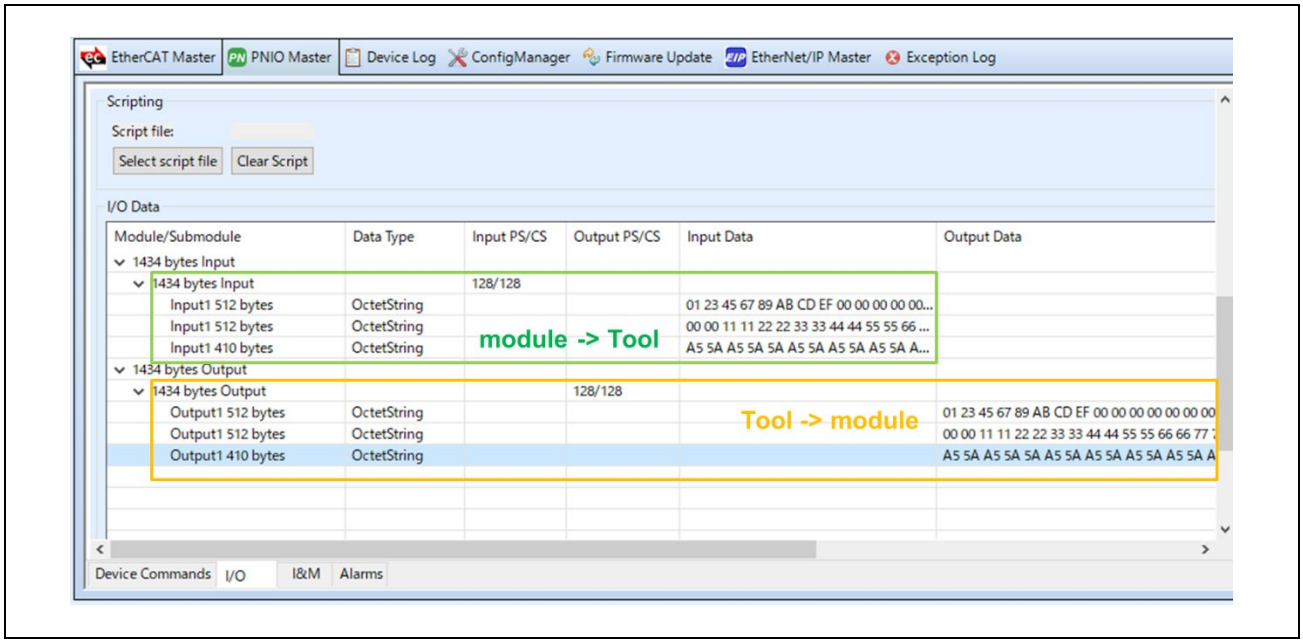


Fig. 3.27 sample application (mirror)

4. Disconnect

[Disconnect] disconnects cyclic communication.

3.3.3 I&M

Read I&M (Identification and Maintenance) record information.

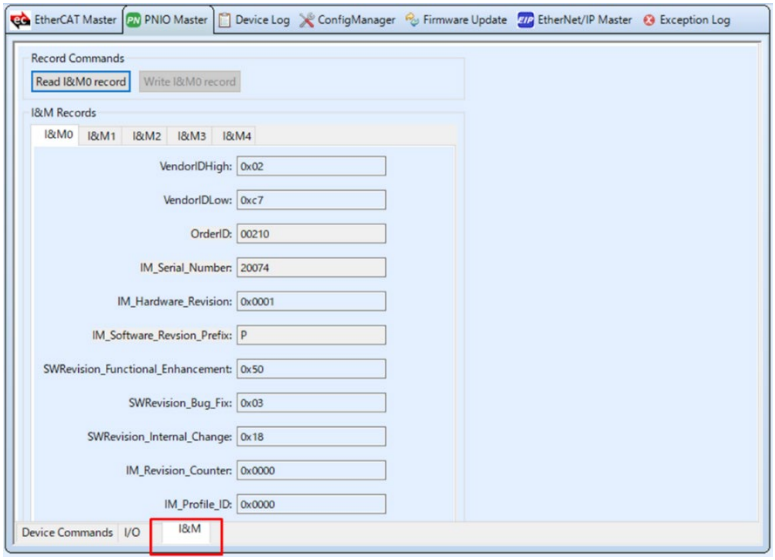


Fig. 3.28 I&M

I&M is the information specified in the PROFINET.

Table 3-10 I&M

	R/W	overview
I&M 0	Read Only	I&M 1-4 reference and deice identify.
I&M 1 - 3	Read / Write	Installation information
I&M 4	Read / Write	password

3.3.4 Alarm

Loading Alarm.

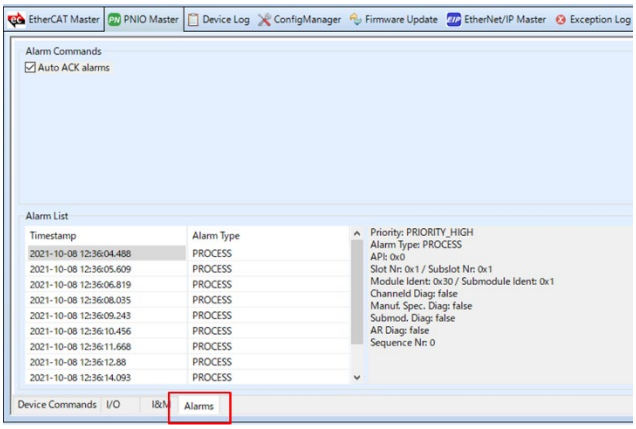


Fig. 3.29 Alarm

3.4 EtherNet/IP Simple Scanner

Management Tool supports the following functions as an EtherNet/IP simple scanner that emulates the EtherNet/IP master.

> **note**
> The simple scanner function is a simple function for evaluation and is partially different from the actual master specifications. To evaluate in a form closer to actual use, refer to the product PLC or software PLC connection guide and perform the evaluation with CODESYS for EtherNet/IP [R30AN0378EJ****].

The function consists of 2 tabs.

Table 3-11 EtherNet/IP Simple scanner function

Tab	Function
Device Command	EtherNet/IP device scan Read device information
I/O Data	EtherNet/IP Class1 data communication

3.4.1 Device Command

Controls EtherNet/IP device detection and parameter reading.

Scan device EtherNet/IP Select the R-IN32M3 module to be controlled and execute [Scan device] to detect the R-IN32M3 module as a EtherNet/IP device. The detected device information is reflected in Device Data.

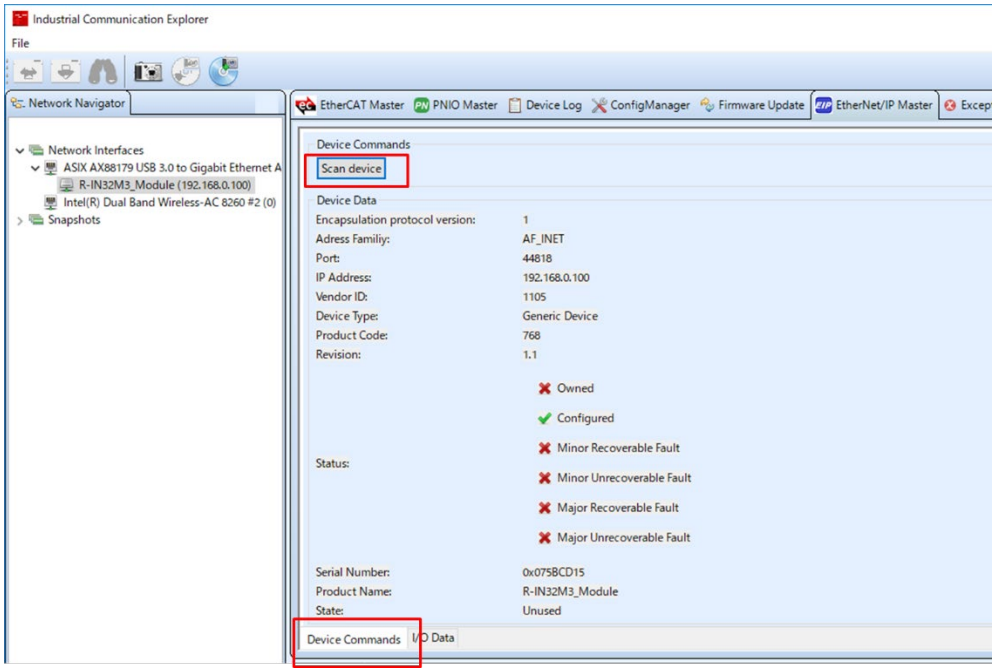


Fig. 3.30 Device Command

3.4.2 I/O Data

Controls I/O data communication through Class 1 communication with the R-IN32M3 module detected as an EtherNet/IP device.

Table 3-12 I/O data function

Inf.	
Device Command	Data communication [Connect] / [Disconnect]
Connection Parameter	[Connection Parameter O -> T] Parameter setting (Scanner to Adapter) [Connection Parameter T -> O] Parameter setting (Adapter to Scanner)
Config Assembly Parameter	Assembly Parameter
I/O Data	Output Data [I/O Data O -> T] Scanner to Adapter Input Data [I/O Data T -> O] Adapter to Scanner

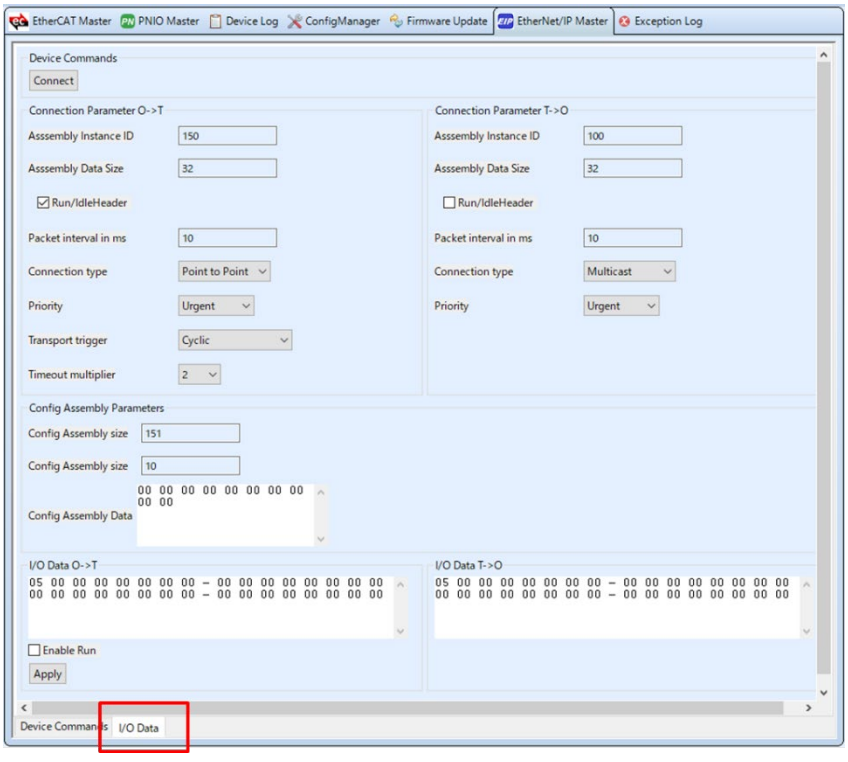


Fig. 3.31 I/O data

1. Connect

Device command [Connect] is executed, EtherNet/IP cyclic communication is started. When communication is successfully established with the R-IN32M3 module and cyclic communication is initiated, the Network Navigator window will be grayed out and the [Connect] button will change to [Disconnect].

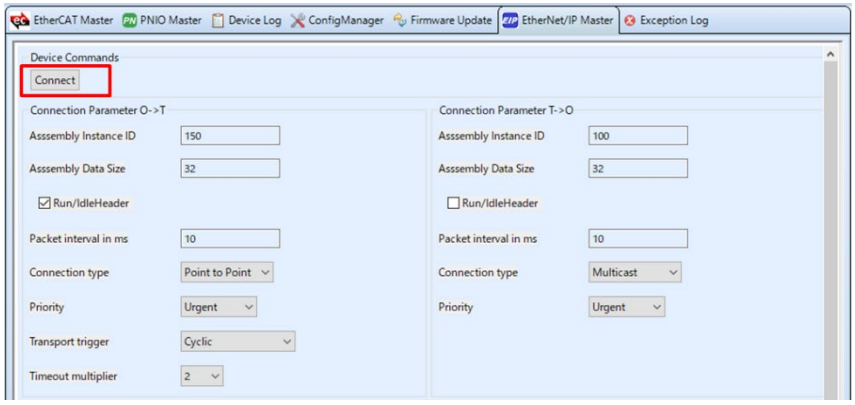


Fig. 3.32 Connect

2. Application

In the sample app mirror sample (…\appl\ mirror_sample\02_eip, …\appl\ mirror_sample\05_eip_largesize), the R-IN32M3 module mirrors the same data as the Output data (I/O Data T->O) sent from the tool and Input data. It will be reflected in Input Data (I/O Data O->T).

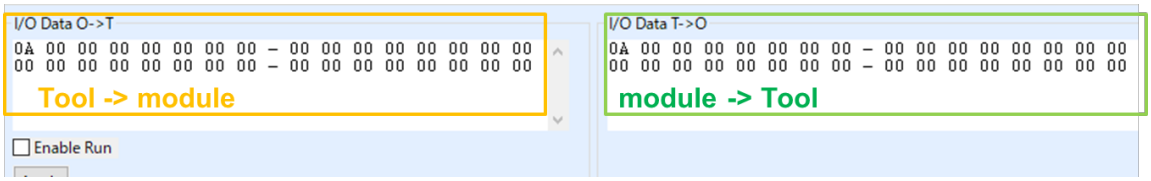


Fig. 3.33 sample application (mirror)

3. Disconnect

[Disconnect] disconnects cyclic communication.

3.5 EtherCAT Simple Master

Management Tool supports the following functions as an EtherCAT simple master that emulates the EtherCAT master.

To control the simple EtherCAT master, it is necessary to enable EtherCAT Proxy for the network interface to be used in advance.

[NOTE]

R-IN32M3 module Supports EtherCAT with firmware version 2.0.0.0 or higher. For firmware update, refer to 3.2.4 Firmware Update.

[NOTE]

The simple master function is a simple function for evaluation and is partially different from the actual master specifications. To evaluate in a form closer to actual use, refer to the product PLC or software PLC connection guide and perform the evaluation with CODESYS for EtherCAT [R30AN0379EJ****] or TwinCAT [R30AN0380EJ****].

The function consists of 5 tabs.

Table 3-13 EtherCAT Simple Master function

Tab	Function
Device Info	Read Device information
Object Dictionary	Read/Write Object dictionary
PDO Mapping	Read/Write PDO mapping
I/O Data	PDO data communication
EEPROM	Program EEPROM

3.5.1 EtherCAT Proxy

To control the EtherCAT simple master, it is necessary to activate EtherCAT mode for the network interface to be used.

To activate it, right-click on the network interface and select [Enable EtherCAT]. When EtherCAT Proxy is executed, the font of the network interface turns red.

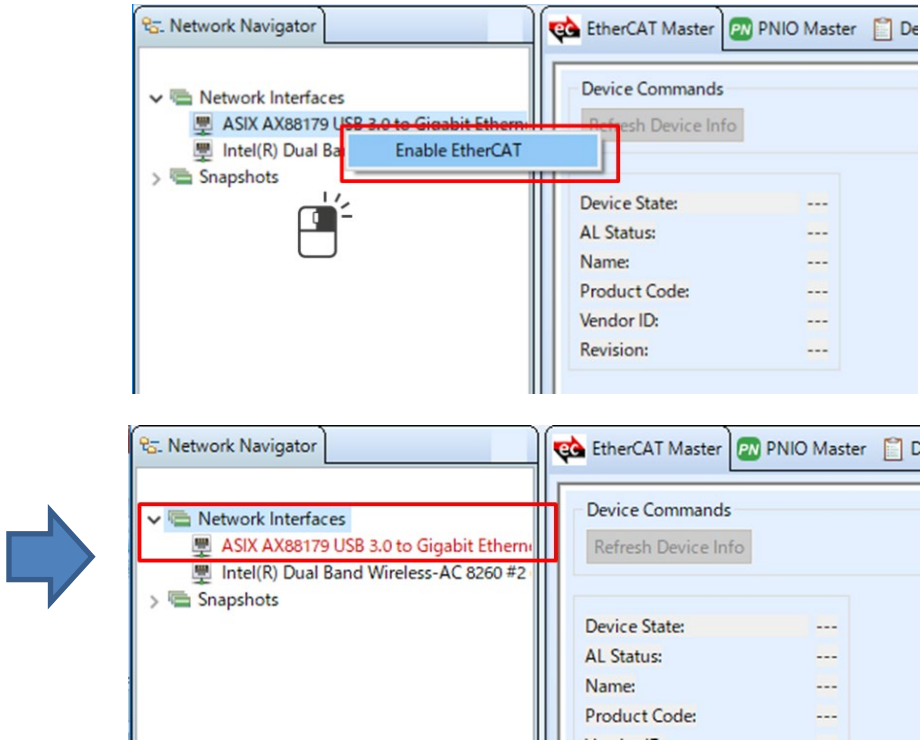


Fig. 3.34 enable EtherCAT Proxy

3.5.2 EtherCAT scan device

When EtherCAT Proxy is executed and the font of the network interface turns red, the EtherCAT-controlled R-IN32M3 module can be detected from Management tool. Scanning procedure is the same as for 3.2.1 Scan device.

Scan device

1. Select the network interface connected to the EtherCAT controlled R-IN32M3 module
2. network search [Scan Network]

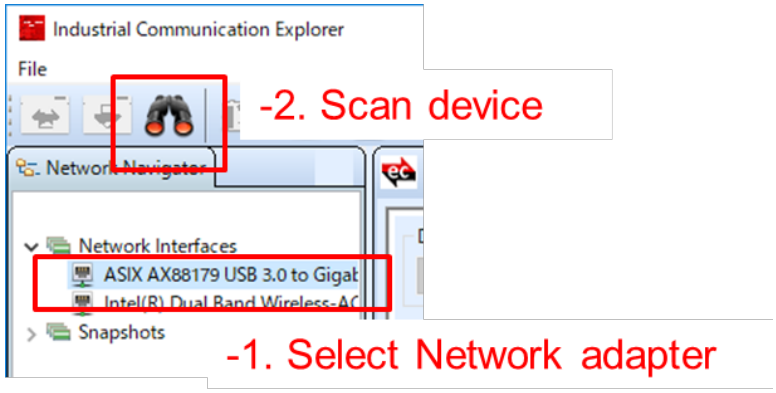


Fig. 3.35 scan device

3.5.3 Device Info

Displays the slave device information of the R-IN32M3 module.

The State Machine shows the status of the EtherCAT slave. When start PDO data exchange on the I/O data tab, the state transitions to Operational.

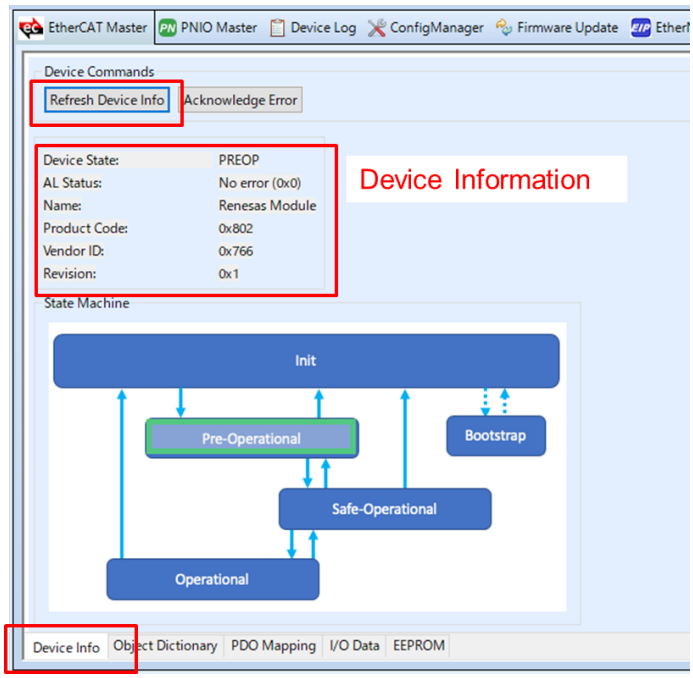


Fig. 3.36 slave device information

3.5.4 Object Dictionary

Read Object dictionary.

[Read Object Dictionary Info] to see the EtherCAT slave objects.

Object information can be read individually [Read value] and collectively [Read All object value].

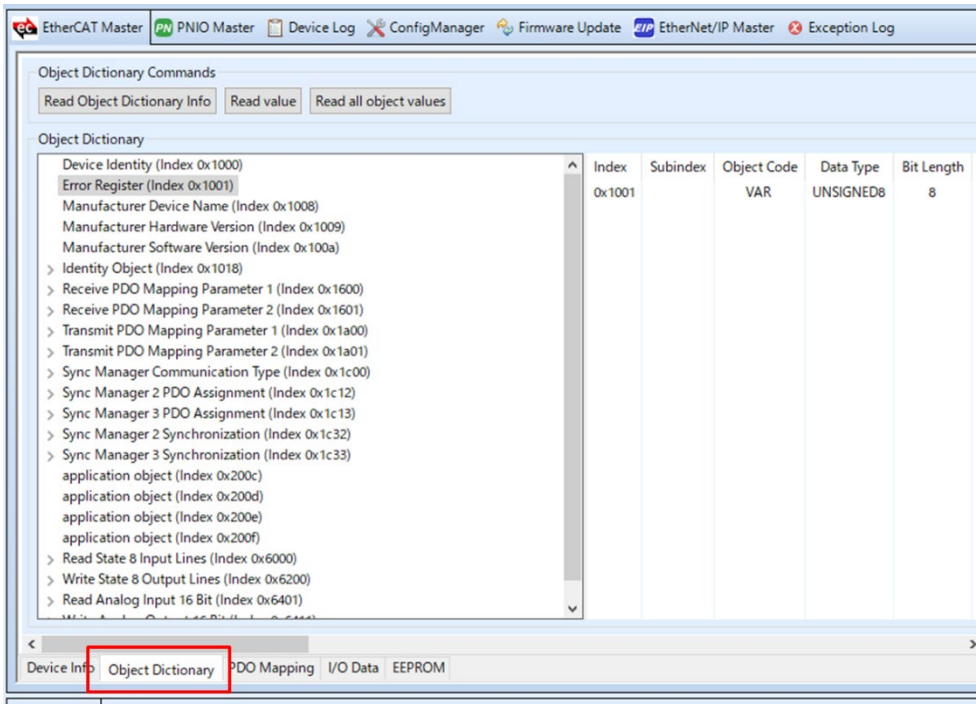


Fig. 3.37 Object dictionary

3.5.5 PDO Mapping

The loaded PDO Mapping is displayed.

To assign / remove the parameters that are mapped by [Add object to mapping] / [Remove object from mapping].

The mappings assigned to RxPDO and RxPDO can be registered with [Select PDO assignment].

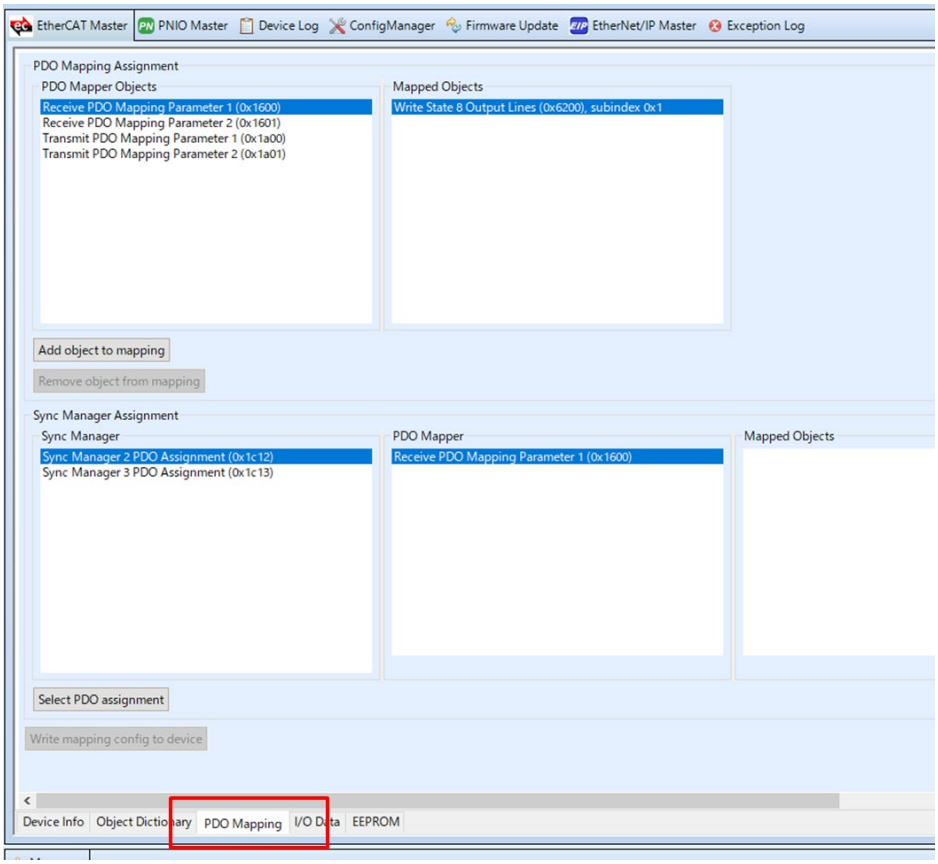


Fig. 3.38 PDO mapping

3.5.6 I/O Data

Control the Process Data exchange.

Start data exchange with [Start process data exchange].

In the sample app mirror sample (… appl \ mirror_sample \ 03_ecat,… appl \ mirror_sample \ 06_ecat_largesize), the R-IN32M3 module mirrors the same data sent from the tool and reflects it in TxPDO.

Data exchange step

1. Set output data in RxPDO
2. [Udpate RxPDO data] reflects the value in RxPDO
3. The input data (mirror data of RxPDO) sent from the R-IN32M3 module is reflected in RxPDO.

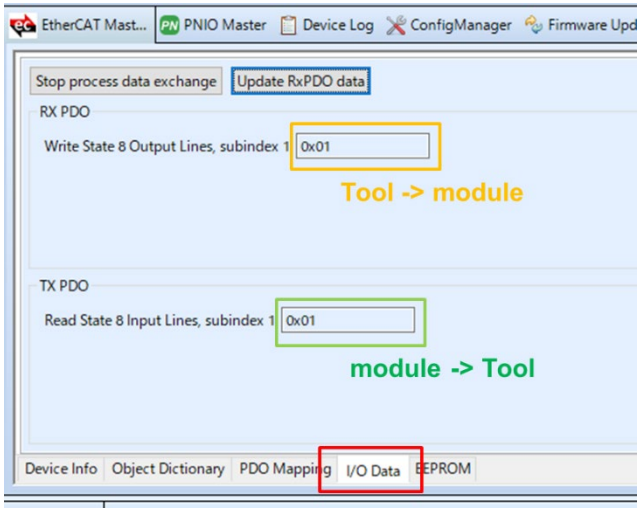


Fig. 3.39 sample application (mirror)

4. [Stop process data exchange] disconnects cyclic communication.

3.5.7 EEPROM

Program SII (Slave Information Interface) to the EEPROM on the R-IN32M3 module.

Load binary file from [Load EEPROM Binary File], and programing [Write EEPROM].

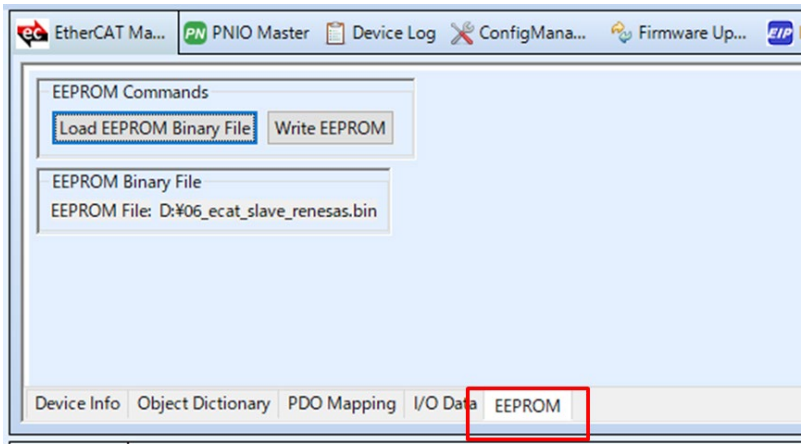


Fig. 3.40 program EEPROM

Appendix

1. Cause and Remedy

Error	Remedy	reference
Module cannot be detected	Check connection configuration with the device	Fig. 2.12 Connection configuration
Module cannot be detected	Check Npcap install in “Winpcap API compatible Mode”	2.1.2 Software Environment
Module cannot be detected	Check Windows firewall setting	2.1.2.1 Management Tool Set-up
Modules can no longer be detected	Clear cache of Management Tool C:\Users*user-name*\.mantool	—
Protocol device cannot be detected	Check the target protocol is running on the host microcomputer	R-IN32M3 Module Application note

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct/15/2021	-	First Edition
1.01	Aug/5/2022	-	Minor correction
		5, 15	Update sample package number
		32	Update table with added samples

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The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)
   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on
   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state
   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins
   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals
   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin
   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses
   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products
   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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