Anybus® Modbus-TCP/RTU Gateway

HMS Connecting Devices™

Important User Information

Liability

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

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

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

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

Intellectual Property Rights

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

Trademark Acknowledgements

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

Table of Contents

1 Preface

1.1 About This Document

This manual describes how to install and configure Anybus Modbus-TCP/RTU Gateway.

For additional related documentation and file downloads, please visit the Anybus support website at www.anybus.com/support.

1.2 Document history

Summary of recent changes

Change	Where (section no.)
Major rewrite	—

Revision list

Version	Date	Author	Description
1.00...1.13			
2.00	2009-10-09	KeL	New template
2.01	2011-05-13	KeL	Minor update
2.02	2012-03-12	KeL	Minor update
2.03	2012-09-21	KaD	Minor update
3.00	2016-04-11	ThN	New layout and structure Major rewrite

1.3   Conventions

Unordered (bulleted) lists are used for:

- Itemized information

- Instructions that can be carried out in any order

Ordered (numbered or alphabetized) lists are used for instructions that must be carried out in sequence:

1. First do this,

2. Then open this dialog, and

   a. set this option...

   b. ...and then this one.

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

---

i *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.

1.4   Terminology

In this document the TIA-232/485 serial communication standards are referred to as RS-232/485 when describing hardware, and as EIA-232/485 in the software interface.
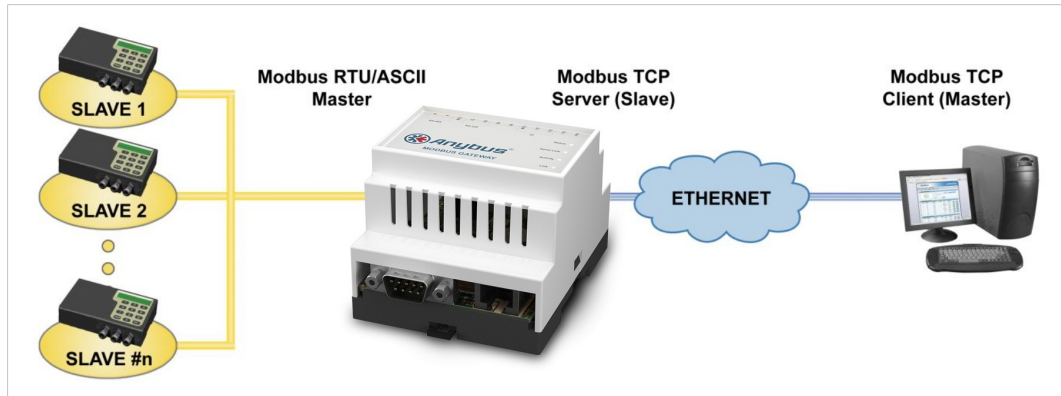
2 Introduction

Fig. 1   Overview

The Anybus Modbus-TCP/RTU Gateway allows Modbus RTU devices be connected to a Modbus TCP network. The gateway functions as a Modbus TCP server and performs a transparent conversion between the two protocols. All Modbus accesses that are not addressed to the virtual slave of the Anybus Modbus-TCP/RTU Gateway will be forwarded to the Modbus RTU network.

The maximum frame length (number of registers) that can be used is limited only by the Modbus specification and the functionality of the connected Modbus RTU devices. All Modbus function codes are supported.

Configuration is carried out using the built-in web interface. The IP address of the gateway can be set using the Anybus IPconfig utility.

3 Installation

3.1 Mounting on DIN Rail

Mounting

1. Hook the unit onto the upper lip of the rail.

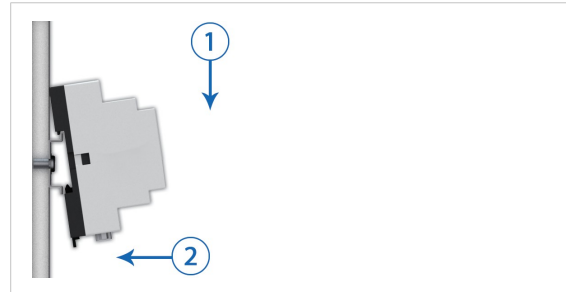2. Press the unit towards the rail until it snaps into place.

Fig. 2   Mounting on DIN rail

Removing

1. Insert a flat-head screwdriver into the slotted tab on the bottom of the unit and pull the tab gently downwards.

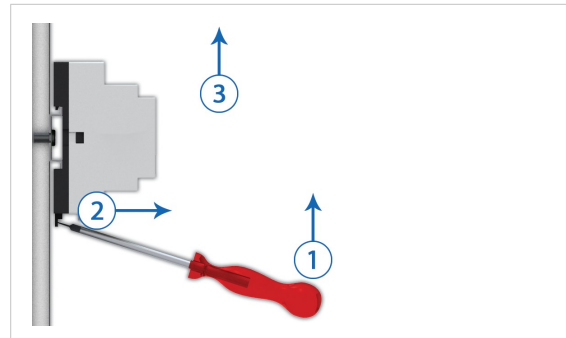2. Pull the bottom end of the unit free of the rail and lift the unit from the rail.

Fig. 3   Removing from DIN rail

3.2 MAC ID and Default IP Address

The default IP address of a Anybus Modbus-TCP/RTU Gateway is **10.200.1.n**, where **n** corresponds to the last number in the MAC ID, which is printed on the label on the side of the unit.

The MAC ID is in hexadecimal format. If the MAC ID is **00:30:11:FA:00:1F**, the IP address will be **10.200.1.31**, since the hexadecimal value 1F = 31.
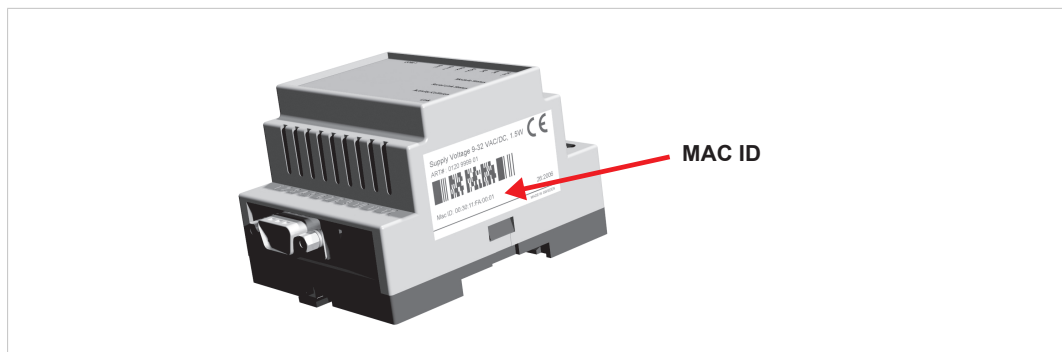

Fig. 4   Label with MAC ID

3.3 Connections

> ℹ️ *In this document the TIA-232/485 serial communication standards are referred to as RS-232/485 when describing hardware, and as EIA-232/485 in the software interface.*
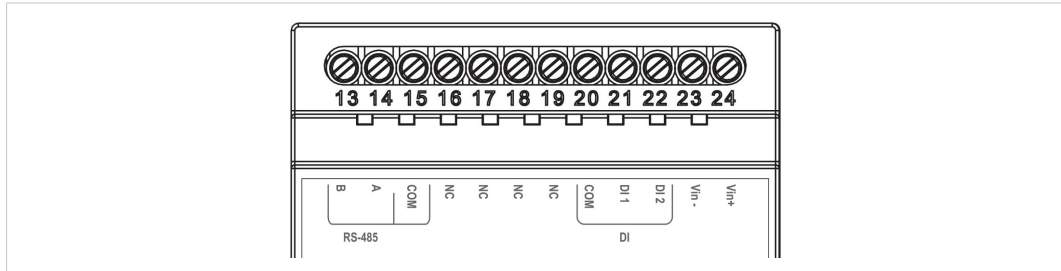
3.3.1 Terminal Block

Fig. 5   Terminal block

Terminal block connections

Pin	Label	Description
24	Vin+	Power 9–24 V DC/AC
23	Vin-	PE ground
22	DI:DI 2	Digital Input 2 + (10–24 VDC)
21	DI:DI 1	Digital Input 1 + (10–24 VDC)
20	DI:COM	Digital Input Common -
19	NC	Not used
18	NC	Not used
17	RS232:RX	RS-232 Receive
16	RS232:TX	RS-232 Transmit
15	COM	Serial common (signal ground)
14	RS-485:A	RS-485 Line A
13	RS-485:B	RS-485 Line B

3.3.2 D-sub Connector

The 9-pin male D-sub connector provides an RS-232 interface. The Anybus Modbus-TCP/RTU Gateway is configured as a DTE device.

D-sub connector pin layout

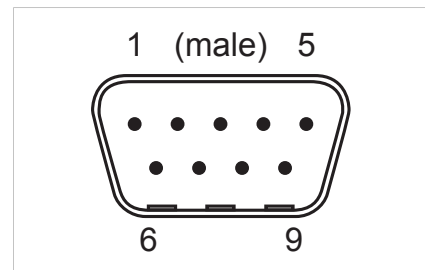| Pin	Function
1	CD (Carrier Detect)
2	Rx (Receive)
3	Tx (Transmit)
4	DTR (Data Terminal Ready)
5	GND (Signal Ground)
6	DSR (Data Set Ready)
7	RTS (Request To Send)
8	CTS (Clear To Send)
9	RI (Ring Indicator)

Fig. 6   D-sub connector

3.3.3 Ethernet Connector

The RJ-45 socket provides a 10/100 Mbps Ethernet network connection.

Ethernet connector pin layout

Pin	Function
1	TD+
2	TD-
3	RD+
4, 5, 7, 8	Termination
6	RD-
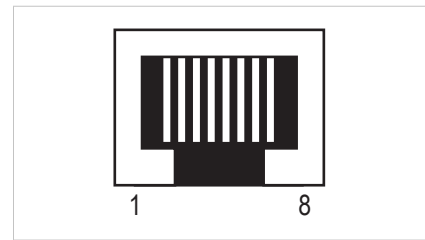
Fig. 7   Ethernet connector

3.4 LED Indicators
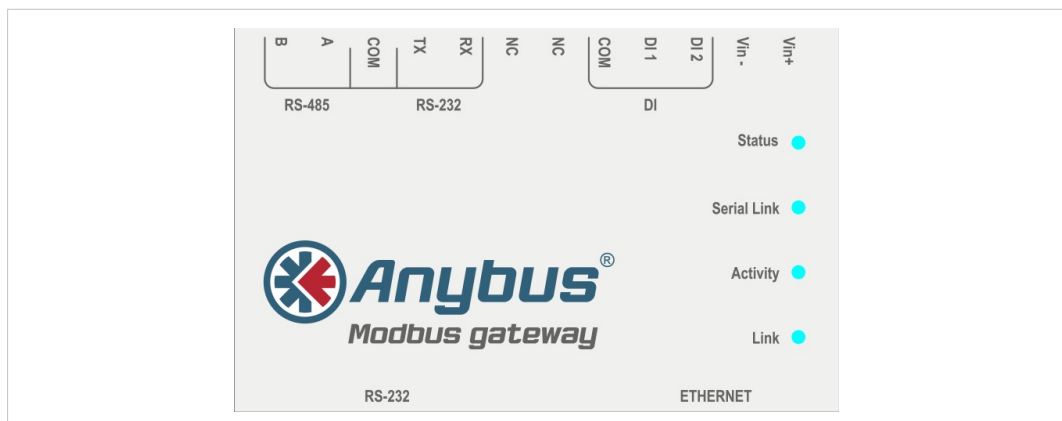
Fig. 8   LED Indicators

LED Indication		Meaning
Status	OFF	No power
	Green	System is operating normally
	Orange	System is starting up
	Red	Hardware fault
	Flashing red	Error during initialization
Serial Link	Flashing green	Receiving serial packet (on either port)
	Flashing red	Transmitting serial packet (on either port)
	Orange	System is starting up
Activity	Flashing green	Receiving Ethernet packet
	Flashing red	Ethernet collision
Link	Green	10 Mbps Ethernet network detected
	Orange	100 Mbps Ethernet network detected

4 Configuration

4.1 IP Configuration

4.1.1 Installing the IPconfig Utility

IPconfig is a Windows-based tool used for TCP/IP network configuration of a HMS devices. The tool will detect all connected devices and allow configuration of their IP address, netmask, default gateway, DNS and hostname.

1. Download IPconfig from www.anybus.com/support.

2. Extract the contents of the zip archive in a folder on your computer and double-click the executable file to run the installer.

4.1.2 Scanning for Connected Devices

Make sure that the devices to be configured are connected on the same Ethernet subnet as the computer running IPconfig. Use standard Ethernet cables.

When IPconfig utility started it will scan the available local networks. All detected devices will be presented in a list in the main window. To refresh the list, click on **Scan**.
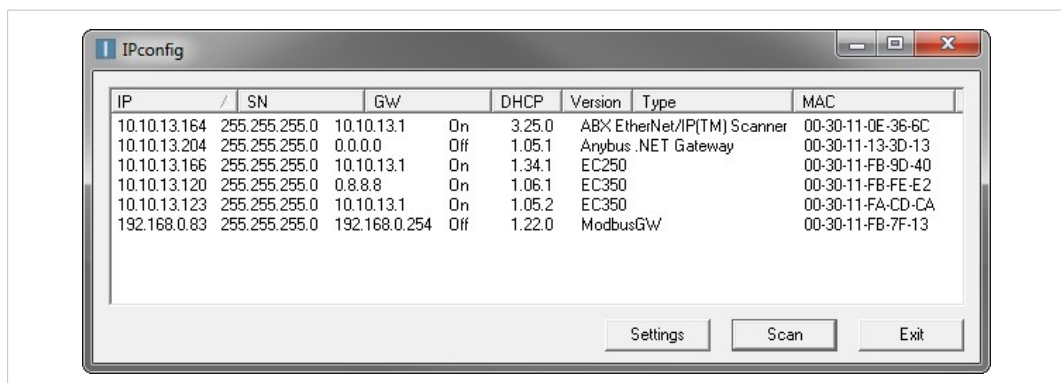
Fig. 9   IPconfig main window

IP	IP address of the device
SN	Subnet mask
GW	Default gateway
DHCP	Automatically managed IP configuration
Version	Firmware version
Type	Product name
MAC	Ethernet MAC address (System ID)

4.1.3 Ethernet Configuration

To change the TCP/IP settings for a device, either double-click on the entry or right-click on it and select **Configuration**.
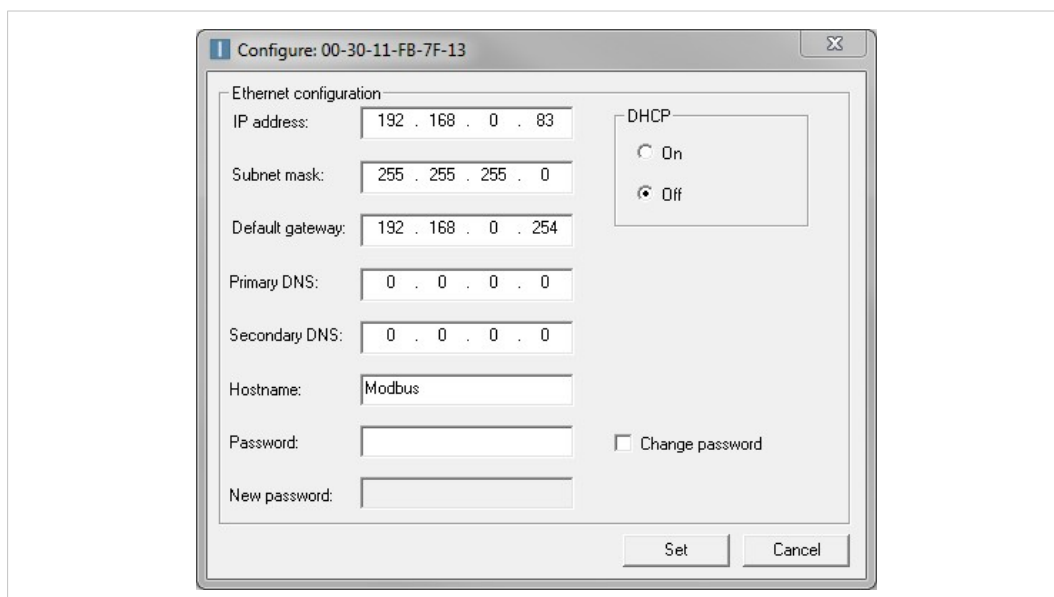

Fig. 10 Ethernet configuration

Notes

- Do not enable DHCP if there is no DHCP server available on the network.
  See also *IPconfig Settings, p. 11*

- You can add a name for the device in the **Hostname** field. Only characters a-z, A-Z, 0–9 and _ (underscore) are allowed.

- The default password for authentication of the new settings is *admin*. To change the password, check the **Change password** box and enter the current password in the **Password** field and the new password in the **New password** field.

> ! For security reasons the default password should always be changed.

Click **Set** to save the new settings. The device will be automatically restarted. The new settings can be tested by opening a web browser and entering the IP address assigned to the device.

4.1.4 IPconfig Settings

Additional settings for IPconfig can be accessed by clicking on **Settings**.
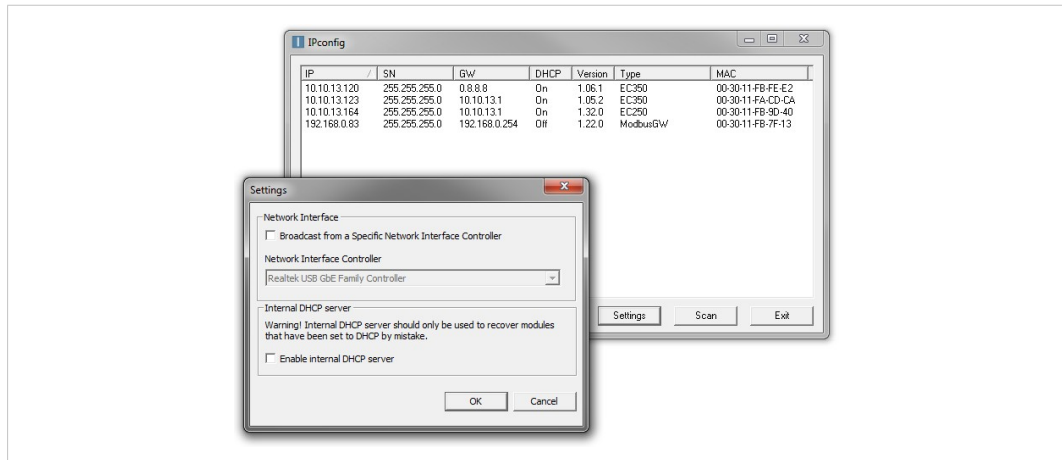
Fig. 11   IPconfig settings

Network Interface	Check this option to select a specific network interface to use when scanning for devices on a computer with multiple interfaces.
Internal DHCP Server	If a device has been set to use DHCP but there is no DHCP server on the network, the device may no longer be detected in a scan. To recover the device, an internal DHCP server in IPconfig can be activated.
	Click the checkbox to enable the option, then click **OK** to close the window. IPconfig will automatically refresh, and the missing device should now be detected. Select the device and change its configuration to use manual addressing instead of DHCP.
	Disable the internal DHCP server after the device has been recovered.

4.2 Web Configuration Interface

Right-click on the entry for the gateway in IPconfig and select **Open Web Interface** to open its local web server in your default browser. You can also type the IP address directly into the web browser address field.

The default login user name is *admin* and the default password is *admin*.
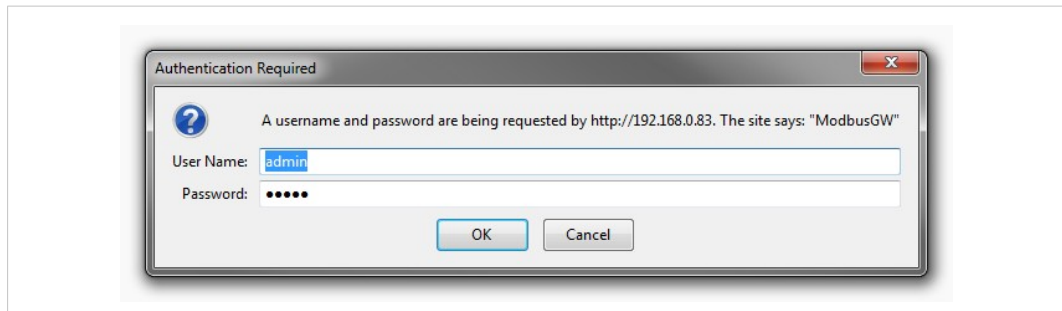
Fig. 12   Logging in to the web interface

> ⚠ For security reasons the default password should be changed after the first login. The user name cannot be changed.

4.2.1 Network
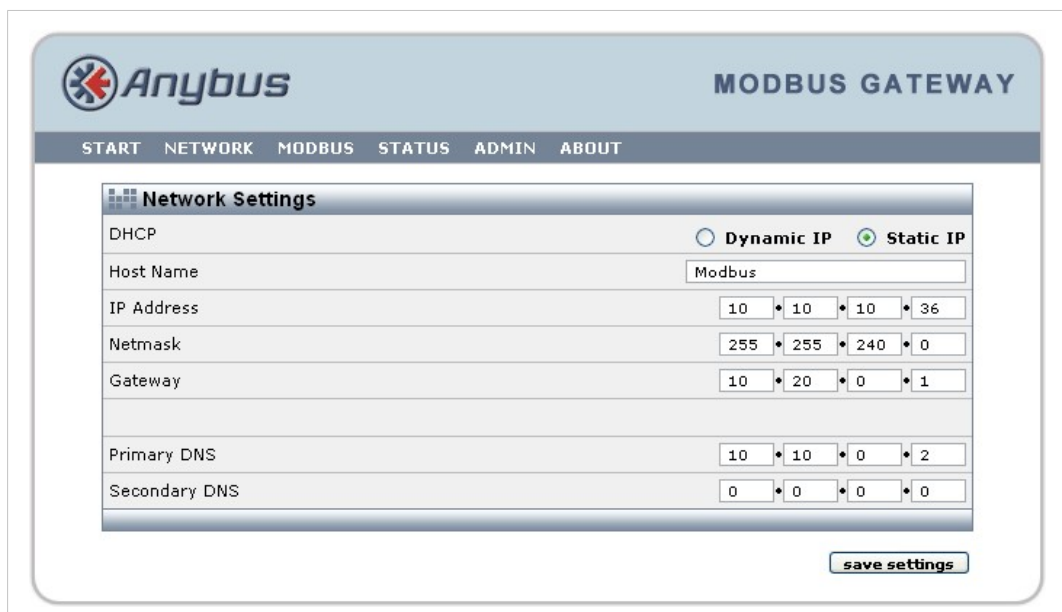
Fig. 13   Network settings

The **Network** settings page allows viewing and changing the TCP/IP settings. These are the same settings as those entered in IPconfig.

When DHCP is enabled the unit will automatically receive the settings for IP address, subnet mask, default gateway, and DNS. Contact your network administrator if in doubt.

Click on **Save Settings** to save the new configuration.

> ⚠ Do not select Dynamic IP unless there is an active DHCP server on the local network.

4.2.2 Modbus

Fig. 14 Modbus settings

Serial Settings (Modbus RTU/ASCII)	
Transmission Mode	RTU or ASCII
Slave Response Timeout	Default = 200 ms
Physical Interface	EIA-485 (terminal), EIA-232 (terminal) or EIA-232 (D-sub)
Baudrate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 bps
Character Format	Parity and number of stop bits
Extra delay between messages	Some nodes may require extra time to finish handling a message before receiving another. This setting adds a delay between each message.
Character delimiter	The "silent" period to be regarded as a delimiter between one message and the next. If set to 0 (zero) the default Modbus setting of 3.5 characters is used. The actual time will then depend on the baud rate.

Ethernet Settings (Modbus TCP)	
Port Number	The port to use for Modbus TCP communication. Default = 502
Gateway Registers	Queries sent to the specified address offset will be handled by the internal registers in the gateway instead of being forwarded to the Modbus RTU network. See *Internal Registers, p. 15*. Default = disabled.
Server Idle Timeout	Idle timeout for the Modbus TCP connection. If no Modbus TCP query is received within this time the connection will close. Default = 60 seconds.
IP Authentication	If enabled, specifies the IP address and netmask of the device that is allowed to connect to the gateway. Default = disabled.

4.2.3 Status
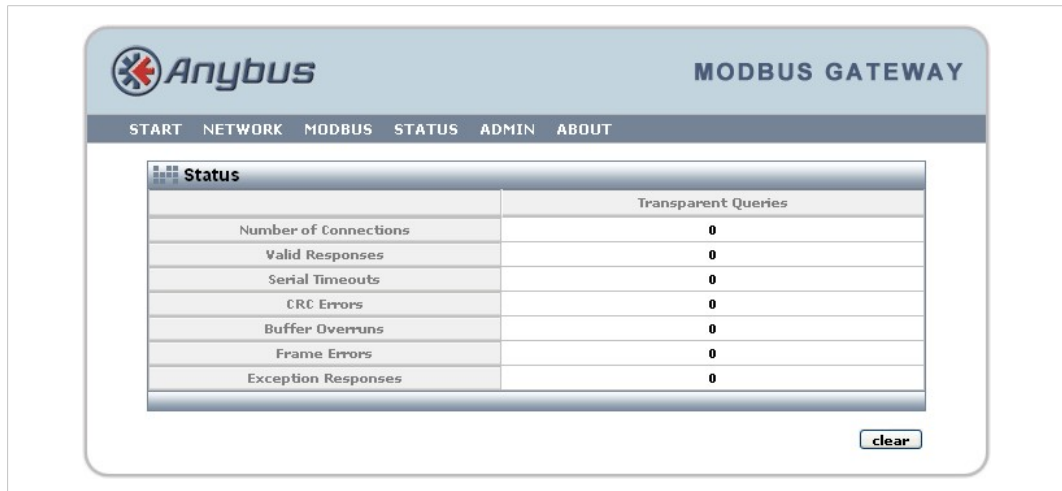
Fig. 15   Status page

Status	
Number of Connections	Number of Modbus masters connected to the gateway
Valid Responses	Valid responses from the Modbus RTU slaves
Serial Timeouts	Modbus RTU slave timeouts
CRC Errors	CRC errors on incoming Modbus RTU responses
Buffer Overruns	Input buffer overruns (incoming Modbus RTU responses that are exceeding 300 bytes)
Exception Responses	Exception responsed from connected Modbus RTU slaves

4.2.4 Admin

Fig. 16   Admin page

This page allows you to change the default password for the gateway. The user name cannot be changed.

!	For security reasons the default password should be changed after the first login.

A   Internal Registers

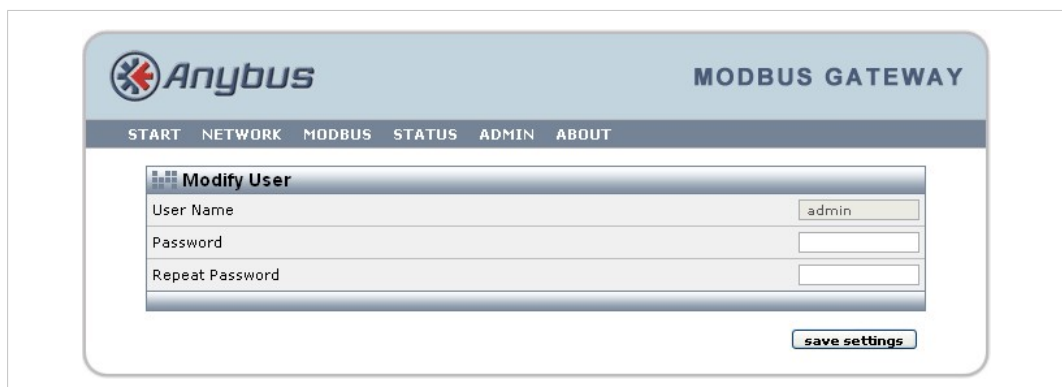| Register	Name	Values	Options	Comment
1	Digital input 1 status	0 or 1		Read only
2	Digital input 2 status	0 or 1		Read only
3	Active MBTCP connections	0 - 10		Read only
4	Active internal connections	0 - 10		Read only
Serial status (Modbus TCP)				
5	Valid responses	0 - 65535		Can be cleared
6	Serial 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 to 255		
		-1	Disabled	Default
		0 - 255	Enabled	
25	Modbus TCP idle time out	0 - 65535		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	
28	Number of stop bits	1 - 2		Default: 1 stop bit
29	Slave time out time	25 - 65535		Default: 1000 ms
30	Physical interface	0 - 2		
		0	EIA-485 (terminal)	Default
		1	EIA-232 (DSUB)	
		2	EIA-232 (terminal)	

Register	Name	Values	Options	Comment
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

B   Technical Data

Technical Specifications

Model name	Anybus Modbus-TCP/RTU Gateway
Order code	AB7702
Ethernet	10/100 Mbit/s
Serial Interfaces	EIA-232 with full modem control (RTS, CTS, DCD, DTR, DSR, RI) EIA-485
Protocols	Modbus RTU, ASCII, TCP
Baud rates	300–115200 bps
Mounting	DIN rail (EN 50022)
Housing	Grey plastic (LEXAN 940) Self-extinguishing according to UL94–V0
Dimensions (W x D x H)	90 x 70 x 58 mm
Operating temperature	-40 to +65 °C
Storage temperature	-40 to +85 °C
Humidity range	5–95 % RH, non-condensing
Housing class	IP20
Power supply	9–24 V DC or AC, SELV
Power consumption	2.0 W
Certifications	CE, $_{c}UL_{US}$

C Regulatory Compliance

C E

This product is in compliance with the EMC directive 2014/30/EC through conformance with the following standards:

EN 61000-6-4 (2007)
Emission standard for industrial environment

- EN 55016-2-3, Class A (2010)

- EN 55022, Class A (2011)

EN 61000-6-2 (2005)
Immunity for industrial environment

- EN 61000-4-2 (2009)

- EN 61000-4-3 (2006)

- EN 61000-4-4 (2012)

- EN 61000-4-5 (2014)

- EN 61000-4-6 (2014)

C $\bigcirc$ US LISTED

E214107

Field wiring terminals shall be connected with minimum wire size 24 AWG.

This page intentionally left blank