

INVERTER
Plug-in option
A8NEIP_2P
INSTRUCTION MANUAL

EtherNet/IP communication interface

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HALMSTAD • CHICAGO • KARLSRUHE • TOKYO • BEIJING • MILANO • MULHOUSE • COVENTRY • PUNE • COPENHAGEN

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Important User Information

This document is intended to provide a good understanding of the functionality offered by the A8NEIP_2P EtherNet/IP Option Board. The document only describes the features that are specific to the option board. For general information regarding the FR-A800 inverter, consult the FR-A800 inverter design guides.

The reader of this document is expected to be familiar with high level software design, and communication systems in general. The use of advanced EtherNet/IP-specific functionality may require in-depth knowledge in EtherNet/IP networking internals and/or information from the official EtherNet/IP specifications. In such cases, the people responsible for the implementation of this product should either obtain the EtherNet/IP specification to gain sufficient knowledge or limit their implementation in such a way that this is not necessary.

Liability

Every care has been taken in the preparation of this manual. Please inform HMS Industrial Networks AB of any inaccuracies or omissions. The data and illustrations found in this document are not binding. We, HMS Industrial Networks AB, reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be considered as a commitment by HMS Industrial Networks AB. HMS Industrial Networks AB assumes no responsibility for any errors that may appear in this document.

There are many applications of this product. Those responsible for the use of this device must ensure that all the necessary steps have been taken to verify that the applications meet all performance and safety requirements including any applicable laws, regulations, codes, and standards.

HMS Industrial Networks AB will under no circumstances assume liability or responsibility for any problems that may arise as a result from the use of undocumented features, timing, or functional side effects found outside the documented scope of this product. The effects caused by any direct or indirect use of such aspects of the product are undefined, and may include e.g. compatibility issues and stability issues.

The examples and illustrations in this document are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular implementation, HMS Industrial Networks AB cannot assume responsibility for actual use based on these examples and illustrations.

Intellectual Property Rights

HMS Industrial Networks AB has intellectual property rights relating to technology embodied in the product described in this document. These intellectual property rights may include patents and pending patent applications in the US and other countries.




Trademark Acknowledgements

Anybus ® is a registered trademark of HMS Industrial Networks AB. All other trademarks are the property of their respective holders.

<p>Warning: This is a class A product. in a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.</p> <p>ESD Note: This product contains ESD (Electrostatic Discharge) sensitive parts that may be damaged if ESD control procedures are not followed. Static control precautions are required when handling the product. Failure to observe this may cause damage to the product.</p>


Thank you for choosing this Mitsubishi Inverter plug-in option for the Mitsubishi FR-A800 Series Inverter. This Instruction Manual gives handling information and precautions for use of this equipment. Incorrect handling may cause an unexpected failure or damage. In order to ensure optimal performance, please read this manual carefully prior to use of the equipment.

Please forward this manual to the end user of the equipment.


This section is specifically about safety matters	
Do not attempt to install, operate, maintain or inspect this product until you have read through this Instruction Manual and any related documents carefully, and can use the equipment correctly. Do not use this product until you have a full working knowledge of the equipment, safety information and instructions.	
In this Instruction Manual, the safety instruction levels are classified into "WARNING" and "CAUTION" levels.	
 WARNING	Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
 CAUTION	Assumes that incorrect handling may cause hazardous conditions, resulting in moderate or slight injury, or may cause physical damage only.
Please note that even the  CAUTION level may lead to a serious consequence depending on conditions. Please be sure to follow the instructions of both levels as they are critical to personnel safety.	

SAFETY INSTRUCTIONS

1. Electric Shock Prevention

 WARNING
<ul style="list-style-type: none"> • Do not open any cover on the inverter while power is on or while the inverter is running, as an electrical shock may result. • Do not operate the inverter with any cover or wiring cover removed, as accidental contact with exposed high-voltage terminals and internal components may occur, resulting in an electrical shock. • If power is off do not remove any cover except when necessary for wiring or periodic inspection. While any cover is removed, accidental contact with exposed high-voltage terminals and internal components may occur, resulting in an electrical shock. • Prior to starting wiring or inspection, confirm that input power to the inverter has been switched off via observation of the inverter's display panel. Additionally, wait for at least 10 minutes after removal of input power, and then confirm that all residual voltage has been dissipated by using a voltage meter. Internal DC bus capacitors may contain high voltages for several minutes after removal of input power, resulting in a dangerous situation should anything come into contact with them. • All personnel involved in the installation or inspection of this equipment should be fully competent to perform the required work. • Always install plug-in options prior to wiring main power. • Do not touch the plug-in option with wet hands. • Do not subject the cables to scratches, excessive stress, heavy loads or pinching.

2. Injury Prevention

 CAUTION
<ul style="list-style-type: none"> • To prevent explosions or similar damage, apply only the voltages specified in the instruction manual to each terminal. • To prevent explosions or similar damage, ensure that all cables are properly connected to the correct terminals. • To prevent explosions or similar damage, observe all wiring polarity indicators. • To prevent burns from hot components, do not touch the inverter while power is on, or for some time after power is removed.

3. Additional Instructions

Please note the following points to prevent equipment damage, injury or electrical shock.

1. Transportation and mounting

CAUTION

- Do not install or operate the plug-in option if it is damaged or has parts missing.
- Do not stand or rest heavy objects on the equipment.
- Check that the mounting orientation is correct.
- Prevent conductive items such as screws and metal fragments, or flammable substances such as oil from entering the inverter.

2. Trial run

CAUTION

- To prevent unexpected equipment movement, confirm and adjust all required parameters prior to starting operation.

3. Usage

WARNING

- Do not modify the equipment.
- Do not remove any inverter or option parts unless specifically instructed to do so in this manual.

CAUTION

- Performing a "parameter clear" or "all parameter clear" will reset all inverter parameters to their factory default settings. After performing one of these operations, remember to reenter any custom parameter values prior to starting operation.
- To prevent damage from electric discharge, always touch a grounded piece of metal prior to touching any equipment.

4. Maintenance, inspection and parts replacement

CAUTION

- Do not perform hi-pot tests on the equipment.

5. Disposal

CAUTION

- Contact the local or state environmental agency in your area for details on the disposal of electrical components and packaging.

6. General instruction

For clarity purposes, illustrations in this manual may be drawn with covers or safety guards removed. Ensure all covers and safety guards are properly installed prior to starting operation.

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P. About This Document

For more information, documentation etc., please visit the ME web site, see section P.2 below.

P.1 Related Documents

Document	Author
Installation guideline of Mitsubishi inverter drive	ME
Instruction manual of Mitsubishi inverter drive	ME

P.2 Download

The following web sites are available for downloads:

Web Site	Region
http://www.mitsubishi-automation.com	EU
http://www.meau.com/eprise/main/sites/public/Products/Variable_Frequency_Drives/A800/default	Americas

P.3 Document History

Summary of Recent Changes (... 1.00)

Change	Page(s)
-	-
-	-
-	-

Revision List

Revision	Date	Author(s)	Chapter(s)	Description
1.00	2013-09-16	KeL	All	First revision

P.4 Conventions & Terminology

The following conventions are used throughout this manual:

- Numbered lists provide sequential steps
- Bulleted lists provide information, not procedural steps
- The term 'module' refers to the option board.
- Hexadecimal values are written in the format NNNNh, where NNNN is the hexadecimal value.

P.5 Support

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Please refer to the drive manual for other region contact addresses.

1. Preoperation Instructions

1.1 History

The FR-A800 series from Mitsubishi Electric (ME), is a family of frequency inverters. The communication modules, option boards, enabling communication on different industrial networks, are developed and produced by HMS Industrial Networks.

Examples of applications for the frequency inverters are:

- Lifting equipment
- Warehouse systems
- Extruders
- Centrifuges

1.2 Product Overview

The A8NEIP_2P EtherNet/IP Option Board for EtherNet/IP allows information to be transferred seamlessly between an FR-A800 and an EtherNet/IP network with minimal configuration requirements. The option board installs directly onto the inverter's control board, and presents two standard 10BASE-T/100BASE-TX Ethernet ports for connection to the EtherNet/IP network. The option board also hosts an embedded web server, which provides access to inverter information via a standard web browser for remote monitoring, configuration and control.

The option board is connected directly to the control board of the inverter and communicates to the inverter via a built-in communication port. Note that when the inverter's built-in communication port is used by the A8NEIP_2P EtherNet/IP Option Board, it is unavailable for use by any other network.

Before using the option board, please familiarize yourself with the product and be sure to thoroughly read the instructions and precautions contained in this manual. In addition, please make sure that this instruction manual is delivered to the end user of the product, and keep this instruction manual in a safe place for future reference or unit inspection.

1.3 Features

- Two standard EtherNet/IP ports
- Internal switch enabling daisy chaining
- Drive operation according to the AC/DC Drive Profile
- Compliant with ODVA conformance test CT10
- Announce based Device Level Ring (DLR)
- FTP server
- Web server
- Firmware upgrade functionality¹
- 10BASE-T/100BASE-TX full/half duplex Ethernet interface
- CIP Parameter Object support
- IPv4 Address Conflict Detection for EtherNet/IP

1. Instructions are included when downloading a new firmware version.

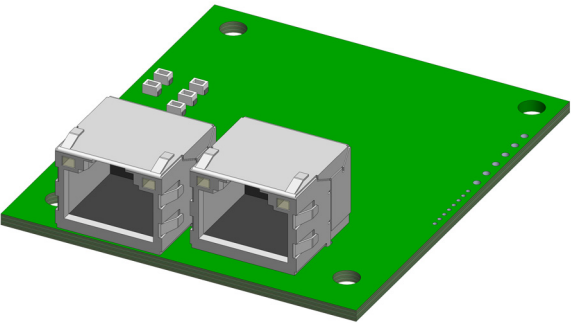



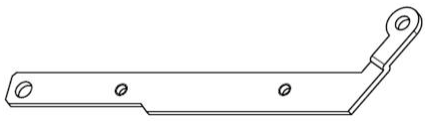
1.4 Unpacking and Product Confirmation

1.4.1 Shipment Confirmation

Check the enclosed items. Confirm that the correct quantity of each item was received, and that no damage occurred during shipment.

1.4.2 Component Overview

The following items are included in the package.

Item	No. of pcs	
PCB board	1	
M3 x 6 mm screw	3	
Board spacer	2	
LED cover	1	
PE plate	1	

1.5 Environmental Specifications

Item	Specification
Operating Temperature	-10° to +50° Celsius (ambient of the drive, non-freezing)
Storage Temperature	-40° to +65° Celsius
Relative Humidity	93% non condensing
Vibration	Max acceleration amplitude: 10 m/s ² at 9 - 200 Hz Max displacement amplitude: 3 mm at 2 - 9 Hz
Grounding	Connected to inverter frame ground through the PE plate / isolated from inverter control power common
Power Supply	Supplied from inverter
Cooling Method	Self cooled
Communication Speed	10/100 Mbit

The A8NEIP_2P EtherNet/IP Option Board is lead-free / RoHS-compliant.

2. Get Started

This chapter describes how to make a standard configuration of the option board.

2.1 Physical Installation

It is recommended to make a note of the MAC address of the option board, prior to installing the option board in the inverter. The MAC address can for example be found on the label located on the option board.

The physical installation of the option board is described in “Installation Procedure” on page 29

2.2 Option Board IP Address

If a DHCP server is present on the network, there is no need to assign an IP address to the option board, as DHCP is enabled by default. The master needs to know the IP address to set up the communication on the EtherNet/IP network.

See “IP Configuration” on page 41 for more information.

2.3 Download EDS File

The option board can be used without an EDS file. However it is recommended to use the EDS file, if supported by the configuration software.

An EDS file is available for download, see section P.2 “Download”.

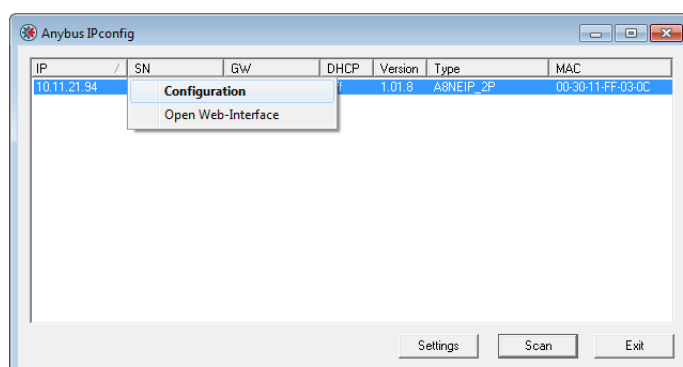
2.4 Configuration Example

The example presented in this section, is created using the configuration software Studio 5000 from Rockwell.

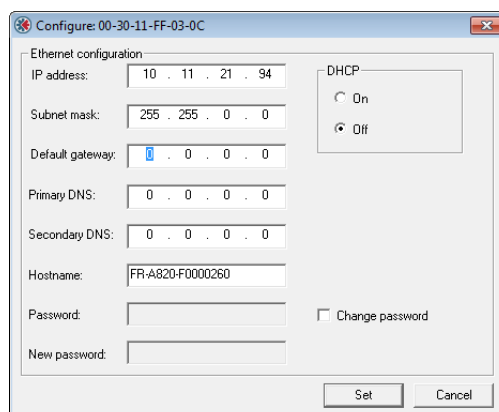
2.4.1 IP Configuration

DHCP is enabled by default, but if the IP settings need to be changed please follow these steps:

1. Download the Anybus IPconfig support tool (version 1.9.13 or later) from the support pages at www.hms-networks.com.
2. Install and start the tool. A list of Ethernet modules available on the network will appear. Select the option board in the list and right-click to show the menu.¹



3. Select the option board in the list and double-click or select Configuration in the pop-up menu to open the IP settings configuration window.



4. Enter the new IP settings and click set.
5. Close IPconfig.

The IP settings can also be changed by setting the option board parameters using the handheld parameter unit or using the internal web pages of the option board. For more information see:

- “Option Board Parameters” on page 35
- FR-A800 user manual
- “Network Interface” on page 44

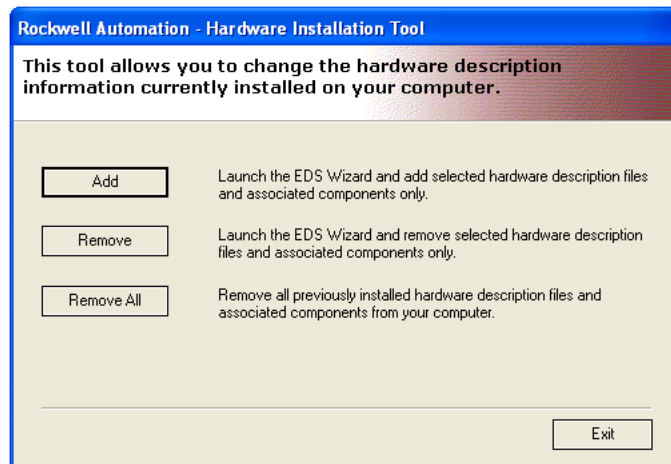
1. If no device appears, make sure that the correct network interface card is selected, using the Settings button.

2.4.2 Import EDS File

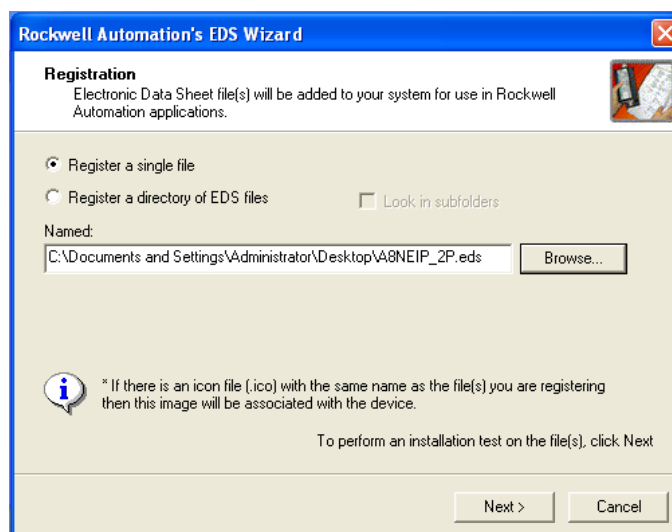
If an EDS file is needed for the configuration, it has to be imported into the configuration tool as described below. If no EDS file is to be used, please continue to section 2.4.4 on page 19.

Note: The following steps requires that RSLinx is installed and configured.

1. Open RSLinx and select Tools -> Hardware Installation Tool. Select Add.



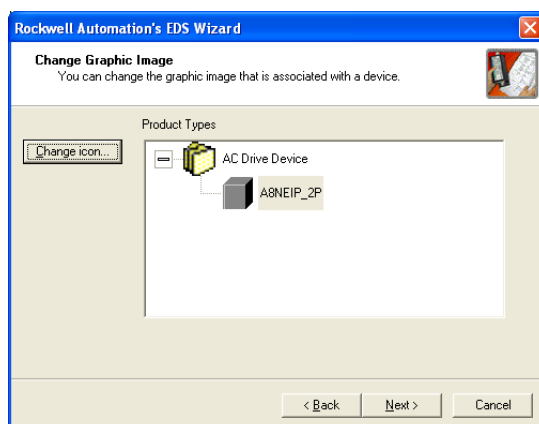
2. Browse to the previously downloaded EDS file. Select the file and click Next.



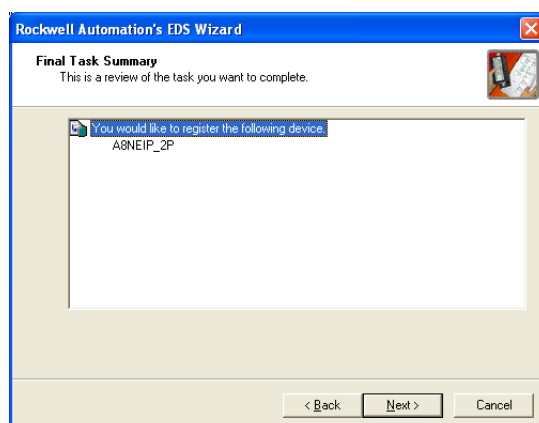
3. The imported EDS file is evaluated. When this is finished, click Next.



4. In this step it is possible to change the icon of the device. Click Next when you are finished.



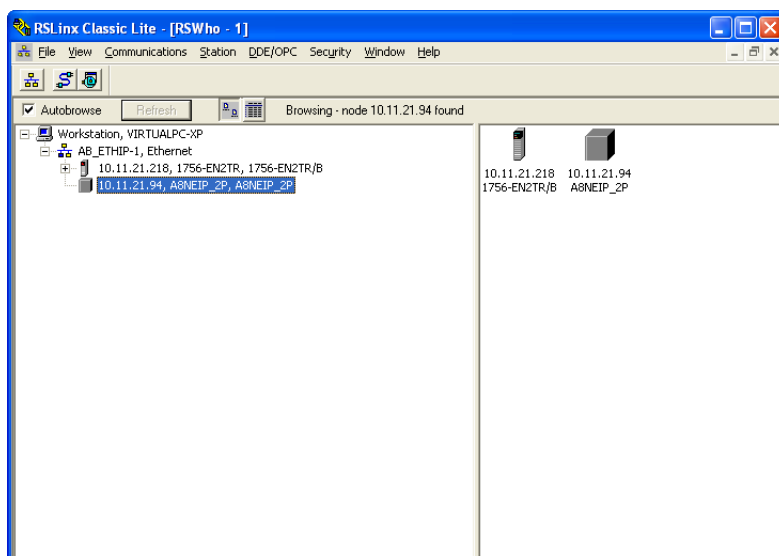
5. A summary will be shown. Review it and click Next, if satisfied.



6. Exit the tool.

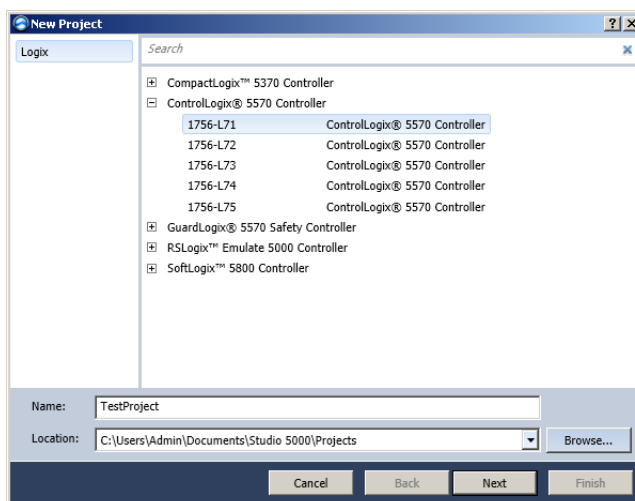
2.4.3 Verify the Settings

Use RSLinx or RSLinx Classic to verify the settings. The option board should appear in the list if the correct EDS file is used and the IP settings are correct.

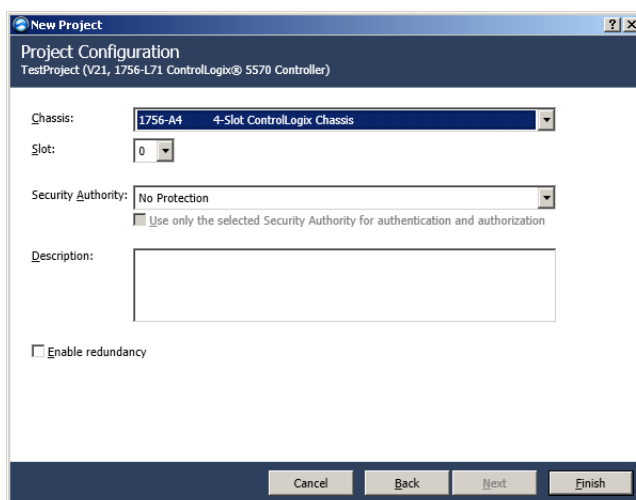


2.4.4 Create a New Project

1. Open the Studio 5000 configuration software.
2. Select Controller and set a name to the project. Click Next.



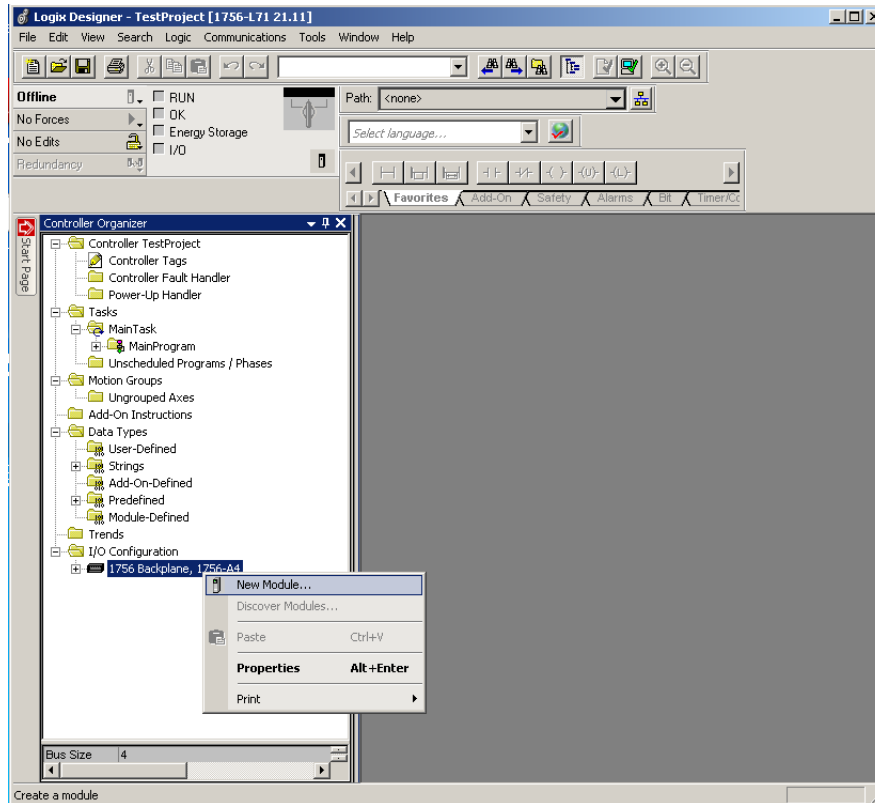
3. Select chassis and slot. Click Finish



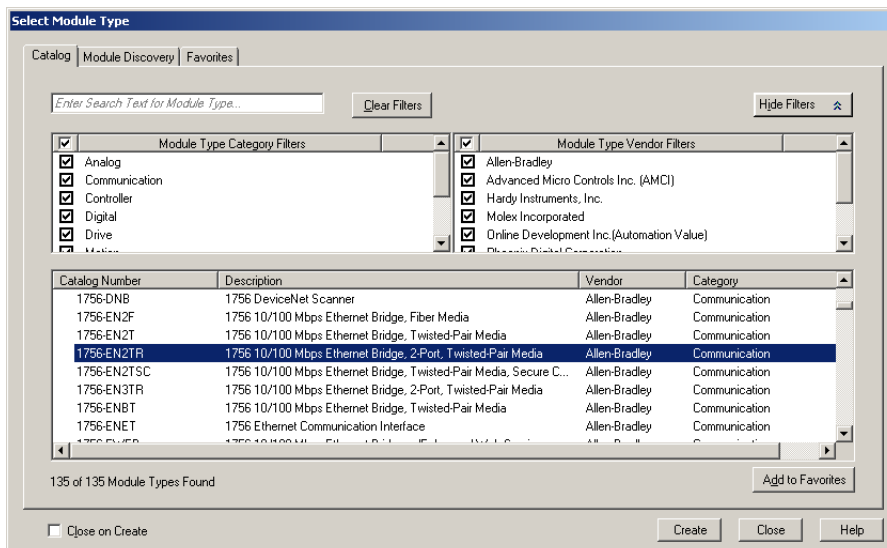
2.4.5 Add a Module to the IO Configuration

This section shows how to add a module to the back plane.

1. In the Logix Designer window, right click on the backplane and select New Module.



2. Select the correct module (an Ethernet bridge in the PLC) and press Create.



3. Give the name and the IP address for the Ethernet module, Click OK and then close the Select Module Type window.

The screenshot shows the 'New Module' configuration window with the following details:

- General Tab:**
 - Type: 1756-EN2TR 1756 10/100 Mbps Ethernet Bridge, 2-Port, Twisted-Pair Media
 - Vendor: Allen-Bradley
 - Parent: Local
 - Name: ethBridge
 - Description: (empty)
- Ethernet Address:**
 - Private Network: 192.168.1.
 - IP Address: 10 . 11 . 21 . 170
 - Host Name: (empty)
- Slot:** 1
- Module Definition:**
 - Revision: 5.1
 - Electronic Keying: Compatible Module
 - Connection: None
 - Time Sync Connection: None
- Status:** Creating
- Buttons:** OK, Cancel, Help

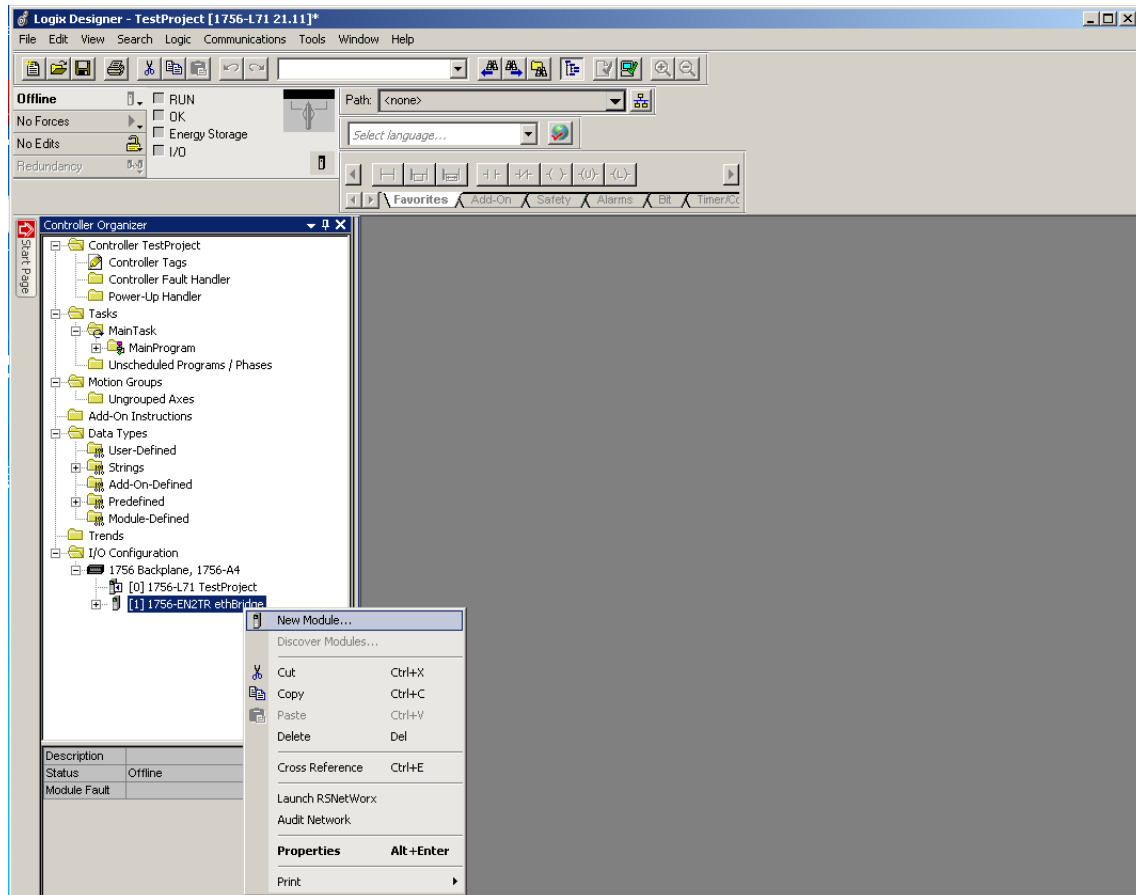
2.4.6 Add an Option Board Module to the Ethernet Bridge

In this section an option board module is added to the configuration.

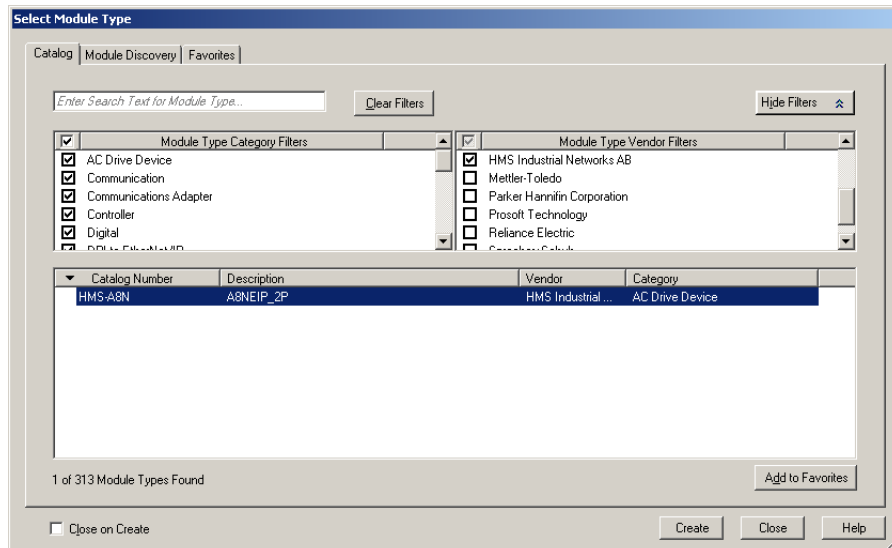
Note: If no EDS file is imported for the option board, please proceed to step 1 on page 25.

EDS File Imported

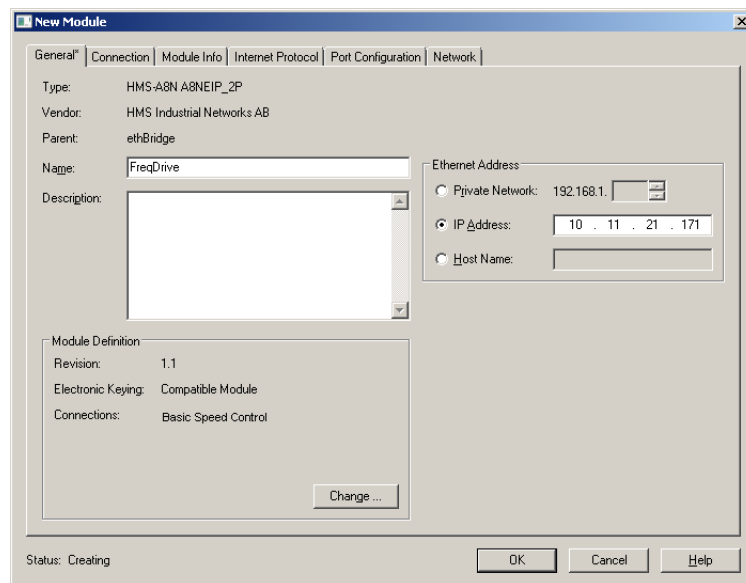
1. Select the EtherNet bridge just added. Right click and select New Module.



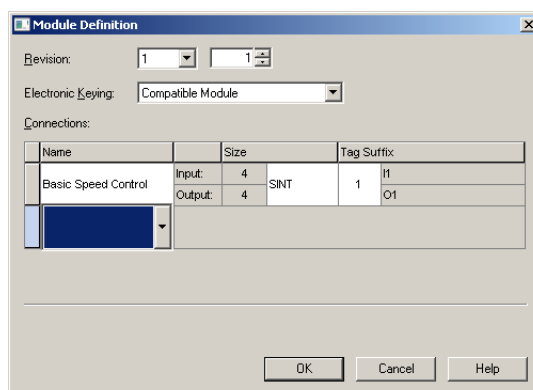
- In the Select Module Type window, filter for modules with vendor HMS Industrial Networks AB. Select HMS-A8N in the list and press Create.



- Add the settings for the module, then click on Change in the General tab.



4. Enter a Module Definition e.g. Basic Speed Control, then press OK.

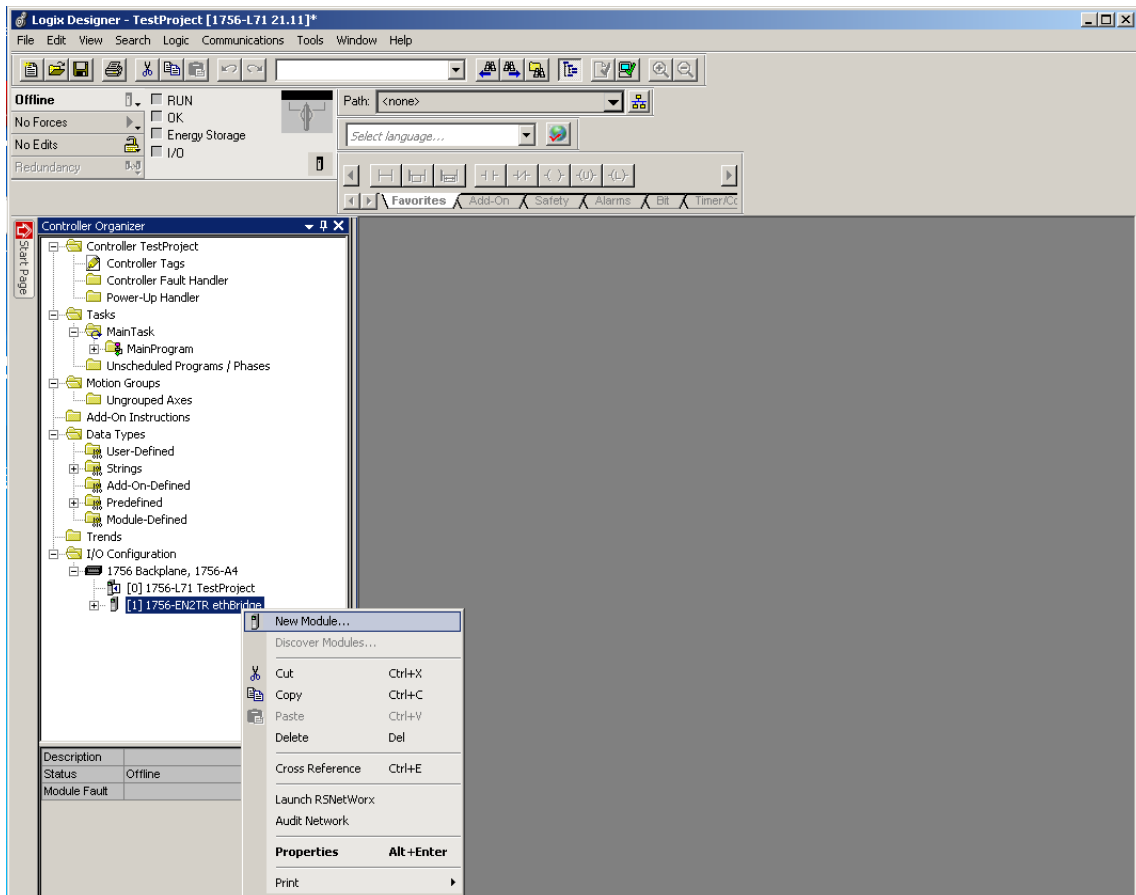


See “Connection Names” on page 92 for more information.

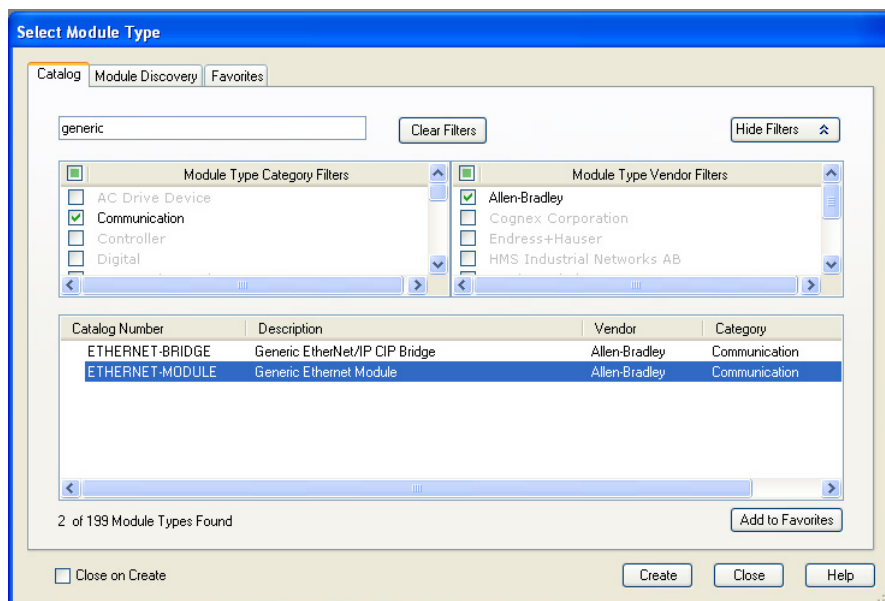
5. Press OK in the New Module window and then press Close in the Select Module Type window. Please proceed to “Download Configuration to PLC” on page 27.

No EDS File Imported

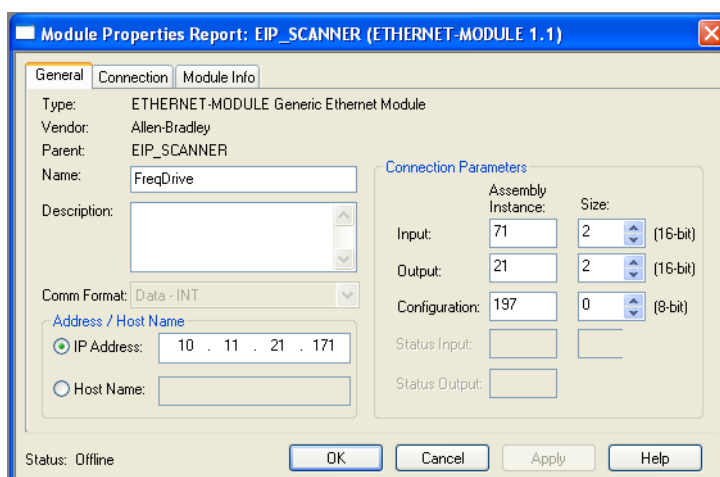
1. Select the EtherNet bridge just added. Right click and select New Module.



2. In the Select Module Type window, filter for generic modules. Select a module with the description Generic Ethernet Module in the list and press Create.



3. Add the settings for the module, then press OK.

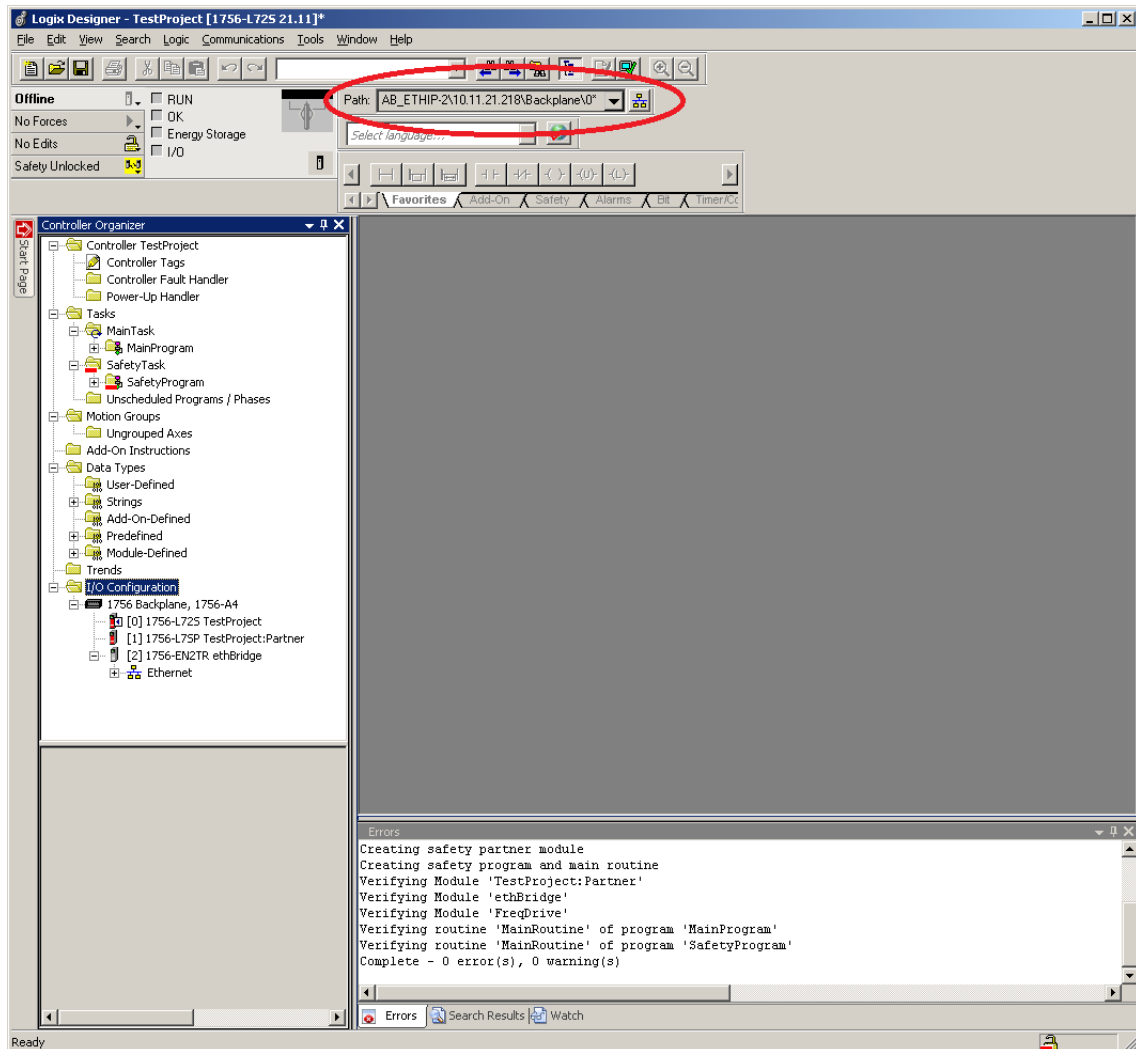


4. Press OK in the New Module window and then press Close in the Select Module Type window. Please proceed to "Download Configuration to PLC" on page 27.

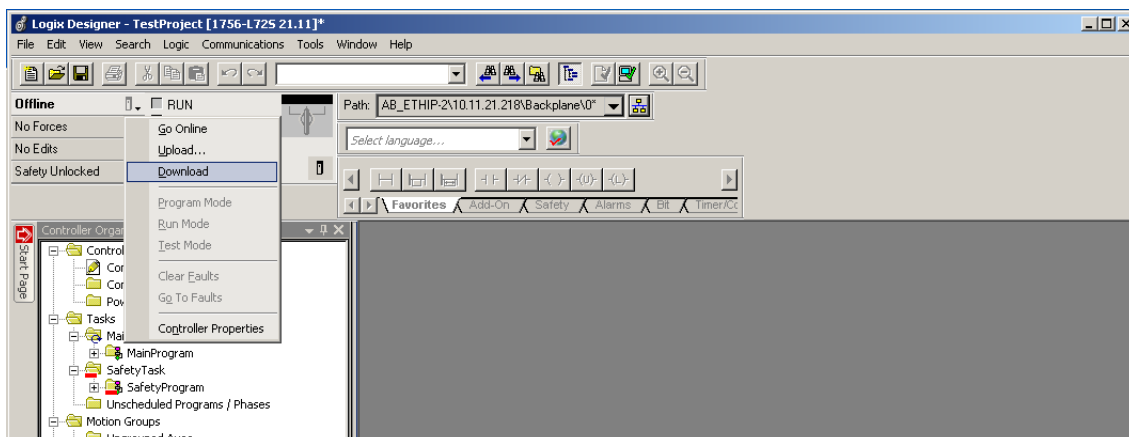
2.4.7 Download Configuration to PLC

The last step is to download the configuration to the PLC.

1. Enter the path to the PLC.



2. Select Download.



2.5 Parameter Settings

Parameters can be set at runtime either using the internal web pages of the option board, the hand-held parameter unit or the setup software MELSOFT FR-Configurator¹. The values of some of the parameters will not be valid until the inverter has been restarted.

The following information can be seen, and in certain cases changed, from the web pages:

- Network interface, including the IP settings (requires a restart to take effect)
- Parameter data, including drive profile parameters
- Drive Monitor

For more information on what the web pages look like, what information you can find there and what parameters you can change the value of, see “Embedded Web Server” on page 43.

2.5.1 Parameter Unit

Parameter data can be seen, and in certain cases changed from the parameter unit.



For more information, please consult the manual for the FR-A800 series frequency inverter.

1. See the product pages at <http://www.mitsubishi-automation.com>.

3. Installation

3.1 Preinstallation Instructions

Important! Make sure that the inverter's power is off.

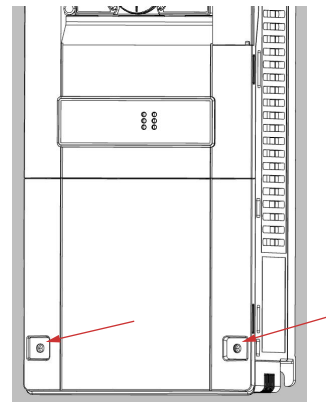
 WARNING	
	To avoid damage to the inverter or plug-in option board, never install or remove a plug-in option board while the inverter's input power is on.

Physical installation of the option board is a two-step process. First, the card will be mounted onto an available option connector on the inverter's control board. Second, the card will be connected to the EtherNet/IP network using a network cable.

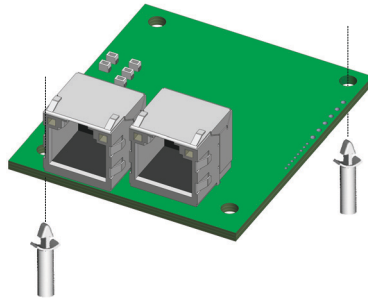
Note: Prior to mounting the option board in the inverter, please write down the MAC address, which is found on a label on the board.

3.2 Installation Procedure

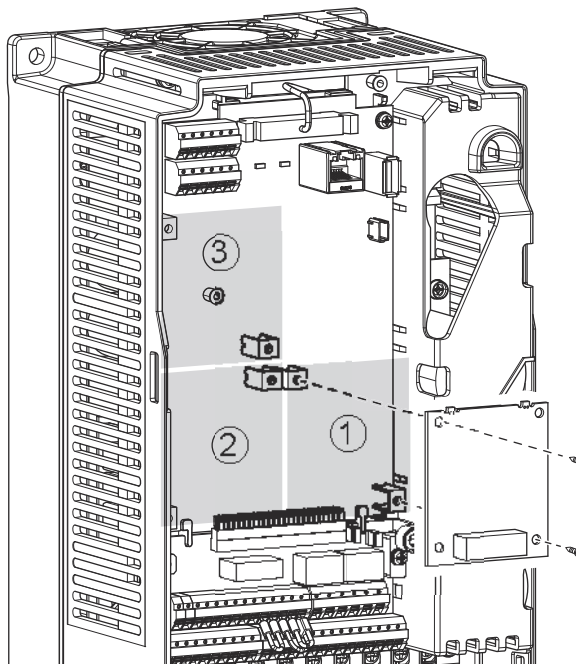
1. Make sure that power is off. After switching off the power, wait for at least 10 minutes prior to proceeding with the installation.
2. Remove both lids of the FR-A800.
 - Unscrew the two screws in the bottom corners of the inverter.
 - Remove the lid covering the lower front of the inverter.
 - Unscrew the screw in the bottom right corner of the lid covering the upper front of the inverter.
 - Remove the lid.



3. Put the included board spacers in the holes at the right top and left bottom corners of the PCB.



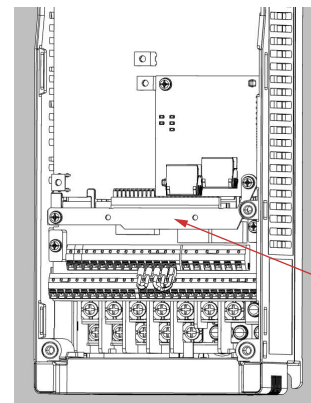
4. Position the A8NEIP_2P EtherNet/IP Option Board at the option slot 1 as shown in the image. This is the only position that will allow network connectivity.



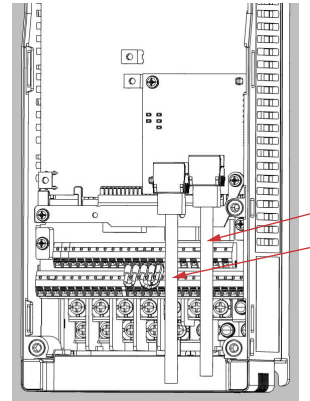
5. Fasten the option board by tightening the included screws at the left top and right bottom corners. The PE plate is attached along with the screw in the right bottom corner.

Note: Over-tightening the screws will damage the board.

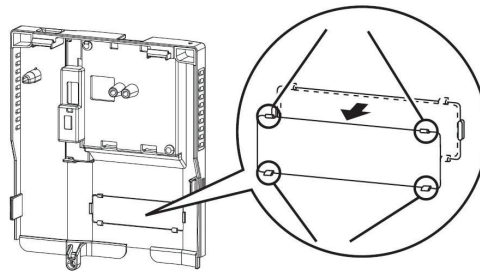
6. Fasten the other end of the PE plate with another screw as shown in the picture.



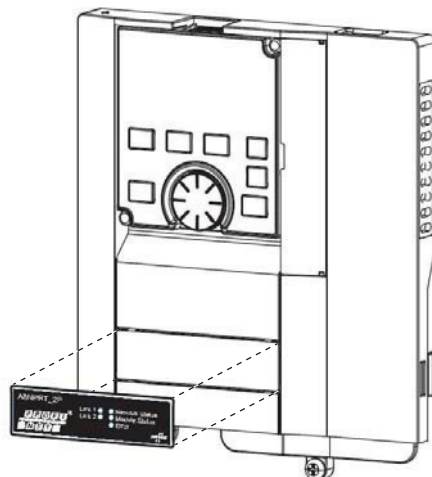
7. Attach network cable(s) to any of the network connectors on the option board.



8. To fit the LED cover on the front cover of the drive, do as follows:
- Cut the bridges, using nippers, on the upper front cover.



- Snap the LED cover into the front cover of the drive.



9. Fasten both front covers, top front cover first.

The option board is now mounted and power can be applied.

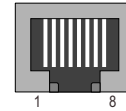
Removal

1. Remove both lids of the FR-A800.
2. Remove the network cable(s).
3. Remove the screws.
4. Carefully remove the option board by lifting it straight up.
5. Remove the board spacers.
6. Replace the lids.

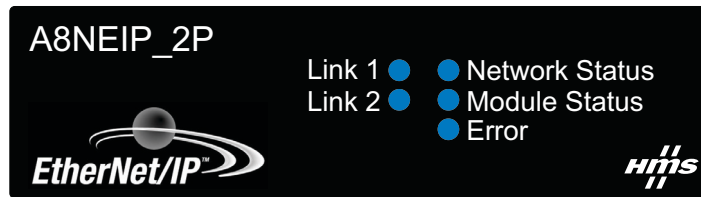
3.3 Network Connector (RJ45)

The option board provides connection to EtherNet/IP through two identical network connectors.

Pin	Name	Description
1	TX+	Transmit positive
2	TX-	Transmit negative
3	RX+	Transmit positive
4	NC	Terminated with a 50 - 75 Ω resistor
5	NC	
6	RX-	Receive negative
7	NC	Terminated with a 50 - 75 Ω resistor
8	NC	
Housing	Shield	Filter connection to PE



3.4 LED Indicators



LED	State	Status
Network status	Off	No power or no IP address.
	Green	Online, one or more connections established (CIP Class 1 or 3).
	Green, flashing	Online, no connections established.
	Red	Duplicate IP address, FATAL error.
	Red, flashing	One or more connections timed out (CIP Class 1 or 3)
Module status	Off	No power
	Green	Controlled by an EtherNet/IP master in Run state.
	Green, flashing	Not configured, or the scanner (the master) is in Idle state.
	Red	Major fault (Exception error: the option board is in the exception state, or FATAL error etc.)
	Red, flashing	Recoverable fault(s)
Link/Activity (1, 2)	Off	No link, no activity
	Green	Link (100 Mbit/s) established
	Green, flashing	Activity (100 Mbit/s)
	Yellow	Link (10 Mbit/s) established
	Yellow, flashing	Activity (10 Mbit/s)
Error LED	Off	Communication with inverter is working without problems.
	Red	Error in communication with inverter
	Red, flashing (2 blinks)	Invalid process data parameter mapped
	Red, flashing (3 blinks)	Too many process data parameters mapped
	Red, flashing (4 blinks)	Wrong prepend instance number selected in Option Board parameters.

4. Inverter Settings

4.1 Inverter Parameters

The inverter parameters are critical for overall operation of the end-to-end communication system. Some of these parameters must be set to specific values, and some may have multiple allowable settings depending on the desired operation of the overall application. It is important to understand the manner in which the parameters will impact successful communications with, and control of the inverter.

The inverter parameters can be changed via the handheld parameter unit, via the web pages of the option board or using the setup software MELSOFT FR-Configurator¹. The handheld parameter unit is described in the user manual for the FR-A800, and the option board web pages are described in “Web Pages” on page 44.

Inverter parameters can be accessed through CIP objects, see “CIP Objects” on page 57.

Note: The scaling of the parameter values are different if you use the parameter unit or the option board web pages, as well as in the CIP object A2h. For further information see “Parameter Data” on page 48.

1. See the product pages at <http://www.mitsubishi-automation.com>.

4.2 Option Board Parameters

The option board parameters are stored in the inverter. At startup they are transferred from the inverter to the option board and can be changed using the parameter unit, the option board web pages or the setup software MELSOFT FR-Configurator¹. Option parameters 6 to 20 are network specific.

Pr. No. (hex)	Pr. No. (dec)	Parameter Name	Description
514h	1300	Option parameter 1	General settings, see "Parameter 514h / Pr. 1300 (General Settings)" on page 38
515h	1301	Option Parameter 2	Ethernet Host Settings, see "Parameter 515h / Pr. 1301 (Ethernet Host Settings)" on page 39
516h	1302	Option Parameter 3	Network Type ^a
517h	1303	Option parameter 4	Serial number (low word) ^b
518h	1304	Option parameter 5	Serial number (high word) ^b
519h	1305	Option parameter 6	IP address (first byte), see "Parameters 519h - 51Ch / Pr. 1305 - 1308 (IP Address)" on page 39
51Ah	1306	Option parameter 7	IP address (second byte)
51Bh	1307	Option parameter 8	IP address (third byte)
51Ch	1308	Option parameter 9	IP address (fourth byte)
51Dh	1309	Option parameter 10	Subnet mask (first byte), see "Parameters 51Dh - 520h / Pr. 1309 - 1312 (Subnet Mask)" on page 39
51Eh	1310	Option parameter 11	Subnet mask (second byte)
51Fh	1311	Option parameter 12	Subnet mask (third byte)
520h	1312	Option parameter 13	Subnet mask (fourth byte)
521h	1313	Option parameter 14	Gateway address (first byte), see "Parameters 521h - 524h / Pr. 1313 - 1316 (Gateway Address)" on page 39
522h	1314	Option parameter 15	Gateway address (second byte)
523h	1315	Option parameter 16	Gateway address (third byte)
524h	1316	Option parameter 17	Gateway address (fourth byte)
525h	1317	Option parameter 18	Ethernet Communication Settings, see "Parameter 525h / Pr. 1317 (Ethernet Communication Settings)" on page 40
526h	1318	Option parameter 19	Prepend output assembly: Prepend output assembly instance number. This setting is only valid if prepend output is selected. Valid instance numbers: 20-23
527h	1319	Option parameter 20	Prepend input assembly: Prepend input assembly instance number. This setting is only valid if prepend output is selected. Valid instance numbers: 70-73
528h	1320	Option parameter 21	Read process data 1 ^c : User defined read process data mapping #1.
529h	1321	Option parameter 22	Read process data 2 ^c : User defined read process data mapping #2.
52Ah	1322	Option parameter 23	Read process data 3 ^c : User defined read process data mapping #3.
52Bh	1323	Option parameter 24	Read process data 4 ^c : User defined read process data mapping #4.
52Ch	1324	Option parameter 25	Read process data 5 ^c : User defined read process data mapping #5.
52Dh	1325	Option parameter 26	Read process data 6 ^c : User defined read process data mapping #6.

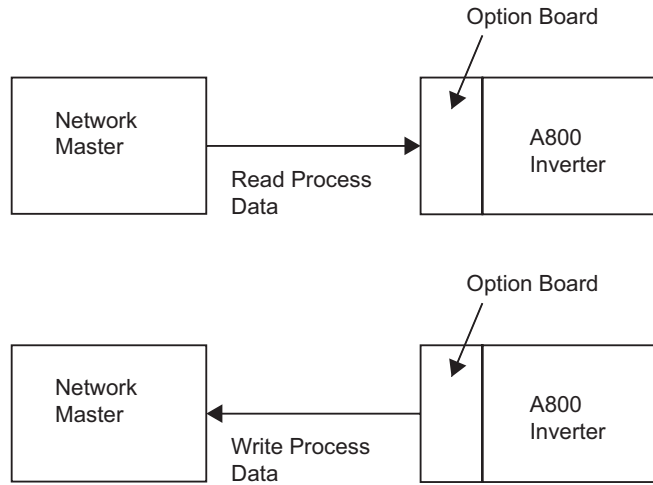
Pr. No. (hex)	Pr. No. (dec)	Parameter Name	Description
52Eh	1326	Option parameter 27	Read process data 7 ^c : User defined read process data mapping #7.
52Fh	1327	Option parameter 28	Read process data 8 ^c : User defined read process data mapping #8.
530h	1328	Option parameter 29	Read process data 9 ^c : User defined read process data mapping #9.
531h	1329	Option parameter 30	Read process data 10 ^c : User defined read process data mapping #10.
532h	1330	Option parameter 31	Write process data 1 ^d : User defined write process data mapping #1.
533h	1331	Option parameter 32	Write process data 2 ^d : User defined write process data mapping #2.
534h	1332	Option parameter 33	Write process data 3 ^d : User defined write process data mapping #3.
535h	1333	Option parameter 34	Write process data 4 ^d : User defined write process data mapping #4.
536h	1334	Option parameter 35	Write process data 5 ^d : User defined write process data mapping #5.
537h	1335	Option parameter 36	Write process data 6 ^d : User defined write process data mapping #6.
538h	1336	Option parameter 37	Write process data 7 ^d : User defined write process data mapping #7.
539h	1337	Option parameter 38	Write process data 8 ^d : User defined write process data mapping #8.
53Ah	1338	Option parameter 39	Write process data 9 ^d : User defined write process data mapping #9.
53Bh	1339	Option parameter 40	Write process data 10 ^d : User defined write process data mapping #10.
53Ch	1340	Option parameter 41	Write process data 11 ^d : User defined write process data mapping #11.
53Dh	1341	Option parameter 42	Write process data 12 ^d : User defined write process data mapping #12.
53Eh	1342	Option parameter 43	Write process data 13 ^d : User defined write process data mapping #13.
53Fh	1343	Option parameter 44	Write process data 14 ^d : User defined write process data mapping #14.

- a. During startup the option board will verify the value of this parameter. If it differs from the network type of the option board, the option board will change the parameter value to the actual network type and clear all other parameters, i.e. will set the parameter values to default.
- b. During startup the option board will verify the value of this parameter. If it differs from the serial number of the option board, the option board will change the parameter value to the actual serial number and also set the option board host name to [main-unit-name]-[serial number]
- c. Read process data is defined as output data from the EtherNet/IP network master that is read by the inverter.
- d. Write process data is defined as input data to the EtherNet/IP network master that is written by the inverter.

The first time the option board and the inverter start up after installation, default standard settings will be used. Any changes of the parameter values during runtime, will not be available until the inverter has been restarted.

The application can more often than not be run on standard settings.

Note: Read process data is defined as the data read by the option board/inverter, i.e. output process data from the network master's point of view. Consequently, write process data is defined as data written by the option/board, i.e. input process data from the network master's point of view. See figure below.



4.2.1 Parameter 514h / Pr. 1300 (General Settings)

For EtherNet/IP specific functionality, see below. Only read by the option board during startup.

Bit	Name	Default	Description
0	User specific process data mapping	0	0: User data mapping is disabled. 1: User data mapping is enabled.
1	Communication settings from Net	0	0: Network settings can be set from the network. 1: Network settings cannot be set from the network.
2	Prepend output	0	0: Prepend output is disabled. 1: Prepend output is enabled.
3	Prepend input	0	0: Prepend input is disabled. 1: Prepend input is enabled.
4	Clear all Option Parameters	0	0: - 1: Clears all option parameters and sets the default values. Will reset itself to 0 after completion.
5-15	Reserved	0	N/A

Bit 0

This setting enables the user to choose a user defined mapping in assembly instance 150/100. The user data mapping is set using Read process data 1 - Read process data 10 parameters and Write process data 1 - Write process data 14 parameters (Option parameters 21 - 44). For more information see “Assembly Object (04h)” on page 61.

Bit 2

If Prepend output is enabled, the assembly instance, defined in Option parameter 19, will be prepended the user defined parameters in assembly instance 150. For more information, see “Instance 150 (96h) - Positioning Control/Transparent Output” on page 63.

Bit 3

If Prepend input is enabled, the assembly instance, defined in Option parameter 20, will be prepended the user defined parameters in assembly instance 100. For more information, see “Instance 100 (64h) - Positioning Control/Transparent Input” on page 67.

4.2.2 Parameter 515h / Pr. 1301 (Ethernet Host Settings)

Only read by the option board during startup.

Bit	Name	Default	Description
0	HICP	0	0: Support for the HICP protocol used by the Anybus IPconfig utility is enabled. 1: Support for the HICP protocol used by the Anybus IPconfig utility is disabled.
1	Web Server	0	0: The built-in web server is enabled. 1: The built-in web server is disabled.
2	Web ADI access ^a	0	0: Access to inverter parameters from the web server is enabled. 1: Access to inverter parameters from the web server is disabled.
3	FTP server	0	0: The built-in FTP server is enabled. 1: The built-in FTP server is disabled.
4	Admin mode	0	0: FTP admin mode is disabled. 1: FTP admin mode is enabled.
5	Reserved	0	N/A
6	Format file system	0	0: - 1: Formats the file system. Will reset itself to 0 after completion.
7-15	Reserved	0	N/A

a. Web server must be enabled for web access to inverter parameters to be available.

4.2.3 Parameters 519h - 51Ch / Pr. 1305 - 1308 (IP Address)

These four parameters store the IP Address of the option board. Byte order is allocated as in the following example:

IP address:	192.	168.	111.	222
Parameter no (hex):	519	51A	51B	51C
Parameter no (dec):	1305	1306	1307	1308

4.2.4 Parameters 51Dh - 520h / Pr. 1309 - 1312 (Subnet Mask)

These four parameters store the subnet mask. Byte order is allocated as in the following example:

IP address:	255.	255.	255.	0
Parameter no (hex):	51D	51E	51F	520
Parameter no (dec):	1309	1310	1311	1312

4.2.5 Parameters 521h - 524h / Pr. 1313 - 1316 (Gateway Address)

These four parameters store the gateway address of the option board. Byte order is allocated as in the following example:

IP address:	192.	168.	111.	1
Parameter no (hex):	521	522	523	524
Parameter no (dec):	1313	1314	1315	1316

4.2.6 Parameter 525h / Pr. 1317 (Ethernet Communication Settings)

Only read by the option board during startup.

Bit	Name	Default	Values	Description
0	Priority of setting	0	0: 1:	Option board settings are used for network settings. Option board parameters (inverter parameter data) are used for network settings.
1	DHCP ^a	0	0: 1:	DHCP is enabled DHCP is disabled
2-4	Duplex and speed for Comm.1 ^a	0	b4 b3 b2 0 N/A N/A 1 0 0 1 0 1 1 1 0 1 1 1	Speed Duplex Automatic detection of speed and duplex 10 Mbps Half duplex 10 Mbps Full duplex 100 Mbps Half duplex 100 Mbps Full duplex
5-7	Duplex and speed for Comm.2 ^a	0	b7 b6 b5 0 N/A N/A 1 0 0 1 0 1 1 1 0 1 1 1	Speed Duplex Automatic detection of speed and duplex 10 Mbps Half duplex 10 Mbps Full duplex 100 Mbps Half duplex 100 Mbps Full duplex
8-15	(reserved)	0	N/A	

a. The value of this bit is ignored if bit 0 (Priority of setting) of the parameter is set to 0 (default).

4.3 Operation Mode Setting

Please refer to the FR-A800 instruction manual for information.

5. IP Functionality

A device on a EtherNet/IP network is defined by its IP address. To be able to take advantage of the internal web pages of the option board, the user needs to find/set this.

5.1 IP Configuration

On product delivery, the A8NEIP_2P EtherNet/IP Option Board will use the following default configuration:

IP address:	0.0.0.0
Subnet mask:	0.0.0.0
Gateway address:	0.0.0.0
DHCP:	On
DNS1:	0.0.0.0
DNS2:	0.0.0.0
Host Name:	""
Domain Name:	""

If the option board is reset to factory default, the values in the list above will be restored.

The IP address and related settings can be configured using the following methods:

- DHCP (default)
- Network configuration page (internal web server)
- TCP/IP Interface Object (CIP object, EtherNet/IP)
- HICP (Host IP Configuration Protocol).
- Option Board parameter settings, either through internal web pages or via the parameter unit.

5.1.1 DHCP

DHCP is enabled by default. When a link has been detected at upstart, the option board will request a network configuration from a DHCP/BOOTP server.

If the option board loses its link, the option board will issue a DHCP request message when the link has been re-established. No fallback IP configuration will be used. The option board will keep issuing DHCP requests until an address is received from the DHCP server.

5.1.2 Network Configuration Page

The IP configuration can be configured using the internal network configuration web page. Changing the settings from the web page will store the configuration on the option board and the changes will have immediate effect.

5.1.3 TCP/IP Interface Object (CIP object)

Setting the IP configuration through the TCP/IP Interface Object will store the new settings. The settings are available immediately, without a reset. See “TCP/IP Interface Object (F5h)” on page 83.

5.1.4 Host IP Configuration Protocol (HICP)

The A8NEIP_2P EtherNet/IP Option Board supports the HICP protocol, used by the Anybus IPconfig utility for changing settings e.g. IP address, subnet mask and enable/disable DHCP. Anybus IPconfig can be downloaded free of charge from www.hms-networks.com.

For more information see See “HICP (Host IP Configuration Protocol)” on page 94.

5.2 Address Conflict Detection (ACD)

The A8NEIP_2P EtherNet/IP Option Board implements duplicate IP address detection. The Network Status LED will indicate if a duplicate IP address is detected, see “LED Indicators” on page 33.

6. Embedded Web Server

6.1 Overview

The interface contains an embedded web server (also known as an HTTP server), which allows users to access the inverter's internal data in a graphical manner with web browsers such as Microsoft Internet Explorer or Mozilla Firefox. In this way, the inverter can be monitored, configured and controlled from across the room or from across the globe.

To access an interface's embedded web server, either use the IPConfig Tool and select the "Open Web Interface" button when the target unit is highlighted, or just directly enter the target unit's IP address into the address (URL) field of your web browser.

The web server supports up to 20 concurrent connections and communicates through port 80.

6.2 Authorization

Directories can be protected from web access by placing a file called 'web_accs.cfg' in the directory to protect.¹ This file shall contain a list of users that are allowed to access the directory and its subdirectories.

File Format:

```

Username1:Password1
Username2:Password2
...
UsernameN:PasswordN

```

List of approved users.

```

[AuthName]
(message goes here)

```

Optionally, a login message can be specified by including the key [AuthName]. This message will be displayed by the web browser upon accessing the protected directory.

The list of approved users can optionally be redirected to one or several other files.

Example:

In this example, the list of approved users will be loaded from 'here.cfg' and 'too.cfg'.

```

[File path]
|i\put\some\over\here.cfg
|i\actually\put\some\of\it\here\too.cfg

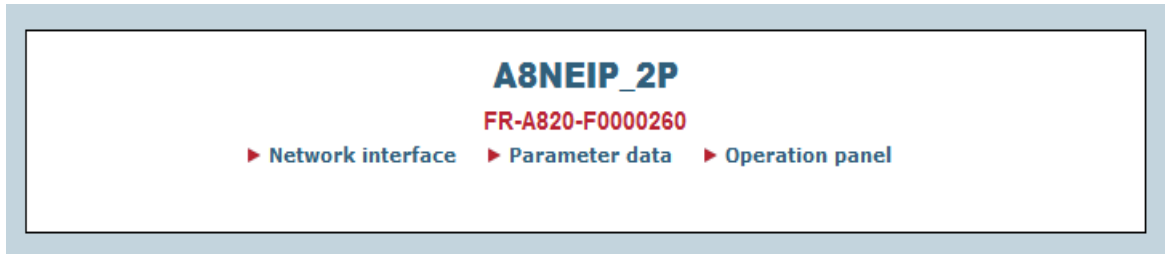
[AuthName]
Howdy. Password, please.

```

1. For more information about the file system, see "File System and FTP Server" on page 50.

6.3 Web Pages

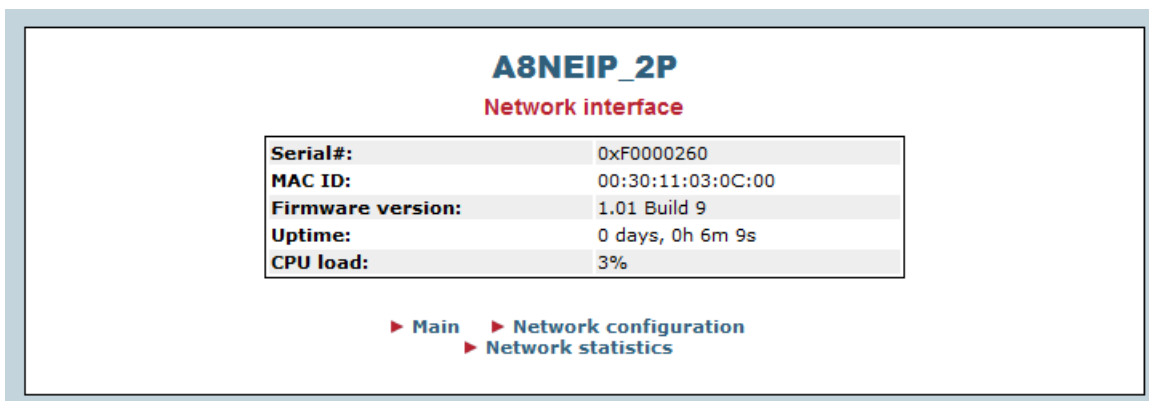
Open a web browser (IE or Firefox e.g.). Enter the IP address for the option board. The window pane below will appear:



The index page gives access to the following pages:

- Network interface
- Parameter data
- Operation panel

6.3.1 Network Interface



The following information is available on the network interface page:

Name	Description
Serial#	The serial number of the option board.
MAC ID	The MAC ID of the option board.
Firmware version	The firmware version of the option board.
Uptime	The uptime of the option board.
CPU load	Current CPU load of the option board.

From this web page you can continue to:

- Network configuration
- Network statistics

Network Configuration

The network configuration provides an interface for configuring the network settings. The option board needs a reset for the changes to take effect.

A8NEIP_2P

Network configuration

IP Configuration	
IP address:	<input type="text" value="10.11.21.173"/>
Subnet mask:	<input type="text" value="255.255.0.0"/>
Gateway:	<input type="text" value="0.0.0.0"/>
Host name:	<input type="text" value="FR-A820-F0000260"/>
Domain name:	<input type="text" value="example.com"/>
DNS1:	<input type="text" value="0.0.0.0"/>
DNS2:	<input type="text" value="0.0.0.0"/>
DHCP:	<input checked="" type="checkbox"/>
<input type="button" value="Store settings"/>	

Ethernet Configuration	
Comm 1:	<input type="text" value="Auto"/>
Comm 2:	<input type="text" value="Auto"/>
<input type="button" value="Store settings"/>	

▶ [Main](#) ▶ [Network interface](#)

Available editable settings:

IP Configuration	Description
IP address	The TCP/IP settings of the option board
Subnet mask	Default values: 0.0.0.0
Gateway	Valid values: 0.0.0.0 - 255.255.255.255
Host name	IP address or name Max 64 characters
Domain name	IP address or name Max 48 characters
DNS1	IP address
DNS2	IP address
DHCP	Enabling or disabling DHCP Default: Enabled

Ethernet Configuration	Description
Comm 1	Link speed and duplex configuration of port 1
Comm 2	Link speed and duplex configuration of port 2

Ethernet Statistics Page

A8NEIP_2P
Network statistics

Ethernet Link	
Port 1:	
Speed:	100 Mbps
Duplex:	Full Duplex
Port 2:	
Speed:	-
Duplex:	-

EtherNet/IP Statistics	
Established Class1 Connections:	0
Established Class3 Connections:	0
Connection Open Request:	0
Connection Open Format Rejects:	0
Connection Open Resource Rejects:	0
Connection Open Other Rejects:	0
Connection Close Requests:	0
Connection Close Format Rejects:	0
Connection Close Other Rejects:	0
Connection Timeouts:	0

Interface Counters	
In Octets:	19551
In Ucast Packets:	158
In NUCast Packets:	3
In Discards:	0
In Errors:	0
In Unknown Protos:	0
Out Octets:	25715
Out Ucast Packets:	157
Out NUCast Packets:	11
Out Discards:	0
Out Errors:	0

[▶ Main](#) [▶ Network interface](#)

The Ethernet statistics web page contains the following information:

Ethernet Link		Description
Port 1	Speed	The current link speed
	Duplex	The current duplex configuration
Port 2	Speed	The current link speed
	Duplex	The current duplex configuration

EtherNet/IP Statistics	Description
Established Class 1 Connections	Current number of established class1 connections
Established Class3 Connections	Current number of established class3 connections
Connection Open Requests	Number of received connection open requests
Connection Open Format Rejects	Connection open requests rejected due to request format error
Connection Open Resource Rejects	Connection open requests rejected due to lack of resources
Connection Open Other Rejects	Connection open requests rejected due to other reasons
Connection Close Requests	Number of received connection close requests

EtherNet/IP Statistics	Description
Connection Close Format Rejects	Connection close requests rejected due to request format error
Connection Close Other Rejects	Connection close requests rejected due to other reasons
Connection Timeouts	Number of connection timeouts

Interface Counters	Description
In Octets	Received bytes
In Ucast packets	Received unicast packets
In NUcast packets	Received non-unicast packets (broadcast and multicast)
In Discards	Received packets discarded due to no available memory buffers
In Errors	Received packets discarded due to reception error
In Unknown Protos	Received packets with unsupported protocol type
Out Octets	Sent bytes
Out Ucast packets	Sent unicast packets
Out NUcast packets	Sent non-unicast packets (broadcast and multicast)
Out Discards	Outgoing packets discarded due to no available memory buffers
Out Errors	Transmission errors

6.3.2 Parameter Data

The parameter data can be changed on this web page,

A8NEIP_2P
Parameter data

Number of parameters per page:

#	Parameter	Unit	Value	
1	Pr.0 Torque boost	0.1%	<input type="text" value="20"/>	<input type="button" value="Set"/>
2	Pr.1 Maximum frequency	0.01Hz	<input type="text" value="12000"/>	<input type="button" value="Set"/>
3	Pr.2 Minimum frequency	0.01Hz	<input type="text" value="0"/>	<input type="button" value="Set"/>
4	Pr.3 Base frequency	0.01Hz	<input type="text" value="6000"/>	<input type="button" value="Set"/>
5	Pr.4 Multi-speed setting (high speed)	0.01Hz	<input type="text" value="6000"/>	<input type="button" value="Set"/>
6	Pr.5 Multi-speed setting (middle speed)	0.01Hz	<input type="text" value="3000"/>	<input type="button" value="Set"/>
7	Pr.6 Multi-speed setting (low speed)	0.01Hz	<input type="text" value="1000"/>	<input type="button" value="Set"/>
8	Pr.7 Acceleration time	0.1s	<input type="text" value="0"/>	<input type="button" value="Set"/>
9	Pr.8 Deceleration time	0.1s	<input type="text" value="0"/>	<input type="button" value="Set"/>
10	Pr.9 Electronic thermal O/L relay	0.01A	<input type="text" value="4600"/>	<input type="button" value="Set"/>

1-10	11-20	21-30	31-40	Next >>
41-50	51-60	61-70	71-80	
81-90	91-100	101-110	111-120	
121-130	131-140	141-150	151-160	
161-170	171-180	181-190	191-200	
201-210	211-220	221-230	231-240	
241-250	251-260	261-270	271-280	
281-290	291-300	301-310	311-320	
321-330	331-340	341-350	351-360	
361-370	371-380	381-390	391-400	
401-410	411-420	421-430	431-440	
441-450	451-460	461-470	471-480	
481-490	491-500	501-510	511-520	
521-530	531-540	541-550	551-560	
561-570	571-580	581-590	591-600	
601-610	611-620	621-630	631-640	
641-650	651-660	661-670	671-680	
681-690	691-700	701-710	711-720	
721-730	731-740	741-750	751-760	
761-770	771-780	781-790	791-800	
801-810	811-820	821-830	831-840	
841-850	851-860	861-870	871-880	
881-890	891-900	901-906		

[▶ Main](#)

Please note that all values have to be scaled to conform to the values shown in the hand-held parameter unit. The scaling factor is specific to each parameter and listed in the inverter frequency manual. The value shown on the web page has to be multiplied by this scaling factor. The picture above shows the web pages including the scaling factor for each parameter. See “Download” on page 9 for web sites where these web pages are available for download.

6.3.3 Drive Monitor

This web page makes it possible to monitor actual values from the device

A8NEIP_2P

Drive Monitor

Monitor	Value
Frequency	- Hz
Speed	- rpm
Current	- A
Voltage	- V
Status	- - - - -

Setpoint Speed: Hz

▶ Main

The Forward (Fwd), Reverse (Rev) and Stop buttons allows the user to start forward rotation or reverse rotation of the drive, aswell as to stop the drive.

7. File System and FTP Server

7.1 General

The file system of the option board is used to store files used by the application firmware, e.g. configuration files.

Whenever the configuration is completed, it is suggested that a backup copy of the configuration file be downloaded from the unit to a PC. One reason for this is in case it becomes necessary to restore a previous configuration at a later time. Another reason is that it may be desirable to load multiple units with the same configuration, as a downloaded configuration file can be uploaded again to any compatible unit, allowing the user to easily clone multiple units with the same configuration.

Interacting with the file system is performed by use of the File Transfer Protocol (FTP). The built-in FTP server makes it easy to manage the file system using a standard FTP client, interacting with the files in the same manner as though they were traditional files stored on a local or remote PC.

Note that certain routers or firewall applications (such as Windows Firewall) can block FTP traffic. If an FTP connection to the interface card cannot be established, be sure to check the computer's firewall settings during troubleshooting, and add an exception to the firewall configuration if necessary.

7.2 FTP Server

7.2.1 Initiation

By default, the following port numbers are used for FTP communication:

- TCP, port 20 (FTP data port)
- TCP, port 21 (FTP command port)

The FTP server supports up to 8 concurrent connections.

7.2.2 User Accounts

User accounts are stored in the configuration file '\ftp.cfg'. This file holds the user names, passwords, and home directory for all users. Users are not able to access files outside of their home directory.

File Format:

```
User1:Password1:Homedir1
User2:Password2:Homedir2
User3:Password3:Homedir3
```

Optionally, the UserN:PasswordN-section can be replaced by a path to a file containing a list of users as follows:

File Format ('\ftp.cfg'):

```
User1:Password1:Homedir1
User2:Password2:Homedir2
\path\userlistA:HomedirA
\path\userlistB:HomedirB
```

The files containing the user lists shall have the following format:

File Format:

```
User1:Password1  
User2:Password2  
User3:Password3
```

Notes:

- User names must not exceed 15 characters in length.
- Passwords must not exceed 15 characters in length.
- User names and passwords must only contain printable characters in the Lower ASCII characters set (value 32 to 127). Delimiter character ':' must not be used as part of the user name or password. Character '\' must not be used as the first character of the user name.
- File must be stored using ANSI encoding.
- If '\ftp.cfg' is missing or cannot be interpreted, all user name/password combinations will be accepted and the home directory will be the FTP root (i.e. '\ftp\').
- The home directory for a user must also exist in the file system if they should be able to log in, just adding the user information to the 'ftp.cfg' file it is not enough.
- If 'Admin Mode' has been enabled in the Option Board parameters, all user name/password combinations will be accepted and the user will have unrestricted access to the file system (i.e. the home directory will be the system root).
- It is strongly recommended to have at least one user with root access (\) permission. If not, 'Admin Mode' must be enabled each time a system file needs to be altered (including '\ftp.cfg').

8. EtherNet/IP Implementation

The option board implements EtherNet/IP according to the specification based on the Common Industrial Protocol (CIP).

8.1 TCP/IP Connection

Data will be transported over both TCP and UDP.

TCP port 44818 is used for encapsulation messages.

UDP port 44818 is used for encapsulation messaging sent over UDP.

UDP port 2222 is used for I/O data (Class 1, Multicast (T->O) or Point to Point (O->T, T->O)).

8.2 Class 1 Connections

Class 1 connections are used to transfer I/O data, and can be established to instances in the Assembly Object. Each Class 1 connection will establish two data transports; one consuming and one producing. The heartbeat instances can be used for connections that shall only access inputs. Class 1 connections use UDP transport.

- Total number of supported class 1 connections: 4
- Max input connection size: 42 bytes¹
- Max output connection size: 42 bytes¹
- Supported API: 2... 3200ms
- T->O Connection type: Point-to-point, Multicast
- O->T Connection type: Point-to-point
- Supported trigger types: Cyclic, Change-of-state

8.2.1 Exclusive Owner Connection

This connection type is used for controlling the outputs of the A8NEIP_2P EtherNet/IP Option Board and shall not be dependent on any other connection. Only one exclusive owner connection can be opened against the Option Board.

- Connection point O->T is an Output Assembly object instance.
- Connection point T->O is an Input Assembly object instance.

8.2.2 Input Only Connection

This connection is used to read data from the A8NEIP_2P EtherNet/IP Option Board without controlling the outputs. This connection type is not dependent on any other connection.

The size of the O->T direction for an input only connection of the Forward_Open is zero. If not, an error is returned.

Important: Even though input only connections do not depend on any other connection, they will “hook onto” transports already producing the same data. If they are hooked on to an exclusive owner

1. Regardless of number of connections.

connection that times out, the input only connection will time out as well. If the exclusive owner connection is properly closed, the input only connection will not be affected.

- Number of supported input only connections is 4 (Shared with exclusive owner and listen only connection).
- Connection point O->T is Assembly object, instance 198 (Input only heartbeat) (Default)
- Connection point T->O is an Input Assembly object instance.

8.2.3 Input Only Extended Connection

This connection's functionality is the same as the standard input only connection. However when this connection times out it does not affect the state of the application.

- Connection point O->T is Assembly object, instance 195 (Input only extended heartbeat) (Default)
- Connection point T->O is an Input Assembly object instance.

8.2.4 Listen Only Connection

This connection is dependent on another connection to exist. If that connection (Exclusive owner or Input only) is closed, the listen only connection will be closed as well.

The size of the O->T direction for an input only connection of the Forward_Open is zero. If not, an error is returned.

- The number of supported listen only connections is 4 (Shared with exclusive owner and input only connection).
- Connection point O->T is Assembly object, instance 199 (Listen only heartbeat) (Default)
- Connection point T->O is an Input Assembly object instance.

8.2.5 Listen Only Extended Connection

This connections functionality is the same as the standard listen only connection. However when this connection times out it does not affect the state of the application.

- Connection point O->T is Assembly object, instance 196 (Listen only extended heartbeat) (Default)
- Connection point T->O is an Input Assembly object instance.

8.2.6 Redundant Owner Connection

This connection type is not supported by the A8NEIP_2P EtherNet/IP Option Board.

8.3 Class 3 Connections

8.3.1 Explicit Message Connection

Class 3 connections are used to establish connections to the message router. Thereafter the connection is used for explicit messaging. Class 3 connections use TCP connections.

- 16 simultaneously class 3 connections are supported

- Supported API: = 100 - 10000ms.
- T->O Connection type: Point-to-point
- O->T Connection type: Point-to-point
- Supported trigger type: Application

8.4 Electronic Data Sheet File

A standard EDS file is available for download (see “Download” on page 9).

Due to that the CIP parameter object (see page 72) is implemented, some configuration tools can automatically generate an EDS file for the option board.

8.5 Drive Profile Implementation

The A8NEIP_2P EtherNet/IP Option Board supports the AC/DC Drive Profile. The inverter parameters are represented as dedicated CIP objects.

See also:

- “Motor Data Object (28h)” on page 74
- “AC/DC Drive Object (2Ah)” on page 77
- Drive profile parameters in Instruction manual of Mitsubishi inverter drive

9. Data Exchange

9.1 General

Inverter parameters are represented as dedicated CIP objects, see “CIP Objects” on page 57. These objects can only be accessed from the EtherNet/IP network.

Translation of Parameter Numbers

Parameter numbers used in the inverter do not directly translate to object instance numbers (“Inverter Parameter Object (A2h)” on page 81) used on EtherNet/IP.

The array below presents a summary of the parameter number translation. For a complete presentation of how to translate the parameter numbers for the option board drive profile parameters, see “Translation of Parameter Numbers” on page 91.

Inverter Parameter Type	Inverter Parameter No.	Offset	EtherNet/IP number (Parameter No. + Offset)	Acyclic Data Exchange	Cyclic Data Exchange
Parameter	0h .. FFFh ^a	1000h	1000h .. 1FFFh	Yes	No
Monitor Data	000h .. FFFh ^a	2000h	2000h .. 2FFFh	Yes	Yes
Option Board Drive Profile Parameters	400h .. 431h 412h, 415h .. 41Ch ^c	3000h 3800h	3400h .. 3431h 3C12h, 3C15h .. 3C1Ch	Yes Yes	Yes/no ^b Yes

- Highest parameter number supported by the option board is FFFh. Please consult the Instruction manual of Mitsubishi inverter drive for max number supported by the inverter.
- Some of these parameters can be mapped for cyclic data exchange, see “Translation of Signal Numbers” on page 45.
- These parameters can either be accessed (as acyclic data) as an array, with offset 3000h, or can each entry in the array be mapped as a separate parameter with offset 3800h (as acyclic and/or cyclic data).

Note: The scaling of the parameter values are different if you use the parameter unit or the option board web pages, for further information see “Parameter Data” on page 48.

9.2 Drive Profile Parameters (Acyclic Data Exchange)

Inverter parameters and drive profile parameters can be accessed using “Inverter Parameter Object (A2h)” on page 81, where object instance numbers are used to access a specific parameter. As mentioned above, the parameter numbers do not correspond directly to the instance numbers used on EtherNet/IP. A translation table for the Option Board Drive Profile Parameters is available in “Translation of Parameter Numbers” on page 91.

9.3 Process Data (Cyclic Data Exchange)

Process Data is represented on EtherNet/IP through dedicated instances in the Assembly Object.

See also:

- “Assembly Object (04h)” on page 61
- “Connection Manager (06h)” on page 71

9.3.1 Static Access to Parameters

Instances 20 - 23 and 70 - 73 in the Assembly Object are defined by the AC/DC drive profile. The setup of these instances is predefined and can not be changed by the user. Instances 150 and 100 also have predefined setups, but can be used for user specific data mapping, see below.

9.3.2 Vendor Specific Access to Parameters

Instances 150 and 100 in the Assembly object are available for vendor specific access. If Prepend is enabled (see “Parameter 514h / Pr. 1300 (General Settings)” on page 38), the information in the selected assembly instance will be prepended the user specific data. This is e.g. useful when exchanging control/status word data, that you can only find in the predefined assembly instances.

For more information see “Assembly Object (04h)” on page 61.

A. CIP Objects

A.1 General Information

This chapter specifies the CIP-object implementation in the option board. These objects can be accessed from the EtherNet/IP network.

Mandatory Objects:

- “Identity Object (01h)” on page 58
- “Message Router (02h)” on page 60
- “Assembly Object (04h)” on page 61
- “Connection Manager (06h)” on page 71
- “Parameter Object (0Fh)” on page 72
- “Motor Data Object (28h)” on page 74
- “Control Supervisor Object (29h)” on page 75
- “AC/DC Drive Object (2Ah)” on page 77
- “DLR Object (47h)” on page 79
- “QoS Object (48h)” on page 80
- “TCP/IP Interface Object (F5h)” on page 83
- “Ethernet Link Object (F6h)” on page 86

Vendor Specific Objects:

- “Inverter Parameter Object (A2h)” on page 81

Unconnected CIP routing is supported, which means that a message can be sent to a device without first setting up a connection.

A.2 Identity Object (01h)

Object Description

This object provides information and general information about the device.

Supported Services

Class: Get_Attribute_Single
 Get_Attributes_All

Instance: Get_Attribute_Single
 Set_Attribute_Single
 Get_Attributes_All
 Reset

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Object revision)

Instance #1 Attributes

#	Name	Access	Type	Value
1	Vendor ID	Get	UINT	005Ah (HMS Industrial Networks AB)
2	Device Type	Get	UINT	0002h (AC Drive)
3	Product Code	Get	UINT	013Ch
4	Revision	Get	Struct of: {USINT, USINT}	Major and minor firmware revision
5	Status	Get	WORD	See "Device Status" on page 59
6	Serial Number	Get	UDINT	Unique serial number set at production
7	Product Name	Get	SHORT_STRING	"A8NEIP_2P" (Product name)
11	Active language	Set	Struct of: USINT USINT USINT	'e', 'n', 'g' (active language)
12	Supported Language List	Get	Array of: Struct of: USINT USINT USINT	'e', 'n', 'g' (List of languages supported by the host application. Only English is supported)

Device Status

bit(s)	Name
0	Module Owned, shall be set when at least one connection is configured.
1	(reserved, set to 0)
2	Configured ^a
3	(reserved, set to 0)
4... 7	Extended Device Status: <u>Value:Meaning:</u> 0000b Unknown 0010b Faulted I/O Connection 0011b No I/O connection established 0100b Non-volatile configuration bad 0110b Connection in Run mode 0111b Connection in Idle mode (other) (reserved)
8	Set for minor recoverable faults ^b
9	Set for minor unrecoverable faults ^b
10	Set for major recoverable faults ^b
11	Set for major unrecoverable faults ^b
12... 15	(reserved, set to 0)

a. This bit shows if the product has other settings than "out-of-box". The value is set to true.

b. Default conversion table is used, see "Diagnostics" on page 89.

Service Details: Reset Service

There are two types of network reset requests on EtherNet/IP that are supported by the option board

- **Type 0: 'Power Cycling Reset'**

This service will cause a power cycle of the option board and the inverter.

- **Type 1: 'Out of box reset'**

This service will cause a power cycle on the inverter and the option board. It will also issue a clear all parameter command to the inverter. All settings are returned to factory default.

A.3 Message Router (02h)

This object is not used with the A8NEIP_2P EtherNet/IP Option Board.

Object Description

-

Supported Services

Class: -

Instance: -

Class Attributes

-

Instance Attributes

-

A.4 Assembly Object (04h)

Object Description

The Assembly object uses static assemblies and holds the Process Data sent/received by the inverter. All instances are predefined for specific drive profile parameters. If user specific process data mapping is enabled, instances 150 and 100 are transparent and can be used for user specific process data.

See also:

- “Parameter 514h / Pr. 1300 (General Settings)” on page 38
- “Process Data (Cyclic Data Exchange)” on page 56

Supported Services

Class: Get_Attribute_Single

Instance: Get_Attribute_Single
Set_Attribute_Single

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0002h (Object revision)
2	Max Instance	Get	UINT	(Highest instance number)

Instance Attributes

Instances/Connections points implement the following data attributes:

#	Name	Access	Type	Value	Description
3	Data	Get/Set	Array of USINT	-	Data produced/consumed by the option board

Consuming Instance (Output assemblies)

Instance 20 (14h) - Basic Speed Control Output

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Fault reset		Run fwd
1								
2	Speed reference (Low byte)							
3	Speed reference (High byte)							

For definitions and mapping of data in this instance, see “Data Definitions, Output Assemblies” on page 64.

Instance 21 (15h) - Extended Speed Control Output

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		NetRef	NetCtrl			Fault reset	Run rev	Run fwd
1								
2	Speed reference (Low byte)							
3	Speed reference (High byte)							

For definitions and mapping of data in this instance, see “Data Definitions, Output Assemblies” on page 64.

Instance 22 (16h) - Speed and Torque Control Output

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Fault reset		Run fwd
1								
2	Speed reference (Low byte)							
3	Speed reference (High byte)							
4	Torque reference (Low byte)							
5	Torque reference (High byte)							

For definitions and mapping of data in this instance, see “Data Definitions, Output Assemblies” on page 64.

Instance 23 (17h) - Extended Speed and Torque Control Output

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		NetRef	NetCtrl			Fault reset	Run rev	Run fwd
1								
2	Speed reference (Low byte)							
3	Speed reference (High byte)							
4	Torque reference (Low byte)							
5	Torque reference (High byte)							

For definitions and mapping of data in this instance, see “Data Definitions, Output Assemblies” on page 64.

Instance 150 (96h) - Positioning Control/Transparent Output

This instance will be used for positioning data as default. If user specific process data mapping is enabled in bit 0, see “Parameter 514h / Pr. 1300 (General Settings)” on page 38, the instance will be used for user specific data mapping.

Using standard process data mapping the mapping will be as follows:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 ^a		NetRef	NetCtrl			Fault reset	Run rev	Run fwd
1								
2	Speed reference (Low byte)							
3	Speed reference (High byte)							
4 ^b	MRS	RT	RH	RM	RL			AU
5 ^b					RES	STOP	CS	JOG
6	Position reference (Low byte)							
7	Position reference (Low middle byte)							
8	Position reference (High middle byte)							
9	Position reference (High byte)							
10	Acceleration time (Low byte)							
11	Acceleration time (Low middle byte)							
12	Acceleration time (High middle byte)							
13	Acceleration time (High byte)							
14	Deceleration time (Low byte)							
15	Deceleration time (Low middle byte)							
16	Deceleration time (High middle byte)							
17	Deceleration time (High byte)							

- For definitions and mapping of data in byte 0 - 3, see “Data Definitions, Output Assemblies” on page 64.
- Bytes 4 and 5 (Run command) corresponds directly to the Variable Frequency Drive (VFD) 485 communication. The data differs depending on VFD model. The A800 frequency inverter is used as an example. Please refer to the section about 485 communication in the corresponding VFD manual.

With user process data mapping enabled in Option parameter 1, see “Parameter 514h / Pr. 1300 (General Settings)” on page 38, this instance will be used for user specific process data mapping:

Byte	Bits 7 - 0
0	User specific
1	User specific
...	...
...	...

The user specific data mapping is set using Option parameters 21 - 44, see “Option Board Parameters” on page 35 and the description of bit 0 in “Parameter 514h / Pr. 1300 (General Settings)” on page 38 for more information.

If Prepend is enabled (see “Parameter 514h / Pr. 1300 (General Settings)” on page 38), the user process data will be prepended by the assembly instance that is selected in Option parameter 19. In the example below, Assembly instance 150 first holds the same data as Assembly instance 21 (Extended Speed Control Output), which is followed by user specific data.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0 ^a		NetRef	NetCtrl			Fault reset	Run rev	Run fwd
1								
2	Speed reference (Low byte)							
3	Speed reference (High byte)							
4	User specific							
5	User specific							
...	...							
...	...							

a. For definitions and mapping of data in byte 0 - 3, see “Data Definitions, Output Assemblies” on page 64.

If Prepend is enabled, the control word will be present in the assembly instance. This is the only way to exchange this information as user specific data.

Data Definitions, Output Assemblies

The following table indicates the mapping of the data in the consuming instances of the Assembly Object. Further information is found in the description of the objects, see:

- “Control Supervisor Object (29h)” on page 75
- “AC/DC Drive Object (2Ah)” on page 77.

Name	Object		Instance No.	Attribute	
	Name	No.		Name	No.
Run rev	Control Supervisor	29h	1	Run2	4
Run fwd	Control Supervisor	29h	1	Run1	3
Fault reset	Control Supervisor	29h	1	FaultRst	12
NetCtrl	Control Supervisor	29h	1	NetCtrl	5
NetRef	AC/DC Drive	2Ah	1	NetRef	4
Speed reference	AC/DC Drive	2Ah	1	SpeedRef	8
Torque reference	AC/DC Drive	2Ah	1	TorqueRef	12

Example, User Specific Mapping

This example shows how to define user specific data (in this case Inverter Monitor Data Parameter #0034h)¹ using prepended output.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		NetRef	NetCtrl			Fault reset	Run rev	Run fwd
1								
2	Speed reference (Low byte)							
3	Speed reference (High byte)							
4	PID Set point (Low byte)							
5	PID Set point (High byte)							
...	...							
...	...							

To achieve the user specific mapping above, set the inverter parameters as follows:

1. Set parameter 514h (1300, Option parameter 1, “General Settings”) to 5 (0005h) (user data mapping is enabled and prepend output is enabled).
2. Set parameter 526h (1318, Option parameter 19) to 21, i.e. prepend assembly instance number 21, including Speed reference data.
3. Set parameter 528h (1320, Option Parameter 21), to 2034h (8244d, Monitor data #0034h + offset 2000h), which constitutes user defined read process data #1.

1. For definitions of Monitor data parameter numbers, please consult the Instruction manual of Mitsubishi inverter drive, appendix “For customers using HMS network options”.

Producing Instances (Input Assemblies)

Instance 70 (46h) - Basic Speed Control Input

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Running1		Faulted
1								
2	Speed actual (Low byte)							
3	Speed actual (High byte)							

Instance 71 (47h) - Extended Speed Control Input

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At reference	Ref from net	Ctrl from net	Ready	Running 2 (Rev)	Running1 (Fwd)	Warning	Faulted
1 ^a	Drive state							
2	Speed actual (Low byte)							
3	Speed actual (High byte)							

a. For possible drive states and behavior, see "Control Supervisor Object (29h)" on page 75, instance attribute #6, and "State Transition Diagram" on page 76.

Instance 72 (48h) - Speed and Torque Control Input

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Running1		Faulted
1								
2	Speed actual (Low byte)							
3	Speed actual (High byte)							
4	Torque actual (Low byte)							
5	Torque actual (High byte)							

Instance 73 (49h) - Extended Speed and Torque Control Input

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At reference	Ref from net	Ctrl from net	Ready	Running 2 (Rev)	Running1 (Fwd)	Warning	Faulted
1 ^a	Drive state							
2	Speed actual (Low byte)							
3	Speed actual (High byte)							
4	Torque actual (Low byte)							
5	Torque actual (High byte)							

a. For possible drive states and behavior, see "Control Supervisor Object (29h)" on page 75, instance attribute #6, and "State Transition Diagram" on page 76.

Instance 100 (64h) - Positioning Control/Transparent Input

This instance will be used for positioning data as default. If user specific process data mapping is enabled in bit 0, see “Parameter 514h / Pr. 1300 (General Settings)” on page 38, the instance will be used for user specific data mapping.

Using standard process mapping the mapping will be as follows:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At reference	Ref from net	Ctrl from net	Ready	Running 2 (Rev)	Running1 (Fwd)	Warning	Faulted
1 ^a	Drive state							
2	Speed actual (Low byte)							
3	Speed actual (High byte)							
4 ^b	SO	ABC2	ABC1	FU	OL	IPF	SU	RUN
5 ^b								
6	Actual position (Low byte)							
7	Actual position (Low middle byte)							
8	Actual position (High middle byte)							
9	Actual position (High byte)							
10	Actual torque (Low byte)							
11	Actual torque (High byte)							
12	Position error (Low byte)							
13	Position error (Low middle byte)							
14	Position error (High middle byte)							
15	Position error (High byte)							

- For possible drive states and behavior, see “Control Supervisor Object (29h)” on page 75, instance attribute #6, and “State Transition Diagram” on page 76.
- Bytes 4 and 5 (Output terminal status) indicate status of the inverter output terminal. The data differs depending on Virtual Frequency Drive (VFD) model. The A800 frequency inverter is used as an example. Please refer to the corresponding VFD manual.

With user process data mapping enabled in Option parameter 1, see “Parameter 514h / Pr. 1300 (General Settings)” on page 38, this instance will be used for user specific process data mapping:

Byte	Bits 7 - 0
0	User specific
1	User specific
...	...
...	...

The user specific data mapping is set using Option parameters 21 - 44, see “Option Board Parameters” on page 35 and the description of bit 0 in “Parameter 514h / Pr. 1300 (General Settings)” on page 38 for more information.

If Prepend is enabled (see “Parameter 514h / Pr. 1300 (General Settings)” on page 38), the user process data will be prepended by the assembly instance that is selected in Option parameter 20. In the example below, Assembly instance 100 first holds the same data as Assembly instance 71 (Extended Speed Control Input), which is followed by user specific data.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At reference	Ref from net	Ctrl from net	Ready	Running 2 (Rev)	Running1 (Fwd)	Warning	Faulted
1 ^a	Drive state							
2	Speed actual (Low byte)							
3	Speed actual (High byte)							
4	User specific							
5	User specific							
...	...							
...	...							

a. For possible drive states and behavior, see “Control Supervisor Object (29h)” on page 75, instance attribute #6, and “State Transition Diagram” on page 76.

If Prepend is enabled, the status word will be present in the assembly instance. This is the only way to exchange this information as user specific data.

Data Definitions, Input Assemblies

The following table indicates the mapping of the data in the producing instances of the Assembly Object. Further information is found in the description of the objects, see:

- “Control Supervisor Object (29h)” on page 75
- “AC/DC Drive Object (2Ah)” on page 77.

Name	Object		Instance No.	Attribute	
	Name	No.		Name	No.
Faulted	Control Supervisor	29h	1	Faulted	10
Warning	Control Supervisor	29h	1	Warning	11
Running1 (Fwd)	Control Supervisor	29h	1	Running1	7
Running2 (Rev)	Control Supervisor	29h	1	Running2	8
Ready	Control Supervisor	29h	1	Ready	9
Ctrl from net	Control Supervisor	29h	1	CtrlFromNet	15
Ref from net	AC/DC Drive	2Ah	1	RefFromNet	29
At reference	AC/DC Drive	2Ah	1	AtReference	3
Drive state	Control Supervisor	29h	1	State	6
Speed actual	AC/DC Drive	2Ah	1	SpeedActual	7
Torque actual	AC/DC Drive	2Ah	1	TorqueActual	11

Example, User Specific Mapping

This example shows how to define user specific data (in this case Inverter Monitor Data Parameter #000Dh)¹ using prepended output.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At reference	Ref from net	Ctrl from net	Ready	Running 2 (Rev)	Running1 (Fwd)	Warning	Faulted
1	Drive state							
2	Speed actual (Low byte)							
3	Speed actual (High byte)							
4	Input Power (Low byte)							
5	Input Power (High byte)							
...	...							
...	...							

To achieve the user specific mapping above, set the inverter parameters as follows:

1. Set parameter 514h (1300, Option parameter 1, “General Settings”) to 9 (0009h) (user data mapping is enabled and prepend input is enabled).
2. Set parameter 527h (1319, Option parameter 20) to 71, i.e. prepend assembly instance number 71, including Speed actual data.
3. Set parameter 532h (1330, Option Parameter 31), to 200Dh (8205d, Monitor data #000Dh + offset 2000h), which constitutes user defined write process data #1.

1. For definitions of Monitor data parameter numbers, please consult the Instruction manual of Mitsubishi inverter drive, appendix “For customers using HMS network options”.

Heartbeat and Configuration Instances

Instance/Connection Point 198 (C6h)

Used as heartbeat for input only connections. Data size of the heartbeat instance in the Forward_Open request shall be zero bytes.

#	Name	Access	Type	Description
1	Data	Set	N/A	This attribute has zero byte data size

Instance/Connection Point 199 (C7h)

Used as heartbeat for listen only connections. Data size of the heartbeat instance in the Forward_Open request shall be zero bytes.

#	Name	Access	Type	Description
1	Data	Set	N/A	This attribute has zero byte data size

Instance/Connection Point 195 (C3h)

Used as extended heartbeat for input only connections. Data size of the heartbeat instance in the Forward_Open request shall be zero bytes.

#	Name	Access	Type	Description
1	Data	Set	N/A	This attribute has zero byte data size

Instance/Connection Point 196 (C4h)

Used as extended heartbeat for listen only connections. Data size of the heartbeat instance in the Forward_Open request shall be zero bytes.

#	Name	Access	Type	Description
1	Data	Set	N/A	This attribute has zero byte data size

Instance 197 (C5h)

This instance is not supported by the option board.

A.5 Connection Manager (06h)

Object Description

This object is used to manage the characteristics of a communication connection.

See “EtherNet/IP Implementation” on page 52 for more information about connection details.

Supported Services

Class:	-
Instance:	Forward_Open Forward_Close

A.6 Parameter Object (0Fh)

Object Description

This object allows configuration tools such as Studio 5000, RSNetwork or NetTool to extract information about the inverter parameters and present them with their name and range to the user.

Due to limitations imposed by the CIP standard, some data types (i.e. arrays etc.) cannot be represented through this object. In such cases, default values will be returned, see “Default Values” on page 73.

See also:

- “Default Values” on page 73
- “Inverter Parameter Object (A2h)” on page 81

Supported Services

Class: Get_Attribute_Single

Instance: Get_Attribute_Single
Set_Attribute_Single
Get_Attributes_All
Get_Enum_String

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Revision of the object)
2	Max instance	Get	UINT	Maximum created instance number
8	Parameter class descriptor	Get	WORD	Default: 000Bh <u>Bit:Contents:</u> 0 Supports parameter instances (1) 1 Supports full attributes (1) 2 Must do non-volatile storage save command (0) 3 Parameters are stored in non-volatile storage (1)
9	Configuration Assembly instance	Get	UINT	0000h (Configuration assembly not supported)

Instance Attributes

#	Name	Access	Type	Value
1	Parameter Value	Get/Set	Specified in attributes 4, 5 & 6.	Actual value of parameter This attribute is read-only if bit 4 of Attribute #4 is true
2	Link Path Size	Get	USINT	0007h (in bytes)
3	Link Path	Get	Packed EPATH	20 A2 25 nn nn 30 05h (Path to the object from where this parameter's value is retrieved)
4	Descriptor	Get	WORD	<u>Bit:Contents:</u> 0 Supports Settable Path (N/A) 1 Supports Enumerated Strings 2 Supports Scaling (N/A) 3 Supports Scaling Links (N/A) 4 Read only Parameter 5 Monitor Parameter (N/A) 6 Supports Extended Precision Scaling (N/A)
5	Data type	Get	EPATH	Data type code
6	Data size	Get	USINT	Number of bytes in parameter value
7	Parameter Name String	Get	SHORT_STRING	Name of the parameter, truncated to 16 chars
8	Units String	Get	SHORT_STRING	(not supported)
9	Help String	Get	SHORT_STRING	
10	Minimum value	Get	(Data Type)	Minimum value of parameter
11	Maximum value	Get	(Data Type)	Maximum value of parameter
12	Default value	Get	(Data Type)	Default value of parameter
13	Scaling Multiplier	Get	UINT	0001h (not supported)
14	Scaling Divisor	Get	UINT	
15	Scaling Base	Get	UINT	
16	Scaling Offset	Get	INT	0000h (not supported)
17	Multiplier link	Get	UINT	
18	Divisor Link	Get	UINT	
19	Base Link	Get	UINT	
20	Offset Link	Get	UINT	
21	Decimal precision	Get	USINT	

Default Values

#	Name	Value	Comments
1	Parameter Value	0	-
2	Link Path Size	0	Size of link path in bytes.
3	Link Path	-	NULL Path
4	Descriptor	0010h	Read only Parameter
5	Data type	C6h	USINT
6	Data size	1	-
7	Parameter Name String	(reserved)	-
8	Units String	""	-
9	Help String	""	-
10	Minimum value	N/A	0
11	Maximum value	N/A	0
12	Default value	N/A	0

A.7 Motor Data Object (28h)

Object Description

This object serves as a database for motor parameters.

Supported Services

Class: Get_Attribute_Single

Instance: Get_Attribute_Single
Set_Attribute_Single

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Object revision)

Instance #1 Attributes

#	Name	Access	Type	Value
3	MotorType	Get/Set	USINT	<u>Value/Type:</u> 0 Non-standard motor 1 PM DC Motor 2 FC DC Motor 3 PM Synchronous Motor 4 FC Synchronous Motor 5 Switched Reluctance Motor 6 Wound Rotor Induction Motor 7 Squirrel Cage Induction Motor 8 Stepper Motor 9 Sinusoidal PM BL Motor 10 Trapezoidal PM BL Motor
6	RatedCurrent	Get/Set	UINT	AC Drive: Rated Stator Current DC Drive: Rated Armature Current Units: [100mA]
7	RatedVoltage	Get/Set	UINT	AC Drive: Rated Base Voltage DC Drive: Rated Armature Voltage Units: [V]
12	PoleCount	Get/Set	UINT	Number of poles in the motor.
15	RatedSpeed	Get/Set	UINT	Nominal speed at rated frequency from nameplate

A.8 Control Supervisor Object (29h)

Object Description

This object models all the management functions for devices “Hierarchy of Motor Control Devices”.

Supported Services

Class: Get_Attribute_Single
 Instance: Get_Attribute_Single
 Set_Attribute_Single
 Reset

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Object revision)

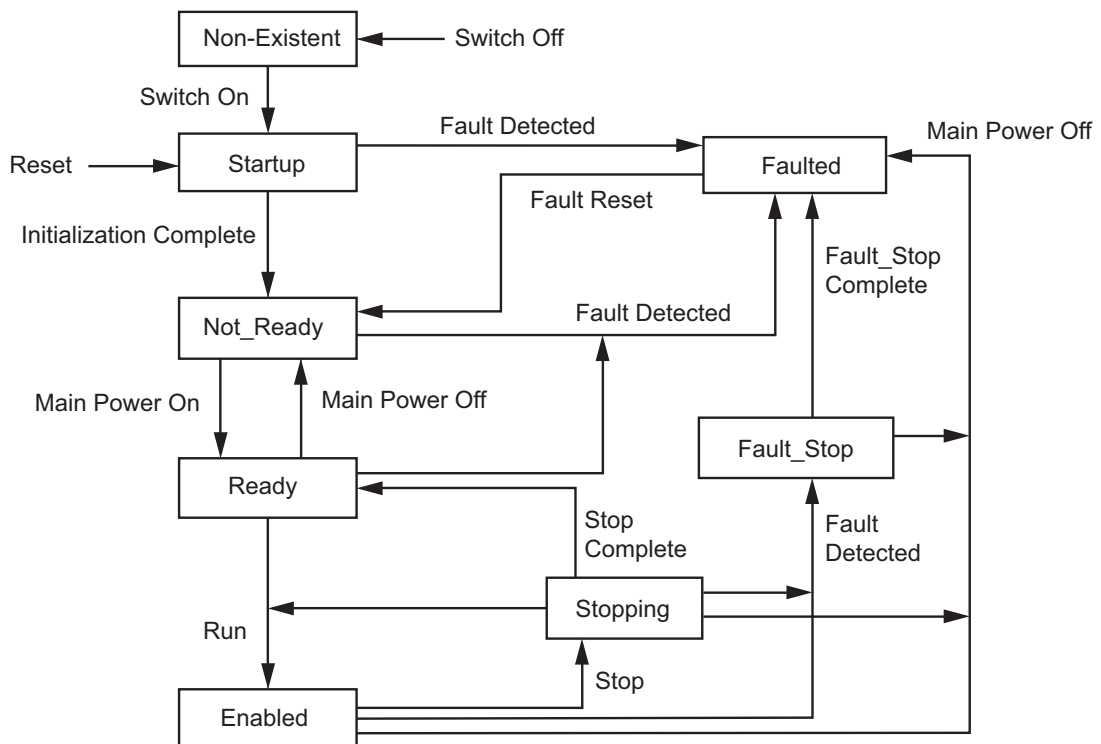
Instance Attributes

#	Name	Access	Type	Value
3	Run1	Get/Set	BOOL	Run forward
4	Run2	Get/Set	BOOL	Run forward
5	NetCtrl	Get/Set	BOOL	Request Run/Stop control: <u>Value:Meaning:</u> 0 Control is local 1 Controlled from network
6	State	Get	USINT	Current state of Control supervisor, see also “State Transition Diagram” on page 76. <u>Value:Meaning:</u> 0 Vendor specific 1 Startup 2 Not ready 3 Ready 4 Enabled 5 Stopping 6 Fault Stop 7 Faulted
7	Running1	Get	BOOL	<u>Value:Meaning:</u> 0 Other state 1 (Enabled and Run1) or (Stopping and Running1) or (Fault_stop and Running2)
8	Running2	Get	BOOL	<u>Value:Meaning:</u> 0 Other state 1 (Enabled and Run1) or (Stopping and Running1) or (Fault_stop and Running2)
9	Ready	Get	BOOL	<u>Value:Meaning:</u> 0 Other state 1 Ready, Enabled or Stopping
10	Faulted	Get	BOOL	<u>Value:Meaning:</u> 0 No faults present 1 Fault occurred (latched)

#	Name	Access	Type	Value
11	Warning	Get	BOOL	<u>Value:Meaning:</u> 0 No warning present 1 Warning This attribute gets set when there is a minor (recoverable or unrecoverable) event flagged in the Identity object.
12	FaultRst	Get/Set	BOOL	<u>Value:Meaning:</u> 0→1 Fault Reset 1 No Action
15	CtrlFromNet	Get	BOOL	Status of Run/Stop control source. <u>Value:Meaning:</u> 0 Control is local 1 Control is from network

State Transition Diagram

The state transition diagram provides a graphical description of the states and corresponding state transitions.



A.9 AC/DC Drive Object (2Ah)

Object Description

This object models the functions specific to an AC or DC Drive, for example speed ramp and torque control.

Supported Services

Class	Get Attribute Single
Instance:	Get Attribute Single Set Attribute Single

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Revision of the object)

Instance attributes

#	Name	Access	Type	Description
3	AtReference	Get	BOOL	<u>Value:Meaning:</u> 0 - 1 Drive actual at reference (speed or torque reference) based on mode.
4	NetRef	Get/Set	BOOL	<u>Value:Meaning:</u> 0 Local reference 1 Reference from network
6	DriveMode	Get/Set	USINT	<u>Value:Mode:</u> 0 Vendor specific mode 1 Open loop speed 3 Torque control
7	SpeedActual	Get	INT	Actual drive speed Units: RPM / 2 ^{SpeedScale}
8	SpeedRef	Get/Set	INT	Speed reference Units: RPM / 2 ^{SpeedScale}
11	TorqueActual	Get	INT	Actual torque Units: Nm / 2 ^{TorqueScale}
12	TorqueRef	Get/Set	INT	Torque reference Units: Nm / 2 ^{TorqueScale}
18	AccelTime	Get/Set	UINT	Acceleration time Time from 0 to HighSpdLimit Units: ms
19	DecelTime	Get/Set	UINT	Deceleration time Time from 0 to LowSpdLimit Units: ms
20	LowSpdLimit	Get/Set	UINT	Minimum speed limit Units: RPM / 2 ^{SpeedScale}
21	HighSpdLimit	Get/Set	UINT	Maximum speed limit Units: RPM / 2 ^{SpeedScale}
22	SpeedScale	Get/Set	SINT	Speed scaling factor
24	TorqueScale	Get/Set	SINT	Torque scaling factor
29	RefFromNet	Get	BOOL	Status of torque/speed reference: <u>Value:Status:</u> 0 Local reference 1 Network reference

A.10 DLR Object (47h)

Object Description

-

Supported Services

Class: Get_Attribute_Single
 Get_Attributes_All

Instance: Get_Attribute_Single
 Set_Attribute_Single

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0002h (Object revision)

Instance #1 Attributes

#	Name	Access	Type	Value
1	Network Topology	Get	USINT	<u>Bit Contents:</u> 0 "Linear" 1 "Ring"
2	Network Status	Get	USINT	<u>Bit Contents:</u> 0 "Normal" 1 "Ring Fault" 2 "Unexpected Loop Detected" 3 "Partial Network Fault" 4 "Rapid Fault/Restore Cycle"
10	Active Supervisor Address	Get	Struct of: {UDINT, Array of 8 USINTs}	This attribute holds the IP address (IPv4) and/or the Ethernet Mac address of the active ring supervisor
12	Capability Flags	Get	DWORD	01h (Announce-based ring node)

A.11 QoS Object (48h)

Object Description

-

Supported Services

Class: Get_Attribute_Single
 Get_Attributes_All

Instance: Get_Attribute_Single
 Set_Attribute_Single

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Object revision)

Instance Attributes

#	Name	Access	Type	Value
1	802.1Q Tag Enable	Get/Set	USINT	Enables or disables sending 802.1Q frames. <u>Bit:Contents:</u> 0 Disabled (Default) 1 Enabled
4	DSCP Urgent	Get/Set	USINT	CIP transport class 1 messages with priority Urgent Default: 55
5	DSCP Scheduled	Get/Set	USINT	CIP transport class 1 messages with priority Scheduled Default: 47
6	DSCP High	Get/Set	USINT	CIP transport class 1 messages with priority High Default: 43
7	DSCP Low	Get/Set	USINT	CIP transport class 1 messages with priority Low Default: 31
8	DSCP Explicit	Get/Set	USINT	CIP UCMM and CIP class 3 Default: 27

A.12 Inverter Parameter Object (A2h)

Object Description

This object is used to present the inverter parameters on EtherNet/IP.

The signal numbers of the inverter parameters do not correspond directly to the instance numbers that are used on EtherNet/IP to access the parameters.

See also:

- “Parameter Object (0Fh)” on page 72 (CIP Object)
- “Translation of Parameter Numbers” on page 91

Supported Services

Class: Get_Attribute_Single

Instance: Get_Attribute_Single
Set_Attribute_Single

Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	Object revision (Current value = 0001h)
2	Max Instance	Get	UINT	Value is equal to highest instance number.

Instances Attributes

Each instance corresponds to a drive profile parameter accessible from the inverter.

#	Name	Access	Type	Description
1	Name	Get	SHORT_STRING	Parameter name (Including length)
2	Data type	Get	USINT	Data type of instance value
3	No. of elements	Get	USINT	Number of elements of the specified data type
4	Descriptor	Get	USINT	Bit field describing the access rights for this instance <u>Bit Meaning:</u> 0 Set = Read Access 1 Set = Write Access
5	Value ^a	Get/Set	Determined by attribute #2	Instance value
6	Max value ^a	Get		The maximum permitted parameter value.
7	Min value ^a	Get		The minimum permitted parameter value.
8	Default value ^a	Get		The default parameter value.

a. Converted to/from CIP standard by the option board.

A.13 TCP/IP Interface Object (F5h)

Object Description

The object groups TCP/IP-related settings. See also:

- “IP Functionality” on page 41

Supported Services

Class services: Get_Attribute_All
 Get_Attribute_Single

Instance services: Get_Attribute_All
 Get_Attribute_Single
 Set_Attribute_Single

Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0003h	Revision 3

Instance Attributes

Extended

#	Access	Name	Type	Value	Comments
1	Get	Status	DWORD	-	<u>Bit #:</u> <u>Meaning:</u> 0-3: When set to 1h, attribute #5 contains valid configuration from DHCP or non-volatile storage. When set to 2h, attribute #5 contains valid configuration from hardware settings. Remaining values are reserved for future use. 4: Multicast pending if set to 1 5: (reserved, set to 0) 6: AcdStatus. Set to 1 if an address conflict is detected. Address conflict detection is enabled/disabled in attribute #10. 7 - 31: (reserved, set to 0)
2	Get	Configuration Capability	DWORD	0000 0086h - or - 0000 0096h	The device is capable of resolving host names by querying a DNS server, obtaining its network configuration via DHCP. The device is ACD capable. If bit 4 is 1, the configuration can be set from the network, if bit 4 is 0, the configuration can not be set from the network.
3	Get/Set	Configuration Control	DWORD	-	<u>Value:</u> <u>Meaning:</u> 0: Configuration from non-volatile memory 2: Configuration from DHCP
4	Get	Physical Link Object	Struct of: UINT (Path size) Padded EPATH	- 0002h 20 F6 24 03h	- 2 words Path to Ethernet Link Object, Instance #1
5	Get/Set	Interface Configuration	Struct of: UDINT (IP) UDINT (Mask) UDINT (GW) UDINT (DNS1) UDINT (DNS2) STRING (Domain)		- IP address Subnet mask Default gateway Primary DNS Secondary DNS Default domain
6	Get/Set	Host Name	STRING	-	Host name of option board
7	(not used)				
8	Get/Set	TTL Value	USINT	1	TTL value for EtherNet/IP multicast packets
9	Get/Set	Mcast Config	Struct of:		IP multicast address configuration
		Alloc Control	USINT	0	<u>Value:</u> <u>Meaning:</u> 0: Use default allocation algorithm to generate multicast addresses 1: Allocate multicast addresses according to the values in the 'Num Mcast'- and 'Mcast Start Addr'-fields.
		(reserved)	USINT	0	Set to zero. Do not change.
		Num Mcast	UINT	1	Number of multicast addresses to allocate for EtherNet/IP
		Mcast Start Addr	UDINT	-	Starting multicast address from which to begin allocation
10	Get/Set	SelectAcd	Bool	1	<u>Value:</u> <u>Meaning:</u> 0: Disable ACD 1: Enable ACD (Default)

#	Access	Name	Type	Value	Comments
11	Get/Set	LastConflictDe- tected	Struct of:		ACD Diagnostic parameters
		AcdActiviity	USINT	-	
		RemoteMAC	ARRAY of 6 USINT	-	
		ArpPdu	ARRAY of 28 USINT	1-	

A.14 Ethernet Link Object (F6h)

Object Description

This object groups diagnostic information for the Ethernet interface.

Supported Services

Class services: Get_Attribute_All
 Get_Attribute_Single

Instance services: Get_Attribute_All
 Get_Attribute_Single
 Set_Attribute_Single
 Get_And_Clear

Class Attributes

#	Access	Name	Type	Value	Comments
1	Get	Revision	UINT	3	Revision 3
2	Get	Max Instance	UINT	3	Instance 3 is the max instance
3	Get	Number of instances	UINT	3	3 instances

Instance Attributes

Extended

#	Access	Name	Type	Value	Comments
1	Get	Interface Speed	UDINT	10 or 100	Actual ethernet interface speed
2	Get	Interface Flags	DWORD	-	See "Interface Flags" on page 88.
3	Get	Physical Address	Array of 6 USINTS	(MAC ID)	The assigned MAC address
4	Get	Interface Counters	Struct of:		
		In Octets	UDINT	-	Octets received on the interface
		In Ucast Packets	UDINT	-	Unicast packets received on the interface
		In NUcast Packets	UDINT	-	Non-unicast packets received on the interface
		In Discards	UDINT	-	Inbound packets with unknown protocol
		In Errors	UDINT	-	Inbound errors that contain errors (does not include In Discards)
		In UnknownProtos	UDINT	-	Inbound packets with unknown protocol
		Out Octets	UDINT	-	Octets sent on the interface
		Out Ucast Packets	UDINT	-	Unicast packets sent on the interface
		Out NUcast Packets	UDINT	-	Non-unicast packets sent on the interface
		Out Discards	UDINT	-	Outbound packets with unknown protocol
		Out Errors	UDINT	-	Outbound errors that contain errors (does not include Out Discards)

#	Access	Name	Type	Value	Comments
5	Get	Media Counters	Struct of:		Media-specific counters
		Alignment Errors	UDINT	-	Frames received that are not an integral number of octets in length
		FCS Errors	UDINT	-	Frames received that do not pass the FCS check
		Single Collisions	UDINT	-	Successfully transmitted frames which experienced exactly one collision
		Multiple Collisions	UDINT	-	Successfully transmitted frames which experienced more than one collision
		SQE Test Errors	UDINT	0	Number of times SQE test error message is generated (not provided with current PHY interface)
		Deferred Transmissions	UDINT	-	Frames for which first transmission attempt is delayed because the medium is busy
		Late Collisions	UDINT	-	Number of times a collision is detected later than 512 bit-times into the transmission of a packet
		Excessive Collisions	UDINT	-	Frames for which a transmission fails due to excessive collisions
		MAC Transmit errors	UDINT	-	Frames for which transmission fails due to an internal MAC sublayer receive error
		Carrier Sense Errors	UDINT	-	Times that the carrier sense condition was lost or never asserted when attempted to transmit a frame
		Frame Too Long	UDINT	-	Frames received that exceed the maximum permitted frame size
		MAC Receive Errors	UDINT	-	Frames for which reception on an interface fails due to an internal MAC sublayer receive error
6	Get/Set ^a	Interface Control	Struct:		
		Control Bits	WORD	-	Interface control bits
		Forced Interface Speed	UINT	-	Speed at which the interface shall be forced to operate. Returns 'Object state Conflict' if auto-negotiation is enabled.
7	Get	Interface Type	USINT	-	See "Interface Type" on page 88
10	Get	Interface Label	SHORT_STRING	-	See "Interface Label" on page 88

a. Support for this attribute can be disabled by implementing attribute #9 in the EtherNet/IP Host Object.

Interface Flags

Bit	Name	Description
0	Link status	Indicates whether or not the Ethernet 802.3 communications interface is connected to an active network. <u>Value:Meaning:</u> 0 Inactive link 1 Active link
1	Half/full duplex	Indicates the duplex mode currently in use. <u>Value:Meaning:</u> 0 Half duplex 1 Full duplex
2 - 4	Negotiation Status	Indicates the status of link auto-negotiation <u>Value:Meaning:</u> 0 Auto-negotiation in progress. 1 Auto-negotiation and speed detection failed (using default values) 2 Auto negotiation failed but detected speed (using default duplex value) 3 Successfully negotiated speed and duplex. 4 Auto-negotiation not attempted. Forced speed and duplex.
5	Manual Setting requires Reset	<u>Value:Meaning:</u> 0 Interface can activate changes to link parameters during runtime 1 Reset is required in order for changes to have effect
6	Local Hardware Fault	<u>Value:Meaning:</u> 0 No local hardware fault detected 1 Local hardware fault detected
7-31	(reserved)	(ignore)

Interface Type

Instance	Value	Description
1	2	Twisted-pair
2	2	Twisted-pair
3	1	Internal interface

Interface Label

Instance	Value
1	Port 1
2	Port 2
3	Internal

B. Diagnostics

Faults, generated in the inverter, are represented by the fault codes below. Any fault will be represented as a major recoverable fault in the Identity object (CIP), see “Identity Object (01h)” on page 58. Also the fault bit in the status word in the input assemblies will be set, see “Assembly Object (04h)” on page 61. The actual fault code of the latest active fault can be accessed, using the Inverter Parameter Object (A2h), instance no. 2054h, to access monitor data parameter no. 054h (see “Inverter Parameter Object (A2h)” on page 81)

Inverter Fault Code	Inverter Fault Name	Inverter Description
10h	E.OC1	OC During Acc
11h	E.OC2	Steady spd OC
12h	E.OC3	OC During Dec
20h	E.OV1	OV During Acc
21h	E.OV2	Steady spd OV
22h	E.OV3	OV During Dec
30h	E.THT	Inv. Ovrload
31h	E.THM	Motor Ovrload
40h	E.FIN	H/Sink O/Temp
50h	E.IPF	Inst. Pwr. Loss
52h	E.ILF	Input phase loss
60h	E.OLT	Stall Prev STP
70h	E.BE	Br. Cct. Fault
80h	E.GF	Ground Fault
81h	E.LF	Output phase loss
90h	E.OHT	OH Fault
91h	E.PTC	PTC Activated
A0h	E.OPT	Option fault
A1h	E.OP1	Option1 fault
A2h	E.OP2	Option2 fault
A3h	E.OP3	Option3 fault
B0h	E.PE	Corrupt memory
B1h	E.PUE	PU Leave out
B2h	E.RET	Retry No Over
B3h	E.PE2	PR Storage Alarm
C0h	E.CPU	CPU Fault
C1h	E.CTE	PU Short cct
C2h	E.P24	24VDC short cct
C4h	E.CDO	OC Detect level
C5h	E.IOH	Inrush overheat
C6h	E.SER	VFD Comm error
C7h	E.AIE	Analog in error
C8h	E.USB	USB Comm error
C9h	E.SAF	Safety cct fault
D0h	E.OS	Overspeed
D1h	E.OSD	Excess spd deviation
D2h	E.ECT	Enc. Signal loss
D3h	E.OD	Excess pos fault
D5h	E.MB1	Brake seq fault
D6h	E.MB2	Brake seq fault
D7h	E.MB3	Brake seq fault

Inverter Fault Code	Inverter Fault Name	Inverter Description
D8h	E.MB4	Brake seq fault
D9h	E.MB5	Brake seq fault
DAh	E.MB6	Brake seq fault
DBh	E.MB7	Brake seq fault
DCh	E.EP	Enc. Phase Fault
F1h	E.1	Fault 1 (opt slot 1)
F2h	E.2	Fault 2 (opt slot 2)
F3h	E.3	Fault 3 (opt slot 3)
F5h	E.5	Fault 5
F6h	E.6	Fault 6
F7h	E.7	Fault 7
FBh	E.11	Fault 11
FDh	E.13	Fault 13
51h	E.UVT	Under Voltage

C. Translation of Parameter Numbers

Parameter numbers used in the inverter do not directly translate to the numbers of the instances of the Inverter Parameter Object used on EtherNet/IP. An offset is added according to the table below.

Every parameter number corresponds to 16 bits. A 32-bit parameter e.g., occupies two numbers, but is addressed by the lower number only.

Name	Inverter Parameter No. (hex)	Offset (hex)	Instance no. (Parameter No. + Offset, hex)	Acyclic Data Exchange	Cyclic Data Exchange
DriveControlMaskWrite	400	3000	3400	Yes	Yes
DriveControl	402	3000	3402	Yes	Yes
DriveStatus	403	3000	3403	Yes	Yes
SetpointSpeed	405	3000	3405	Yes	Yes
CommandSpeed	406	3000	3406	Yes	Yes
ActualSpeed	407	3000	3407	Yes	Yes
SpeedScaleNumerator	408	3000	3408	Yes	No
SpeedScaleDenominator	40A	3000	340A	Yes	No
RatedSpeed	40C	3000	340C	Yes	No
PoleCount	40D	3000	340D	Yes	No
RatedCurrent	40E	3000	340E	Yes	No
RatedVoltage	410	3000	3410	Yes	No
MotorType	411	3000	3411	Yes	No
DriveMode ^a	412	3000	3412	Yes	No
		3800	3C12	Yes	Yes
SupportedModes	413	3000	3413	Yes	No
AccelerationDeltaSpeed ^a	415	3000	3415	Yes	No
		3800	3C15	Yes	Yes
AccelerationDeltaTime ^a	417	3000	3417	Yes	No
		3800	3C17	Yes	Yes
DecelerationDeltaSpeed/ ^a	419	3000	3419	Yes	No
		3800	3C19	Yes	Yes
DecelerationDeltaTime ^a	41B	3000	341B	Yes	No
		3800	3C1B	Yes	Yes
QuickDecelerationDeltaSpeed	41D	3000	341D	Yes	No
QuickDecelerationDeltaTime	41F	3000	341F	Yes	No
MaxSpeed	421	3000	3421	Yes	No
MinSpeed	423	3000	3423	Yes	No
TargetTorque	425	3000	3425	Yes	Yes
ActualTorque	426	3000	3426	Yes	Yes
TorqueSlope	427	3000	3427	Yes	No
TorqueProfileType	429	3000	3429	Yes	No
RatedTorque	42A	3000	342A	Yes	No
TorqueScaleNumerator	42C	3000	342C	Yes	No
TorqueScaleDenominator	42E	3000	342E	Yes	No
DisableOptionCode	430	3000	3430	Yes	No
ShutdownOptionCode	431	3000	3341	Yes	No

a. These parameters can either be accessed (as acyclic data) as an array, with offset 3000h, or each entry in the array can be accessed as a separate parameter with offset 3800h (as acyclic and/or cyclic data).

D. Connection Names

The table below gives the corresponding assembly name and connection type to each connection name in the EDS. The connection types are described in “Class 1 Connections” on page 52. Please note that the EDS connection names may be changed by the user, making this table obsolete.

Connection name ^a	Consuming Assembly Name ^b	Producing Assembly Name ^c	Connection Type ^d
Basic Speed Control	Instance 20 (14h) - Basic Speed Control Output	Instance 70 (46h) - Basic Speed Control Input	Exclusive Owner
Input Only - Basic Speed Control	N/A	Instance 70 (46h) - Basic Speed Control Input	Input Only
Listen Only - Basic Speed Control	N/A	Instance 70 (46h) - Basic Speed Control Input	Listen Only
Input Only Ext - Basic Speed Control	N/A	Instance 70 (46h) - Basic Speed Control Input	Input Only Extended
Listen Only Ext - Basic Speed Control	N/A	Instance 70 (46h) - Basic Speed Control Input	Listen Only Extended
Extended Speed Control	Instance 21 (15h) - Extended Speed Control Output	Instance 71 (47h) - Extended Speed Control Input	Exclusive Owner
Input Only - Extended Speed Control	N/A	Instance 71 (47h) - Extended Speed Control Input	Input Only
Listen Only - Extended Speed Control	N/A	Instance 71 (47h) - Extended Speed Control Input	Listen Only
Input Only Ext - Extended Speed Control	N/A	Instance 71 (47h) - Extended Speed Control Input	Input Only Extended
Listen Only Ext - Extended Speed Control	N/A	Instance 71 (47h) - Extended Speed Control Input	Listen Only Extended
Speed and Torque Control	Instance 22 (16h) - Speed and Torque Control Output	Instance 72 (48h) - Speed and Torque Control Input	Exclusive Owner
Input Only - Speed and Torque Control	N/A	Instance 72 (48h) - Speed and Torque Control Input	Input Only
Listen Only - Speed and Torque Control	N/A	Instance 72 (48h) - Speed and Torque Control Input	Listen Only
Input Only Ext - Speed and Torque Control	N/A	Instance 72 (48h) - Speed and Torque Control Input	Input Only Extended
Listen Only Ext - Speed and Torque Control	N/A	Instance 72 (48h) - Speed and Torque Control Input	Listen Only Extended
Extended Speed and Torque Control	Instance 23 (17h) - Extended Speed and Torque Control Output.	Instance 72 (49h) - Extended Speed and Torque Control Input.	Exclusive Owner
Input Only - Extended Speed and Torque Control	N/A	Instance 72 (49h) - Extended Speed and Torque Control Input.	Input Only
Listen Only - Extended Speed and Torque Control	N/A	Instance 72 (49h) - Extended Speed and Torque Control Input.	Listen Only
Input Only Ext - Extended Speed and Torque Control	N/A	Instance 72 (49h) - Extended Speed and Torque Control Input.	Input Only Extended
Listen Only Ext - Extended Speed and Torque Control	N/A	Instance 72 (49h) - Extended Speed and Torque Control Input.	Listen Only Extended
Exclusive Owner	Instance 150 (96h) - Positioning Control/Transparent Output	Instance 100 (64h) - Positioning Control/Transparent Input	Exclusive Owner

Connection name ^a	Consuming Assembly Name ^b	Producing Assembly Name ^c	Connection Type ^d
Input Only	N/A	Instance 100 (64h) - Positioning Control/Transparent Input	Input Only
Listen Only	N/A	Instance 100 (64h) - Positioning Control/Transparent Input	Listen Only
Input Only Ext	N/A	Instance 100 (64h) - Positioning Control/Transparent Input	Input Only Extended
Listen Only Ext	N/A	Instance 100 (64h) - Positioning Control/Transparent Input	Listen Only Extended

a. The connection names listed here are used in the standard EDS file, that can be downloaded. For download, see "Download" on page 9.

b. See "Consuming Instance (Output assemblies)" on page 61.

c. See "Producing Instances (Input Assemblies)" on page 66.

d. See "Class 1 Connections" on page 52.

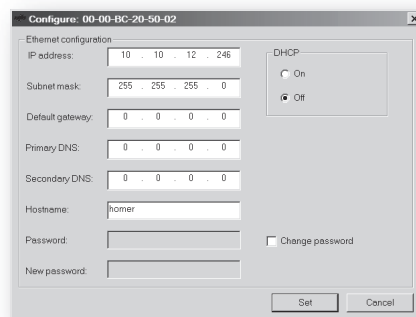
E. HICP (Host IP Configuration Protocol)

E.1 General

The option board supports the HICP protocol used by the Anybus IPconfig utility for changing settings, e.g. IP address, Subnet mask, and enable/disable DHCP. Anybus IPconfig can be downloaded free of charge from the HMS website, www.anybus.com. This utility may be used to access the network settings of any Anybus product connected to the network via UDP port 3250.

E.2 Operation

Upon starting the program, the network is scanned for Anybus products. The network can be re-scanned at any time by clicking 'Scan'.



To alter the network settings of the option board, double-click on its entry in the list. A window will appear, containing the settings for the option board.

Validate the new settings by clicking 'Set', or click 'Cancel' to cancel all changes.

Optionally, the configuration can be protected from unauthorized access by a password. To enter a password, click on the 'Change password' checkbox, and enter the password under 'New password'.

F. Troubleshooting

When a fault occurs where the inverter trips itself and the A8NEIP_2P EtherNet/IP Option Board, check the inverter's operation panel and the LED indications on the A8NEIP_2P EtherNet/IP Option Board. Consult the checkpoints in the table below to identify the cause, and take appropriate counter-measures.

This table needs to be completed by ME!!!

Operation Panel Display on the Drive	LED indications on A8NEIP_2P Option board	Possible Cause		Checkpoint/Troubleshooting
0.00E	No LED lit			
	LEDs lit			
E.OP _n	LEDs lit			

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