Anybus® Modbus TCP/RTU Gateway

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About This Document

How To Use This Document

This document is intended to provide a good understanding of the functionality offered by the Anybus®
Modbus TCP/RTU Gateway.

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

For more information, documentation etc., please visit the HMS web site, 'www.anybus.com'.

Important User Information

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

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

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

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 cannot assume responsibility or liability for actual use based on these examples and illustrations.

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.

Document History

Summary of Recent Changes (1.13... 2.00)

Change	Page(s)
Moved manual from Word to FM	All
Updated pictures and web shots	All

Revision List

Revision	Date	Author	Chapter	Description
.....1.13				In Microsoft Word
2.00	2009-10-09	KeL	All	New look

Conventions & Terminology

The following conventions are used throughout this document:

- Numbered lists provide sequential steps
- Bulleted lists provide information, not procedural steps
- The terms 'Anybus', 'gateway' or 'module' refers to the Anybus® Modbus TCP/RTU Gateway.
- The term 'host' refers to a host device on a TCP/IP network.
- Hexadecimal values are written in the format NNNNh, where NNNN is the hexadecimal value.

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About the Anybus® Modbus TCP/RTU Gateway

General Information

The Anybus® Modbus TCP/RTU Gateway can be used to connect a Modbus/TCP master to one or several Modbus/RTU slaves. The transparent Modbus TCP/RTU gateway will act as a Modbus/TCP slave on an Ethernet network, and transform the queries to the Serial Modbus network, and send back the Modbus/RTU slave response to the Modbus/TCP master.
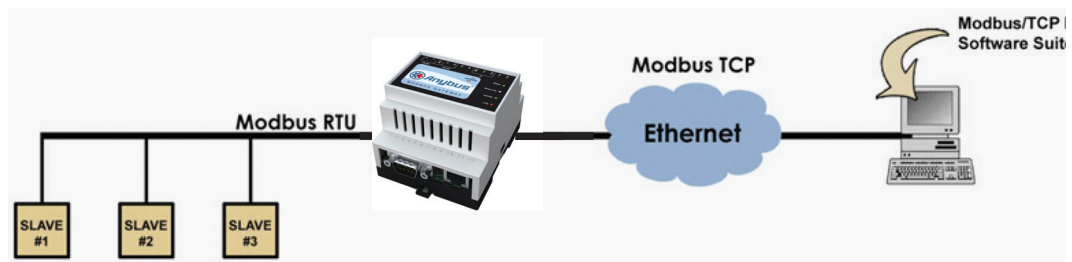
The Anybus Modbus Gateway supports RS-232 through a 9-pole DSUB or RS-485 through the screw terminal block on the other side of the module. It supports 10/100Mbps Ethernet through a standard Ethernet connector (RJ-45). It can be configured via a web-interface or by using the Anybys IPConfig utility. It also contains a Flash memory for easy software updates.

Mounting

A - Snap on   B - Snap off
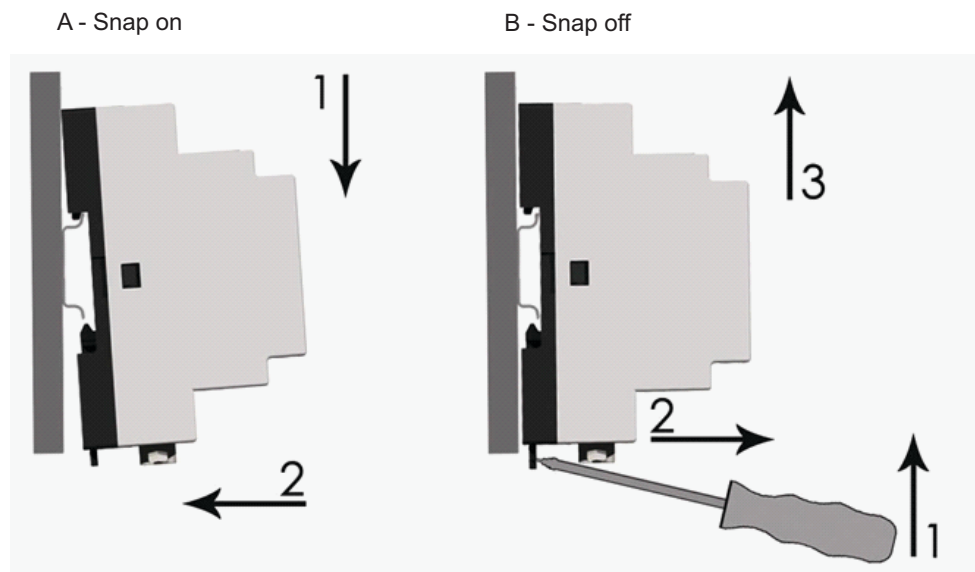
1. Snap the Anybus module on to the DIN-rail (as described in picture A above).

2. Connect the Ethernet cable to the RJ45 connector.

3. Connect the Modbus/RTU network to the DSUB connector (RS-232) or through the screw terminal block (RS-485)

4. Connect the power supply and apply power

5. Now you can start using the Gateway. Use the "Anybus IPConfig Utility" to configure the IP address and other network settings. See 2-1 "Configure the IP address" for further information.

Note: The default IP address of the Anybus module is 10.200.1.X, where X is the last digit in the MAC ID (can be found on a label on the device).


MAC ID

Connectors

Modbus/RTU Interface, RS-232

The 9-pole DSUB, male connector on the Anybus module contains a fully equipped RS-232 interface. This port can be used to connect to any equipment with an RS-232 interface.

Pin no	Function
1	CD (Carrier Detect)
2	Rx (Receive)
3	Tx (Transmit)
4	DTR (DTE Ready)
5	GND
6	DSR (DCE Ready)
7	RTS (Request To Send)
8	CTS (Clear to Send)
9	RI (Ring Indicator)

Serial interface
(DSUB-9, RS-232)

Ethernet interface
(RJ-45, 10/100Mbps)
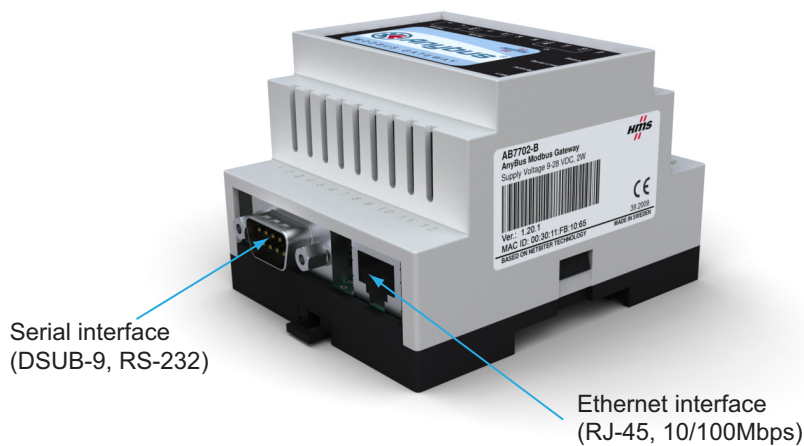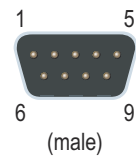
Modbus/RTU Interface, RS-485 and RS-232

The product carries a screw terminal block with 12 contacts. Five of these can be used to connect to any equipment with an RS-485 interface.

Ethernet Interface

The Ethernet interface supports 10/100 Mbps, using a standard RJ-45 connector.

Power Supply Connection

The Anybus module can be powered by a 9 - 32 VAC/DC supply.

Digital Inputs

The digital inputs are opto-isolated, and can accept a 10-24 VDC signal for logic HIGH input. For logic LOW the voltage should be in the range 0-2 VDC.

The status of the inputs can be read in the Gateway Internal Registers (if enabled). See 2-7 "Internal Registers" for more information.

Pin no	Description
13	RS-485, line B
14	RS-485, line A
15	Common
16	RS-232, Tx
17	RS-232, Rx
18	Not connected
19	Not connected
20	Digital In Common
21	Digital In 1
22	Digital In 2
23	Vin- (ground connection)
24	Vin+

Indicators
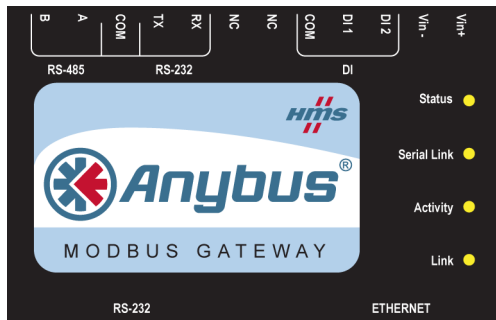
LED functionality

Name	Color	Description
Status	OFF	Power off
	Green	Module is running in normal mode
	Orange	Boot-up
Serial Link	Flashing Green	Serial Packet receive
	Flashing Red	Serial Packet transmit
	Orange	Boot-up
Activity	Flashing Green	Ethernet Packet received
	Flashing Red	Ethernet Collision detected
Link	OFF	No Ethernet Link detected
	Green	Ethernet network detected, 10 Mbps
	Orange	Ethernet network detected, 100 Mbps

Configuration

Configure the IP address

About the Anybus IPConfig utility

The IPConfig utility is a PC-based configuration utility to set TCP/IP network settings in the Anybus module. Anybus IPConfig scans the Ethernet network for connected Anybus devices and lets the user set IP-address, net mask, gateway, DNS and host name for each unit.

Installation

System Requirements

- Pentium 133 MHz or higher
- 5 Mb of free space on the hard drive
- Win 95/98/ME/NT/2000/XP/Vista
- Network Interface Card (Ethernet)

Installation Procedure

- Download the self-extracting installation package "Anybus IPConfig utility for module TCP/IP configuration" from:
  http://www.anybus.com/support/support.asp?PID=237&ProdType=Anybus%20X-gateway
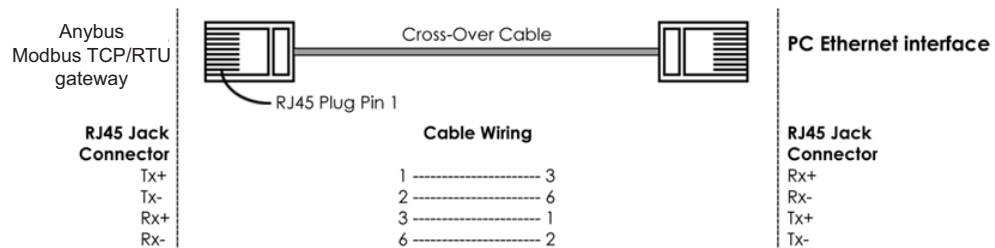- Run IPConfig

Scanning for connected devices

First ensure that you have connected the Anybus units you want to install on the same Ethernet network as the PC is connected to. Use standard Ethernet cables, straight-through or crossover, depending on how you connect to the device. See pictures below for details.
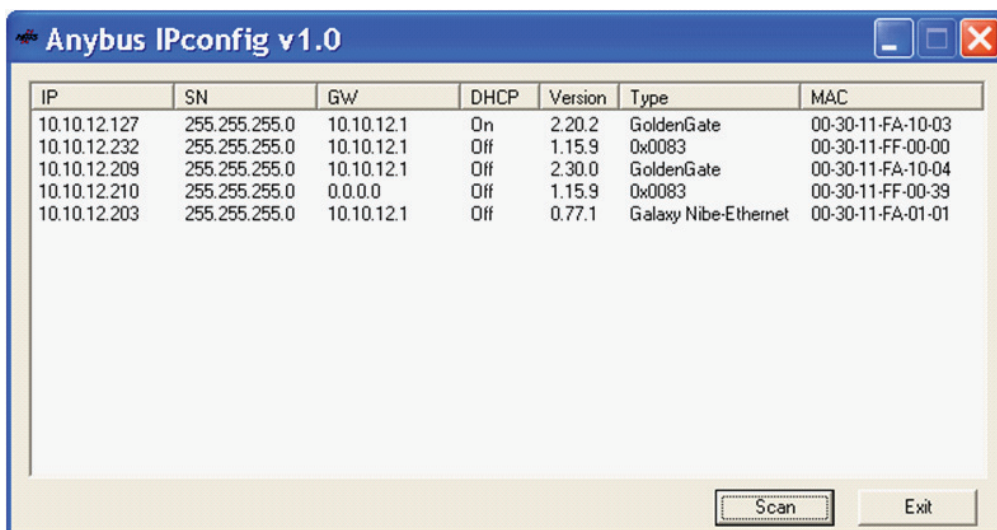
Connecting the Anybus® Modbus TCP/RTU Gateway to a hub or a switch
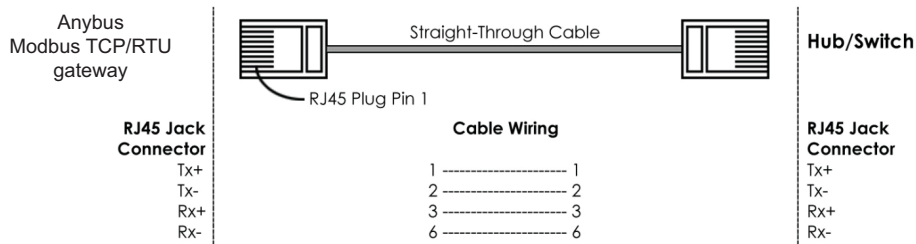
Connecting the Anybus® Modbus TCP/RTU Gateway directly to a PC

When the Anybus IPConfig utility is started, it will scan the Ethernet network for Anybus devices. All detected devices will be presented in a list in the main window. To force a new scan for devices, press the "Scan" button.

Heading	Description
IP	IP address of the Anybus module
SN	Subnet mask
GW	Default gateway
DHCP	Dynamically assigned IP address on/off
Version	Application software version
Type	Product type
MAC	Ethernet MAC address

Changing IP Settings

To change the IP settings of a detected device, double-click on the device you want to configure in the list of devices. This will open a dialogue where you can enter the desired IP configuration. To obtain the necessary information about IP address, Subnet mask etc. please contact your network administrator.

Note: Do not select the DHCP option if you don't have a DHCP server available on the network.

Host name, Primary DNS and Secondary DNS are optional.

The default password for authentication of the new settings is "admin". Pressing "Set" will cause the Anybus module to reboot and the new settings will be enabled on restart. You can test the new settings by opening a web browser and enter the IP you selected. If you selected DHCP and want to know what IP your device has been assigned, you can do a new scan with the Anybus IPConfig utility to view the new network configuration information.
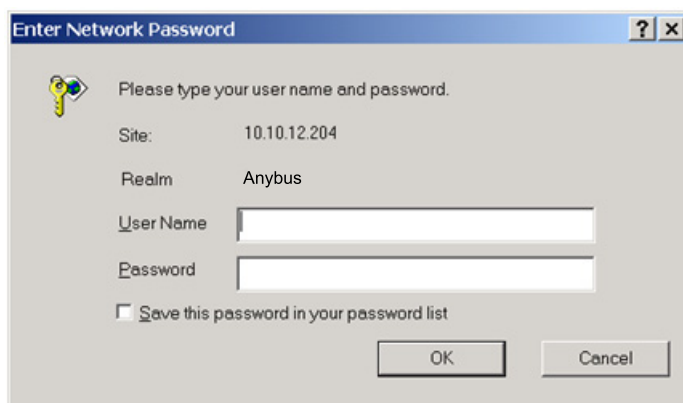
Configure the Gateway

Log in

Open a web browser and enter the IP address you have set for the Anybus module with the Anybus IPConfig utility:

> http://10.10.12.204

The login screen should appear:

To be able to configure the gateway you should enter "admin" in the user name box. This is the default password and can be changed at a later stage.

If you have problems to log in and you are sure that your password is correct, make sure that Caps Lock is not enabled on your keyboard.

Start Page

The start page shows the available options.

Network Settings

Choosing "Network" will give the opportunity to view and change the TCP/IP settings in the module. These settings are the same as the ones defined in Anybus IPConfig.

DHCP: Select this if you have a DHCP server on our network and you want the IP address to be assigned automatically by the server.

Note: Do not select the DHCP option if you don't have a DHCP server available on the network.

Network Setting	Comment
Host Name	Enter the host name of your device (optional)
IP address	IP address
Netmask	Subnet mask
Gateway	The default gateway
Primary DNS	The primary Domain Name server (optional)
Secondary DNS	The secondary Domain Name server (optional)

Modbus Configuration

Choosing "Config" will give the opportunity to configure Modus.

Serial settings (Modbus RTU/ ASCII)	Comment
Transmission Mode	RTU or ASCII
Slave Response Time out	Default value 200ms
Physical Interface	EIA-485 or EIA-232
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 bps
Character Format	Select number of stop bits and if parity should be enabled (odd or even)
Extra delay between messages	Some nodes on the network may need extra time to finish handling one message before they can receive the next message.
Character delimiter	Specifies the time (in ms) that separates two messages. If set to 0 (zero), the gateway will use the standard Modbus delimiter of 3.5 characters (the actual number of ms will be calculated automatically based on the currently used communication settings).

Ethernet settings (Modbus TCP)	Comment
Port Number	Which port to use for Modbus TCP communication. Default: 502
Gateway Registers	The address offset to the gateway internal registers (if enabled). See page 2-7 "Internal Registers" for details.
Server Idle Time out	Idle time out in seconds for the Modbus/TCP connection. If the gateway doesn't receive any Modbus/TCP query within this time the connection sill be closed. Default: 60 s.
IP Authentication	Defines the IP-number of the device that is allowed to connect to the gateway.

Note: To ensure that the Modbus master can communicate with all slaves present on the bus, do not assign the same address to more than one Modbus device.

Internal Registers

If Gateway Registers are enabled, queries sent to those addresses will not be forwarded to the Serial Modbus/RTU network, but handled by the gateway.

Register	Name	Values	Options	Comment
1	Digital input 1 status	0 or 1		Read only
2	Digital input 2 status	0 or 1		Read only
3	Number of active connections MB/TCP	0 - 10		Read only
4	Number of active internal connections	0 - 10		Read only
Serial status (Modbus/TCP)				
5	Valid responses	0 - 65535		Can be cleared
6	Serial time outs	0 - 65535		Can be cleared
7	CRC errors	0 - 65535		Can be cleared
8	Input Buffer overruns	0 - 65535		Can be cleared
9	Frame errors	0 - 65535		Can be cleared
10	Exceptions responses	0 - 65535		Can be cleared
Serial status (buffered messages)				
11	Valid responses	0 - 65535		Can be cleared
12	Serial time outs	0 - 65535		Can be cleared
13	CRC errors	0 - 65535		Can be cleared
14	Input Buffer overruns	0 - 65535		Can be cleared
15	Frame errors	0 - 65535		Can be cleared
16	Exceptions responses	0 - 65535		Can be cleared
Serial status (internal requests and web pages)				
17	Valid responses	0 - 65535		Can be cleared
18	Serial time outs	0 - 65535		Can be cleared
19	CRC errors	0 - 65535		Can be cleared
20	Input Buffer overruns	0 - 65535		Can be cleared
21	Frame errors	0 - 65535		Can be cleared
22	Exceptions responses	0 - 65535		Can be cleared
Configuration registers				
23	Modbus/TCP Port	1 - 65535		Default: 502
24	Gateway Modbus address	-1 - 255		
		-1	Disabled	Default
		0 - 255	Enabled	
25	Modbus/TCP idle time out	0 - 65535 (seconds)		Default: 60 seconds
		0	Disabled	
		1 - 65535	Enabled	
26	Baud rate	2400	2400 bps	
		4800	4800 bps	
		9600	9600 bps	Default
		19200	19200 bps	
		38400	38400 bps	
		57600	57600 bps	
		115200	115200 bps	
27	Parity	0 - 2		
		0	No parity	Default
		1	Even parity	
		2	Odd parity	

Register	Name	Values	Options	Comment
28	Number of stop bits	1 - 2		Default: 1 stop bit
29	Slave time out time	25 - 65535 ms		Default: 1000 ms
30	Physical interface	0 - 2		
		0	EIA-485 (Screw terminal block)	Default
		1	EIA-232 (DSUB)	
		2	EIA-232 (Screw terminal block)	
Authentication				
31	Valid IP address 1	0 - 255		First byte of IP address
		0	Disabled	IP address authentication disabled
		1 - 255	Enabled	
32	Valid IP address 2	0 - 255	Enabled	Second byte of IP address
33	Valid IP address 3	0 - 255	Enabled	Third byte of IP address
34	Valid IP address 4	0 - 255	Enabled	Fourth byte of IP address
35	Mask for Valid IP address 1	0 - 255	Enabled	First byte of mask
36	Mask for Valid IP address 2	0 - 255	Enabled	Second byte of mask
37	Mask for Valid IP address 3	0 - 255	Enabled	Third byte of mask
38	Mask for Valid IP address 4	0 - 255	Enabled	Fourth byte of mask

Valid commands:

Command	Name
3	Read Holding Registers
6	Preset Single Register
16	Preset Multiple Registers

Password Settings

Choosing "Admin" will allow you to change the administrator password for the device.

Status

The following status information is available on the Status web page:

Info	Description
Number of connections	Number of masters that are connected to the module
Valid Responses	Counts valid responses from the Modbus/RTU slaves
Serial Time outs	Number of Modbus/RTU slave time outs
CRC Errors	Number of CRC errors on incoming Modbus/RTU responses
Buffer Overruns	Number of input buffer overruns (if an incoming Modbus/RTU response is bigger than 300 bytes, it will cause the input buffer to overflow).
Exception Responses	Number of exception responses from the connected Modbus/RTU slaves

Specifications

Ethernet Connection

10BASE-T or 100BASE-TX (IEEE 802.3). RJ45 connector.

Serial Interfaces

EIA-232 with full modem control (RTS, CTS, DCD, DTR, DSR, RI), 300-115200 bps, 9-pole DSUB connector

EIA-485, 300-115200 bps, connection through screw terminal block

Power Supply

9 - 32 VAC/DC

70 mA@24 VDC (1.7 W).

Environmental Specification

Operating temp:	0 - 55 °C
Storage temperature:	- 25 - 75 °C
Humidity range:	5 - 93%, non-condensing

Cover Material

Grey plastic, LEXAN 940, self-extinguishing acc. to UL94-V0

Mounting Option

DIN rail (EN 50022)

CE Certification

EN 50081-2:1993

EN 1000-6-2:1999