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Linking Device

EtherNet/IP™ to PROFIBUS® DP

USER MANUAL

SCM-1202-026 1.0 ENGLISH

Connecting Devices™

Important User Information

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Table of Contents

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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.

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

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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

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	-	-

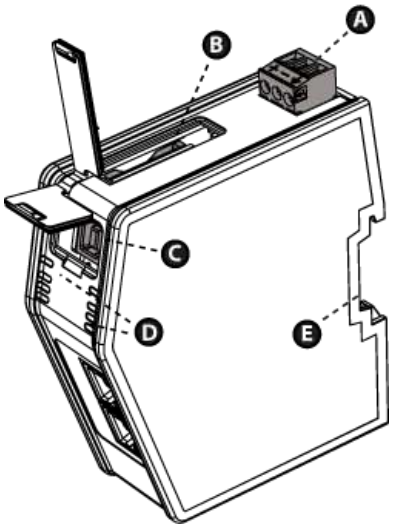
2.8 PROFIBUS Slave Live List

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



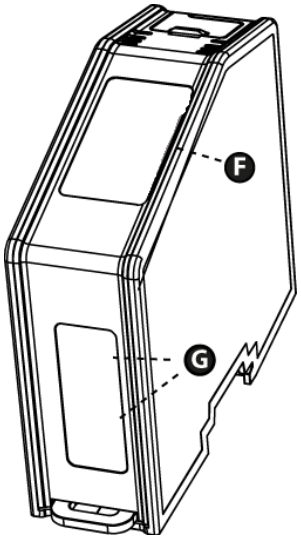
A: Power Connector
This connector is used to apply power to the linking device. It is also possible to connect protective earth (PE) to the power connector.

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).



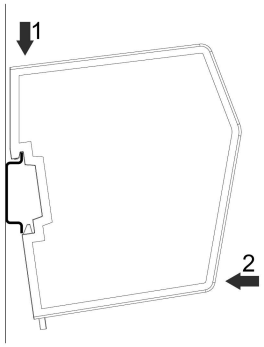
F: EtherNet/IP Connectors

G: PROFIBUS Connector

3.2 Mounting the Linking Device

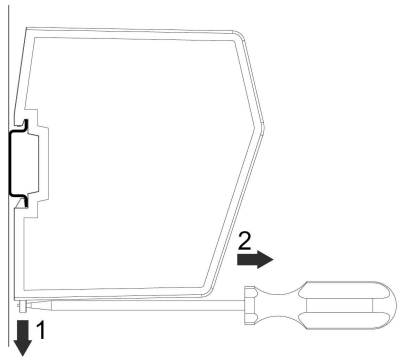
The EtherNet/IP to PROFIBUS DP Linking Device can be physically installed either by mounting it onto a DIN-rail or, if installed in areas exposed to vibration, by mounting it on a wall for more stability.

3.2.1 DIN-rail Mounting

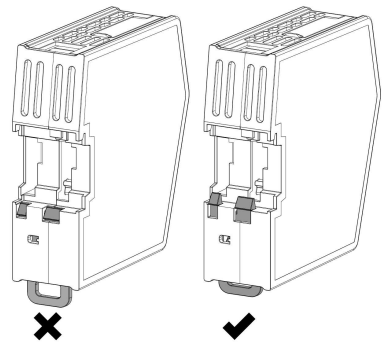


Make sure the DIN-rail fastening mechanism on the back of the module is in a fixed and closed position, i. e. pushed all the way up.

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).



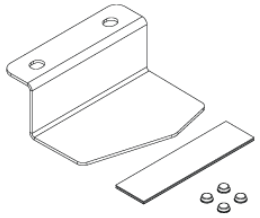
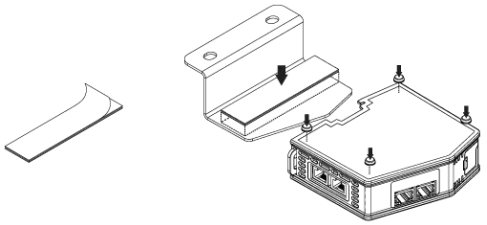
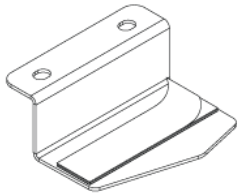
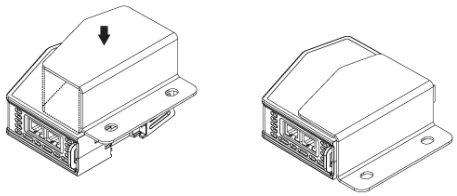
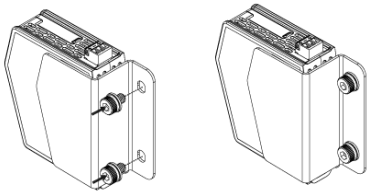
Do not leave the module with the DIN-rail fastening mechanism in a fixed and open position. This may eventually wear the fastening mechanism out so it cannot be used efficiently. Be sure to push the DIN-rail fastening mechanism back into the fixed and closed position after demounting the module.

3.2.2 Wall Mounting

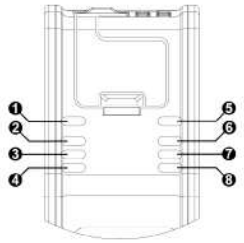
Use the wall mounting option if there is a need to place the linking device in an environment exposed to vibration. This way of mounting the module offers more stability than the traditional DIN-rail mounting.

: 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.

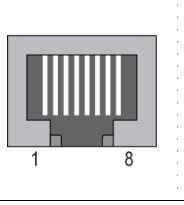
Step	Description	Visual Description
1	Open up the package containing the wall mounting accessories. - One metal frame - Industrial velcro - Four plastic vibration dampers	
2	Remove the plastic protection from one side of the velcro. Attach the velcro to the metal frame. Attach the four plastic vibration dampers to the linking device, on the side that will face the wall.	
3	Remove the plastic protection from the other side of the velcro.	
4	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.	
5	Attach the metal frame and the device to a wall using screws and washers (not enclosed).	

3.3 Status LEDs

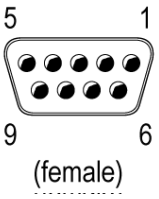
Name	Indication	Meaning	
(MS EN) Module Status	Off Flashing green Green Orange Flashing red Red	Power off Not configured, or scanner in idle state Controlled by a scanner in run state Boot up Recoverable error Fatal error	
(NS) Network Status	Off Flashing green Green Orange Flashing red Red	No IP address 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	

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.

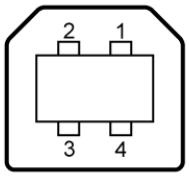
3.4 EtherNet/IP Connectors

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

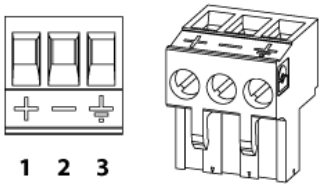
3.5 PROFIBUS Connector

Pin no	Description	Connector
3	B-Line	
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	
2	GND	
3	FE (Functional Earth)	

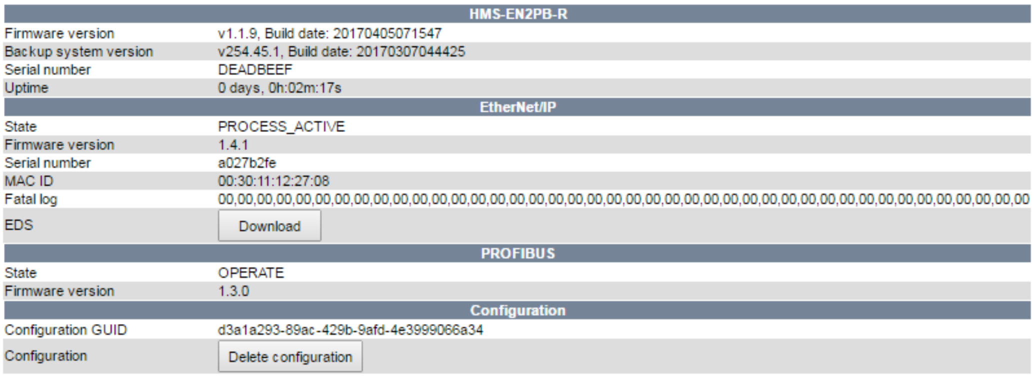
4 The Linking Device Web Interface

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

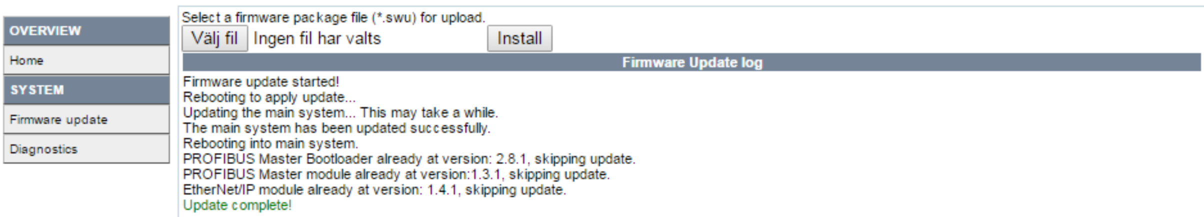
This page provides general information about the linking device.



4.2 Firmware Update

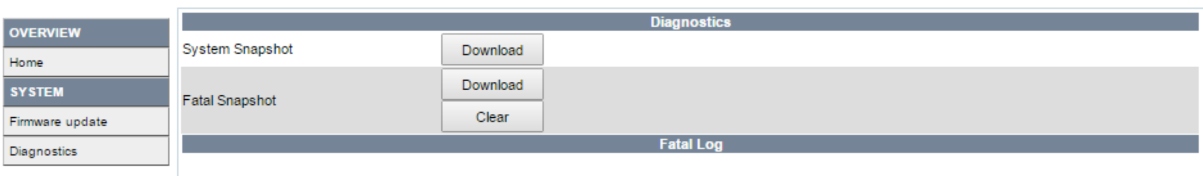
Via the firmware page, it is possible to update the firmware in the linking device. The Firmware Update Log presents information about the latest firmware update.

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.



4.3 Diagnostics

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

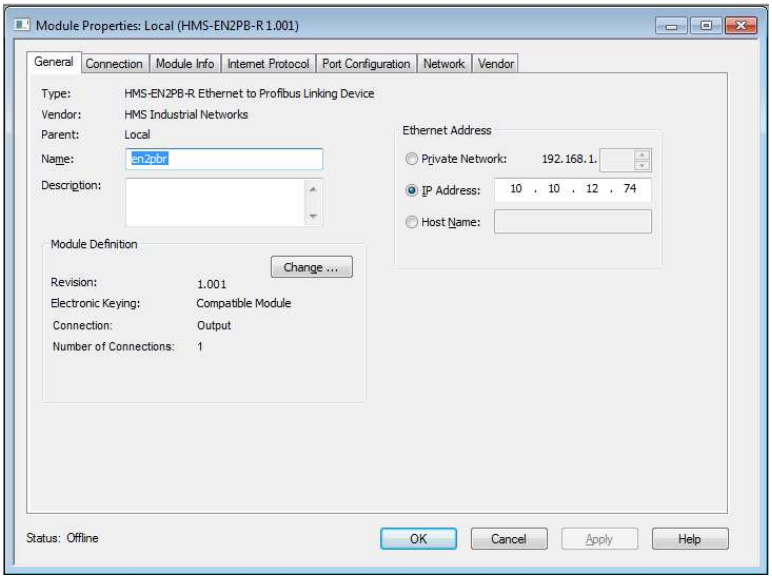


5 Studio 5000 Implementation Example

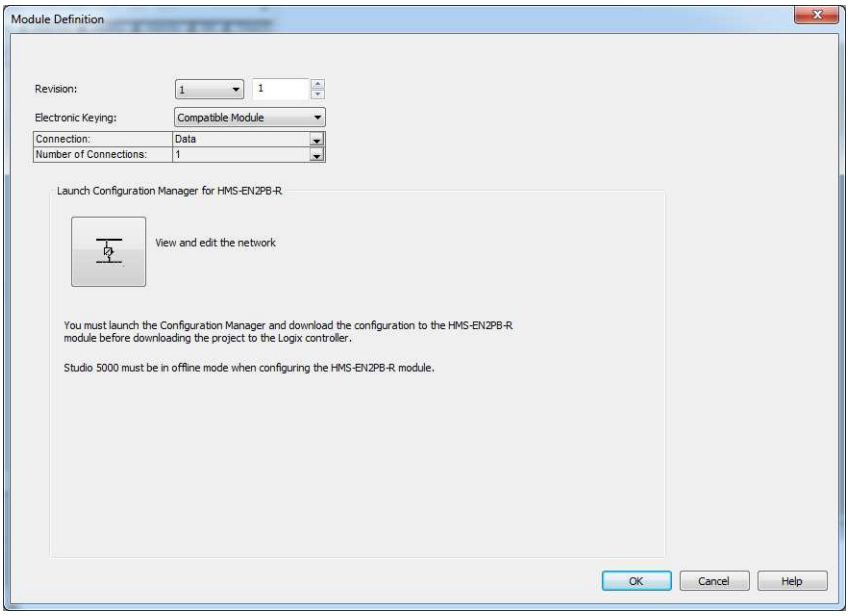
This section will be a guide through all steps necessary to create a basic configuration for the EtherNet/IP to PROFIBUS DP Linking Device.

5.1 Step by Step Guide

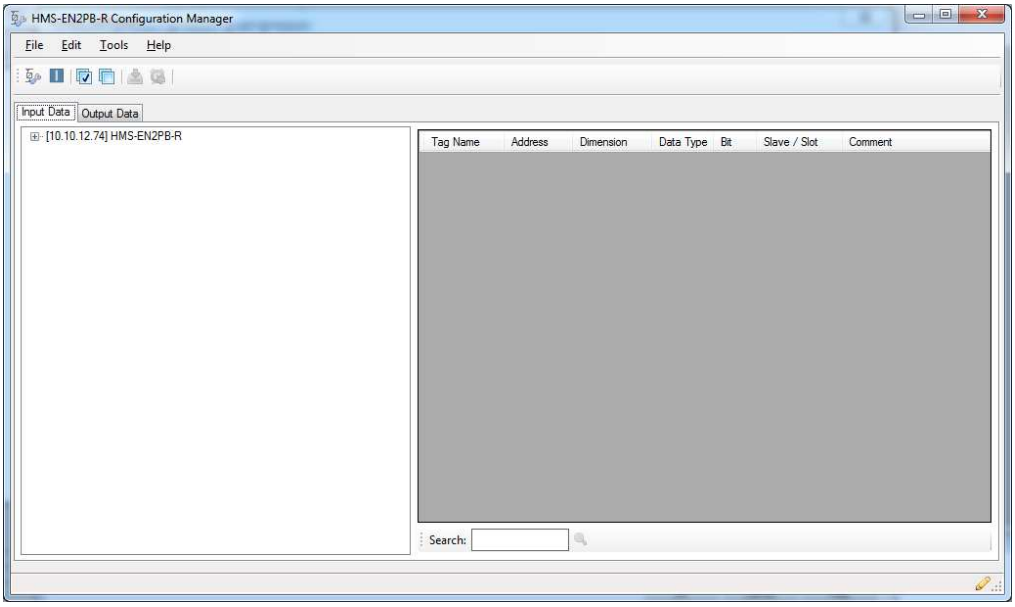
1. Start the Studio 5000 software. Expand the “I/O Configuration” folder in the tree view. Right-click “Ethernet” and select “New Module”.
2. Select the HMS-EN2PB-R linking device and click “Create”.
3. In the “New Module” window, assign a name to the module. The IP address should be set via the BOOTP-DHCP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



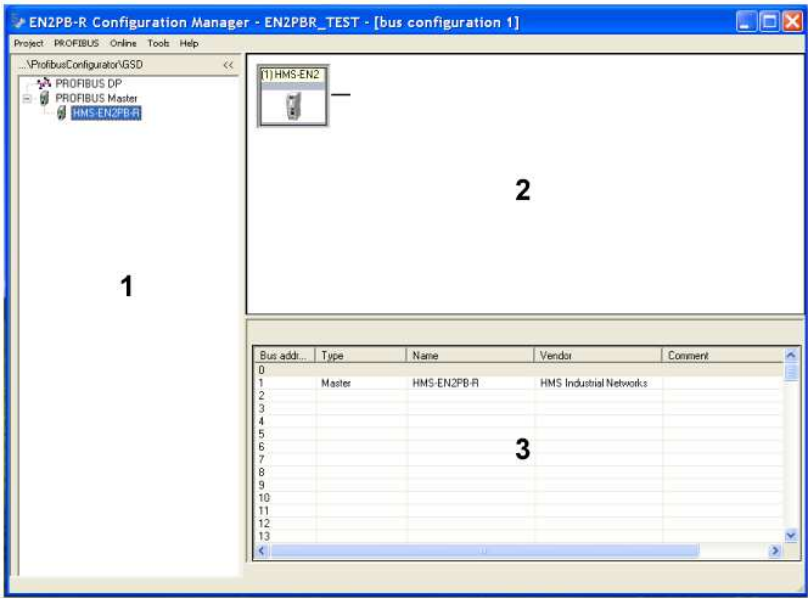
4. In the “Module Definition” window, launch the configuration manager for the HMS-EN2PB-R linking device.



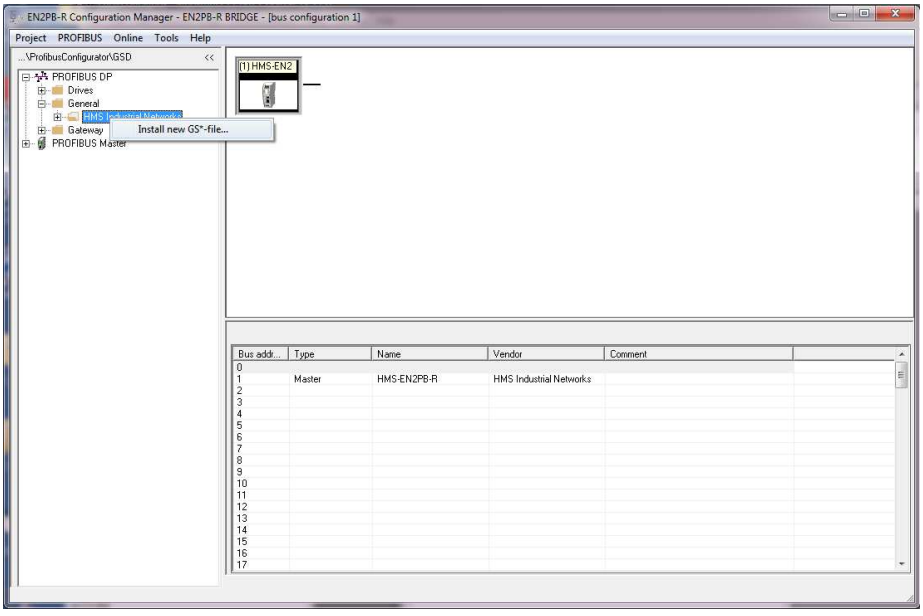
5. This part of the configuration manager is called the tag editor. Since this is a new configuration, the editor is empty. To proceed, open the HMS-EN2PB-R configuration tool by clicking the left-most icon in the tool bar.



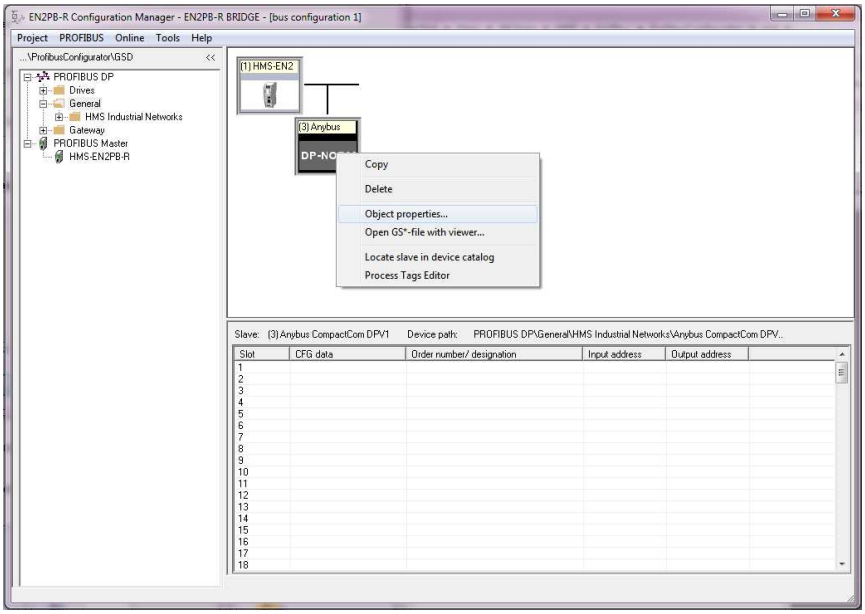
6. The bus view window consists of three parts.
   - 1. A tree view of all connected devices
   - 2. A graphical view of the connected devices in the network
   - 3. A list view for input/output data and slave properties



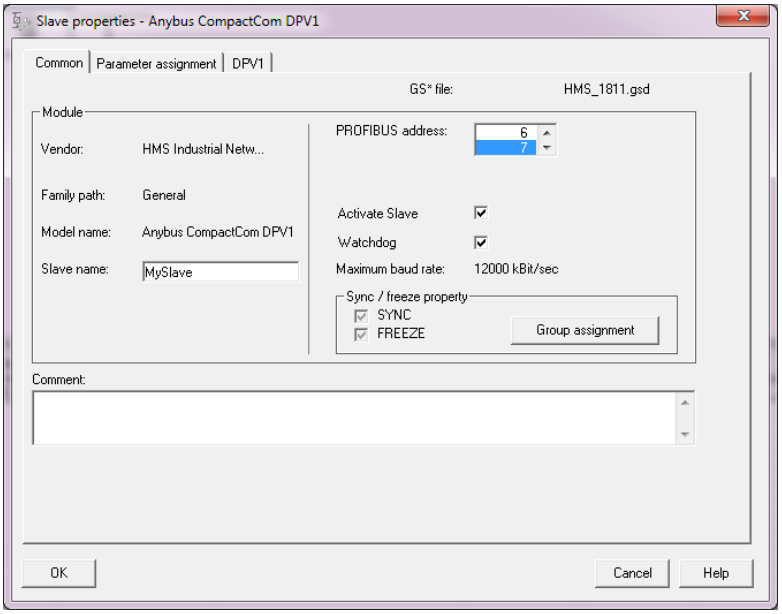
7. Add a slave by right-clicking on the “General” folder in the tree view. Choose “Install new .GS* file”. In this case, an Anybus-S DPV1 is used.



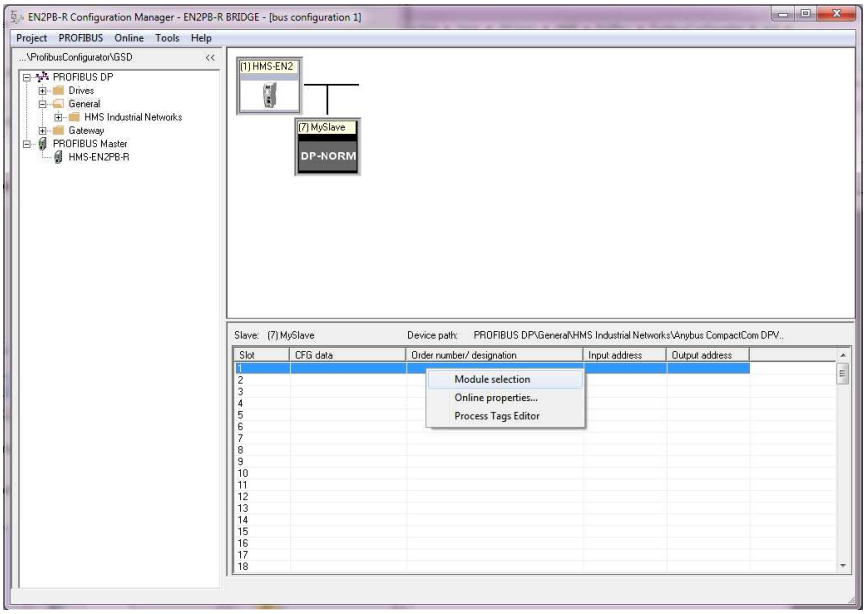
8. Right-click the slave to bring up the slave properties window.



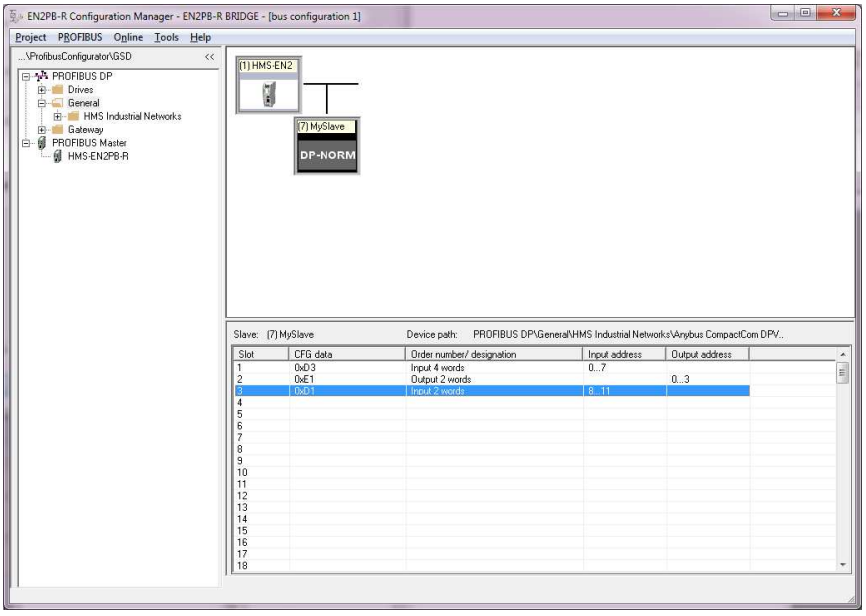
9. Set the name of the slave and set the PROFIBUS slave address



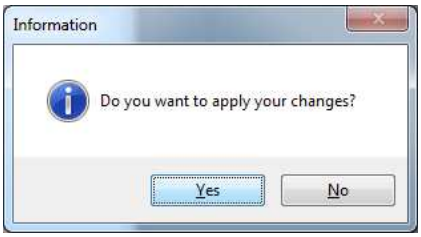
10. Right-click in the list view, and choose “Module selection”.



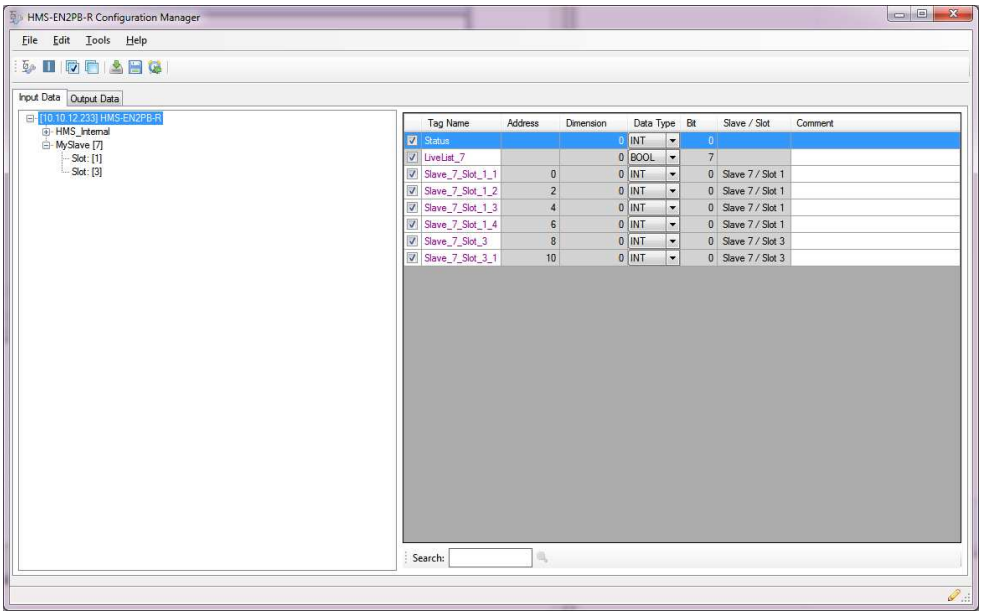
11. Add input/output data to the slave. In this case, there are three transactions.



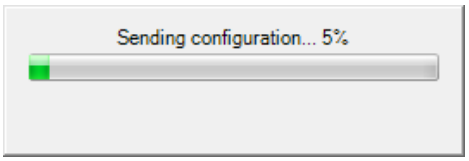
12. When the configuration is finished, close the bus view window. Click “Yes” to apply the new configuration and transfer it to the tag editor.



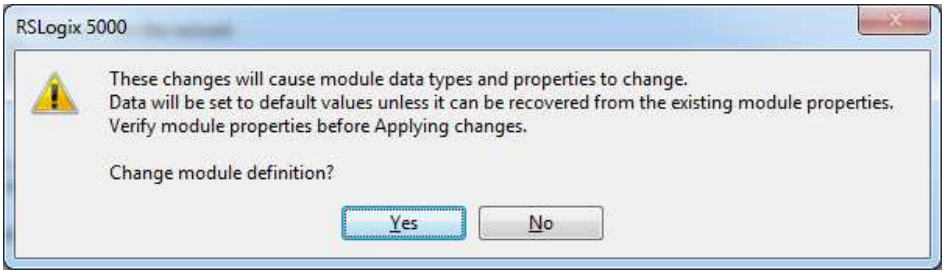
13. The tag editor is now updated with Studio 5000 tags. All transactions are visible under the “Input Data” and “Output data” tabs.



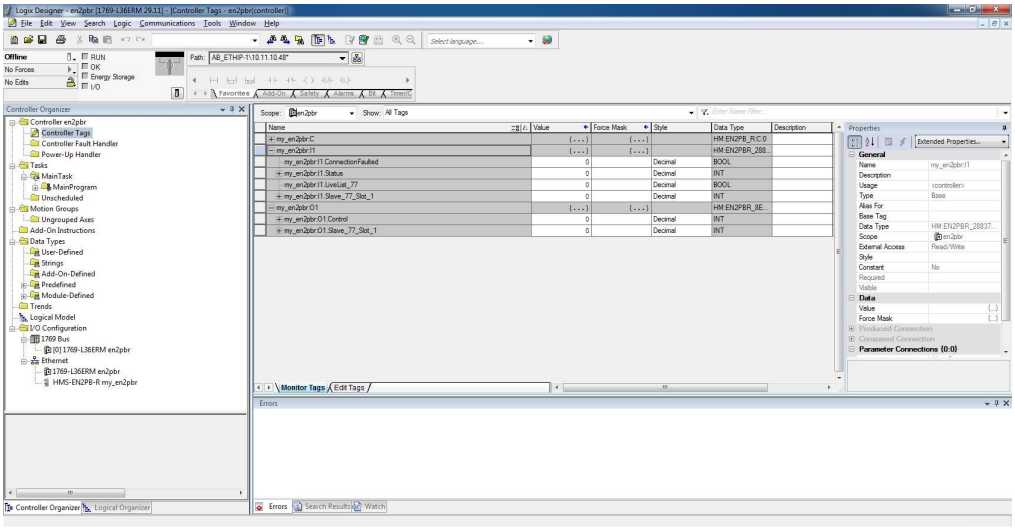
14. Download the configuration to the linking device by clicking the download icon in the tool bar. The progress bar will indicate the progress.



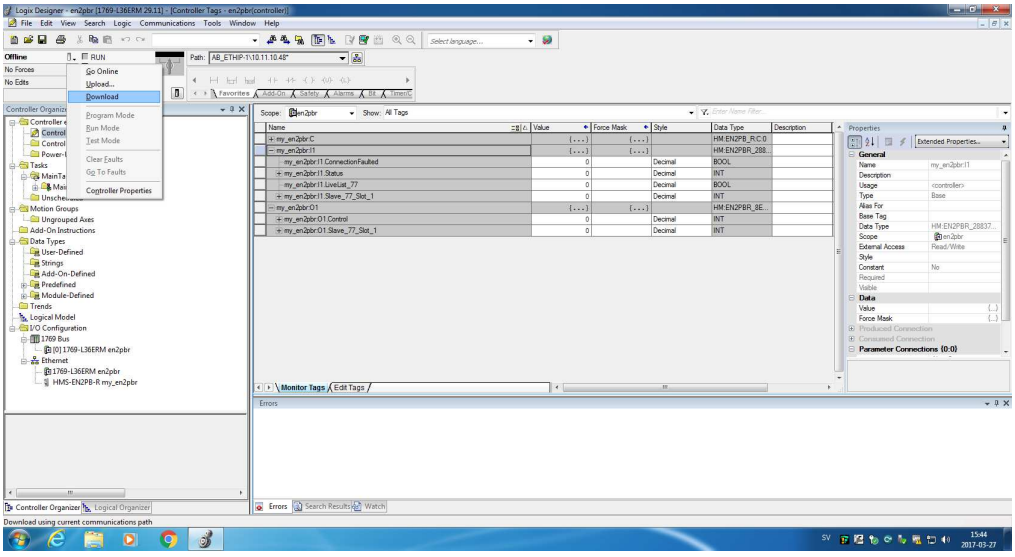
15. Close the tag editor.
16. Close the “Module Definition” window. Click “Yes” in the RSLogix 5000 information window, to change the module definition in the Studio 5000 environment.



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”.

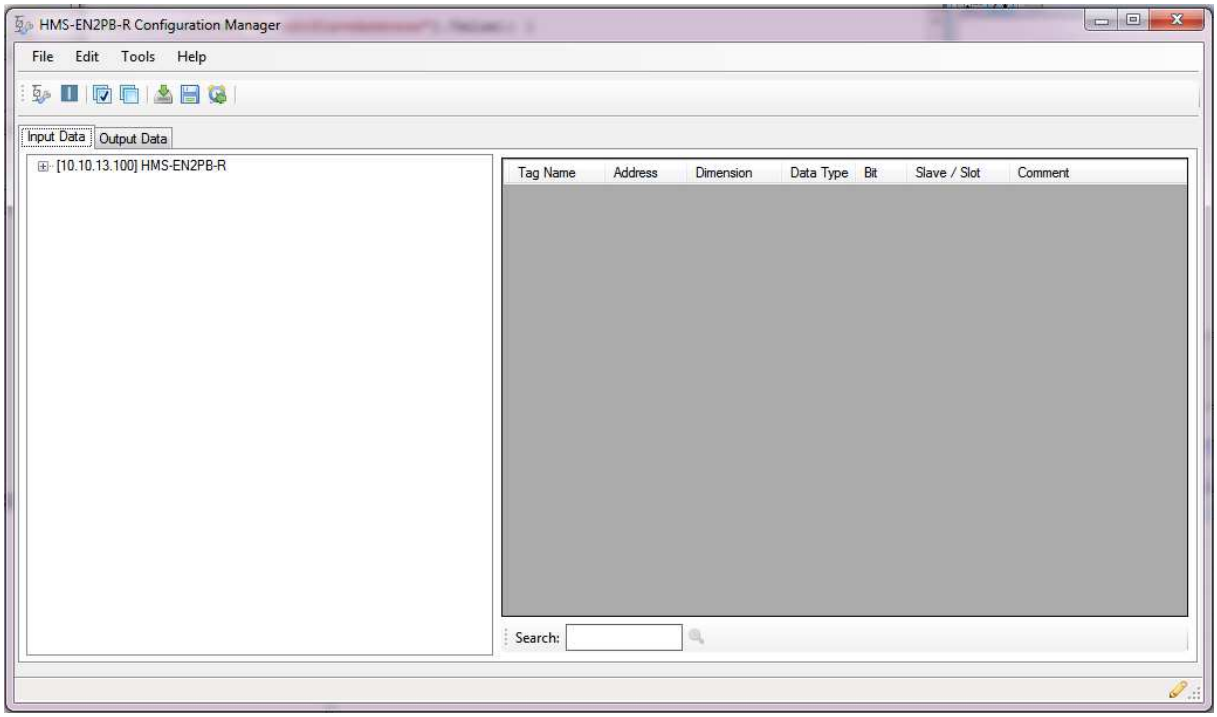
6 Tag Editor

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

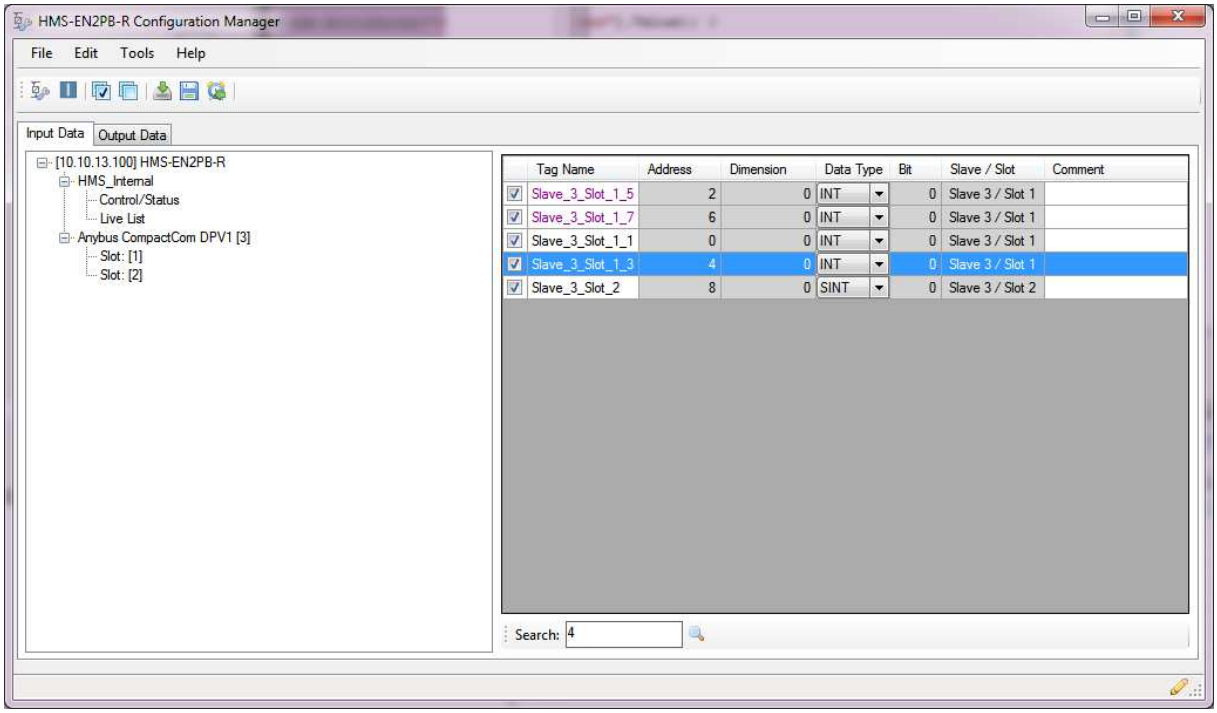
- **About**

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.