

X-gateway Interface Addendum **PROFIBUS Slave**

Doc: HMSI-27-250, Rev: 2.02



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Important User Information

This document is intended to provide a good understanding of the functionality offered by the Interface described here.

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

Liability

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

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

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Trademark Acknowledgements

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WARNING: This is a class A product. in a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

ESD Note: This product contains ESD (Electrostatic Discharge) sensitive parts that may be damaged if ESD control procedures are not followed. Static control precautions are required when handling the product. Failure to observe this may cause damage to the product.

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P. About This Document

P.1 How To Use This Document

This document describes network specific features and procedures needed when operating the PROFIBUS Slave Interface for the Anybus X-Gateway. For general information and operating instructions for the Anybus X-Gateway, consult the Anybus-X Generic Gateway User Manual.

The reader of this document is expected to be familiar with PROFIBUS networking technology, and communication systems in general.

For further information, documentation etc., please visit www.anybus.com.

P.2 Related Documents

| Document | Author |
|----------------------------------------------|--------|
| Anybus-X Generic Gateway User Manual | HMS |
| Anybus-S PROFIBUS Fieldbus Appendix | HMS |
| PROFIBUS Slave Interface, Installation Sheet | HMS |

P.3 Document History

Revision List

| Revision | Date | Author | Chapter | Description |
|----------|------------|--------|-----------|-----------------------------------------------|
| 1.00 | 2004-04-02 | PeP | All | First release |
| 1.01 | 2005-02-04 | PaL | A | Added recommended PROFIBUS connectors |
| 1.02 | 2007-06-13 | PeP | 2, A, All | Minor update |
| 1.03 | 2011-07-26 | KeL | P, A | Minor update |
| 1.04 | 2012-02-02 | KeL | 1 | Minor update |
| 2.00 | May 2014 | SDa | Multiple | New hardware and Anybus Configuration Manager |
| 2.01 | May 2014 | SDa | 1 | Added I&M support |
| 2.02 | May 2014 | SDa | 2 | Corrected total data size |

P.4 Conventions & Terminology

The following conventions are used throughout this document:

- Numbered lists provide sequential steps
- Bulleted lists provide information, not procedural steps
- The term 'X-Gateway' refers to the Anybus X-Gateway
- The term 'Slave interface' refers to the PROFIBUS Slave interface for the Anybus X-Gateway.
- The term 'user manual' refers to the Anybus-X Generic Gateway User Manual.
- Hexadecimal values are written in the format NNNNh, where NNNN is the hexadecimal value.
- 16/32 bit values are generally stored in Motorola (big endian) format unless otherwise stated.

P.5 Sales and Support

For general contact information and support, please refer to the contact and support pages at www.anybus.com.

1. About the PROFIBUS Slave Interface

1.1 General Description

The PROFIBUS Slave Interface for the Anybus X-Gateway offers complete slave functionality according to extensions of EN 50170 (DPV1), supporting the standard DP functionality as well as acyclic Class 1 and Class 2 services.

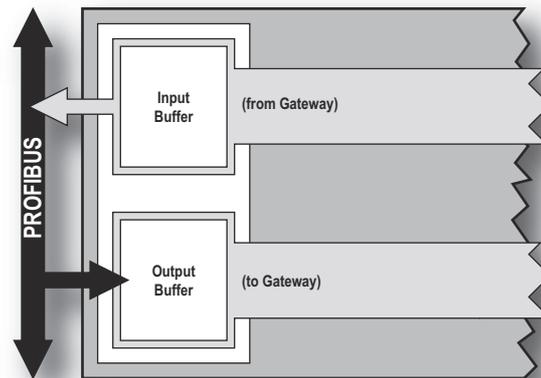
Like all X-Gateway interfaces, the PROFIBUS Slave interface exchanges data via two buffers as follows:

- **Input Buffer**

This buffer holds data forwarded *from* the other network, i.e. data which is read by the PROFIBUS master.

- **Output Buffer**

This buffer is forwarded *to* the other network, i.e. data which is written by the PROFIBUS master.



1.2 Features

- Galvanically isolated PROFIBUS interface
- Complete DP-V1 Slave functionality according to extensions of EN 50170 (DP-V1)
- Automatic baudrate detection (9600 bit/s - 12 Mbit/s)
- Supports PA baud rate 45.45 kbit/s
- Address range: 1-99 using onboard switches
- Up to 244 bytes of cyclic I/O in each direction, 344 bytes in total
- Supports acyclic Class 1 & Class 2 services
- Supports Identification & Maintenance (I&M)

1.3 External View

1.3.1 Interface Status LEDs

| LED | Colour | Indication |
|----------------|-----------------|---------------------------------------------------------------|
| Gateway Status | | Consult the Anybus X-gateway user manual for further details. |
| Acyclic | Off | No acyclic traffic |
| | Green | Processing acyclic request |
| Online | Green | Online |
| | Green, flashing | Clear mode |
| | Red | Major internal fault |
| | Off | Not online |
| Offline | Red | Offline |
| | Off | Not offline |
| Diagnostics | Red, 1Hz | Error in Configuration Data |
| | Red, 2Hz | Error in User Parameter Data |
| | Red, 4Hz | Internal error |
| | Off | No diagnostics present |

1.3.2 Connectors and Switches

PROFIBUS connector

See A-12 “PROFIBUS Connector Pinout”.

PROFIBUS Node address switches

See 3-9 “Node Address”.

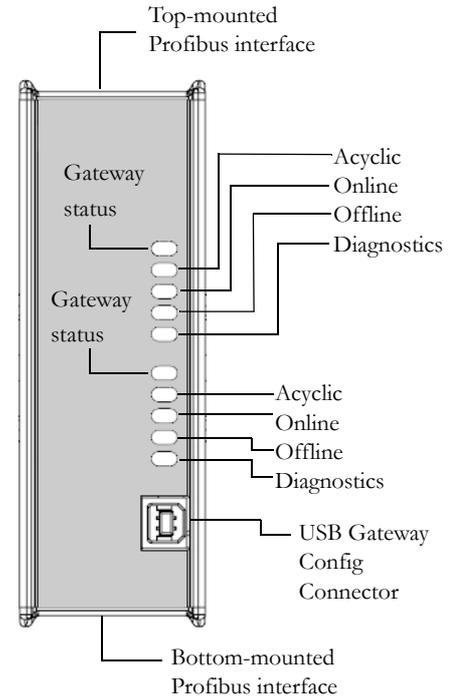
Gateway power connector

See the Anybus X-gateway user manual for further details.

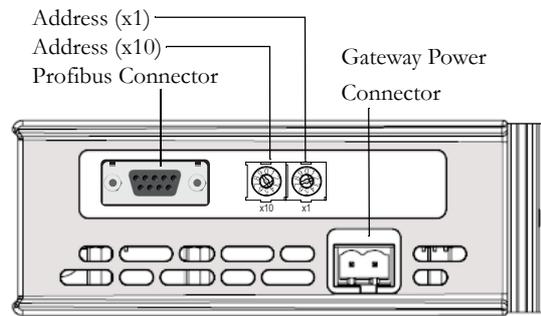
Gateway Config connector

See the Anybus X-gateway user manual for further details.

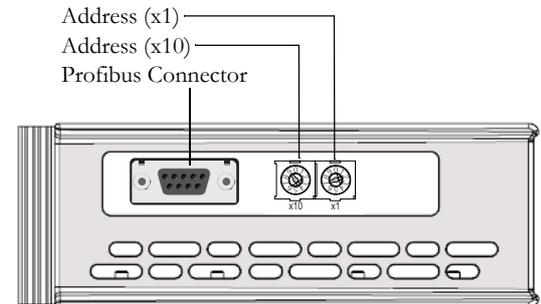
Front View



Top-mounted interface



Bottom-mounted interface

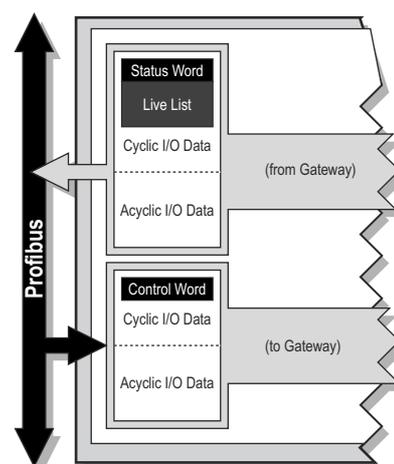


2. Data Exchange

On PROFIBUS, data from the gateway is represented as cyclical I/O data (DP) and Acyclical I/O data (DP-V1).

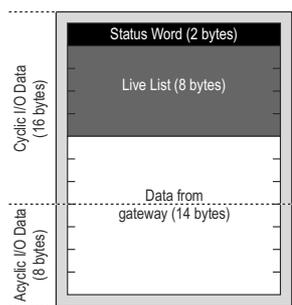
The amount of data that is represented as Cyclical I/O data vs. the amount that is represented as Acyclical I/O data can be configured via the Gateway Config interface.¹

The Slave interface can handle up to 244 bytes of I/O data in each direction. However, the total data size (input + output) cannot exceed 344 bytes.



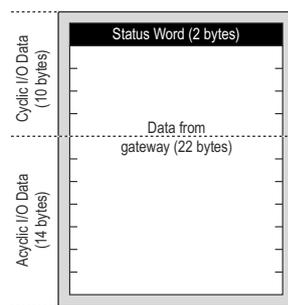
2.1 Input Data (Gateway to PROFIBUS)

Depending on the type of gateway and how it has been configured, up to 10 bytes of the data produced by the gateway may be occupied with status information.



Example A:

Cyclic I/O Data Size = 16
 Acyclic I/O Data Size = 8
 Live List = Enabled
 Control & Status Word = Enabled



Example B:

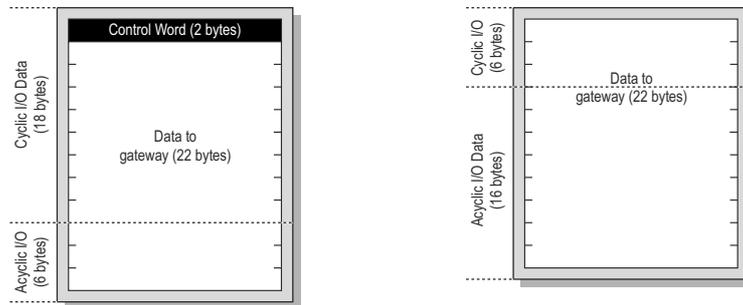
Cyclic I/O Data Size = 10
 Acyclic I/O Data Size = 14
 Live List = Disabled
 Control & Status Word = Enabled

Note: The Live List is only available on master-slave gateway versions.

1. Please consult the Anybus X-gateway user manual for more information about and how to use the Gateway Config interface.

2.1.1 Output Data (PROFIBUS to Gateway)

Depending on how the gateway is configured, the first two bytes consumed by the gateway may be interpreted as control information.



Example A:

Cyclic I/O Data Size = 18

Acyclic I/O Data Size = 6

Control Word = Enabled

Example B:

Cyclic I/O Data Size = 6

Acyclic I/O Data Size = 16

Control Word = Disabled

Note: The Live List is only available on master-slave gateway versions.

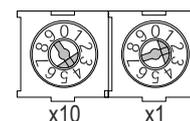
3. Installation and Configuration

3.1 Node Address

On a PROFIBUS network, each node must be assigned its own unique node address. The Slave interface features on board switches for node address configuration, providing an address range of 1 - 99.

Example:

In this example, the profibus node address will be 42 (4 x 10) + (2 x 1).



Note: Depending on if the Slave interface is top or bottom mounted, the orientation of the switches are different.

3.2 Network Configuration (Anybus NetTool for PROFIBUS)

3.2.1 General Information

The following example describes how to include the Slave interface in a PROFIBUS network using Anybus NetTool for PROFIBUS. (The procedure used for other network configuration tools is similar, although individual steps may be slightly different.)

3.2.2 Step 1: Install the .GSD-file

Each device in a PROFIBUS network is associated with an .GSD-file¹. This file contains information about the device and is used by the network configuration tool, in this case Anybus NetTool for PROFIBUS.

1. Start Anybus NetTool for PROFIBUS.
2. To add the .GDS-file for the Slave interface, select 'Install new GS*-file' from the 'Tools' menu.
3. Select the .GSD file using the file selector, and click 'Open'.

The .GSD-file is now included in the configuration tool (Anybus NetTool for PROFIBUS).

1. The latest version of the .GSD-file for this product can be obtained either by downloading it from the HMS website (www.hms-networks.com) or received by contacting HMS.

3.2.3 Step 2: Create a New Configuration

(If the Slave interface should be included in an existing configuration, the steps in this section can be skipped)

The following steps describes how to create a simple configuration with a PROFIBUS master and a slave (in this case the PROFIBUS Slave interface for the X-Gateway). Note that this requires that a master has previously been installed in the configuration tool.

1. Select 'New' from the 'Project' menu.
2. Drag the desired PROFIBUS master from the tree structure on the left of the screen to the network window on the right.
3. Drag the 'Anybus-S DPV' (Which is the same as the PROFIBUS Slave interface for the X-Gateway) slave from the tree structure on the left of the screen to the network window on the right.
4. Double click on the Slave interface in the network window.
5. Make sure the value under 'PROFIBUS Address' matches the node address switches on the module.
6. Click 'OK'

The Slave interface is now included in the PROFIBUS configuration tool (Anybus NetTool for PROFIBUS).

3.2.4 Step 3: Configure the I/O block layout of the Slave Interface

To be able to exchange data, the master will need to know the I/O configuration of the Slave interface.

1. Expand the I/O settings for the 'Anybus-S DPV'. This will reveal I/O blocks that are used to compose the I/O data configuration of the Slave interface.
2. Drag I/O blocks to the Slave interface window, until the total size of the I/O modules matches the I/O configured in the Slave interface.

3.2.5 Step 4: Download Configuration the Configuration into the Master

To be able to download the configuration, it must first be saved to disk.

1. Select 'Download Configuration' from the 'Online' menu
You program will now ask if the current configuration should be saved.
2. Click 'Yes'.
In the file selector, type a filename for the configuration.
3. Click 'Save'. The file will now be saved.
4. A dialog will appear, prompting for the transport path (PCI, serial etc.) to use for the master.
5. Select the transport path to use, and click 'OK'.

The configuration will now be downloaded into the master

3.2.6 Step 4: Go Online

To be able to exchange data, the configuration must be downloaded into the master.

1. Select 'Download Configuration' from the 'Online' menu
2. The Slave interface should now exchange data on the PROFIBUS network.

Note: If problems exist, verify that the I/O block configuration for the Slave Interface ('Anybus-S DPV') in Anybus NetTool for PROFIBUS matches the configuration of the gateway (See chapter 'Gate-

way Config Interface' in the user manual). Also make sure that the node address specified for the Slave interface ('Anybus-S DPV') matches the settings of the on board switches, and that the node address does not conflict with another device on the PROFIBUS network. Furthermore, verify that the settings for the transport provider matches the interface and PROFIBUS master.

A. Technical Specification

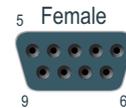
A.1 Network Interface Details

- Complete PROFIBUS-DPV1 Slave functionality according to extensions of EN 50170 (DPV1)
- Supports Class 1 & Class 2 services
- Automatic baudrate detection (9600 bit/s - 12 Mbit/s)
- Supports PA baud rate 45.45 kbit/s
- Optically isolated PROFIBUS interface with on-board DC/DC converter.
- Address range: 1-99 using onboard switches
- Cyclic I/O data size up to 244 bytes in/244 bytes out, max 328 bytes total (in+out)
- User Parameter data/Diagnostics length - up to 237 bytes.
- LED-indications: ON-line, OFF-line, Fieldbus related diagnostics

A.2 PROFIBUS Connector Pinout

PROFIBUS connectivity is provided via a 9 pin female D-sub connector.

| # | Signal | Description |
|---------|---------|------------------------------|
| housing | Shield | Connected to PE |
| 1 | - | (not connected) |
| 2 | - | (not connected) |
| 3 | B-Line | Positive RS485 RxD/TxD |
| 4 | RTS | Request to send |
| 5 | GND BUS | Isolated GND from RS485 side |
| 6 | +5V BUS | Isolated GND from RS485 side |
| 7 | - | (not connected) |
| 8 | A-Line | Negative RS485 RxD/TxD |
| 9 | - | (not connected) |



Recommended Profibus Connectors

- **Profibus Max standard**
Part no. 134928 and PROFIBUS reversed, part no. 104577
web: www.erni.com
- **Fast connect Bus connector**
Part no. 6GK1500-0FC00 or 6ES7 972-0BA50-0XA0
web: www.siemens.com