



# Linking Device

## EtherNet/IP™ to PROFIBUS® DP

### USER MANUAL

SCM-1202-026 1.0 ENGLISH

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# Important User Information

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# 1 About This Document

## 1.1 About This Document

This manual describes how to install and configure EtherNet/IP to PROFIBUS DP Linking Device.

For additional related documentation and file downloads, please visit the support website at [www.anybus.com/support](http://www.anybus.com/support).

## 1.2 Related Documents

Document	Author	Document ID
EtherNet/IP to Modbus-TCP Linking Device User Manual	HMS	SCM-1202-008
Copyright Notices for the HMS-EN2PB-R	HMS	

## 1.3 Document history

Version	Date	Description
1.0	2017-04-21	First version

## 1.4 Trademark Information

Anybus® is a registered trademark of HMS Industrial Networks AB.

All other trademarks are the property of their respective holders.

## 1.5 Conventions

Ordered lists are used for instructions that must be carried out in sequence:

1. First do this
2. Then do this

Unordered (bulleted) lists are used for:

- Itemized information
- Instructions that can be carried out in any order

...and for action-result type instructions:

- ▶ This action...
  - ➔ leads to this result

**Bold typeface** indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

Monospaced text is used to indicate program code and other kinds of data input/output such as configuration scripts.

This is a cross-reference within this document: [Conventions, p. 4](#)

This is an external link (URL): [www.hms-networks.com](http://www.hms-networks.com)



*This is additional information which may facilitate installation and/or operation.*



This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.



### Caution

This instruction must be followed to avoid a risk of personal injury.



### WARNING

This instruction must be followed to avoid a risk of death or serious injury.

## **2 EtherNet/IP to PROFIBUS DP Linking Device**

### **2.1 Introduction**

The EtherNet/IP to PROFIBUS DP Linking Device is used to provide a seamless connection between a PROFIBUS network and an EtherNet/IP network. The linking device enables the master of the EtherNet/IP network to control the PROFIBUS network, and data can be transmitted transparently between the two networks.

### **2.2 Features**

#### **2.2.1 The EtherNet/IP to PROFIBUS DP Linking Device**

- Up to 7000 bytes IO data  
3500 bytes in each direction over multiple IO connections on EtherNet/IP.
- Routing of acyclic data  
Predefined CIP objects available for specific PROFIBUS DPV1 Class 1 and Class 2 read and write requests. These are accessed either by the PLC through CIP Message Instructions from Studio 5000 Logix Designer or from within the Custom Add-On Profile network configuration software by the system integrator
- Control/Status information added to the I/O data for diagnostic purposes
- Live List of the active status of the connected slaves
- Configuration through Customer Add-On Profile for Studio 5000 Logix Designer for Device and Network configuration of the PROFIBUS network and data structures for Studio 5000

#### **2.2.2 EtherNet/IP Adapter Class Product Specifics**

- Beacon Based DLR (Device Level Ring) and linear network topology supported
- 10/100 Mbit, full/half duplex operation
- Dual port cut-through switch
- ODVA Conformance tested

#### **2.2.3 PROFIBUS DP Master Specifics**

- Complete PROFIBUS DP Master functionality according to IEC 61158
- Controls up to 125 slaves
- Acyclic Communication (DP-V1, Class 1 & 2)
- Supports all common baudrates up to 12Mbps
- Galvanically isolated PROFIBUS interface

#### **2.2.4 Custom Add-On Profile for Studio 5000**

- Contains a unique tag editor for uplink PLC data structuring
- Contains the PROFIBUS DP Master configuration tool
- Contains IP Config utility
- Backup of configuration data into Studio 5000 project and stored in the Controller memory
- Dynamically generates data structures based on the configuration

- Automatic generation of named and structured Studio 5000 Controller Tags. Possible to manually edit generated tag names if desired
- Possible to Group tags by Slave which creates substructures per slave in Studio 5000
- Possible to exclude defined tags to minimize the amount of tags in PLC
- Possible to pack selected tags into arrays of tags to minimize the amount of tags in PLC
- All network and device level configuration is done within Studio 5000
- No need for any separately installed software or additional licenses

### 2.2.5 Other

- USB for firmware download
- ODVA, CE, UL, ATEX and Haz.Loc. certifications available

## 2.3 Unique Integration into Studio 5000

The EtherNet/IP to PROFIBUS DP Linking Device features a custom add-on profile (AOP) for easy integration with Studio 5000. Within this add-on profile (AOP), the HMS configuration tool can be launched. When the configuration is ready, it can automatically be translated to structured Studio 5000 controller tags.

All network and device level configuration is done within Studio 5000.



The add-on profile is supported by RSLogix 5000, v20 and later.

## 2.4 Data Mapping

PROFIBUS slots are assembled in multiple Class 1 Exclusive Owner (IO) Connections, on the EtherNet/IP side. There are a maximum of 10 available connections (with an associated input and output connection parameter per each) available. Each connection can manage up to a maximum of 500 bytes input data and 496 bytes output data. In total, all 10 connections can manage 3500 bytes input data and 3500 bytes output data.

Class 1 Exclusive Owner Connection	Connection Parameter	Assembly Instance	Data Size
Connection 1	Input Data	100	≤500
	Output Data	150	≤496
Connection 2	Input Data	101	≤500
	Output Data	151	≤496
Connection 3	Input Data	102	≤500
	Output Data	152	≤496
Connection 4	Input Data	103	≤500
	Output Data	153	≤496
Connection 5	Input Data	104	≤500
	Output Data	154	≤496
...	Input Data	...	≤500
	Output Data	...	≤496
Connection 10	Input Data	109	≤500
	Output Data	159	≤496



Connections will be made as needed. If a PROFIBUS slot does not fit into the remaining parts of a connection, it will be moved to the next connection. Every slot will always be checked against already existing connections. If it fits in the unused space of an earlier connection, it will be put there.

## 2.5 Configuring the EtherNet/IP Network

The Linking Device is an EtherNet/IP adapter (slave) on the EtherNet/IP network. The general settings for the adapter interface are configured using the configuration pages. All data transfers must be configured in Studio 5000. Please note that the size of the I/O data that can be read from and written to the module is defined when configuring the linking device using the configuration pages.

## 2.6 Control Word

16 bit control word sent to the linking device from the PLC or EtherNet/IP scanner.

Bit(s)	Name	Description
0-1	Run mode	0 - PROFIBUS is set to IDLE 1 - PROFIBUS is set to OPERATE 2 - PROFIBUS is set to STOP
2-15	-	Bits are unused

## 2.7 Status Word

16 bit status word sent from the linking device to the EtherNet/IP scanner or PLC.

Bit(s)	Name	Description
0-1	Run mode	0 - PROFIBUS in IDLE (or not initialized) 1 - PROFIBUS is set in OPERATE 2 - PROFIBUS is set in STOP
2	CFG error	0 - Configuration is valid and in use. 1 - Configuration is either missing or invalid.
3-15	-	-

## 2.8 PROFIBUS Slave Live List

The PROFIBUS slave live list consists of a 16 byte bit-field, where each bit corresponds to one slave on the PROFIBUS network. Each bit is linked to one specific PROFIBUS node address, according to the table below.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Slave 7	Slave 6	Slave 5	Slave 4	Slave 3	Slave 2	Slave 1	Slave 0
1	Slave 15	Slave 14	Slave 13	Slave 12	Slave 11	Slave 10	Slave 9	Slave 8
2-14	...	...	...	...	...	...	...	...
15	Slave 127	Slave 126	Slave 125	Slave 124	Slave 123	Slave 122	Slave 121	Slave 120

## 3 About the Linking Device

### 3.1 External View

**A: Power Connector**

This connector is used to apply power to the linking device. It is also possible to connect protective earth (PE) to the power connector.

**B: SD Card Slot**

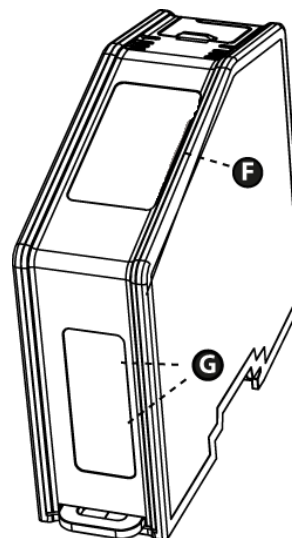
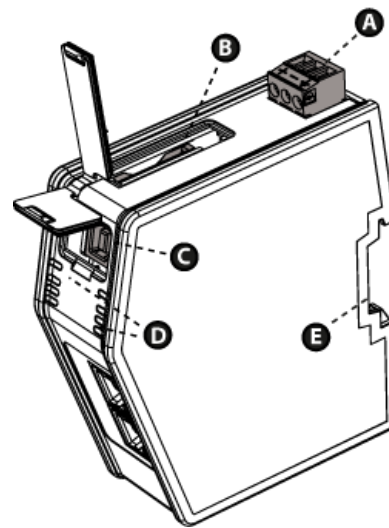
Currently not in use.

**C: USB Port**

This port adds the possibility to connect a PC to the linking device to perform firmware upgrades.

**D: Status LEDs****E: DIN Rail Connector**

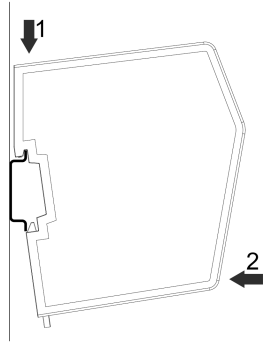
The DIN-rail mechanism fastens the linking device to a DIN-rail and connects the module to protective earth (PE).

**F: EtherNet/IP Connectors****G: PROFIBUS Connector**

## 3.2 Mounting the Linking Device

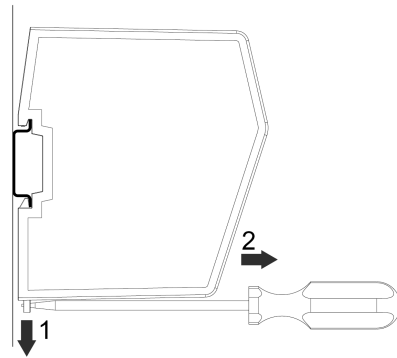
The EtherNet/IP to PROFIBUS DP Linking Device can be physically installed either by mounting it onto a DIN-rail or, if installed in areas exposed to vibration, by mounting it on a wall for more stability.

### 3.2.1 DIN-rail Mounting

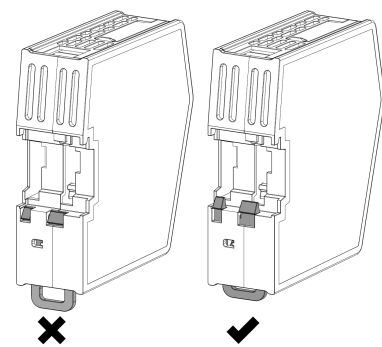


Make sure the DIN-rail fastening mechanism on the back of the module is in a fixed and closed position, i. e. pushed all the way up.

To mount the module, first hook it on to the DIN-rail (1), then push it against the DIN-rail to make it snap on (2).



To unmount the module, a screwdriver is needed. Use the screwdriver to push the DIN-rail fastening mechanism on the back of the module down until it locks in a fixed and open position (1). Then unhook the module from the DIN-rail (2).



Do not leave the module with the DIN-rail fastening mechanism in a fixed and open position. This may eventually wear the fastening mechanism out so it cannot be used efficiently. Be sure to push the DIN-rail fastening mechanism back into the fixed and closed position after demounting the module.

### 3.2.2 Wall Mounting

Use the wall mounting option if there is a need to place the linking device in an environment exposed to vibration. This way of mounting the module offers more stability than the traditional DIN-rail mounting.

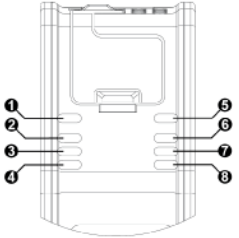


: The device should be fastened in a standing-up position, to ensure a constant air flow.

When mounting the device to a wall using the wall mount option, do not forget to connect the module to protective earth (PE) via the power connector.

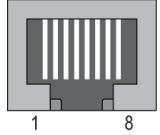
Step	Description	Visual Description
<b>1</b>	Open up the package containing the wall mounting accessories.  - One metal frame - Industrial velcro - Four plastic vibration dampers	
<b>2</b>	Remove the plastic protection from one side of the velcro.  Attach the velcro to the metal frame.  Attach the four plastic vibration dampers to the linking device, on the side that will face the wall.	
<b>3</b>	Remove the plastic protection from the other side of the velcro.	
<b>4</b>	Turn the device around, so that the plastic vibration dampers face downwards.  Fasten the metal frame to the device by pressing the frame firmly against the device, making the two velcro parts attach to each other.	
<b>5</b>	Attach the metal frame and the device to a wall using screws and washers (not enclosed).	

### 3.3 Status LEDs

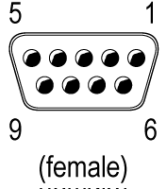
Name	Indication	Meaning	
(MS EN) Module Status	Off Flashing green  Green  Orange Flashing red Red	Power off Not configured, or scanner in idle state Controlled by a scanner in run state Boot up Recoverable error Fatal error	
(NS) Network Status	Off Flashing green Green  Orange Flashing red Red	No IP address Online, no connection Online, connection established Boot up Timeout Duplicate IP address, fatal error	
(Link 1, Link 2) Ethernet Link 1 & 2	Off Flashing green  Yellow Flashing yellow	No link Receiving/transmitting Ethernet packets at 100 Mbit Boot up Receiving/transmitting Ethernet packets at 10 Mbit	
(MS PB) Master Status	Off Red Flashing green Green	Master is offline Master in STOP mode Master in CLEAR mode Master in OPERATE mode	
(DB) Database Status	Off Green Flashing green  Red	No database Database OK Database download in progress Database invalid	
(CS) Communication Status	Off Green  Flashing green  Red	No data exchange Data exchange with all slaves Data exchange with at least one slave Bus control error	
(TH) Token Hold	Off  Green	Another station holds the Token Master interface holds the Token	

**i** At power-up, LED 1 - 2 will indicate solid orange and LED 3 - 4 will indicate solid yellow for 15 - 30 seconds. This will be followed by a LED test sequence, performed on the (MS EN) Module Status and (NS) Network Status LEDs.

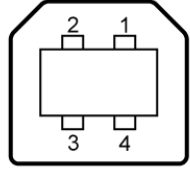
### 3.4 EtherNet/IP Connectors

Pin no	Description	Connector
1	TX+	
2	TX-	
3	RX+	
6	RX-	
4, 5, 7, 8	Not connected	
Housing	Shield	

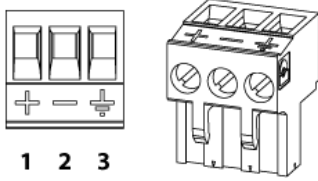
### 3.5 PROFIBUS Connector

Pin no	Description	Connector
3	B-Line	 (female)
4	RTS	
5	GND Bus	
6	+5 V Bus Out	
8	A-Line	
1, 2, 7, 9	Not connected	
Housing	FE (Functional Earth)	

### 3.6 USB Connector

Pin no	Description	Connector
1	+5 V Input	
2	USBDM (USB communication signals)	
3	USBDP (USB communication signals)	
4	Signal GND	
Housing	Cable shield	

### 3.7 Power Connector

Pin no	Description	Connector
1	+24 V DC	 1 2 3
2	GND	
3	FE (Functional Earth)	

## 4 The Linking Device Web Interface

The web page interface for the linking device is accessible via the USB port.

1. Connect a PC to the USB port on the linking device.
2. Open a web browser.
3. Open the linking device overview web page via IP 192.168.10.1.

## 4.1 Overview

This page provides general information about the linking device.

[illegible]

## 4.2 Firmware Update

Via the firmware page, it is possible to update the firmware in the linking device. The Firmware Update Log presents information about the latest firmware update.

To update the firmware, find the firmware file (.swu) on the computer, and press install. The linking device will restart two times during the process.

OVERVIEW

Home

SYSTEM

Firmware update

Diagnostics

Select a firmware package file (\*.swu) for upload.

Välj fil

Ingen fil har valts

Install

Firmware Update log

Firmware update started!  
Rebooting to apply update...  
Updating the main system... This may take a while.  
The main system has been updated successfully.  
Rebooting into main system.  
PROFIBUS Master Bootloader already at version: 2.8.1, skipping update.  
PROFIBUS Master module already at version:1.3.1, skipping update.  
EtherNet/IP module already at version: 1.4.1, skipping update.  
Update complete!

## 4.3 Diagnostics

The diagnostic web page provides information about the system and, if available, logs of fatal events.

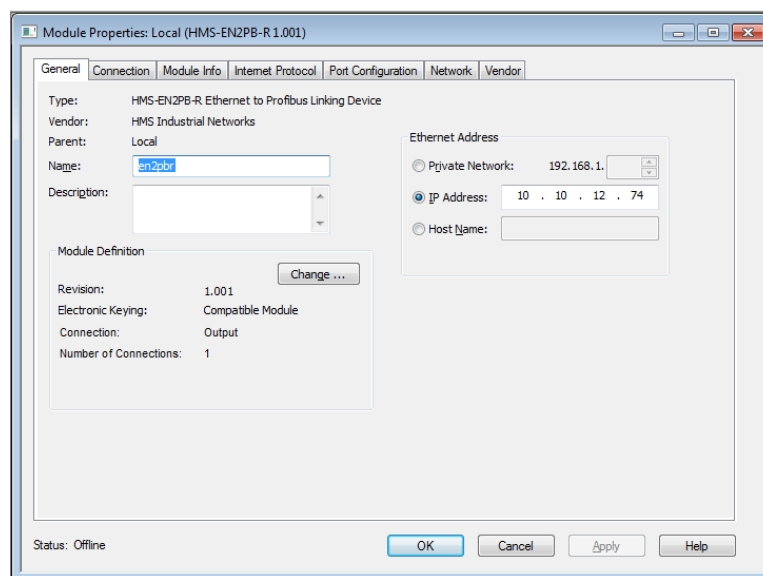
OVERVIEW	Diagnostics	
Home	System Snapshot	Download
SYSTEM	Fatal Snapshot	Download
Firmware update		Clear
Diagnostics	Fatal Log	

## 5 Studio 5000 Implementation Example

This section will be a guide through all steps necessary to create a basic configuration for the EtherNet/IP to PROFIBUS DP Linking Device.

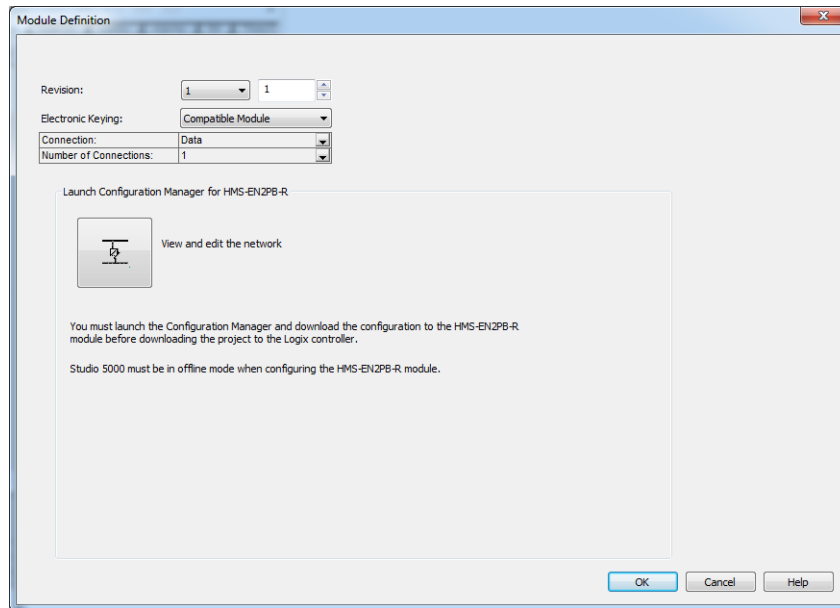
### 5.1 Step by Step Guide

1. Start the Studio 5000 software. Expand the “I/O Configuration” folder in the tree view. Right-click “Ethernet” and select “New Module”.
2. Select the HMS-EN2PB-R linking device and click “Create”.
3. In the “New Module” window, assign a name to the module. The IP address should be set via the BOOTP-DHCP server and entered in the IP address field. Click “Change” in the “Module Definition” section.

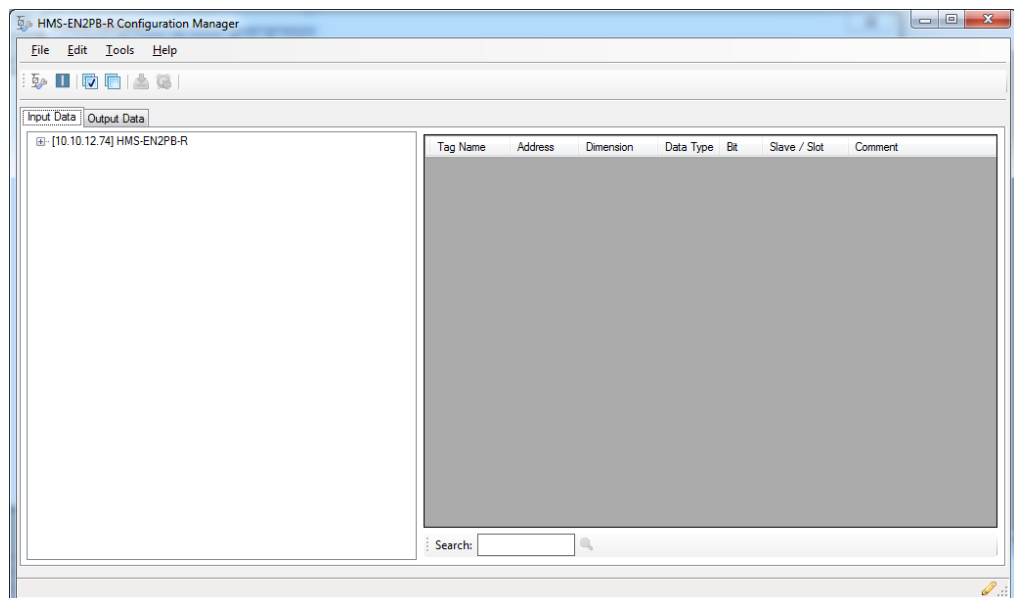




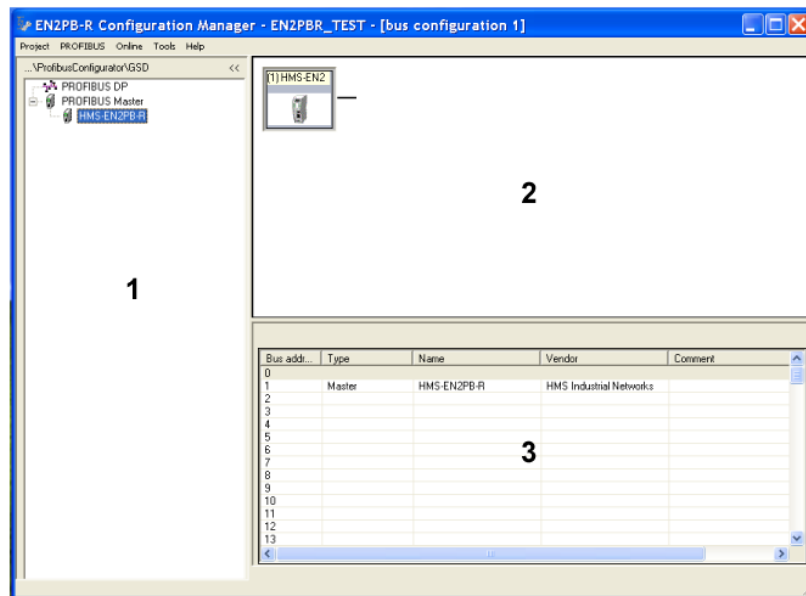
4. In the “Module Definition” window, launch the configuration manager for the HMS-EN2PB-R linking device.



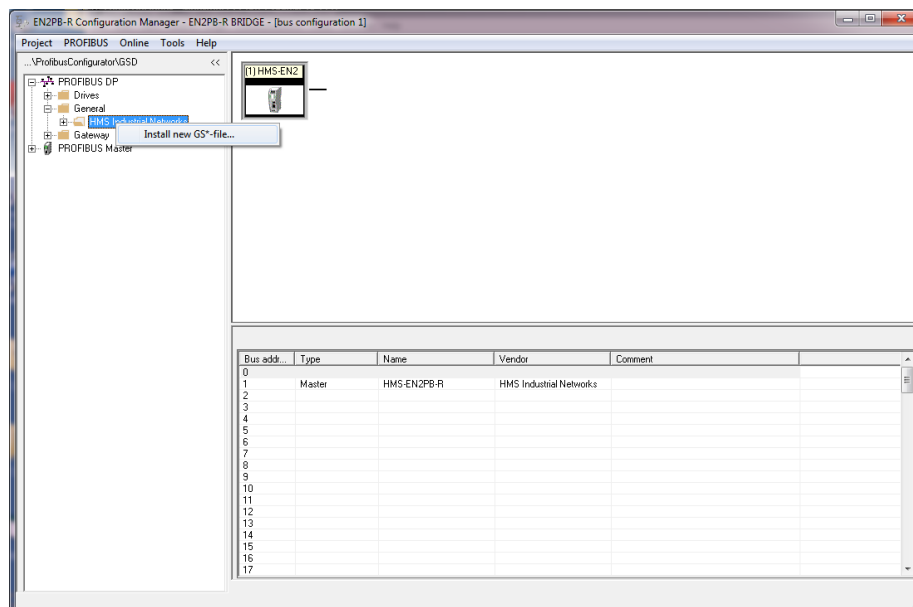
5. This part of the configuration manager is called the tag editor. Since this is a new configuration, the editor is empty. To proceed, open the HMS-EN2PB-R configuration tool by clicking the left-most icon in the tool bar.



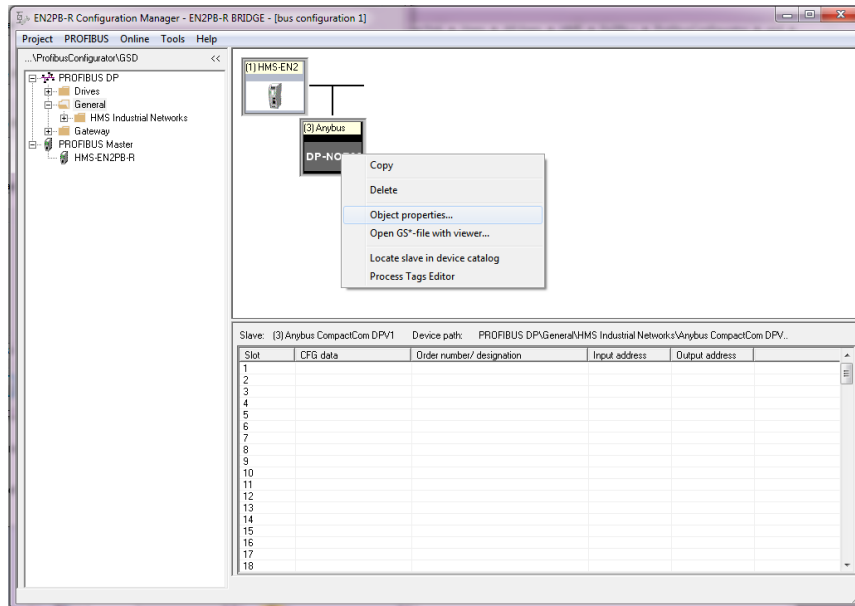
6. The bus view window consists of three parts.
- 1. A tree view of all connected devices
  - 2. A graphical view of the connected devices in the network
  - 3. A list view for input/output data and slave properties



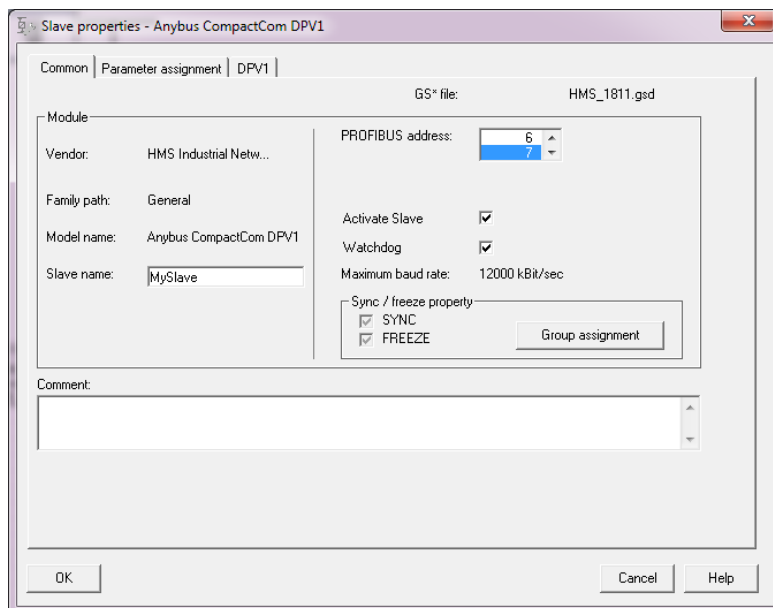
7. Add a slave by right-clicking on the “General” folder in the tree view. Choose “Install new .GS\* file”. In this case, an Anybus-S DPV1 is used.



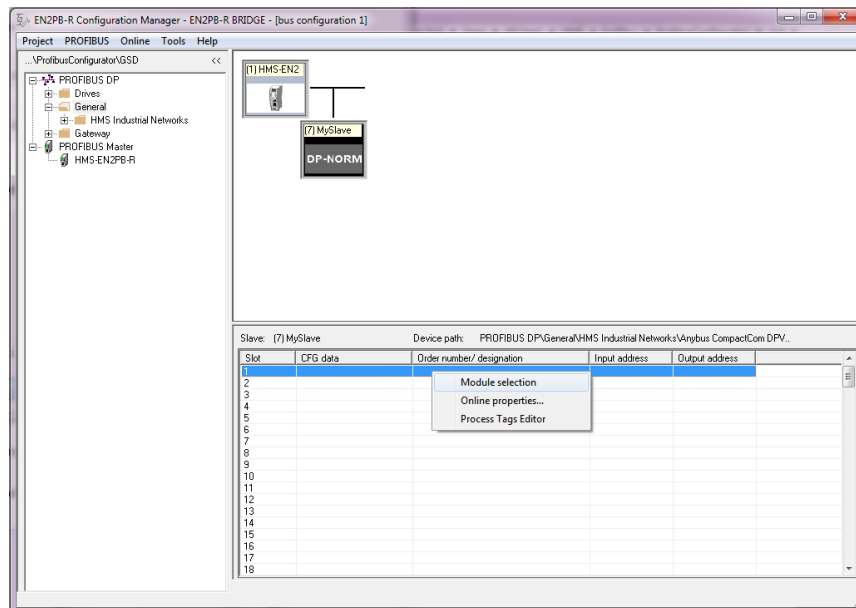
8. Right-click the slave to bring up the slave properties window.



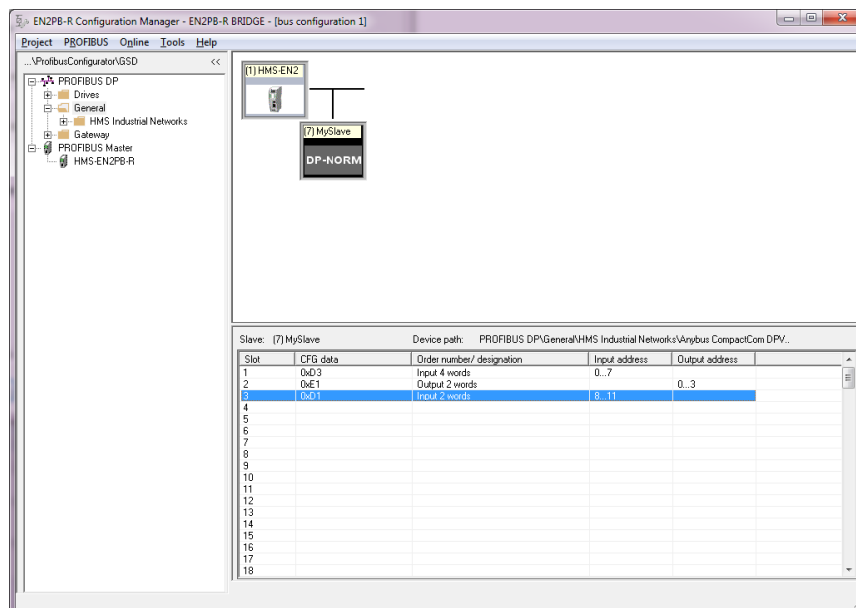
9. Set the name of the slave and set the PROFIBUS slave address



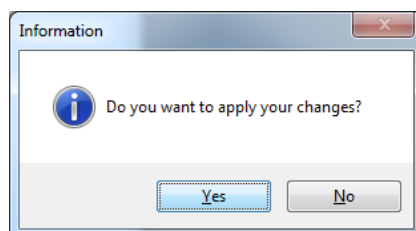
10. Right-click in the list view, and choose “Module selection”.



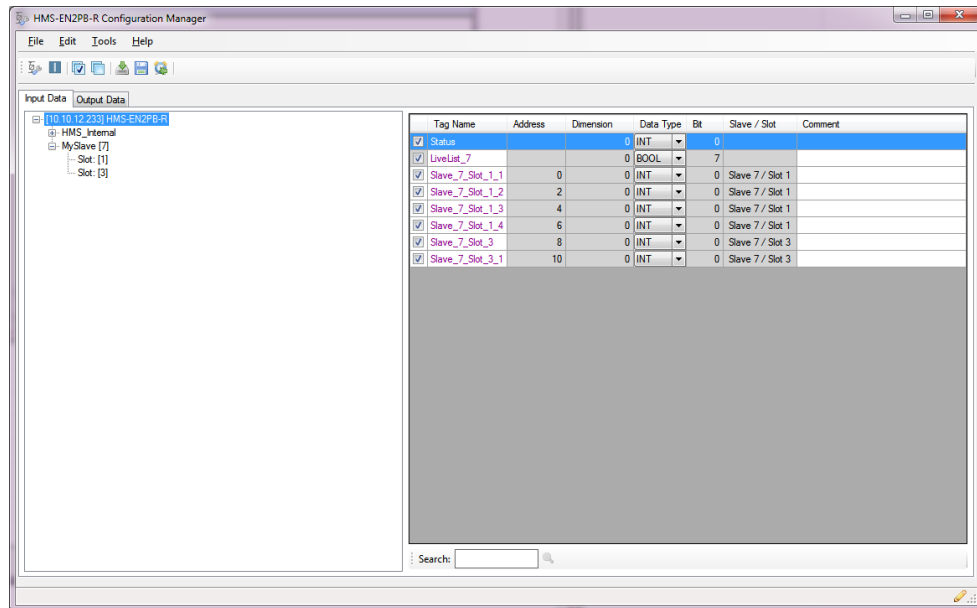
11. Add input/output data to the slave. In this case, there are three transactions.



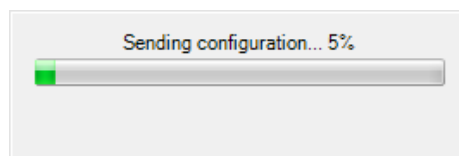
12. When the configuration is finished, close the bus view window. Click “Yes” to apply the new configuration and transfer it to the tag editor.



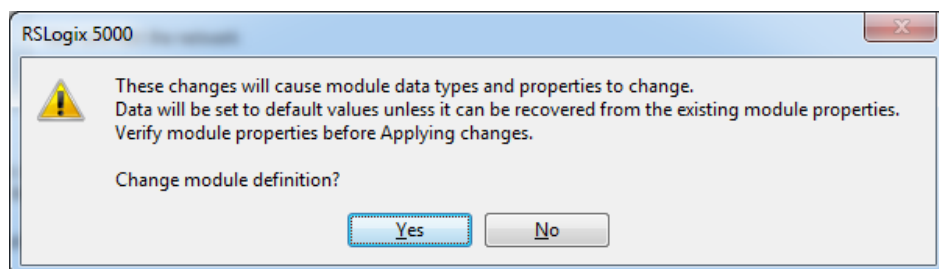
13. The tag editor is now updated with Studio 5000 tags. All transactions are visible under the “Input Data” and “Output data” tabs.



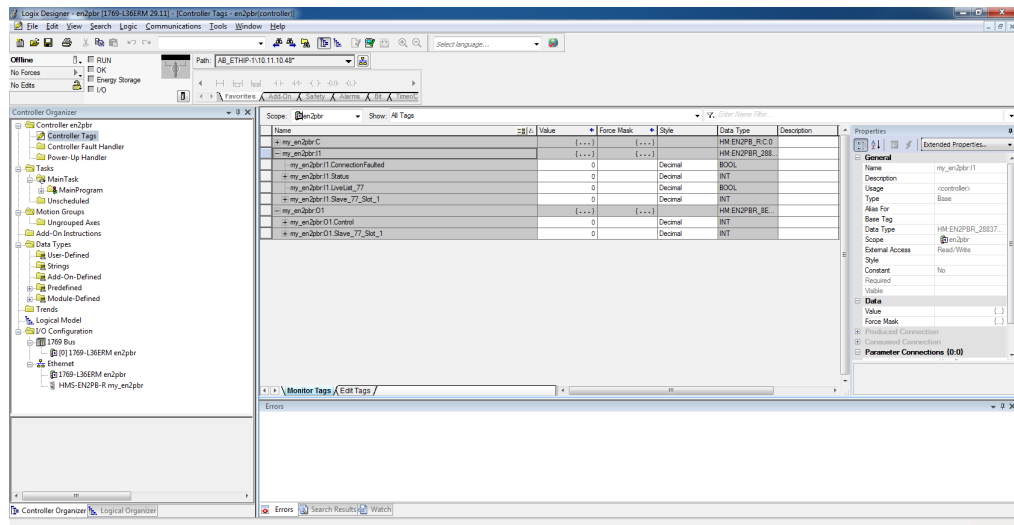
14. Download the configuration to the linking device by clicking the download icon in the tool bar. The progress bar will indicate the progress.



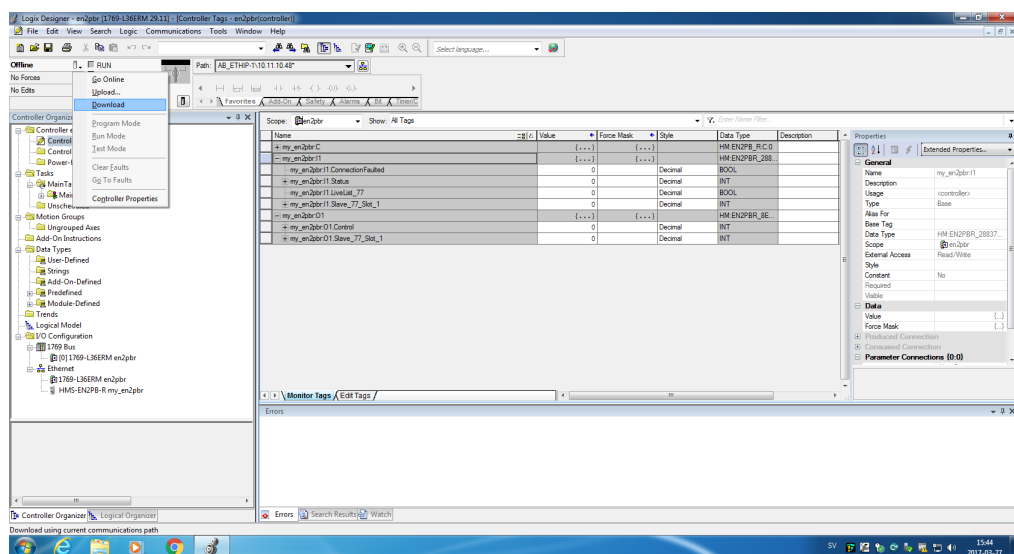
15. Close the tag editor.
16. Close the “Module Definition” window. Click “Yes” in the RSLogix 5000 information window, to change the module definition in the Studio 5000 environment.



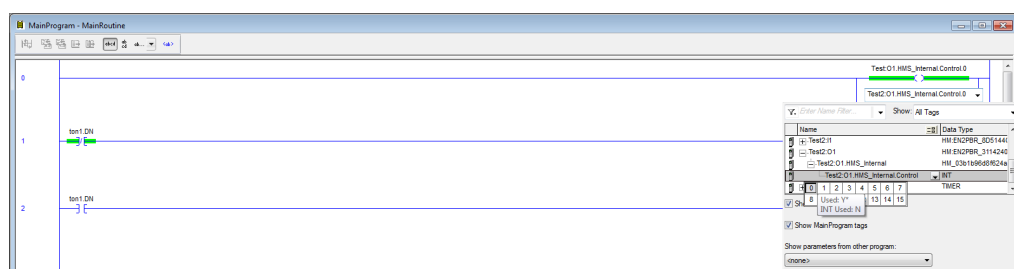
17. The tags for the configuration are now imported into Studio 5000.



18. Download the configuration to the Studio 5000 project by right-clicking the computer icon and then choosing “Download”.



19. To run the application, set the least significant bit in the control word to “y”.



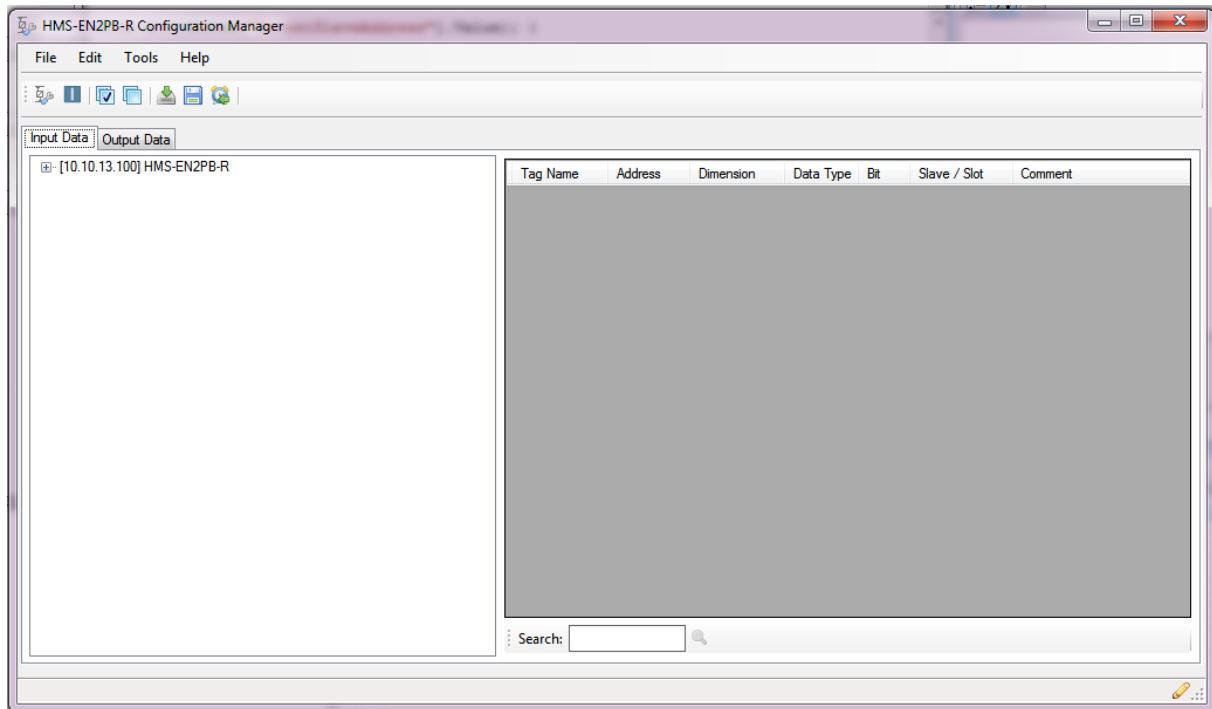
## 6 Tag Editor

The tag editor is supported by Windows 7 and later.

### 6.1 Tag Editor Overview

Initially, the tag editor looks like this.

The pen symbol in the lower right corner tells if the PLC is online or offline. No configuration is possible while the PLC is online.



#### 6.1.1 Menu Choices

##### File

- **Import**  
Import a configuration from the hard drive.
- **Export**  
Export a configuration from the hard drive.
- **Exit**

##### Edit

- **Select All**
- **Deselect All**

##### Tools

- **Edit PROFIBUS Configuration**  
This option will launch the PROFIBUS configuration manager.

- **Download Configuration to EN2PB-R**  
Download the configuration to the linking device.
- **Launch IPConfig**  
With the IPConfig tool, it is possible to scan for devices and alter IP settings for the linking device.
- **Reboot**
- **Factory Reset**  
Resets the linking device to default values.
- **Restore**  
Loads the latest stored configuration from Studio 5000.
- **Options**
  - Hide report on retrieve of PROFIBUS configuration.
  - Group tags on PLC (by PROFIBUS slave)

## Help

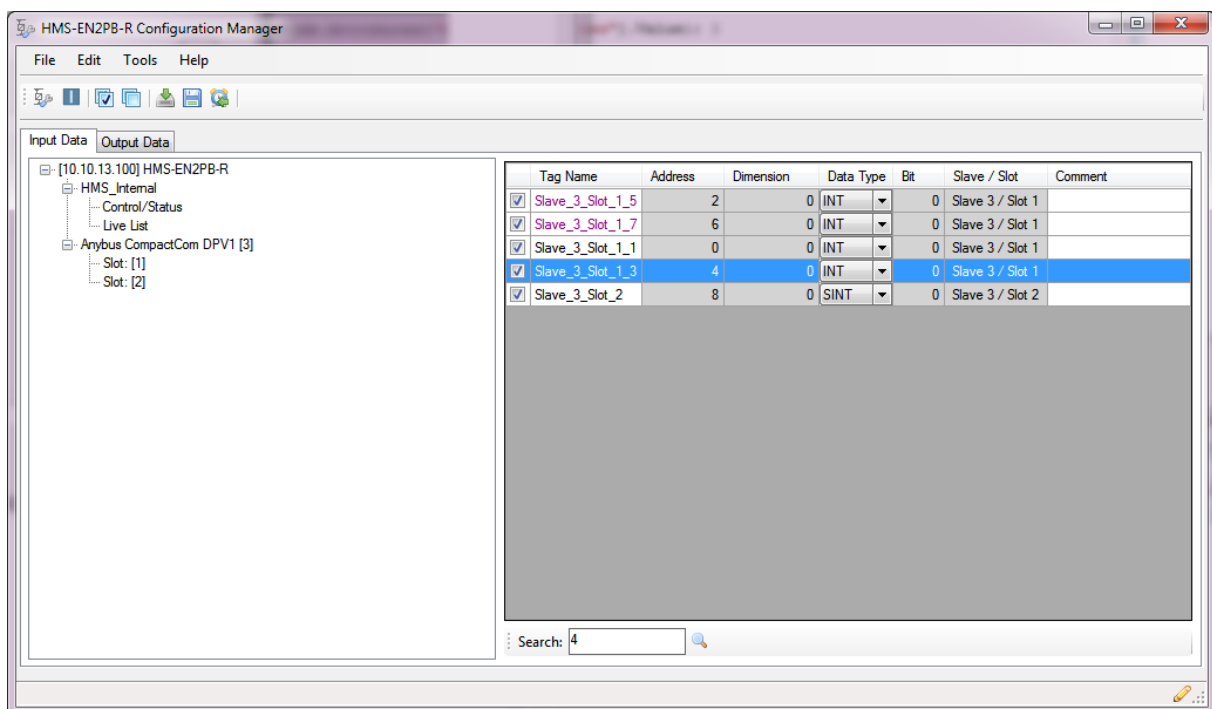
- **About**

## 6.2 Tag Editor Basics

When the PROFIBUS configuration tool is closed after configuration, the tag editor will be filled with resulting Studio 5000 tags.

Tags that are new or altered since last time, will be presented in magenta color.

In the left most column, check boxes makes it possible to choose which tags should be exported to the Studio 5000 environment. Only tags that are checked will be exported.





## 6.3 Tag Rule Definitions



The default and automatically generated tags will follow and adhere to the rules below. This list is only informative.

When adding process tags (controller tags) to the configuration the following rules must apply:

- The designated memory address of the process tag must be inside the process data area boundaries.
- The memory address of the process tag must be divisible by four, for data types DINT or REAL or a tag whose dimension is above zero.
- The memory address of the process tag must be dividable by two for data type INT.
- Two process tags can not occupy the same memory address area on the EtherNet/IP side.
- Two process tags can address the same memory address on the PROFIBUS side.
- The designated memory address of the process tag must smaller than or equal to the corresponding designated memory address in the configuration.

# 7 CIP Objects

## 7.1 General Information

This chapter specifies the CIP-object implementation in the module. These objects can be accessed from the network, but not directly by the host application.

Mandatory objects

- [Identity Object \(01h\), p. 26](#)
- [Message Router \(02h\), p. 28](#)
- [Assembly Object \(04h\), p. 29](#)
- [Connection Manager \(06h\), p. 31](#)
- [DLR Object \(47h\), p. 34](#)
- [QoS Object \(48h\), p. 35](#)
- [TCP/IP Interface Object \(F5h\), p. 36](#)
- [Ethernet Link Object \(F6h\), p. 39](#)

It is possible to implement additional CIP-objects in the host application using the CIP forwarding functionality.

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

## 7.2 Translation of Status Codes

If an error occurs when an object is requested from the application, an error code is returned. These HMS-EN2PB-R error codes are translated to CIP status codes according to the table below.

Linking Device Error Code		CIP Status Code	
Value	Error	Value	Status
00h	Reserved	1Eh	Embedded service error
01h	Reserved	1Eh	Embedded service error
02h	Invalid message format	1Eh	Embedded service error
03h	Unsupported object	05h	Path destination unknown
04h	Unsupported instance	05h	Path destination unknown
05h	Unsupported Command	08h	Service not supported
06h	Invalid CmdExt(0)	14h	Depending on Anybus CompactCom Service returning this reply, e.g. attribute not supported
07h	Invalid CmdExt(1)	-	Depending on Anybus CompactCom Service returning this reply
08h	Attribute not settable	0Eh	Attribute not settable
09h	Attribute not gettable	2Ch	Attribute not gettable
0Ah	Too Much Data	15h	Too much data
0Bh	Not Enough Data	13h	Not enough data
0Ch	Out of range	09h	Invalid attribute value
0Dh	Invalid state	0Ch	Object state conflict
0Eh	Out of resources	02h	Resource unavailable
0Fh	Segmentation failure	1Eh	Embedded service error
10h	Segmentation buffer overflow	23h	Buffer overflow
11h	Value too high	09h	Invalid attribute value
12h	Value too low	09h	Invalid attribute value

Linking Device Error Code		CIP Status Code	
Value	Error	Value	Status
13h	Attribute controlled	0Fh	A permission/privilege check failed
14h	Message channel too small	11h	Reply data too large
FFh	Object Specific Error	1Fh	Vendor specific error. No additional error codes will be sent on EtherNet/IP
Other	-	1Eh	Embedded service error

## 7.3 Identity Object (01h)

### Category

Extended

### Object Description

The Identity Object provides identification of and general information about the module.

### 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)
2	Max instance	Get	UINT	Maximum instance number
3	Number of instances	Get	UINT	Number of instances

### Instance Attributes

#	Name	Access	Type	Value/Description
1	Vendor ID	Get	UINT	005Ah (HMS Industrial Networks AB)
2	Device Type	Get	UINT	000Ch (Communications Adapter)
3	Product Code	Get	UINT	0056h (HMS-EN2PB-R)
4	Revision	Get	Struct of: USINT USINT	Major and minor firmware revision
5	Status	Get	WORD	See Device Status table below
6	Serial Number	Get	UDINT	Unique serial number (assigned by HMS)
7	Product Name	Get	SHORT_STRING	"HMS-EN2PB-R"
11	Active language	Set	Struct of: USINT USINT USINT	Only English supported.
12	Supported Language List	Get	Array of: Struct of: USINT USINT USINT	Only English supported.

## Device Status

bit(s)	Name																		
0	Module Owned																		
1	(reserved)																		
2	Configured This bit shows if the product has other settings than "out-of-box". The value is set to true if the configured attribute in the Application Object is set and/or the module's NV storage is changed from default.																		
3	(reserved)																		
4... 7	Extended Device Status: <table> <tr> <td><u>Value:</u></td><td><u>Meaning:</u></td></tr> <tr> <td>0000b</td><td>Unknown</td></tr> <tr> <td>0010b</td><td>Faulted I/O Connection</td></tr> <tr> <td>0011b</td><td>No I/O connection established</td></tr> <tr> <td>0100b</td><td>Non volatile configuration bad</td></tr> <tr> <td>0101b</td><td>Major fault</td></tr> <tr> <td>0110b</td><td>Connection in Run mode</td></tr> <tr> <td>0111b</td><td>Connection in Idle mode</td></tr> <tr> <td>(other)</td><td>(reserved)</td></tr> </table>	<u>Value:</u>	<u>Meaning:</u>	0000b	Unknown	0010b	Faulted I/O Connection	0011b	No I/O connection established	0100b	Non volatile configuration bad	0101b	Major fault	0110b	Connection in Run mode	0111b	Connection in Idle mode	(other)	(reserved)
<u>Value:</u>	<u>Meaning:</u>																		
0000b	Unknown																		
0010b	Faulted I/O Connection																		
0011b	No I/O connection established																		
0100b	Non volatile configuration bad																		
0101b	Major fault																		
0110b	Connection in Run mode																		
0111b	Connection in Idle mode																		
(other)	(reserved)																		
8	Set for minor recoverable faults.																		
9	Set for minor unrecoverable faults.																		
10	Set for major recoverable faults.																		
11	Set for major unrecoverable faults.																		
12... 15	(reserved)																		

## Service Details: Reset

There are two types of network reset requests on EtherNet/IP:

<b>Type 0: Power Cycling Reset</b>	This service power cycles the module.
<b>Type 1: Out of box reset</b>	This service sets an "out of box" configuration (all configuration data will be erased) and performs a reset.

## 7.4 Message Router (02h)

### Category

Extended

### Object Description

The Message Router Object provides a messaging connection point through which a client may address a service to any object class or instance residing in the physical module.

In the HMS-EN2PB-R module it is used internally to direct object requests.

### Supported Services

Class: -

Instance: -

### Class Attributes

-

### Instance Attributes

-

## 7.5 Assembly Object (04h)

### Category

Extended

### Object Description

The Assembly object uses static assemblies and holds the Process Data sent/received by the host application. It allows data to and from each object to be sent or received over a single connection. The default assembly instance IDs used are 100-109 and 150-159.

It is possible for the application to create and support up to ten consuming and ten producing instances.

The terms “input” and “output” are defined from the network’s point of view. An input will produce data on the network and an output will consume data from the network.

See also ....

- Assembly Mapping Object (see Anybus CompactCom 40 Software Design Guide)

### 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	Maximum instance number

### Instance 03h Attributes (Heartbeat, Input-Only)

This instance is used as heartbeat for Input-Only connections. The data size of the Heartbeat instance in the Forward\_Open-request should be 0 bytes, however other values are also permitted.

#	Name	Access	Type	Value/Description
3	Data	Set	N/A	- (The data size of this attribute is zero)
4	Size	Get	UINT	0 (Number of bytes in attribute 3)

### Instance 04h Attributes (Heartbeat, Listen-Only)

This instance is used as heartbeat for listen-only connections. The data size of the Heartbeat instance in the Forward\_Open-request should be 0 bytes, however other values are also permitted.

#	Name	Access	Type	Value/Description
3	Data	Set	N/A	- (The data size of this attribute is zero)
4	Size	Get	UINT	0 (Number of bytes in attribute 3)

### Instance 05h Attributes (Configuration Data)

Configuration Data that is sent through the service Forward\_Open will be written to this instance.

#	Name	Access	Type	Value/Description
3	Data	Set	N/A	- (Configuration data written to the application when the forward open command has the configuration data included)- (The data size of this attribute is zero)
4	Size	Get	UINT	0 (Number of bytes in attribute 3)

### Instance 06h Attributes (Heartbeat, Input-Only Extended)

This instance is used as heartbeat for input-only extended connections, and does not carry any attributes. The state of connections made to this instance does not affect the state of the HMS-EN2PB-R module, i.e. if the connection times out, the module does not switch to the Error state. The data size of the Heartbeat instance in the Forward\_Open-request should be 0 bytes, however other values are also permitted.

#	Name	Access	Type	Value/Description
3	Data	Set	N/A	- (The data size of this attribute is zero)
4	Size	Get	UINT	0 (Number of bytes in attribute 3)

### Instance 07h Attributes (Heartbeat, Listen-Only Extended)

This instance is used as heartbeat for listen-only extended connections, and does not carry any attributes. The state of connections made to this instance does not affect the state of the Anybus CompactCom 40 module, i.e. if the connection times out, the module does not switch to the Error state. The data size of the Heartbeat instance in the Forward\_Open-request should be 0 bytes, however other values are also permitted.

#	Name	Access	Type	Value/Description
3	Data	Set	N/A	- (The data size of this attribute is zero)
4	Size	Get	UINT	0 (Number of bytes in attribute 3)

### Instance 64h Attributes (Producing Instance)

#	Name	Access	Type	Value/Description
3	Produced Data	Get	Array of BYTE	This data corresponds to the Write Process Data.
4	Size	Get	UINT	Number of bytes in attribute 3

### Instance 96h Attributes (Consuming Instance)

#	Name	Access	Type	Value/Description
3	Produced Data	Get	Array of BYTE	This data corresponds to the Read Process Data.
4	Size	Get	UINT	Number of bytes in attribute 3



## 7.6 Connection Manager (06h)

### Category

Extended

### Object Description

This object is used for connection and connectionless communications, including establishing connections across multiple subnets.

### Supported Services

<b>Class:</b>	-
<b>Instance:</b>	Get Attribute All
	Get Attribute Single
	Set Attribute Single
	Large_Forward_Open
	Forward_Open
	Forward_Close
	Unconnected Send (when unconnected routing is enabled)

### Class Attributes

(No supported class attributes)

### Instance Attributes

#	Name	Access	Type	Value/Description
1	Open Requests	Set	UINT	Number of Forward Open service requests received.
2	Open Format Rejects	Set	UINT	Number of Forward Open service requests which were rejected due to bad format.
3	Open Re-source Rejects	Set	UINT	Number of Forward Open service requests which were rejected due to lack of resources.
4	Open Other Rejects	Set	UINT	Number of Forward Open service requests which were rejected for reasons other than bad format or lack of resources.
5	Close Requests	Set	UINT	Number of Forward Close service requests received.
6	Close Format Rejects	Set	UINT	Number of Forward Close service requests which were rejected due to bad format.
7	Close Other Rejects	Set	UINT	Number of Forward Close service requests which were rejected for reasons other than bad format.
8	Connection Timeouts	Set	UINT	Total number of connection timeouts that have occurred in connections controlled by this Connection Manager.

### Class 0 Connection Details

Not supported.

## Class 1 Connection Details

### General

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. Null forward open is supported.

**Total number of supported class 1 connections:** 10

**Max input connection size:** 500 bytes with Forward\_Open

**Max output connection size:** 496 bytes with Forward\_Open

**Supported RPI (Requested Packet Interval):** 5... 3200 ms

**T→O Connection type:** Point-to-point, Multicast, Null

**O→-T Connection type:** Point-to-point, Null

**Supported trigger types:** Cyclic, CoS (Change of State)

**Supported priorities:** Low, High, Scheduled, Urgent

**T** Target, in this case the module

**O** Origin, in this case the master

### Connection Types

- **Exclusive-Owner connection**

This type of connection controls the outputs of the HMS-EN2PB-R and does not depend on other connections.

**Max. no. of Exclusive-Owner connections:** 10

**Connection point O →T:** Assembly Object, instance 96h (Default)

**Connection point T →O:** Assembly Object, instance 64h (Default)

- **Input-Only connection**

Not supported.

- **Input-Only Extended connection**

Not supported.

- **Listen-Only connection**

Not supported.

- **Listen-Only Extended connection**

Not supported.

## Class 3 Connection Details

### General

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

<b>No. of simultaneous Class 3 connections:</b>	6
<b>Supported RPI (Requested Packet Interval):</b>	100... 10000 ms
<b>T→O Connection type:</b>	Point-to-point
<b>O→T Connection type:</b>	Point-to-point
<b>Supported trigger type:</b>	Application
<b>Supported connection size:</b>	1448 bytes with Large Forward Open

## 7.7 DLR Object (47h)

### Category

Extended

### Object Description

The Device Level Ring (DLR) Object provides the status information interface for the DLR protocol. This protocol enables the use of an Ethernet ring topology, and the DLR Object provides the CIP application-level interface to the protocol.

### Supported Services

**Class:** Get\_Attribute\_Single

Get\_Attributes\_All

**Instance:** Get\_Attribute\_Single

### Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0003h (Object revision)

### Instance Attributes

Attributes #1–4 and #6–7 can be customized by implementing the EtherNet/IP Host Object.

#	Name	Access	Type	Value/Description
1	Network Topology	Get	USINT	<u>Bit:</u> 0 "Linear" 1 "Ring"
2	Network Status	Get	USINT	<u>Bit:</u> 0 "Normal" (N/A) 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: 6 USINTs	This attribute holds the IP address (IPv4) and/or the Ethernet Mac address of the active ring supervisor.
12	Capability Flags	Get	DWORD	82h (Beacon-based ring node, Flush_Table frame capable)

## 7.8 QoS Object (48h)

### Category

Extended

### Object Description

Quality of Service (QoS) is a general term that is applied to mechanisms used to treat traffic streams with different relative priorities or other delivery characteristics. Standard QoS mechanisms include IEEE 802.1D/Q (Ethernet frame priority) and Differentiated Services (DiffServ) in the TCP/IP protocol suite.

The QoS Object provides a means to configure certain QoS related behaviors in EtherNet/IP devices.

The object is required for devices that support sending EtherNet/IP messages with nonzero DiffServ code points (DSCP), or sending EtherNet/IP messages in 802.1Q tagged frames.

### 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 Attributes

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

## 7.9 TCP/IP Interface Object (F5h)

### Category

Extended

### Object Description

This object provides the mechanism to configure the TCP/IP network interface of the module. It groups the TCP/IP-related settings in one instance for each TCP/IP capable communications interface.

### Supported Services

<b>Class:</b>	Get_Attribute_All
	Get_Attribute_Single
<b>Instance:</b>	Get_Attribute_All
	Get_Attribute_Single
	Set_Attribute_Single

### Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0004h (Object revision)
2	Max instance	Get	UINT	1 (Maximum instance number)
3	Number of instances	Get	UINT	1 (Number of instances)
6	Maximum ID Number Class Attributes	Get	UINT	7 (The attribute number of the last implemented class attribute)
7	Maximum ID Number Instance Attributes	Get	UINT	13 (The attribute number of the last implemented instance attribute)

## Instance Attributes

#	Name	Access	Type	Value	Comments
1	Status	Get	DWORD	-	<p><b>Bit:</b>      <b>Meaning:</b>  (reserved, set to 0)</p> <p>0–3      When set to h, 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.</p> <p>4      Multicast pending if set to 1.</p> <p>5      Interface configuration pending if set to 1. A new configuration will be loaded at the next reset.</p> <p>6      AcdStatus. Set to 1 if an address conflict is detected. Address conflict detection is enabled/disabled in attribute #10.</p> <p>7      AcdFault</p> <p>8–31      (reserved, set to 0)</p>
2	Configuration Capability	Get	DWORD	-	<p><b>Bit:</b>      <b>Meaning:</b>  0-3:      Always 4. For more information, consult the CIP specifications.</p> <p>4:      The 'Configuration Settable'-bit reflects the value of instance attribute #9 in the "Ethernet/IP Host Object (F8h)".</p> <p>5:      The module is hardware configurable when this bit is set to 1. The bit will be set if any of the address attributes is set in the Network Configuration Object (04h) during setup or if attribute #6 (Hardware configurable address) in the Application Object (FFh) is set.</p> <p>6:      Always 0. For more information, consult the CIP specifications.</p> <p>7:      If set to 1, the device is capable of detecting address conflicts. The bit is set to 0 if address conflict detection is disabled in the Ethernet Host Object.</p> <p>8 - 31:      (reserved, set to 0)</p>
3	Configuration Control	Get/Set	DWORD	-	<p><b>Value:</b>      <b>Meaning</b>  0:      Configuration from non-volatile memory  2:      Configuration from DHCP</p>
4	Physical Link Object	Get	Struct of: UINT (Path size) Padded EPATH	- 0002h 20 F6 24 03h	- - Path to Ethernet Link Object, Instance #3
5	Interface Configuration	Get/Set	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	Host Name	Get/Set	STRING	-	Host name of the HMS-EN2PB-R
8	TTL Value	Get/Set	USINT	1	TTL value for EtherNet/IP multicast packets
9	Mcast Config	Set	Struct of:		IP multicast configuration
	Alloc Control		USINT	0	<b>Value:</b> <b>Meaning:</b>

#	Name	Access	Type	Value	Comments
					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 Ether-Net/IP
	Mcast Start Addr		UDINT	-	Starting multicast address from which to begin allocation
10	SelectAcd	Set	Bool	1	<u>Value:</u> Meaning: 0: Disable ACD 1: Enable ACD (Default). If ACD (address conflict detection) is enabled, bit 6 in attribute #1 will be set if an ACD conflict is detected. The Network Status LED will also indicate a detected conflict.
11	LastConflict-Detected	Set	Struct of:		ACD Diagnostic parameters Related to the last conflict detected.
	AcdActiviity		USINT	-	State of ACD activity when last conflict detected.
	RemoteMAC		ARRAY of 6 USINT	-	MAC address of remote node form the ARP PDU in which a conflict was detected.
	ArpPdu		ARRAY of 28 USINT	-	Copy of the raw ARP PDU in which a conflict was detected.
13	Encapsula-tion inactivity timeout	Set	UINT	0 - 3600	Number of seconds of inactivity before a TCP connec-tion is closed. 0: Disabled



## 7.10 Ethernet Link Object (F6h)

### Category

Extended

### Object Description

This object maintains link specific counters and status information for an IEEE 802.3 communications interface. Exactly one instance for each communications interface on the module is supported. Instances for internally accessible interfaces can also be supported.

### Supported Services

<b>Class:</b>	Get_Attributes_All
	Get_Attribute_Single
<b>Instance:</b>	Get_Attributes_All
	Get_Attribute_Single
	Set_Attribute_Single
	Get_And_Clear

### Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0004h (Object revision)
2	Max Instance	Get	UINT	1 or 3 (Maximum instance number)
3	Number of Instances	Get	UINT	1 or 3 (Number of instances)
6	Maximum ID Number Class Attributes	Get	UINT	7 (The attribute number of the last implemented class attribute.)
7	Maximum ID Number Instance Attributes	Get	UINT	11 (The attribute number of the last implemented instance attribute.)

### Instance Attributes

#	Name	Access	Type	Value	Comments
1	Interface Speed	Get	UDINT	10 or 100	Actual Ethernet interface speed.
2	Interface Flags	Get	DWORD	-	See table "Interface Flags" below.
3	Physical Address	Get	Array of 6 USINTs	(MAC ID)	Physical network address, i.e. assigned MAC address.
4	Interface Counters	Get	Struct of:		
	In Octets		UDINT	N/A	Octets received on the interface
	In Ucast Packets		UDINT	N/A	Unicast packets received on the interface
	In NUCast Packets		UDINT	N/A	Nonunicast packets received on the interface
	In Discards		UDINT	N/A	Inbound packets with unknown protocol
	In Errors		UDINT	N/A	Inbound packets that contain errors (does not include In discards)

#	Name	Access	Type	Value	Comments
	In Unknown Protos		UDINT	N/A	Inbound packets with unknown protocol
	Out Octets		UDINT	N/A	Octets sent on the interface
	Out Ucast Packets		UDINT	N/A	Unicast packets sent on the interface
	Out NUcast Packets		UDINT	N/A	Nonunicast packets sent on the interface
	Out Discards		UDINT	N/A	Outbound packets with unknown protocol
	Out Errors		UDINT	N/A	Outbound packets that contain errors (does not include Out discards)
5	Media Counters	Get	Struct of:		Media specific counters
	Alignment Errors		UDINT	N/A	Frames received that are not an integral number of octets in length
	FCS Errors		UDINT	N/A	Frames received that do not pass the FCS check
	Single Collisions		UDINT	N/A	Successfully transmitted frames that have experienced exactly one collision
	Multiple Collisions		UDINT	N/A	Successfully transmitted frames that have experienced more than one collision
	SQE Test Errors		UDINT	0	The number of times the SQE test error message is generated(Counter not provided with current PHY interface)
	Deferred Transmissions		UDINT	N/A	Frames for which the first transmission attempt is delayed because the medium is busy
	Late Collisions		UDINT	N/A	The number of times a collision is detected later than 512 bit-times into the transmission of a packet
	Excessive Collisions		UDINT	N/A	Frames for which a transmission fails due to excessive collisions
	MAC Transmit Errors		UDINT	N/A	Frames for which a transmission fails due to an internal MAC sublayer receive error
	Carrier Sense Errors		UDINT	N/A	The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame
	Frame Too Long		UDINT	N/A	Frames received that exceed the maximum permitted frame size
	MAC Receive Errors		UDINT	N/A	Frames for which reception on an interface fails due to an internal MAC sublayer receive error

#	Name	Access	Type	Value	Comments
6	Interface Control	Get/Set	Struct of:		
	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	Interface Type	Get	USINT	-	See table “Interface State” below.
8	Interface State	Get	USINT	-	See table “Interface Type” below.
9	Admin State	Get/Set	USINT	-	See table “Admin State” below.
10	Interface Label	Get	SHORT_STRING	—	See table “Interface Label” below.
11	Interface Capability	Get	Struct of:	-	Indication of the capabilities of the interface
	Capability Bits		DWORD	-	Interface capabilities, other than speed/duplex See table “Interface Capability” below.
	Speed/Duplex Options		Struct of:	-	Indicates speed/duplex pairs supported in the Interface Control Attribute
			USINT	-	Speed/duplex array count
			Array of Struct of:	-	Speed/duplex array
			UINT	-	Interface speed
			USINT	-	Interface Duplex Mode 0 = half duplex 1 = full duplex 2 - 255 = Reserved

## Interface Flags

Bit	Name	Description
0	Link status	Indicates whether or not the Ethernet 802.3 communications interface is connected to an active network.
		<div>Value:</div> <div>Meaning:</div> <div>0 Inactive link</div> <div>1 Active link</div>
1	Half/full duplex	Indicates the duplex mode currently in use.
		<div>Value:</div> <div>Meaning:</div> <div>0 Half duplex</div> <div>1 Full duplex</div>
2 - 4	Negotiation Status	Indicates the status of link auto-negotiation.
		<div>Value:</div> <div>Meaning:</div> <div>0 Auto-negotiation in progress.</div> <div>1 Auto-negotiation and speed detection failed (using default values) (Recommended default values are 10 Mbps, half duplex)</div> <div>2 Auto negotiation failed but detected speed (using default duplex value)</div> <div>3 Successfully negotiated speed and duplex.</div> <div>4 Auto-negotiation not attempted. Forced speed and duplex.</div>
5	Manual Setting requires Reset	Value: Meaning:
		<div>0 Interface can activate changes to link parameters during runtime</div> <div>1 Reset is required in order for changes to have effect</div>
6	Local Hardware Fault	Value: Meaning:
		<div>0 No local hardware fault detected</div> <div>1 Local hardware fault detected</div>
7-31	(reserved)	Set to 0.

## Interface State

This attribute indicates the current operational state of the interface.

Value	Description
0	Unknown interface state.
1	The interface is enabled and is ready to send and receive data.
2	The interface is disabled.
3	The interface is testing.

## Admin State

This attribute controls the administrative setting of the interface state.

Value	Description
0	(reserved)
1	Enable the interface.
2	Disable the interface.
3-255	(reserved)

## Interface Label

Instance	Value
1	Port 1
2	Port 2
3	Internal

## Interface Type

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

## Interface Capability

Bit	Name	Description	Implementation
0	Manual setting requires reset	Indicates that the device automatically applies changes made to the Interface Control attribute (#6) and, therefore, does not require a reset in order for changes to take effect. This bit shall have this value when the Interface Control attribute (#6) is not implemented.	Return 0
1	Auto-negotiate	0 Indicates that the interface does not support link auto-negotiation 1 Indicates that the interface supports link auto-negotiation	0 for internal interface, 1 for external interfaces
2	Auto-MDIX	0 Indicates that the interface does not support auto MDIX operation 1 Indicates that the interface supports auto MDIX operation	0 for internal interface, 1 for external interfaces
3	Manual speed/duplex	0 Indicates that the interface does not support manual setting of speed/duplex. The Interface Control attribute (#6) shall not be supported. 1 Indicates that the interface supports manual setting of speed/duplex via the Interface Control attribute (#6)	0 for internal interface, 1 for external interfaces
4 - 31	Reserved	Shall be set to 0	Return 0

## 7.11 PROFIBUS Master Object (301h)

### Category

Extended

### Object Description

-

### Supported Services

**Class:** Get\_Attribute\_Single

**Instance:** Get\_Attribute\_Single

### Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Object revision)
2	Max instance	Get	UINT	0001h (Maximum instance number)
3	Number of instances	Get	UINT	0001h (Only 1 instance)

### Instance Attributes

#	Name	Access	Type	Value/Description
1	Operation Mode	Get	USINT	The operation mode of the PROFIBUS master can be read here. 0x00 - OFFLINE (master is not initialized) (cannot be Set) 0x40 - STOP (master is not active on the network) 0x80 - CLEAR (master sends no valid data to slaves, but reads data) 0xC0 - OPERATE (master in normal mode)
2	Slave Configured List	Get	Array of 16 * USINT	Array of 16 bytes where each bit correspond to one slave. 0 - Slave is not part of PROFIBUS configuration. 1 - Slave is present in database.
3	Data Transfer List	Get	Array of 16 * USINT	Array of 16 bytes where each bit correspond to one slave. 0 - Slave is not in data exchange with master. 1 - Slave is in data exchange with master.
4	Slave Diagnostic List	Get	Array of 16 * USINT	Array of 16 bytes where each bit correspond to one slave. 0 - Slave does not have any diagnostic data. 1 - Slave has got diagnostics.

## 7.12 PROFIBUS Slave Object (302h)

### Category

Extended

### Object Description

Through this object it is possible to access acyclic PROFIBUS DP-V1 services from the EtherNet/IP-side.

The instance number corresponds to the PROFIBUS slave address.



*It is not possible to address a PROFIBUS slave with node address 0.*

## Supported Services

**Class:** Get\_Attribute\_Single

**Instance:** Get\_Attribute\_Single

Set\_Attribute\_Single

Class2\_Initiate

Class2\_Abort

Class2\_Read

Class2\_Write

Set\_Slave\_Address

Class1\_Read

Class1\_Write

## Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Object revision)
2	Max instance	Get	UINT	-
3	Number of instances	Get	UINT	007Eh (126 instances)
100	Class 2 Connection Live List	Get	Array of 16 * USINT	Array of 16 bytes where each bit correspond to one Class 2 connection. 0 - Connection not open. 1 - Connection established.

## Instance Attributes

#	Name	Access	Type	Value/Description
1	Is Configured	Get	BOOL	False – Slave is not part of PROFIBUS configuration. True – Slave is present in database.
2	In Data Transfer	Get	BOOL	False – Slave is not in data exchange with master. True – Slave is in data exchange with master.
3	Diagnostics Available	Get	BOOL	False – Slave does not have any diagnostic data currently. True – Slave has got diagnostics.
4	Diagnostics Data	Get	Array of USINT	Byte array with diagnostic data for the slave. Length of data is 6-244.
5	Start	Set	BOOL	False – Disable (Stop) slave True – Enable (Start) slave Enable or disable the data exchange for one particular slave. As default the data exchange is enabled.
6	Output Data	Get	Array of USINT	Output data for the selected slave. Data which is sent from the master to the slave. Array of bytes, from 0 - 244.
7	Input Data	Get	Array of USINT	Input data for the selected slave. Data which is sent from the slave to the master. Array of bytes, from 0 - 244.

## Service Details: Class2 Initiate

### Details

Service Code:	0x4B
Valid for:	Object Instance

## Description

This service opens up a Class 2 communication channel.

## Request

Name	Value	Description
Class	0x0302	-
Instance	1-125	Slave node address
Attribute	0	-

## Successful Response

If a successful response is received, the following data will be returned:

Offset	Type	Description
0	SINT	Slave address
1	SINT	Max data length
2-3	INT	Send timeout
4	SINT	Features supported 1
5	SINT	Features supported 2
6	SINT	Profile features supported 1
7	SINT	Profile features supported 2
8-9	INT	Profile ident number
10	SINT	S_Type
11	SINT	S_Length
12	SINT	D_Type
13	SINT	D_Length
16-M	Array of SINT	S_Address
(M+1)-N	Array of SINT	D_Address

## Error Response

If the service returns an error, General Status is set to error and the different error codes are passed.

Name	Value	Description
General Status	0x1F: Vendor specific Error	CIP general status code (object specific)
Size of Additional Status	4	-
Additional Status	0-1: Error decode	See the PROFIBUS specification for details. Only the lower byte is used.
	2-3: Error code 1/ Error code 2	See the PROFIBUS specification for details.
	4-5: Extended Fault Information	Only returned for certain error messages.
	6-7: Fault Information	-

## Service Details: Class2 Abort

### Details

Service Code:	0x4C
Valid for:	Object Instance

## Description

With this service a Class 2 connection can be aborted. Before this service can be used, a connection needs to be opened (using the Class2 Initiate service).

## Request

Name	Value	Description
Class	0x0302	-
Instance	1-125	Slave node address
Attribute	0	-

## Successful Response

If a successful response is received, no data will be returned.

## Error Response

If the service returns an error, General Status is set to error and the different error codes are passed.

Name	Value	Description
General Status	0x1F: Vendor specific Error	CIP general status code (object specific)
Size of Additional Status	4	-
	0-1: Extended Fault Information	Only returned for certain error messages.
	2-3: Fault Information	-

## Service Details: Class2 Read

### Details

Service Code:	0x4D
Valid for:	Object Instance

## Description

This service initiates a PROFIBUS DP-V1 Class 2 Read. Before this service can be used, a connection needs to be opened (using the Class2 Initiate service).

## Request

Name	Value	Description
Class	0x0302	-
Instance	1-125	Slave node address
Attribute	0	-
Data[0]: Slot	0-255	Slot number to address
Data[1]: Index	0-255	Index number to address
Data[2]: Length	1-240	Number of data bytes to request. Response can contain fewer bytes than requested

## Successful Response

Offset	Type	Description
0-N	Array of SINT	Data



## Error Response

If the service returns an error, General Status is set to error and the different error codes are passed.

Name	Value	Description
General Status	0x1F: Vendor specific Error	CIP general status code (object specific)
Size of Additional Status	4	-
Additional Status	0-1: Error decode	See the PROFIBUS specification for details. Only the lower byte is used
	2-3: Error code 1/ Error code 2	See the PROFIBUS specification for details
	4-5: Extended Fault Information	Only returned for certain error messages
	6-7: Fault Information	-

## Service Details: Class2 Write

### Details

Service Code:	0x4E
Valid for:	Object Instance

### Description

This service initiates a PROFIBUS DP-V1 Class 2 Write. Before this service can be used, a connection needs to be opened (using the Class2 Initiate service).

### Request

Name	Value	Description
Class	0x0302	-
Instance	1-125	Slave node address
Attribute	0	-
Data[0]: Slot	0-255	Slot number to address
Data[1]: Index	0-255	Index number to address
Data[2-N]: Data	-	The data to write. 1-240 bytes

## Successful Response

If a successful response is received, no data will be returned.

## Error Response

If the service returns an error, General Status is set to error and the different error codes are passed.

Name	Value	Description
General Status	0x1F: Vendor specific Error	CIP general status code (object specific)
Size of Additional Status	4	-
Additional Status	0-1: Error decode	See the PROFIBUS specification for details. Only the lower byte is used
	2-3: Error code 1/ Error code 2	See the PROFIBUS specification for details
	4-5: Extended Fault Information	Only returned for certain error messages
	6-7: Fault Information	-

## Service Details: SetSlaveAddress

### Details

Service Code:	0x4F
Valid for:	Object Instance

### Description

With this service, the PROFIBUS master can assign a node address to a PROFIBUS slave.

### Request

Name	Value	Description
Class	0x0302	-
Instance	1-126	Slave node address
Attribute	0	-
Data[0]: New slave address	0-126	New slave address
Data[1-2]: Slave ident number	0-0xFFFF	PROFIBUS ident number for the slave that shall receive a new address
Data[3]: No address change lock	0-255	0 – address can be changed again 1 – address can only be changed if the address is reset to 126 (using factory reset or similar)
Data[4-N]: Vendor specific data	-	Array of bytes with vendor specific data. 0-240 bytes

### Successful Response

If a successful response is received, optional data will be returned.

Offset	Type	Description
0-N	Array of SINT	Data

### Error Response

If the service returns an error, General Status is set to error and the different error codes are passed.

Name	Value	Description
General Status	0x1F: Vendor specific Error	CIP general status code (object specific)
Size of Additional Status	4	-
Additional Status	0-1: Error decode	See the PROFIBUS specification for details. Only the lower byte is used.
	2-3: Error code 1/ Error code 2	See the PROFIBUS specification for details.
	4-5: Extended Fault Information	Only returned for certain error messages.
	6-7: Fault Information	-

## Service Details: Class1 Read

### Details

Service Code:	0x50
Valid for:	Object Instance

### Description

This service initiates a PROFIBUS DP-V1 Class 1 Read.

**Request**

Name	Value	Description
Class	0x0302	-
Instance	1-125	Slave node address
Attribute	0	-
Data[0]: Slot	0-255	Slot number to address
Data[1]: Index	0-255	Index number to address
Data[2]: Length	1-240	Number of data bytes to request. Response can contain fewer bytes than requested

**Successful Response**

Offset	Type	Description
0-N	Array of SINT	Data

**Error Response**

If the service returns an error, General Status is set to error and the different error codes are passed.

Name	Value	Description
General Status	0x1F: Vendor specific Error	CIP general status code (object specific)
Size of Additional Status	4	-
Additional Status	0-1: Error decode	See the PROFIBUS specification for details. Only the lower byte is used
	2-3: Error code 1/ Error code 2	See the PROFIBUS specification for details
	4-5: Extended Fault Information	Only returned for certain error messages
	6-7: Fault Information	-

**Service Details: Class1 Write****Details**

Service Code:	0x51
Valid for:	Object Instance

**Description**

This service initiates a PROFIBUS DP-V1 Class1 Write.

**Request**

Name	Value	Description
Class	0x0302	-
Instance	1-125	Slave node address
Attribute	0	-
Data[0]: Slot	0-255	Slot number to address
Data[1]: Index	0-255	Index number to address
Data[2-N]: Data	-	The data to write. 1-240 bytes

**Successful Response**

If a successful response is received, no data will be returned.

## Error Response

If the service returns an error, General Status is set to error and the different error codes are passed.

Name	Value	Description
General Status	0x1F: Vendor specific Error	CIP general status code (object specific)
Size of Additional Status	4	-
Additional Status	0-1: Error decode	See the PROFIBUS specification for details. Only the lower byte is used
	2-3: Error code 1/ Error code 2	See the PROFIBUS specification for details
	4-5: Extended Fault Information	Only returned for certain error messages
	6-7: Fault Information	-

## 7.13 EN2PBR Object (303h)

### Category

Extended

### Object Description

...

### Supported Services

**Class:** Get\_Attribute\_Single

**Instance:** Get\_Attribute\_Single

### Class Attributes

#	Name	Access	Type	Value
1	Revision	Get	UINT	0001h (Object revision)
2	Max instance	Get	UINT	0001h (Maximum instance number)
3	Number of instances	Get	UINT	0001h (Only 1 instance)

### Instance Attributes

#	Name	Access	Type	Value/Description
1	Control word	Get	INT	Current control word (most recent received from the EtherNet/IP scanner)
2	Status word	Get	INT	Current status word
3	Product version	Get	Array of 2 * UINT	BCD-coded version number for the product First UINT High byte: Major version (0x01 == 1) Low byte: Minor version (0x02 == 2) Second UINT Build number (0x0009 == 9)
4	EtherNet/IP version	Get	Array of 2 * UINT	BCD-coded version number of the CompactCom device First UINT High byte: Major version (0x01 == 1) Low byte: Minor version (0x02 == 2) Second UINT Build number (0x0009 == 9)

#	Name	Access	Type	Value/Description
5	PROFIBUS master version	Get	UINT	BCD-coded version number of the PROFIBUS master High byte: Major version (0x01 == 1) Low byte: Minor version (0x02 == 2)
6	GUID	Get	Array of 16 * USINT	16 bytes GUID of the configuration
7	Configuration version supported	Get	UINT	1: This is the version of the configuration that the EN2PBR supports

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## **A Technical Specification**

### **A.1 Functional Earth (FE) Requirements**

In order to achieve proper EMC behavior, the product must be connected to functional earth (FE) via the DIN-rail connector. If the DIN-rail cannot be used, FE must be connected to the power connector.

HMS Industrial Networks does not guarantee proper EMC behavior unless these FE requirements are fulfilled.

**Note:** Make sure the DIN-rail is properly connected to FE.

### **A.2 Power Supply**

#### **A.2.1 Supply Voltage**

The HMS-EN2PB-R linking device requires a regulated 24 V (20.4 V to 28.8 V) DC power source.

#### **A.2.2 Power Consumption**

The typical power consumption is 220 mA at 24 V

The maximum power consumption is 300 mA at 24 V

### **A.3 Environmental Specification**

#### **A.3.1 Temperature Operating**

-25° to +60° Celsius, -13° to +140° F

#### **Nonoperating**

-40° to +85° Celsius, -40° to +185° F

#### **A.3.2 Relative Humidity**

The product is designed for a relative humidity of 5% to 95% noncondensing.

### **A.4 EMC (CE) Compliance**

EMC compliance testing has been conducted according to the Electromagnetic Compatibility Directive 2004/108/EC. For more information please consult the EMC compliance document, see product/support pages for EtherNet/IP to PROFIBUS DP Linking Device at [www.anybus.com](http://www.anybus.com).

## **B Copyright Notices**

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