

# M-Bus to Modbus-TCP Gateway

024380-C, 025070-C

## USER MANUAL

SCM-1202-096 2.4 en-US ENGLISH



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# Important User Information

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# 1 Preface

## 1.1 About This Document

This document describes how to install and configure the Anybus M-Bus to Modbus-TCP gateway, models 024380-C and 025070-C.

For additional documentation, configuration examples, FAQs, troubleshooting guides and technical support, please visit [www.anybus.com/support](http://www.anybus.com/support).

## 1.2 Document History

Version	Date	Description
2.1	2018-02-01	First release for this model version
2.2	2018-03-08	Minor corrections and updates
2.3	2020-06-10	Added Transparent Mode section
2.4	2020-12-03	Changed note about admin password in User tab

## 1.3 Document Conventions

Numbered lists indicate tasks that should be carried out in sequence:

1. First do this
2. Then do this

Bulleted lists are used for:

- Tasks that can be carried out in any order
- Itemized information
- An action
  - and a result

**User interaction elements** (buttons etc.) are indicated with bold text.

```
Program code and script examples
```

Cross-reference within this document: [Document Conventions, p. 4](#)

External link (URL): [www.hms-networks.com](http://www.hms-networks.com)



### **WARNING**

Instruction that must be followed to avoid a risk of death or serious injury.



### **Caution**

Instruction that must be followed to avoid a risk of personal injury.



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



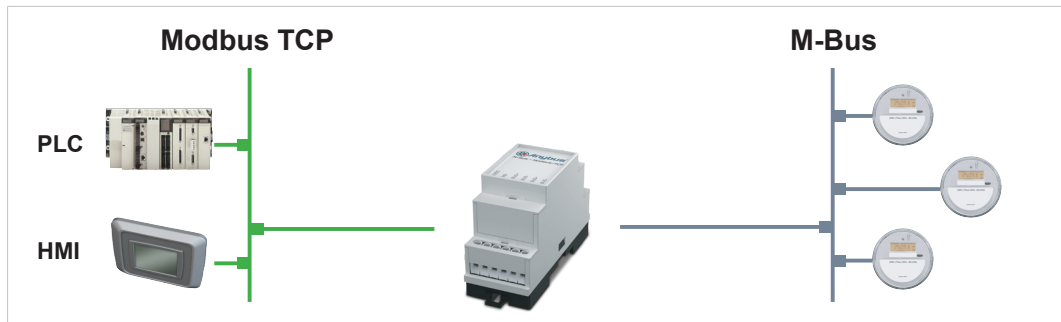
*Additional information which may facilitate installation and/or operation.*

## 2 Product Description

The Anybus M-Bus to Modbus-TCP gateway allows measuring devices that use the M-Bus protocol (meters) to communicate on a Modbus TCP network with up to 5 Modbus clients.

Meters can be added manually or automatically by scanning the M-Bus. The gateway configuration maps data from each meter to a corresponding Modbus register. Meter data will then be read automatically at an interval that can be set globally or individually for each meter.

The gateway and meters are configured through a built-in web interface, or by editing and uploading configuration files via FTP. The complete configuration including the meter configurations can be exported in HTML format.



**Fig. 1** Application example

Each gateway supports up to 20 or 80 unit loads (UL) on the M-Bus depending on model. 1 UL equals 1.5 mA. Each meter can have more than one UL, so the total number of meters that can be connected may be less than the maximum number of supported loads.

## 3 Installation



This product contains parts that can be damaged by electrostatic discharge (ESD). Use ESD prevention measures to avoid damage.

### 3.1 Installation Overview

1. Mount the unit on a DIN rail.
2. Connect the M-Bus and Ethernet cables.
3. Connect the power supply and power on the unit.
4. Check the network settings and configure them as required.
5. Open the web interface to configure the unit.

### 3.2 DIN Rail Mount

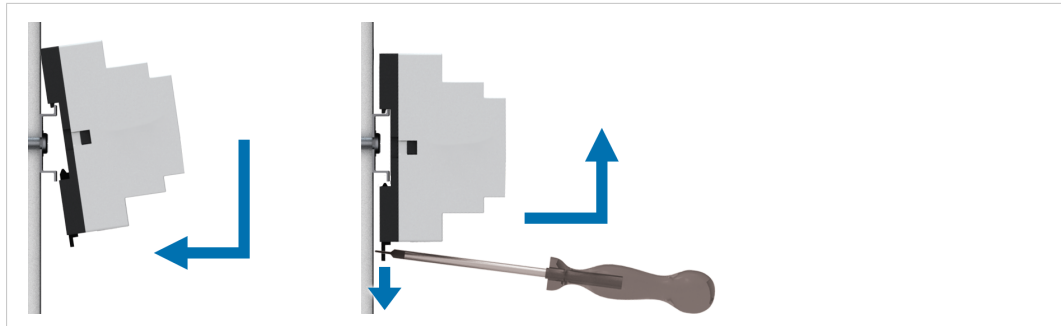


Fig. 2 DIN rail mounting/removing

#### Mounting

Hook the unit onto the rail and press it towards the rail until it snaps into place.

#### Removing

Pull the tab at the bottom of the unit gently downwards to release the unit.



### 3.3 Connections and Indicators

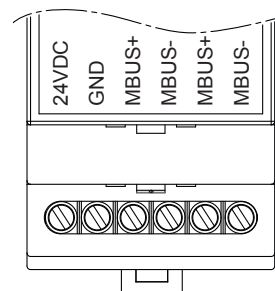


To ensure a good M-Bus signal, make sure that power ground (GND) is NOT electrically connected to protective earth (PE).

Maximum cross sectional area in terminal block = 2.5 mm<sup>2</sup>

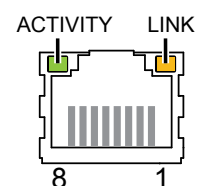
#### Terminal block

Pin	Function
24VDC	+24 VDC
GND	Power ground
MBUS+	M-Bus connection
MBUS-	
MBUS+	M-Bus connection
MBUS-	



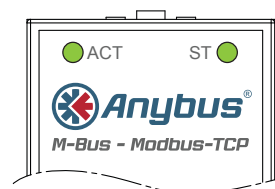
#### Ethernet connector (RJ45)

Pin	Function
1	TD+
2	TD-
3	RD+
4, 5, 7, 8	(reserved)
6	RD-



#### LED Indicators

ACT	OFF	Inactive, standby
	Green	M-Bus readout
ST	Off	Application not running
	Green	Application running
	Orange	Initializing
	Orange, flashing	M-Bus scan
	Red	Error



### 3.4 Network Settings

The Anybus M-Bus to Modbus-TCP gateway is normally configured using the built-in web interface. The IP address of the gateway must be in the same subnet range of your local network as the computer used for configuration.

#### Default network settings

Static IP address	192.168.1.101
Subnet mask	255.255.255.0
Default gateway	192.168.1.254

The network settings can be configured automatically from a DHCP server or manually using the configuration tool *Net discover*. The settings can also be changed from the web interface after you have logged in.



Make sure that you have all necessary information about your local network before starting installation. Contact your network administrator if in doubt.

#### Changing Network Settings with *Net discover*

1. Download *Net discover* from [www.anybus.com/support](http://www.anybus.com/support) and install it on your computer.
2. In *Net discover*, right-click on the entry for the device and select the configuration option.

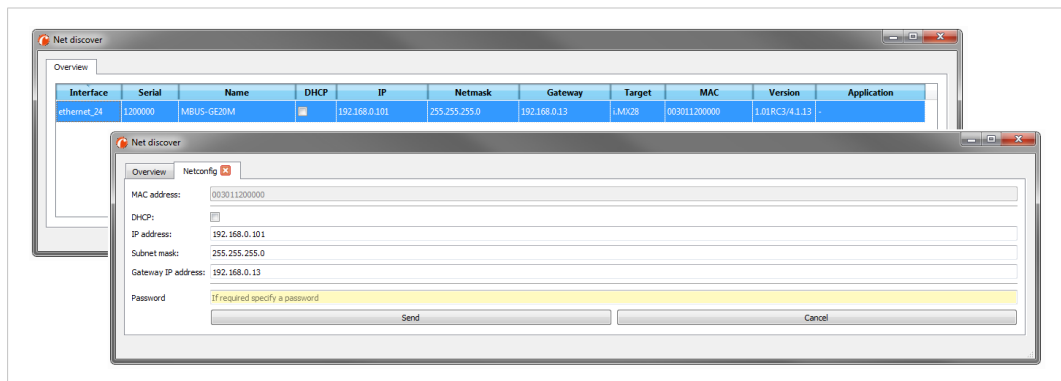


Fig. 3 *Net discover*

3. If the network uses static IP addressing, enter the desired IP address, subnet mask and default gateway address. If the network uses dynamic IP addressing, check the **DHCP** checkbox. Contact your network administrator if in doubt.



Do not enable DHCP if there is no active DHCP server on the network.

4. Click on **Send** to download the IP settings to the gateway.

Right-click on the gateway in *Net discover* and select **HTTP Web** to open the web interface in your default browser. You can also access the web interface by entering the IP address in the address field of any standard web browser.

Additional features of *Net discover* are described in [Advanced Configuration, p. 42](#).

## 4 Configuration

When power is applied the gateway will run the following startup sequence:

1. Applying TCP/IP network settings using DHCP or static configuration
2. Initial generation of SSL device keys (may take some time on first startup)
3. Setting system time via SNTP
4. Starting system services
5. Starting the main application

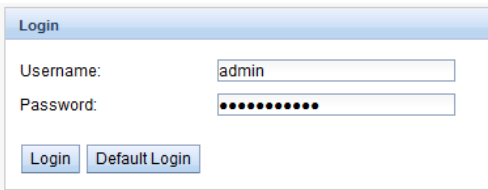
The Anybus M-Bus to Modbus-TCP gateway is normally configured using the web interface, which gives access to all device parameters, meter configuration, and services.

The gateway can also be configured by editing and uploading configuration files directly to the device using FTP. See [Advanced Configuration, p. 42](#).

### 4.1 Web Interface Login

The first time you access the web interface you will be automatically logged in as the default username (web). You can also log in as the default user manually by clicking **Default Login** on the login screen. The default user only has read access.

If the default user has been disabled in the configuration, you must enter a valid username and password and click **Login**.



The screenshot shows a web-based login interface. It has a title bar that says 'Login'. Below the title bar, there are two input fields: 'Username:' with the text 'admin' entered, and 'Password:' with a masked password represented by a series of dots. At the bottom of the form, there are two buttons: 'Login' and 'Default Login'.

Fig. 4 Login window

#### Default usernames and passwords

Username	Password	Description
admin	admin	Administrator user with root access, allows full access to all services (HTTP, FTP, flash update, IP configuration).
web	web	Default user for the web interface. Allows write access to the web interface. If a user with this name and password exists, the web server will automatically log in with these credentials when accessed.
ftp	ftp	User for FTP access to the log directory of the gateway (C:/log/)



If you are logged in with write access you should always log out after finishing the configuration, as only one user with write access can be logged in at a time. If your session stays active, other users will not be able to log in with write access.

## 4.2 General Tab

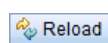
This tab contains general network settings.

**Fig. 5 General tab**

Field	Description	Writable
Device name	Name of the gateway (displayed in configuration tool)	Yes
Serial number	Serial number of the gateway	No
DHCP	Enable/disable dynamic IP addressing	Yes
IP address	IP address of the gateway	Yes
Subnet mask	Subnet mask of the gateway	Yes
Gateway address	IP address of the default gateway/router on the local network	Yes
DNS IP	IP address of the DNS server on the local network	Yes
Free space log (kB)	Available memory space in log data partition	No
Free space Flash (kB)	Available memory space in application data partition	No
System date (local)	Current local system date	Yes
System time (local)	Current local system time	Yes
SNTP Server	IP address of SNTP time server	Yes



*The network parameters will be disabled if **DHCP** is checked.*



Discard changes and reload the current settings



Save the changes and reinitialize the gateway



See [Print Page, p. 21](#).



Changing the network configuration may restrict accessibility. Contact your network administrator for guidance if in doubt.

If the network configuration is changed, the gateway will be available under the new IP address after saving. All established network connections to the gateway will be terminated, and all logged in users will be logged out.

Date and time are processed internally as UTC time (without time zone shift). The web browser will then convert the date and time according to the local time zone of the computer.

## 4.3 Meter Tab

This tab lists the connected meters and allows you to add and edit individual entries.

The screenshot shows the 'Meter' tab in a software interface. At the top, there are tabs: General, **Meter**, Configuration, Server, Security, User, and Service. Below the tabs is a section titled 'Connected meters' containing a table. A context menu is open over the second row of the table, showing options: Edit, Add meter, Add value, Activate, Deactivate, and Delete (with a red X icon).

Interface	S	Serial	MAN	Medium	Version	Link	Value	Scale	Unit	Cycle	User label	Description	Register
M-Bus	*	00023872	EMU	Electricity	16	0				0			10
M-Bus		00389851	EMH	Electricity	10	7				0			220
---							25 541	1E+0	h			On time	230
---							29 298	1E+1	Wh			Energy	240
---							4	1E+0	W			Power	250
---							542	1E+0	None			Reset counter	260
---							4	1E+0	Bin			Error flags (Device type specific)	270
---							No Data	1E+0	None			None [1]	280
M-Bus		00000028	WEP	Electricity	1	0				0			0
M-Bus		92710335	ELS	Valve (gas or water)	89	0				0			0
M-Bus		70125236	PIK	Electricity	2	0				0			0
M-Bus		00000098	CGC	Heat cost allocator	85	0				0			0
M-Bus		35300749	HYD	Communicati controller	57	235				0			0
M-Bus		14677789	KAM	Electricity	1	65				0			0
---							368 100	1E+0	Wh			Energy (Forward flow only)	0
---							0	1E+0	Wh			Energy (Backward flow only)	0
---							368 108	1E+0	None			Special supplier information	0
---							0	1E+0	None			Special supplier information	0

At the bottom of the table are buttons: Reload, Readout, Scan, Add, Delete, Save, and Print.

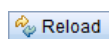
Fig. 6 Meter tab

The meter list is initially empty. After connecting meters to the gateway, click **Scan** to start populating the list. The scanning settings can be changed on the **Configuration** tab.

Successive scans will add discovered meters to the list. Existing meters will not be deleted even if they are unavailable. To delete a meter from the list, select it and click **Delete**.

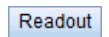


*Scanning can take a long time depending on the scan mode and the number of connected meters. The scan process cannot be interrupted.*



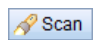
Reload

Discard the changes made on the page and reload the currently active settings.



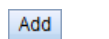
Readout

Refresh all the read out meter values. The normal update cycle will not be not affected.



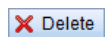
Scan

Scan for meters on the M-Bus.



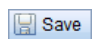
Add

Add meters not found during a scan or that do not support an automated scan.



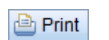
Delete

Delete the selected meter entry. Individual value entries cannot be deleted.



Save

Save the changes and reinitialize the gateway.



Print

See [Print Page, p. 21](#).

The default configuration for each meter is applied immediately after scanning. Additional changes to the configuration must be saved manually.

When activating or deactivating a meter, its meter values will automatically be enabled or disabled according to the hierarchy. An inactive meter will be activated when one of its meter values is enabled.



*Hold down the SHIFT or CTRL keys to select multiple meters or meter values.*

Meter tab fields		
Field	Description	Writable
Interface	Interface of meter (M-Bus)	No
S	Entry status E = Value has been edited * = Value display is limited in the configuration ! = Unable to read value during last readout interval	No
Serial	Serial number of meter	No
MAN	Manufacturer of meter (3-letter abbreviation)	No
Medium	Medium of meter	No
Version	Version number of meter	No
Link	Primary address	No
Value	Meter reading or measurement value	No
Scale	Scale factor (scientific notation)	No
Unit	Unit	No
Cycle	Readout interval in seconds (0 = use general readout interval)	Yes
User label	User specific description of meter or value. Included in export of CSV data, allows application specific mapping.	Yes
Description	Description of meter value	No
Register	Modbus register address in steps of 10	Yes

The arrangement of data in the meter list corresponds to the order of the data in the M-Bus protocol. The meaning of the values can thus be compared directly with the data sheet of the meter. It is also possible to assign the meter values to the raw data of the meter.

### Timestamps

Timestamp values transmitted within the M-Bus protocol are automatically assigned to the other meter values where possible. This means that some of the timestamps may not appear in the list. To enable the display of all timestamps values in the list, set the system configuration parameter MUC\_SHOWTIMESTAMPENTRIES to 1. See [Configuration Files, p. 44](#).

### Webserver capacity error

If a scan or a change in the meter list is terminated with the error message “Webserver capacity exceeded”, see [Troubleshooting, p. 36](#).

## Editing Entries

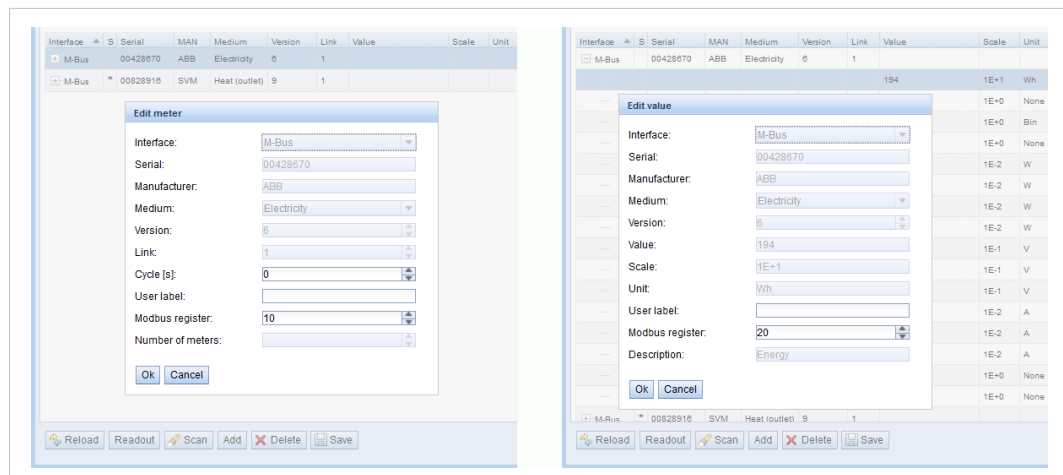


Fig. 7 Editing meter and value entries

Meter and value entries can be configured by double-clicking the entry or by right-clicking the entry and selecting **Edit**. The fields in the Edit dialog correlate with the fields in the meter list. Depending on the used interface some fields may be disabled for editing.

The readout interval can be set independently for each meter in the field **Cycle**. If no value is entered the global readout interval will be used, see [Configuration Tab, p. 14](#).

Each meter or value entry can be assigned a **User label** for application-specific use. The label can consist of up to 50 characters including spaces.

**Valid characters in user labels:** A-Z, a-z, 0-9, ! \$ % & / ( ) = ? + , . \*

**Invalid characters:** < > " "

## Modbus Address Allocation

The Modbus register address can be assigned or reset for a single meter or for all meters by right-clicking on the entry and selecting **Allocate** or **Deallocate**. If duplicate addresses are detected an error message will be shown when the configuration is saved.

## 4.4 Configuration Tab

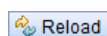
This tab provides global meter settings.

**Configuration of meter interfaces**

Readout interval (s):	900
Description mode:	Standard
Maximum device count:	80
Maximum value count:	25
Raw log active:	<input type="checkbox"/>
M-Bus mode:	Secondary scan
Primary start address:	0
Primary final address:	250
Secondary address mask:	FFFFFFFF
M-Bus baud rate:	2 400
M-Bus timeout (ms):	2 000
M-Bus idle timeout (ms):	100
M-Bus full timeout (ms):	10 000
M-Bus request mode:	Standard
M-Bus reset mode:	Standard
M-Bus max. multipage:	3

Reload Save Print

**Fig. 8 Configuration tab**



Reload

Discard the changes made on the page and reload the currently active settings.



Save

Save the changes and reinitialize the gateway.



Print

See [Print Page, p. 21](#).



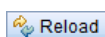
Configuration tab fields		
Field	Description	Writable
Readout interval (s)	Standard readout cycle of meters (in seconds). Value might be overwritten for each meter by parameter Cycle in tab Meter	Yes
Description mode	<p>Mode of displaying the meter value description.</p> <p><b>None</b> No display of description</p> <p><b>Standard</b> Display of common value description.</p> <p><b>Extended</b> Extended display of value description (if not 0). Notation: Description [Memory] &lt;Tariff&gt; {min max error} Example: Energy [2] &lt;1&gt; {max}</p> <p><b>Extended with DIF/VIF</b> Extended display including DIF and VIF raw data. Notation: Description [Memory] &lt;Tariff&gt; {Value Type} # XX XX XX... Example: Energy [2] &lt;1&gt; # 8C 11 04</p> <p><b>Extended with raw data</b> Extended display including raw data of the complete value entry. Notation: Description [Memory] &lt;Tariff&gt; {Value Type} # XX XX XX... Example: Energy [2] &lt;1&gt; # 8C 11 04 96 47 06 00</p> <p><b>DIF/VIF</b> Display of DIF/VIF raw data</p> <p><b>Raw data</b> Displays the raw data of the complete meter value entry. After changing this parameter a readout is needed to update the meter list and to display the relevant data.</p>	Yes
Maximum device count	Maximum number of meters to scan (0 = no limitation). Already configured meters are not affected by this parameter.	Yes
Maximum value count	Maximum number of meter value entries to read during a readout (0 = no limitation). Already configured meter value entries are not affected by this parameter.	Yes
RAW log active	Activates the raw data log.	Yes
M-Bus mode	M-Bus scan mode (secondary, reverse secondary, primary search or transparent)	Yes
Primary start address	First address for primary search	Yes
Primary final address	Last address for primary search	Yes
Secondary address mask	Search mask for secondary search, 8 numerical characters. F defines a wildcard. Missing characters will be filled up with leading zeros	Yes
M-Bus baud rate	Baudrate for M-Bus communication (300–19200 baud)	Yes
M-Bus timeout	M-Bus timeout until reception of first data (ms)	Yes
M-Bus idle timeout	M-Bus timeout until end of reception (ms)	Yes
M-Bus full timeout	M-Bus timeout (complete) for reception of a whole data packet (ms)	Yes
M-Bus request mode	<p>Mode of the M-Bus readout (REQ_UD2)</p> <p><b>Standard</b> Readout with REQ_UD2</p> <p><b>Extended 1</b> Readout with Get-All-Data (DIF/VIF 7F 7E) and REQ_UD2</p> <p><b>Extended 2</b> Readout with Get-All-Data (DIF 7F) and REQ_UD2</p>	Yes
M-Bus reset mode	<p>Mode of the M-Bus Reset (before scan and readout)</p> <p><b>None</b> No reset</p> <p><b>Standard</b> Send SND_NKE to primary address of the meter or broadcast address when using secondary addressing.</p> <p><b>Extended 1</b> Send SND_NKE to primary address FD and SND_NKE to primary address of the meter or broadcast address when using secondary addressing.</p> <p><b>Extended 2</b> Send SND_NKE and an Application Reset to primary address FD and a SND_NKE to the primary address of the meter or to broadcast address when using secondary addressing.</p>	Yes
M-Bus max. multipage	Limits the count of multipage requests	Yes

## 4.5 Server Tab

This tab provides settings for the Modbus TCP interface.

Fig. 9 Server tab

Server tab fields		
Field	Description	Writable
Modbus mode	Select Modbus TCP (default) or Modbus UDP. A maximum of 5 simultaneous connections from Modbus masters are accepted in Modbus TCP mode.	Yes
Modbus port	Port number that the Modbus TCP client (master) should connect to. Default = 502.	Yes
Modbus test	Activates a dummy process image for testing purposes. See <a href="#">Modbus TCP Specification, p. 22</a> .	Yes
Modbus swap	Swap the byte order from MSB first (default) to LSB first.	Yes
Modbus float only	Use a compressed register layout with double words per value and only the floating point representation of a meter value.	Yes
Modbus multi slave	Represent each meter as an individual Modbus slave address.	Yes



Reload

Discard the changes made on the page and reload the currently active settings.



Save

Save the changes and reinitialize the gateway.

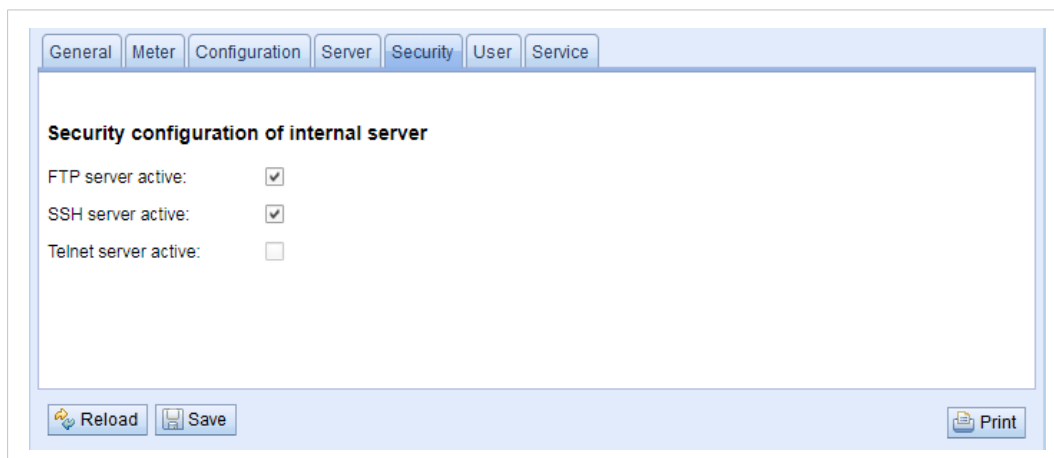


Print

See [Print Page, p. 21](#).

## 4.6 Security Tab

This tab allows you to enable/disable access to the gateway over FTP and SSH connections. See also [Advanced Configuration, p. 42](#).



General Meter Configuration Server **Security** User Service

**Security configuration of internal server**

FTP server active: ☒

SSH server active: ☒

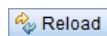
Telnet server active: ☐

Reload Save Print

Fig. 10 Security tab

### Server tab fields

Field	Description	Writable
FTP server active	Enable FTP server	Yes
SSH server active	Enable SSH server	Yes
Telnet server active	Enable Telnet server (this function is permanently disabled)	No



Reload

Discard the changes made on the page and reload the currently active settings.



Save

Save the changes and reinitialize the gateway.



Print

See [Print Page, p. 21](#).

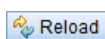
## 4.7 User Tab

This tab allows you to create and manage users and assign them specific access rights.

The screenshot shows the 'User' tab in a configuration application. At the top, there are tabs for General, Meter, Configuration, Server, Security, User, and Service. The 'User' tab is active. Below the tabs is a table with columns: Name, Overwrite password, Change password, Sessions, Maximum sessions, Read General, Write General, Read Meter, Write Meter, Read Config, Write Config, Read Server, Write Server, Read Security, Write Security, Read Service, Write Service, Write User, and FTP. The table contains three rows: 'admin', 'web', and 'ftp'. The 'admin' row has 'Overwrite password' checked, 'Change password' checked, 'Sessions' 0, 'Maximum sessions' 1, and all access rights checked. The 'web' row has 'Overwrite password' unchecked, 'Change password' unchecked, 'Sessions' 1, 'Maximum sessions' -1, and all access rights checked. The 'ftp' row has 'Overwrite password' unchecked, 'Change password' checked, 'Sessions' 0, 'Maximum sessions' -1, and all access rights checked. At the bottom of the table are buttons for Reload, Add, Delete, Save, and Print.

Fig. 11 User tab

User tab fields		
Field	Description	Writable
Name	Username	No
Overwrite password	Not used	Yes
Change password	User is allowed to change his/her password	Yes
Sessions	Number of currently open session with this user account	No
Maximum sessions	Max. number of simultaneous sessions for this user (-1 = unlimited)	Yes
Read General	Read access for tab General	Yes
Write General	Write access for tab General	Yes
Read Meter	Read access for tab Meter	Yes
Write Meter	Write access for tab Meter	Yes
Read Config	Read access for tab Configuration	Yes
Write Config	Write access for tab Configuration	Yes
Read Server	Read access for tab Server	Yes
Write Server	Write access for tab Server	Yes
Read Security	Read access for tab Security	Yes
Write Security	Write access for tab Security	Yes
Read Service	Read access for tab Service	Yes
Write Service	Write access for tab Service	Yes
Write User	Read/Write access for tab User	Yes
FTP	User is allowed to access the FTP server (maximum 2 users)	No



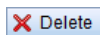
Reload

Discard the changes made on the page and reload the currently active settings.



Add

Add a new user



Delete

Delete the selected user



Save

Save the changes and reinitialize the gateway.



Print

See [Print Page, p. 21](#).

To edit the password and the maximum sessions setting, either double-click on the user entry or right-click on the entry and select **Edit** from the context menu.

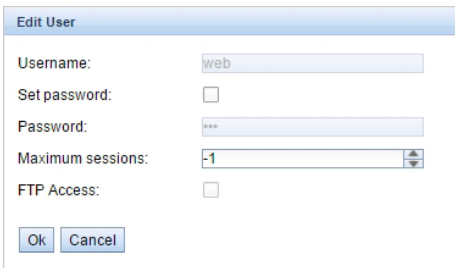


Fig. 12 Edit user

**Username** cannot be changed once the user has been saved.

**FTP Access** will only allow access to the log data directory (C:\log). Only the admin user will have full access to the file system via FTP. This means that you can grant access to logged data from a remote client without exposing any other data or services of the gateway.

**Maximum sessions** -1 = allow unlimited number of sessions.

To change the password, tick the **Set password** checkbox, then enter the new password in the **Password** field.

#### Default usernames and passwords

Username	Password	Description
admin	admin	Administrator user with root access, allows full access to all services (HTTP, FTP, flash update, IP configuration).
web	web	Default user for the web interface. Allows write access to the web interface. If a user with this name and password exists, the web server will automatically log in with these credentials when accessed.
ftp	ftp	User for FTP access to the log directory of the gateway (C:/log/)

#### Admin password

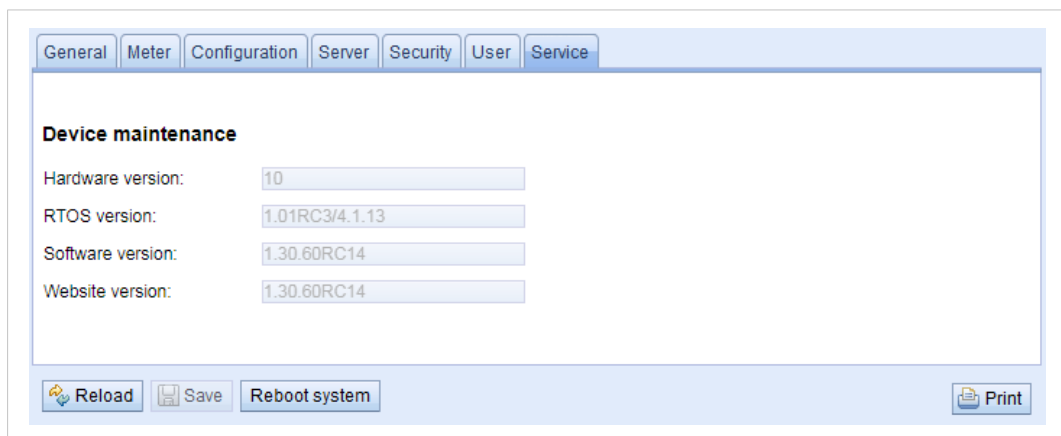
The administrator password cannot be changed from this page. To change the admin password you must log in as admin and click the **Change password** link at the top of the web page.



Do not lose the admin password. It is essential to have when you want to reset the unit to factory defaults.

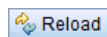
## 4.8 Service Tab

This tab provides read-only information about the hardware and software for support and troubleshooting.



The screenshot shows the 'Service' tab selected in a configuration interface. The tab bar at the top includes 'General', 'Meter', 'Configuration', 'Server', 'Security', 'User', and 'Service'. The main content area is titled 'Device maintenance' and contains four read-only fields: 'Hardware version: 10', 'RTOS version: 1.01RC3/4.1.13', 'Software version: 1.30.60RC14', and 'Website version: 1.30.60RC14'. At the bottom of the tab, there are four buttons: 'Reload' (with a refresh icon), 'Save' (with a floppy disk icon), 'Reboot system', and 'Print' (with a printer icon).

Fig. 13 Service tab



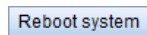
Reload

Refresh the information on this page.



Save

(disabled)



Reboot system

Restart the gateway and reinitialize all internal processes.




Print

See [Print Page, p. 21](#).

## 4.9 Print Page

Clicking **Print** on any tab in the web interface will export the complete configuration (not only the active tab) as a printable HTML page in a new browser tab or window.

The **Meter Configuration** section will be output in a table format that can be copied and pasted directly into a spreadsheet program.



### Anybus M-Bus - Modbus TCP Gateway

#### Configuration

**General configuration**

Device name:	Anybus M-Bus/Modbus
Serial number:	75907
DHCP:	on
IP address:	10.10.13.131
Subnet mask:	255.255.255.0
Gateway address:	

#### Meter Configuration

Interface	S	Serial	MAN	Medium	Version	Link	Value	Scale	Unit	Cycle	User label	Description	Register
M-Bus		00428670	ABB	Electricity	6	1				0			10
							194	1E+1	Wh			Energy	20
							D325-101	1E+0	None			Metrology (firmware) version	30
							1600	1E+0	Bin			Error flags (Device type specific)	40
							7	1E+0	None			Special supplier information	50
							0	1E-2	W			Power	60
							0	1E-2	W			Power (vendor specific)	70
							0	1E-2	W			Power (vendor specific)	80

Fig. 14 Printable export page

## 5 Modbus TCP Specification

The Modbus protocol is a *single master protocol*. The Modbus TCP *client* (master) controls the entire communication, and the connected Modbus TCP *servers* (slaves) are only allowed to respond to its requests. The Anybus M-Bus to Modbus-TCP gateway is a Modbus TCP *server*.

Modbus TCP communication requires an established connection between the servers and the client over a specified TCP port. If there is a network firewall between the servers and the client, the specified TCP port must be opened in the firewall. The default port number is 502.

### 5.1 Function Codes

Supported Modbus Function Codes		
Code	Name	Description
0x01	Read Coil	Not used
0x03	Read Holding Register	Reading of meter data
0x05	Write Single Coil	Not used
0x06	Write Single Register	Not used
0x10	Write Multiple Register	Not used
0x0F	Force Multiple Coil	Not used
0x2B	Read Device Identification	Reading of device data by MEI = 0x0E

Function codes marked “Not used” are replied with ILLEGAL DATA ADDRESS (0x02). Other unsupported codes are replied with ILLEGAL FUNCTION (0x01).

If the function code 0x2B (Read Device Identification) is used with MEI=0x03, the gateway will respond with identification data. The values 0x01 and 0x02 are supported as Device ID code, allowing to retrieve basic and regular device identification data.

Identification Data					
Code	Name	Data type	20 UL model	80 UL model	Type
0x00	VendorName	String	HMS Industrial Networks AB		Basic
0x01	ProductCode	String	1	2	Basic
0x02	MajorMinorRevision	String	001		Basic
0x03	VendorUrl	String	www.anybus.com		Regular
0x04	ProductName	String	Anybus M-Bus to Modbus-TCP Gateway		Regular
0x05	ModelName	String	Standard		Regular
0x06	UserApplicationName	String	Anybus M-Bus to Modbus-TCP 20	Anybus M-Bus to Modbus-TCP 80	Regular

### 5.2 Data Format

The arrangement of data in the Modbus registers corresponds to the usual structure. It uses big endian representation. For the 16 bit registers, the higher byte is sent first, then the lower byte.

**Example:** value: 0x1234 transmission order: 0x12, 0x34

If number and data ranges go beyond 16 bits, representation is similar. Again, the most significant 16 bit register is sent first and is addressed with the lowest register address.

**Example:** value: 0x12345678 transmission order: 0x12, 0x34, 0x56, 0x78

The byte order of 32 bit and 64 bit values can be changed within the system configuration file by setting the parameter MODBUS\_SWAP, see [Configuration Files, p. 44](#).



### Dummy Data

For checking the data layout on the Modbus master side the gateway can be configured to generate dummy data. See [Server Tab, p. 16](#).

The following data will be represented via the Modbus interface according to the register layout described in [Meter Data Format, p. 26](#):

Address	Value	Description	Decoded value
0	0x0002	Serial number of device, upper word	0x2993A
1	0x993A	Serial number of device, lower word	
2	0x0001	Version of the communication protocol	1
3	0x006F	Firmware version of device	0x6F = 111: Version 1.11
4	0x519C	Timestamp of device system time, upper word	0x519CC16D = 1369227629:Wednesday, May 22nd 2013, 15:00:29 GMT+2
5	0xC16D	Timestamp of device system time, lower word	
6	0x0000	Empty field	
7	0x0100	Type field of register set in upper byte	0x01: Device entry
8	0x0000	Empty field	
9	0x0000	Empty field	
10	0x00BC	Serial No. of meter, upper word	0xBC614E = 12345678
11	0x614E	Serial No. of meter, lower word	
12	0x0443	3-letter manufacturer Code	0x0443: ABC
13	0x0102	Version (upper byte) and medium (lower byte) of the meter	0x0102: Version 1, medium 2 (electricity)
14	0x519C	Timestamp of the meter, upper word	0x519CC164 = 1369227620:Wednesday, May 22nd 2013, 15:00:20 GMT+2
15	0xC164	Timestamp of the meter, lower word	
16	0x0000	Empty field	
17	0x0200	Type field of register set in upper byte	0x02: Meter entry
18	0x0000	Empty field	
19	0x0000	Empty field	
20	0x0000	Meter value (integer), highest word	0xBC614E = 12345678 Calculation: $12345678 * 10^{-4} = 1234.5678 \text{ Wh}$
21	0x0000	Meter value (integer)	
22	0x00BC	Meter value (integer)	
23	0x614E	Meter value (integer), lowest word	
24	0x449A	Meter value (float), upper word	0x449A522B = 1234.567800
25	0x522B	Mater value (float), lower word	
26	0xFFFF	Scaling factor (exponent to base 10)	0xFFFF = -4: Factor = $10^{-4}$
27	0x0005	Type field of register set in upper byte and unit of value in lower byte	0x00: Meter value entry 0x05: Wh
28	0x519C	Timestamp of meter value, upper word	0x519CBBB3 = 1369226163:Wednesday, May 22nd 2013, 14:36:03 GMT+2
29	0xBBB3	Timestamp of meter value, lower word	

## 6 Acquiring and Processing Meter Data

The main task of the Anybus M-Bus to Modbus-TCP gateway is the processing and transmission of meter data. For proper operation, the following issues must be considered:

The following requirements must be fulfilled for the Anybus M-Bus to Modbus-TCP gateway to process and transmit meter data:

- Each meter and value must be correctly configured and have a valid register address.
- The read out meter data must be transmittable over Modbus TCP.
- The Modbus TCP client must be able to interpret the meter data format.

### 6.1 Meter Configuration

#### Adding Meters Automatically

The Anybus M-Bus to Modbus-TCP gateway can scan the M-Bus for meters and add them automatically without additional configuration.

#### Primary and Secondary Addressing

The M-Bus interface can use *primary* or *secondary* addressing when accessing a meter. Secondary addressing is recommended if the meters should be recognized and read out without additional configuration. This is also the default setting.

If all meters are pre-configured with a unique primary address, it is recommended to use primary addressing and to set the start and end addresses for the scan. The read-out process will then be considerably faster than when using secondary addressing.

Another major advantage of primary addressing is that meters of the exact same type and configuration (but different serial numbers) can be swapped without reconfiguring the gateway.

#### Mixed Configuration Scan

It is also possible to scan for primary addresses first and then for secondary addresses. Meters that are detected only in the secondary scan are appended to the existing list. Meters that are found in both scanning runs remain unchanged if already configured.

If a meter is found for the first time during the primary scan, the primary address is used for all further requests. This applies also to secondary scan and secondary addressing.

The scan mode is selected on the **Configuration** tab. The scanning process itself is started from the **Meter** tab. See [Configuration, p. 9](#).

## Adding Meters Manually

Fig. 15 Adding a meter

Meters that are connected but not found during a scan can be added manually by clicking on the **Add** button in the **Meter** tab. The configuration of the meter must be known to be able to add it manually.

The fields in the **Add meter** dialog correspond to the fields in the meter list. The following parameters can be edited:

<b>Serial</b>	Serial number of the meter (must be 8 digits)
<b>Link</b>	Primary (link layer) address
<b>Cycle (s)</b>	Readout interval in seconds (0 = use general readout interval)
<b>User label</b>	User specific description of the meter
<b>Modbus register</b>	Modbus register address
<b>Number of meters</b>	If creating multiple meters with the same configuration

See also [Meter Tab, p. 11](#).

Click **OK** to save the configuration. The new meter(s) will now appear in the list.

## 6.2 Meter Data Format

The media IDs, value types and units used in meter data are defined in the EN 13757-3 standard. Custom types and units can be defined depending on the meter interface.

Predefined Media ID values			
Index	Description	Index	Description
0	Other	25	A/D Converter
1	Oil	26	Smoke detector
2	Electricity	27	Room sensor
3	Gas	28	Gas detector
4	Heat (outlet)	29 - 31	Reserved
5	Steam	32	Breaker (electricity)
6	Warm water	33	Valve (gas or water)
7	Water	34 - 36	Reserved
8	Heat cost allocator	37	Customer unit
9	Compressed air	38 - 39	Reserved
10	Cooling (outlet)	40	Waste water
11	Cooling (inlet)	41	Waste
12	Heat (inlet)	42	Carbon dioxide
13	Combined heat / cooling	43 - 48	Reserved
14	Bus / System component	49	Communication controller
15	Unknown medium	50	Unidirectional repeater
16 - 19	Reserved	51	Bidirectional repeater
20	Calorific value	52 - 53	Reserved
21	Hot water	54	Radio converter (system side)
22	Cold water	55	Radio converter (meter side)
23	Dual register (hot/cold) water	56 - 255	Reserved
24	Pressure		

Predefined Measurement Value Types			
Index	Description	Index	Description
0	None	46	Access code developer
1	Error flags (Device type specific)	47	Password
2	Digital output	48	Error mask
3	Special supplier information	49	Baud rate
4	Credit	50	Response delay time
5	Debit	51	Retry
6	Volts	52	Remote control (device specific)
7	Ampere	53	First storagenum. for cyclic storage
8	Reserved	54	Last storagenum. for cyclic storage
9	Energy	55	Size of storage block
10	Volume	56	Storage interval
11	Mass	57	Vendor specific data
12	Operating time	58	Time point
13	On time	59	Duration since last readout
14	Power	60	Start of tariff
15	Volume flow	61	Duration of tariff
16	Volume flow ext	62	Period of tariff
17	Mass flow	63	No VIF
18	Return temperature	64	wM-Bus data container
19	Flow temperature	65	Data transmit interval
20	Temperature difference	66	Reset counter
21	External temperature	67	Cumulation counter
22	Pressure	68	Control signal
23	Timestamp	69	Day of week
24	Time	70	Week number
25	Units for H. C. A.	71	Time point of day change
26	Averaging duration	72	State of parameter activation
27	Actuality duration	73	Duration since last cumulation
28	Identification	74	Operating time battery
29	Fabrication	75	Battery change
30	Address	76	RSSI
31	Meter specific description - can be used to specify custom value types (text based)	77	Daylight saving
32	Digital input	78	Listening window management
33	Software version	79	Remaining battery life time
34	Access number	80	Stop counter
35	Device type	81	Vendor specific data container
36	Manufacturer	82	Reactive energy
37	Parameter set identification	83	Reactive power
38	Model / Version	84	Relative humidity
39	Hardware version	85	Phase voltage to voltage
40	Metrology (firmware) version	86	Phase voltage to current
41	Customer location	87	Frequency
42	Customer	88	Cold/Warm Temperature limit
43	Access code user	89	Cumulative count max. power
44	Access code operator	90 - 255	Reserved
45	Access code system operator		



Predefined Units		
Index	Unit	Description
0	None	None
1	Bin	Binary
2	Cur	Local currency units
3	V	Volt
4	A	Ampere
5	Wh	Watt hour
6	J	Joule
7	m <sup>3</sup>	Cubic meter
8	kg	Kilogram
9	s	Second
10	min	Minute
11	h	Hour
12	d	Day
13	W	Watt
14	J/h	Joule per Hour
15	m <sup>3</sup> /h	Cubic meter per hour
16	m <sup>3</sup> /min	Cubic meter per minute
17	m <sup>3</sup> /s	Cubic meter per second
18	kg/h	Kilogram per hour
19	Degree C	Degree celsius
20	K	Kelvin
21	Bar	Bar
22		Dimensionless
23 - 24	Res	Reserved
25	UTC	UTC
26	bd	Baud
27	bt	Bit time
28	mon	Month
29	y	Year
30		Day of week
31	dBm	dBm
32	Bin	Bin
33	Bin	Bin
34	kVARh	Kilo voltampere reactive hour
35	kVAR	Kilo voltampere reactive
36	cal	Calorie
37	%	Percent
38	ft <sup>3</sup>	Cubic feet
39	Degree	Degree
40	Hz	Hertz
41	kBTU	Kilo british thermal unit
42	mBTU/s	Milli british thermal unit per second
43	US gal	US gallon
44	US gal/s	US gallon per second
45	US gal/min	US gallon per minute
46	US gal/h	US gallon per hour
47	Degree F	Degree Fahrenheit
48 - 255	Res	Reserved

## Modbus Register Layout

The Anybus M-Bus to Modbus-TCP gateway uses a fixed address structure of 10 Modbus registers per meter/ meter value. Addresses are enumerated starting with 0.

- Data types using more than one register are encoded with the most significant word at the lowest address.
- The function code 0x03 (Read Holding Register) is used for reading the data.

Within the Modbus protocol, data is formatted as either integer or float. Other data types, such as BCD, are converted to integer values before transmission.

The first 10 Modbus register, starting at address 0, are status registers of the gateway:

Address	Name	Length	Description
0 - 1	Serial number	32 Bit	Serial number of the gateway in hexadecimal format
2	Protocol version	16 Bit	Protocol version for the Modbus interface (value = 1)
3	Version	16 Bit	Software version of the gateway (as integer)
4 - 5	Time stamp	32 Bit	Unix timestamp of last read-out Device system time must be set correctly (manually or via SNTP)
6	Reserved		Reserved
7	Type field / reserved	16 Bit	Type field for register set in the upper Byte (value=1 for device entry), lower byte is reserved
8 - 9	Reserved		Reserved

Each meter is characterized by 10 Modbus registers. Their offset has to be added to the starting register address for each meter. They are defined as follows:

Offset	Name	Length	Description
0 - 1	Serial number	32 Bit	Serial number of meter as integer value (not BCD), only decimal numbers allowed
2	Manufacturer ID	16 Bit	Encoding of manufacturer by using different blocks of Bits: Bits 10 - 14: first character, Bits 5 - 9: second character and Bits 0 - 4: third character, the particular values point to the three letters, counting from "A" with value 1
3	Version / medium	16 Bit	Version of meter in the upper Byte and the medium ID in the lower Byte
4 - 5	Time stamp	32 Bit	Unix timestamp of last meter read-out, system time of the gateway shall be set correctly (manually or via SNTP)
6	Reserved		Reserved
7	Type field / reserved	16 Bit	Type field for register set in the upper Byte (value=2 for meter entry), lower byte is reserved
8	Flags	16 Bit	Bit 0: Value 1: Meter could not be read, Value 0: Meter could be read correctly Bit 1: Value 1: Not all meter values are updated, Value 0: All meter values updated Bit 2–15: Reserved
9	Reserved		Reserved

Each meter value is characterized by 10 Modbus registers. Their offset has to be added to the starting register address for each meter value. They are defined as follows:

Offset	Name	Length	Description
0 - 3	Meter value	64 Bit	Signed integer value (not scaled)
4 - 5	Meter value	32 Bit	Floating point value (scaled to unit in register 7), IEEE 754
6	Scale factor	16 Bit	Signed scale factor (exponent to the power of 10)
7	Type field / unit	16 Bit	Type field for register set in the upper Byte (value=0 for meter value entry), the lower byte is the unit index (see above).
8 - 9	Time stamp	32 Bit	Unix time stamp transmitted by the meter, if there are no time stamps transmitted by the meter, this value is set to 0



### Example Configuration

In this example, the following data will be transmitted to the Modbus master:

Address	Value	Name	Decoded value
<b>Device entry</b>			
0 1	0x0002 0x993A	Serial number	0x0002993A
2	0x0001	Protocol version	1
3	0x006F	Version	Version = 0x006F = 111 = v1.11
4 5	0x519C 0xC16D	Time stamp	0x519CC16D = 1369227629 = Wednesday, 2013-05-22, 15:00:29 GMT+2
6	0x0000	Reserved	-
7	0x0100	Type field / reserved	Type = 1 = device entry
8 9	0x0000 0x0000	Reserved	-
<b>Meter entry</b>			
10 11	0x03F8 0x3CAA	Serial number	0x03F83CAA = 66600106
12	0x32A7	Manufacturer ID	0x32A7 = 0011.0010.1010.0111 1st letter: _011.00_.____.____ = 0x0C = 12 = L 2nd letter: _____.__10.101_.____ = 0x15 = 21 = U 3rd letter: _____.____.____0.0111 = 0x07 = 7 = G
13	0x0204	Version / medium	Version = 2 Medium = 4 = Heat (outlet)
14 15	0x519C 0xC16D	Time stamp	0x519CC16D = 1369227629 = Wednesday, 2013-05-22, 15:00:29 GMT+2
16	0x0000	Reserved	-
17	0x0200	Type field / reserved	Type = 2 = meter entry
18	0x0000	Flags	No read error, all meter values updated
19	0x0000	Reserved	-
<b>Meter value entry</b>			
20 21 22 23	0x0000 0x0000 0x0000 0x010B	Meter value (integer)	0x0000000000000010B = 267 Resulting value: 267 * 10 <sup>3</sup> Wh
24 25	0x4882 0x5F00	Meter value (floating point)	0x48825F00 = 267000.000000 Wh
26	0x0003	Scale factor	Factor = 10 <sup>3</sup>
27	0x0005	Type field / unit	Type = 0 = meter value entry Unit = 5 = Wh
28 29	0x519C 0xBBB3	Time stamp	0x519CBBB3 = 1369226163 = Wednesday, 2013-05-22, 14:36:03 GMT+2

## 7 Transparent Mode

### 7.1 Introduction

Our data concentrators and gateways collect meter data via standard commands.

Usually, the required data can be read out directly from the meters.

However, in particular applications this is not enough. This may be due to the use of other protocols or special, manufacturer or type-specific commands to meters (e.g. selection of modes, selection of parameter set). How to proceed in those cases?

For such applications we provide a Transparent Mode for all meter interfaces on the device.

#### **What does the Transparent Mode do?**

Essentially, the Transparent Mode is a forwarding of a TCP or UDP port to one of the meter interfaces. This means that all data transmitted to the device via TCP/UDP is sent directly to the meter interface. Equally, the data received at the meter interface is forwarded directly to TCP/UDP. This mode is called transparent because the data remains totally unchanged. The data stream is directly passed through without any changes.

This means that our devices are functionally converted to:

- An Ethernet level converter for the M-Bus
- A distributed wM-Bus receiver

The variety of applications is huge and depending on the respective requirements. For example, the primary address or baud rate of the meter can be set remotely from the PC.

Two things are required to use the Transparent Mode: the parameterization of the device and the connection of the TCP/UDP port to your software application.

## 7.2 Using Transparent Mode

### 7.2.1 How to Activate Transparent Mode

The parameterization of the device is done intuitively via the web-based configuration interface. In the tab **Configuration**, the mode can be set to "Transparent" for each interface.

The user has the choice between a TCP connection or a UDP connection with its respective advantages and disadvantages.

Another mandatory parameter is the port to be used to provide the connectivity. This can be chosen freely, but standard ports such as HTTP (80), FTP (21), SSH (22), HTTPS (443) or Modbus (502) must be considered. These should not be used.

Depending on the interface, additional parameters such as baud rate, UART bit timing, etc. can be configured. The parameters are clearly named. Our devices are now ready for transparent use.

### 7.2.2 How to Connect the Application to the TCP/UDP Port

The most straightforward way is using an application software which offers a direct connection to a TCP/UDP port. Some meter reading tools or manufacturer tools are doing this. In this case you only have to enter the IP of our device and the used port:

**192.168.1.101:5000.**

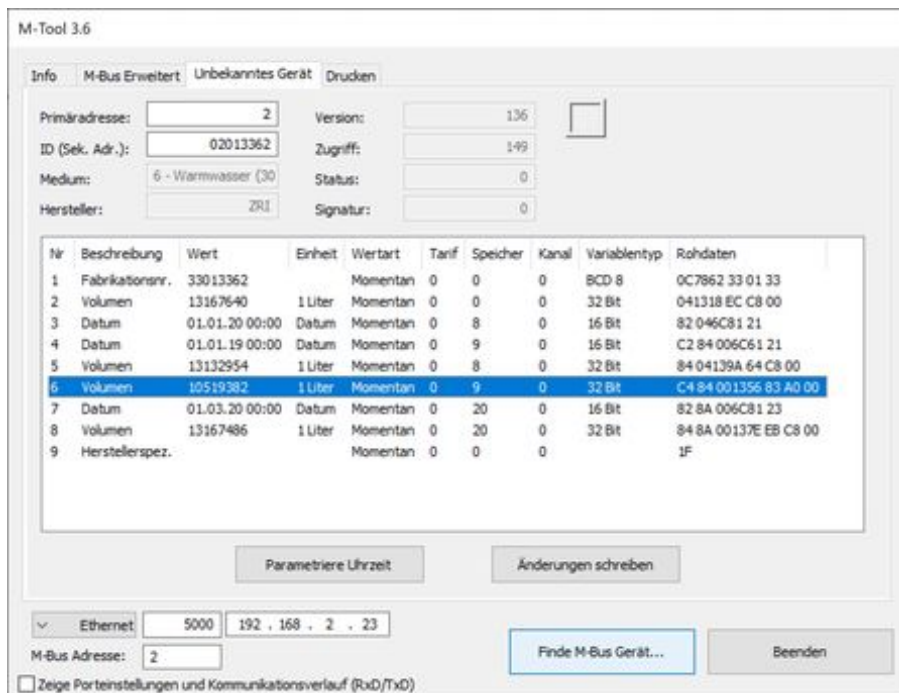
The UART parameters, especially the bit timing, are not relevant to be set in the application because they are generated by the device. The only thing that is important for some tools is that the socket connection runs in raw data mode and does not use Telnet data encoding.

### 7.2.3 Example

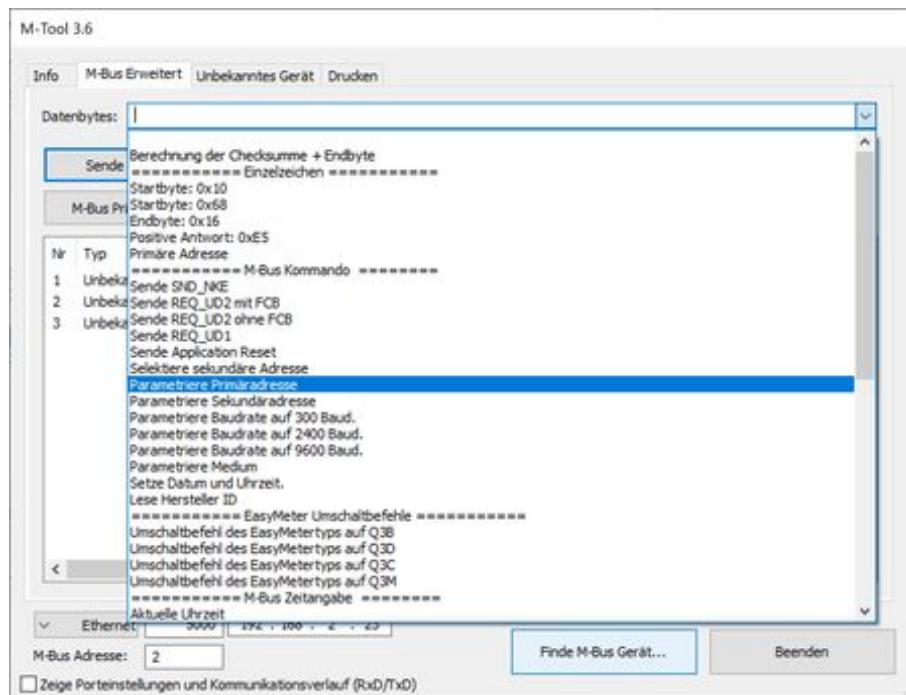
For the parameterization of M-Bus meters via M-Bus we like to use the Tool M-Tool from the company NZR.



Here you can directly enter the IP and the port of our device. If you are searching a meter in this way, the PC will do this logically; our device takes care of the physics like a level converter.



The tool enables various pre-configured or manufacturer-specific commands to be sent to the meter. It is therefore well suited for changing primary addresses, setting times or sending specific commands to meters, as the tool also helps to create the checksum.



If your application software cannot establish a direct TCP/UDP connection, but works via serial interfaces (e.g. COM1), you need a driver for a "Virtual COM port". This works basically like our configured device, only the other way round. This driver creates a COM port and then forwards the data from the COM port to a TCP/UDP port.

A commercial provider for such a COM port driver is Eltima, but there is also shareware and freeware available.

## 8 Troubleshooting

This section lists some common problems and suggestions how to solve them.

If none of the suggested actions solves the problem, please contact Anybus support.

### 8.1 Hardware Errors

#### Gateway is not responding

After powering on the gateway it does not operate. Current consumption is ~0 mA and both Ethernet LEDs are unlit.

1. Check that the power supply is connected with the correct polarity.
2. Check that the voltage between **24VDC** and **GND** is ~24 VDC.

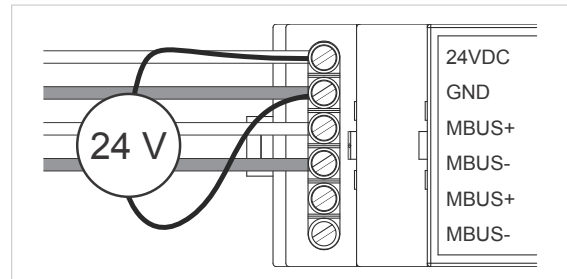


Fig. 16 Power supply voltage

#### Current consumption exceeds 500 mA

1. Check that the voltage between **MBUS+** and **MBUS-** is ~36 VDC.

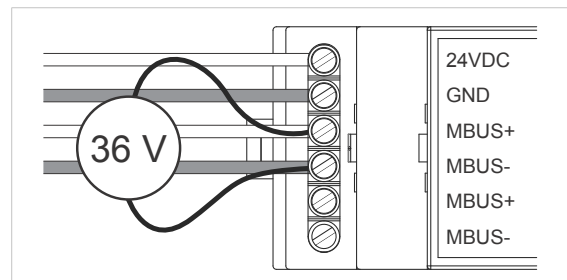


Fig. 17 M-Bus voltage

2. Disconnect the gateway from the M-Bus.
3. Measure the voltage over the M-Bus terminals again.
4. Check if current consumption is back to normal.

## 8.2 Network Errors

### Web interface and FTP server inaccessible

1. Run *Net discover* and check if the gateway appears in the list.
  - If the gateway is not listed, continue to [No network connection](#).
  - If the gateway is listed:
    - Run a connection test (ping).
    - Try to access the FTP server in the gateway.

### No network connection

The gateway cannot be accessed and is not visible in *Net discover*.

1. Check the physical connection (cables and connectors).
  - Check that the link LED on the Ethernet port of the gateway shows an amber light and that the activity LED is flashing green. See also [Connections and Indicators, p. 7](#).
  - Check the corresponding LEDs on the remote terminal (computer, switch, etc.).
  - If necessary, replace the cables and try again.
2. If the gateway is still not visible in *Net discover*, check that communication is not blocked by a firewall. Contact your network administrator if in doubt.
3. If the gateway is visible in *Net discover* now, run a connection test (ping).
  - If no ping reply is received and the gateway is connected via a local network, try using a direct network connection to the computer instead.

The following example IP configuration can be used with a direct connection:

	IP Address	Subnet mask
Computer	192.168.1.100	255.255.0.0
Gateway	192.168.1.101	255.255.0.0



*Do not connect any other network devices to the computer except the gateway when using a direct connection. A crossover Ethernet cable may be required.*

### No write access to the web interface

The web interface is accessible but the settings cannot be changed.

1. Make sure that you are logged in as a user with write access.
2. Write access is only allowed for **one** of the currently logged in users. If another user with write access is already logged in, they will have to log out before you can log in with write access.

If you are the only logged in user that has write access:

- Check if you have another active session in a different browser or browser tab. Close all other sessions except the one you are using.
  - A previous session may not have been closed properly. Try clearing the web browser cache (see the documentation for your browser).
3. Log in as admin and edit the access rights for the user.

### **Web session is unexpectedly terminated**

If the web session is unexpectedly terminated, this may be due to a connection timeout.

The timeout limit can be increased by editing the system parameter `WEBCOM_TIMEOUT`. See [Configuration Files, p. 44](#).

A timeout may also occur if the gateway is currently busy with the collection and transmission of meter data, which takes priority over web communication.

### **FTP login fails or file list is empty**

1. Log in to the web interface as admin and check the FTP user password.
2. Log in to the FTP server as admin and check the communication log.
3. If login was successful (no errors in the communication log) but the files in the gateway are not visible, try using your FTP client in FTP passive mode.
4. Check the network configuration and that the gateway is not blocked by firewall settings. Contact your network administrator if in doubt.



## 8.3 Meter Reading Errors

### No meters are detected

A scan has been completed but none of the connected meters appear in the meter list.

1. Check the cable between the gateway and the meter and replace faulty cables.
2. Check that the voltage between terminals **MBUS+** and **MBUS-** is ~36 VDC.
3. Check that the M-Bus interface (M-Bus mode) is enabled in the Configuration tab.
4. Check that the connected meters support configured search mode (primary or secondary).
5. Try searching for meters gradually by limiting the address space (**Primary start address**) or by using a search mask (**Secondary address mask**).
6. Try different settings of **M-Bus request mode** and **M-Bus reset mode**.
7. Try a different **M-Bus baud rate** (300, 2400 or 9600), or a higher **MBus timeout** value.
8. If possible, disconnect the meters one by one to eliminate a possible source of error.
9. Connect another M-Bus meter (if available) and repeat the communication test with this meter in order to locate the source of error.
10. Increase the system parameter `MBUS_MAXRETRY` from the default value.  
See [Configuration Files, p. 44](#).

Meters that do not respond to every request will be found easier by increasing the number of retries the gateway makes.

### Some meters are not detected

A scan has been completed but some of the connected meters do not appear in the meter list.

1. Perform the scan both as a primary scan and a secondary scan, as not every meter supports both methods.
2. Try searching for meters gradually by limiting the address space (**Primary start address**) or by using a search mask (**Secondary address mask**).
3. If possible, disconnect the meters one by one to eliminate a possible source of error.
4. Connect another M-Bus meter (if available) and repeat the communication test with this meter in order to locate the source of error.
5. Increase the system parameter `MBUS_MAXRETRY` from the default value.  
See [Configuration Files, p. 44](#).

Meters that do not respond to every request will be found easier by increasing the number of retries the gateway makes.

### Meters are detected but have no data

Some meters may contain a wrong declaration of the secondary address. These meters will be visible in the meter list but not addressable for meter readouts.

The system parameter `MBUS_SELECTMASK` makes it possible to mask parts of the secondary address and replace them with a wildcard character. The version field especially is a frequent cause of this problem (`MBUS_SELECTMASK=4`). See [Configuration Files, p. 44](#).

### Scanning takes too long

Under certain circumstances, scanning the M-Bus may take an extremely long time (an hour or more).

1. Try searching for meters gradually by limiting the address space (**Primary start address**) or by using a search mask (**Secondary address mask**).
2. Decrease the system parameter `MBUS_MAXRETRY` from the default value.  
See [Configuration Files, p. 44](#).

Meters that do not respond to a request will then not add excessively to the total scan time.

3. Select a different scan mode, either on the Configuration tab or by setting the system parameter `MBUS_SCANMODE`.

Reversed secondary scan (`SECONDARYSCANREVERSE`) is often particularly useful to speed up scanning of the M-Bus.

### Gateway restarts occasionally during scan

The gateway is equipped with an internal watchdog to prevent denial of service (DoS). If a scan takes a very long time, the watchdog may reboot the gateway.

Under certain circumstances there can be lots of collisions on the M-Bus, for example if all meters are responding at the same time. These collisions and the resulting high current draw of the M-Bus slaves can in exceptional cases trigger a reboot of the gateway.

1. If the scan usually takes a very long time (due to a large number of connected meters or a slow connection) it may be necessary to increase the value of the system parameter `WATCHDOG_SCAN` to prevent the watchdog from rebooting the gateway unnecessarily.  
See [Configuration Files, p. 44](#).
2. Try searching for meters gradually by limiting the address space (**Primary start address**) or by using a search mask (**Secondary address mask**).
3. If possible, try to split the bus and scan each bus segment separately.

## Webserver capacity error message

After a scan or a change in the meter list, the gateway (even after a reboot) may show the following error message in the meter list:

The meter list exceeds the capacity of the internal webserver

This error message is caused by an internal limitation of the webserver. The meter list will be generated in the gateway and meter data will be logged and sent via already configured interfaces, but configuration of the meters via the web interface is not possible.

This can be caused by a large number of configured meters and/or very long parameter lists of single meters. To be able to display the meter list, the number of displayed meters or the number of values per meter need to be limited.

The following parameters on the Configuration tab can be used to set the limitation:

1. **Description mode** set to **Standard** or (if not needed) set to **None**.
2. **Maximum device count** set to the default value of 20 or 80, or to a lower value.
3. **Maximum value count** set to the default value of 25 or to a lower value.
4. **Bus request mode** set to **Standard** (deactivates the request of partly extensive additional data of the meter).
5. **M-Bus max. multipage** set to the default value of 3 or lower.

Any change of the parameter **Description Mode** will be valid directly after clicking **Save**. All other parameters need a regeneration of the meter list. This is accomplished by deleting all meters and saving the now empty meter list, then performing a new scan.



Trying to save a meter list that exceeds the internal limit of the webserver leads to the deletion of the meter list.

The meter configuration may also be changed manually by editing the meter configuration file, see [Configuration Files, p. 44](#). The gateway needs to be restarted for the changes to take effect.

It is not possible to display the meter list in the web interface when manual editing is used.

## 8.4 Meter Data Transmit Error

### Meter data is not transmitted via Modbus

1. Check that the parameters for Modbus communication (IP address and port) are set correctly in the Server tab.
2. If possible, check the network communication with the remote system using a network analyzer such as *Wireshark*.

## 9 Advanced Configuration

The file system in Anybus M-Bus to Modbus-TCP gateway can be accessed directly for advanced configuration or troubleshooting. Right-clicking on the gateway in *Net discover* will open a context menu for accessing the file system in different ways.

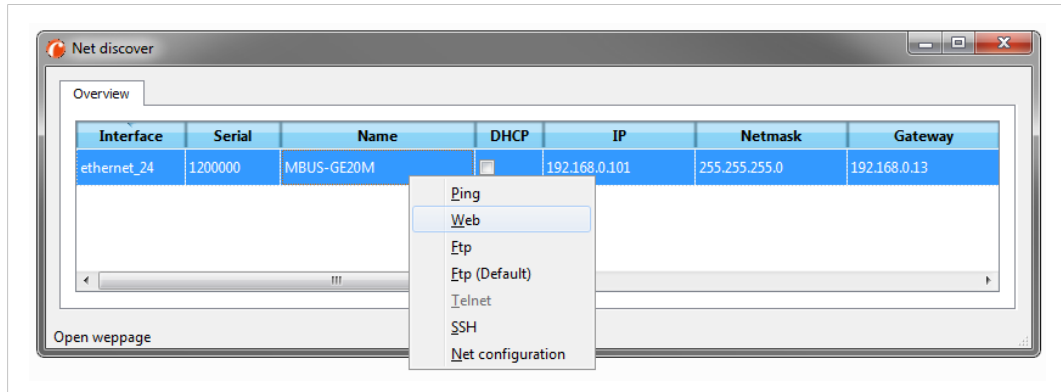


Fig. 18 Context menu



Editing the configuration files may restrict functionality of the device and should always be done with care.

### 9.1 FTP

The file system can be accessed using a standard FTP client such as *FileZilla*, which is bundled with *Net discover*. Right-click on the device in *Net discover* and select **FTP** to open FileZilla, or select **FTP (Default)** to automatically connect and log in as the default user.

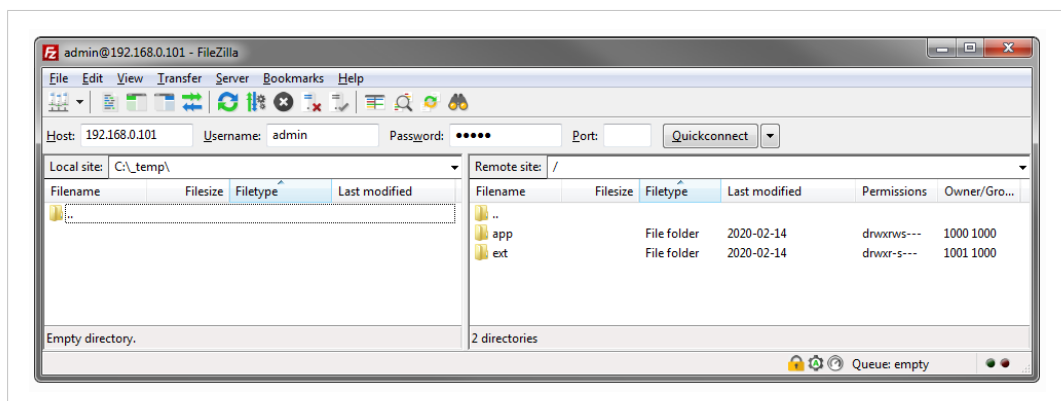


Fig. 19 FTP access

## 9.2 SSH

Secure shell access to the file system is possible using a terminal emulator such as *PuTTY*, which is bundled with *Net discover* and accessible from the context menu.

After logging in as admin you can use shell commands to access the file system.

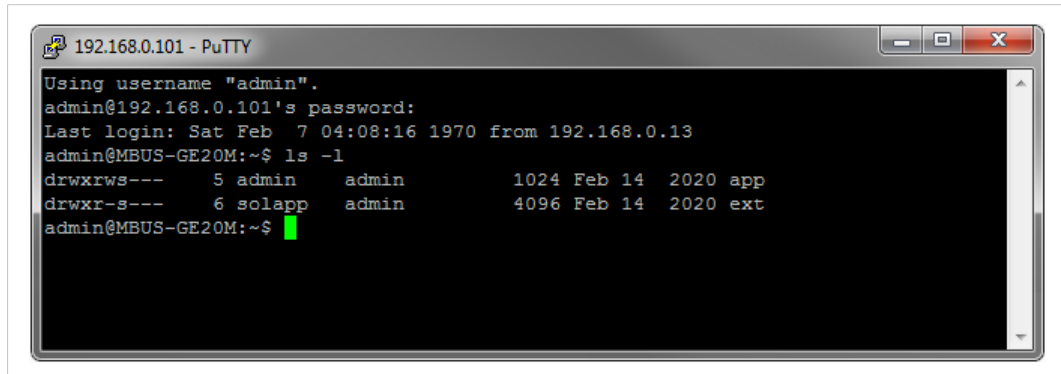


Fig. 20 SSH access using PuTTY

## 9.3 Ping

The **Ping** command in *Net discover* can be used to test the network connection.

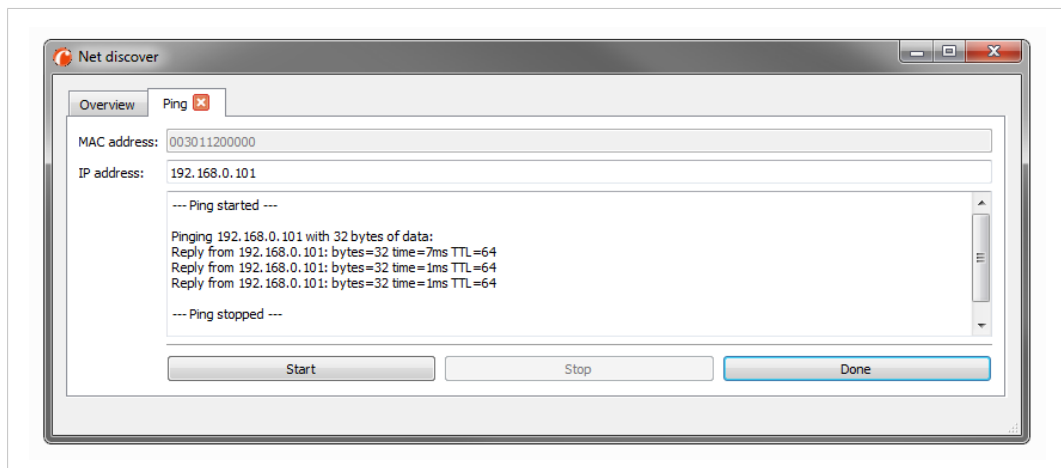


Fig. 21 Ping command

## 9.4 Configuration Files

The configuration files are updated when changes are made via the web interface. They can also be edited manually and downloaded to the gateway via FTP. Manual changes to the configuration files will take effect after the gateway has been rebooted.

Some parameters can only be changed by editing the configuration files manually.

When editing the configuration files you must use an UTF-8 capable text editor. There is no byte order mark (BOM) in the configuration files, which means that the text editor may need to be manually set to use UTF-8 encoding.



Editing the configuration files may restrict functionality of the device and should always be done with care.

Remote site: /app						
Filename	Filesize	Filetype	Last modified	Permissions	Owner/Group	
..						
keys		File folder	1973-02-13	drwx-----	1000 1000	
lost+found		File folder	1970-01-01 01:01:00	drwx-----	0 0	
ssh		File folder	1973-02-13	drwxrws---	1000 1000	
Device_Handle.cfg	78	CFG File	1973-02-13	-rw-rw----	1001 1000	
chip.ini	422	Configurat...	1970-02-07 05:02:00	-rw-rw----	1000 1000	
webcom.ini	1 628	Configurat...	1970-02-07 05:02:00	-rw-rw----	1001 1000	

Fig. 22 File system

### System Configuration File

The file **/app/chip.ini** is the main system configuration file containing general system parameters. Parameters that are not explicitly configured in this file will be set to their default values.

The parameters are described in [System Configuration File \(chip.ini\), p. 45](#). Parameters that are not listed in this table should **not** be changed.

### Meter Configuration File

Meter configuration is stored in the file **/app/Device\_Handle.cfg**. If this file does not already exist it will be generated when the meter list is populated.

Only the entries which differ from the default values will be stored (except *version*).

The parameters are described in [Meter Configuration File, p. 48](#).

System Configuration File (chip.ini)			
Parameter	Description	Valid range	Default value
<b>[IP]</b>			
ADDRESS	IP address of device	0.0.0.0 - 255.255.255.255	Not set
NETMASK	Subnet mask of device	0.0.0.0 - 255.255.255.255	Not set
GATEWAY	IP address of device	0.0.0.0 - 255.255.255.255	Not set
DHCP	Enabling DHCP look-up	0, 1	1
TCPIPMEM	Memory for the webserver (kB)	60–1000	280
<b>[DEVICE]</b>			
NAME	Name of device shown in <i>Net discover</i>	Text (max. 20 characters)	Anybus M-Bus/MTCP 20 (80)
<b>[CONFIG]</b>			
MBUS_BAUDRATE	Baud rate for serial M-Bus communication		2400
MBUS_DATABITS	Data bits for serial M-Bus communication	7, 8	8
MBUS_DEBUGOUT	Enables output of raw data to STDOUT	0, 1	0
MBUS_ENABLE	Enables the M-Bus interface	0, 1	1
MBUS_FREEZESTORAGEUM	Storage number for meter data on Freeze command	0 - 4294967295	0
MBUS_FULLTIMEOUT	Maximum timeout for reading a meter (ms)	0-65535	10000
MBUS_IDLETIMEOUT	Idle timeout for detecting end of communication	0-65535	100
MBUS_MAXMULTIPAGE	Limits number of pages for multipage request	0 - 255	10
MBUS_MAXPRIMARYADDRESS	Upper limit of address range for M-Bus primary scan	0 - 250	250
MBUS_MAXRETRY	Number of retries for a M-Bus or multipage request	0 - 255	3
MBUS_MINPRIMARYADDRESS	Lower limit of address range for M-Bus primary scan	0 - 250	0
MBUS_PARITY	M-Bus parity: 0 = no, 1 = odd, 2 = even, 3 = mark, 4 = space	0 - 4	2
MBUS_RAWLOGENABLE	Enables raw data log to drive B:	0, 1	0
MBUS_REQUESTMODE	Defines request sequence for readout	DEFAULT,EXT,ONLY,FREEZE	DEFAULT
MBUS_RESETDISABLE	Disables reset command	0, 1	0
MBUS_RESETMODE	Reset mode: 0 = Reset after select, 1 = Reset prior to select, 2 = No reset	0 - 2	0
MBUS_SCANMODE	Scan mode for M-Bus	PRIMARYSCAN, SECONDARYSCAN, SECONDARYSCANALLOC, SECONDARYSCANREVERSE, SECONDARYSCANALLOCREVERSE	SECONDARYSCAN
MBUS_SECMASKMANUFACTURER	Predefined manufacturer ID for secondary scan	Exactly 4 characters, 0-9 each or 0xFFFF	0xFFFF

System Configuration File (chip.ini) (continued)

Parameter	Description	Valid range	Default value
MBUS_SECMASKMEDIUM	Predefined medium ID for secondary scan	Exactly 2 characters, 0-9 each or 0xFFFF	0xFF
MBUS_SECMASKSERIAL	Mask for serial number of meters for secondary scan	Exactly 8 characters, 0-9 or 0xF each	0xFFFFFFFF
MBUS_SECMASKVERSION	Predefined version number for secondary scan	Exactly 2 characters, 0-9 each or 0xFFFF	0xFF
MBUS_SELECTMASK	Disables parts of secondary address for exact selection, wildcards are used instead (set via bit mask): +1 = Serial number, +2 = Manufacturer, +4 = Version, +8 = Medium	0 - 15,	0
MBUS_STOPBITS	Stop bits for serial M-Bus communication	1, 2	1
MBUS_TIMEOUT	Timeout for M-Bus (ms)	0 - 65535	2000
MBUS_WAKEUPENABLE	Enables specific wake-up request	0, 1	0
METER_MAXALLVALUECOUNT	Limits the total number of meter values (0 = no limit)	0 - 65535	0
METER_MAXDEVICECOUNT	Limits the number of meters (0 = no limit)	0 - 65535	0
METER_MAXVALUECOUNT	Limits the number of meter values per meter (0 = no limit)	0 - 65535	0
METER_STAT_CONFIG	Path for meter configuration file	Text (max. 40 characters)	/app/Device_Handle.cfg
METER_TIME	Interval for meter read-out (seconds) <b>IMPORTANT:</b> Short cycle times and/or many meters may cause very high amounts of data being generated.	10 - 4294967295	900
MODBUS_ADDRESS	Modbus primary address or unit identifier	0 - 255	0
MODBUS_CONNECTIONTIMEOUT	Connection timeout (seconds)	0 - 65535	60
MODBUS_DEBUGOUT	Enables the debug output of Modbus data	0, 1	0
MODBUS_DISCONNECTTIMEOUT	Timeout for disconnection of an idle connection (seconds)	1 - 1000	60
MODBUS_ENABLE	Enables the Modbus slaves	0, 1	0
MODBUS_MAXCONNECTIONS	Maximum count of simultaneous Modbus TCP connections	0 - 80	5
MODBUS_NWPORT	Network port of the Modbus slave	0 - 65535	502
MODBUS_SWAP	Swap byte order of Modbus data 0: MSB first 1: LSB first	0, 1	0
MODBUSMETER_PROTOCOLVERSION	Protocol version of the Modbus meter data: Bit 0 = 2 registers per value (float-only) Bit 1 = Multislave Bit 2 = Word-Swapping of 32-bit values Bit 3 = Dummy-mode	0 - 16	0
MUC_CONFIG_VER	Version of the configuration file	1, 2	2 (explicit)



System Configuration File (chip.ini) (continued)

Parameter	Description	Valid range	Default value
MUC_LOG	Sets the level for output of system data to STDOUT	DEFAULT,NONE,ERRORONLY,ALL	DEFAULT
MUC_METERDESCRIPTION_ENABLEFLAGS	Enable flags that control the display of the description field in the meter view: Bit 0 = Description Bit 1 = Storage-number, tariff, value type Bit 2 = DIF/VIF raw data Bit 3 = Complete raw data of meter value entry	0-16	1
MUC_SETDEVICES	Activates writing of meter values	S0,ALL,NONE	S0
MUC_PROTOCOL_VER	Protocol version for CSV and XML data	0, 1, 2, 3	30
MUC_SHOWTIMESTAMPENTRIES	Explicit display of the meter timestamp	0, 1	0
MUC_USE_FREEZE	Enables using the Freeze command prior to meter read-out	0, 1	0
SNTP_ENABLE	Enables obtaining system time via SNTP	0, 1	1
SNTP_MAXTIMEOUT	Maximum timeout for time request from a SNTP server (seconds)	1 - 4294967295	93600
SNTP_MINTIMEOUT	Minimum timeout for a time request from a SNTP server (seconds)	1 - 4294967295	79200
SNTP_REQTIMEOUT	Timeout for the SNTP request (ms)	1 - 65535	30000
SNTPIP	IP address of SNTP time server	Text (max. 40 characters)	ptbtime1.ptb.de
WATCHDOG_IDLE	Timeout for watchdog during idle state (seconds)	1 - 4294967295	120
WATCHDOG_PROCESS	Timeout for watchdog during busy state (seconds)	1 - 4294967295	900
WATCHDOG_READOUT	Timeout for watchdog during read-out (seconds)	1 - 4294967295	4 times the read-out cycle, at least:WATCHDOG_PROCESS
WATCHDOG_SCAN	Timeout for watchdog during scan process (seconds)	1 - 4294967295	1800
WEBCOM_TIMEOUT	Timeout for a web session, user is logged out automatically after that period (ms)	1 - 4294967295	30000
[FTP]			
CERT_COUNTRY	Certificate information for SFTP connection	Text	SE
CERT_STATE		Text	Halland
CERT_LOCATION		Text	Halmstad
CERT_ORGANISATION		Text	HMS Industrial Networks
CERT_ORGANISATION_UNIT		Text	BU Anybus
CERT_COMMON_NAME		Text	www.hms-networks.com
[UDPCFG]			
IPCFG_PASSWORD	Password for IP configuration	Text	admin

Meter Configuration File				
Parent	Element name	Description	Default value	Example
root	version	Version of XML specification	-	0x08
	meter	Parent element for each meter	-	-
meter	interface	Interface to meter	-	M-Bus
	serial	Serial number of meter (hexadecimal notation with leading 0x)	0xFFFFFFFF	0x30101198
	manufacturer	Manufacturer of meter (abbreviation)	Not set	SLV
	version	Version of meter	Not set	0x01
	medium	Medium of meter (see <a href="#">Meter Data Format, p. 26</a> )	Not set	Electricity
	primaryaddress	Primary address of meter (M-Bus or S0)	0	0x03
	addressmode	Used mode for addressing: 0 = Secondary, 1 = Primary	0	0
	readoutcycle	Specific read-out interval (seconds)	0	900
	maxvaluecount	Limit for number of meter values	0	12
	encryptionkey	Encryption key for meter (AES for wM-Bus)	Not set, 0	0x82 0xB0 0x55 0x11 0x91 0xF5 0x1D 0x66 0xEF 0xCD 0xAB 0x89 0x67 0x45 0x23 0x01
	active	Enables logging of meter data or transmission via WAN interface	1	1
	rsi	Received Signal Strength Indicator at last reception (wM-Bus)	0	123
	register	Allocated Modbus register	0	20
	value	Parent element for meter values	-	-
value	description	Description of value (see <a href="#">Meter Data Format, p. 26</a> )	None	Energy
	unit	Unit of value (see <a href="#">Meter Data Format, p. 26</a> )	None	Wh
	encodetype	Coding of value	NODATA	INT32
	scale	Scale factor (scientific notation)	1e0	1e-3
	valuetype	Type of value: instantaneous, maximum, minimum, errorstate	instantaneous	instantaneous
	storagenum	Storage number of value	0	2
	tariff	Tariff information for value	0	3
	confdata	Generic data, OBIS code for value (X-X:X.X. X*X; X=0...255) (OBIS-ID in tab Meter)	Not set	0x01 0x00 0x01 0x08 0x00 0xFF
	active	Enables logging of value data or transmission via WAN interface	1	1
	register	Allocated Modbus register	0	30
	user	User specified, max. 50 chars (User label in tab Meter)	Not set	OG-1-Re

## A Technical Data

Technical Specifications		
Model name	Anybus M-Bus to Modbus-TCP gateway	
Order code	024380	025070
M-Bus max. number of unit loads	20	80
M-Bus baud rates	300 to 19200 Bd	
M-Bus Uspace	36 V	
M-Bus Umark	24 V	
M-Bus max. continuous current load	140 mA	
Ethernet interface	100 Base-TX, RJ45 connector	
Galvanic isolation (Ethernet)	1000 V	
Dimensions (W x D x H)	89 x 35 x 58 mm	
Weight	80 g	
Operating temperature	0 to +50 °C	
Humidity range	10 to 95 % RH, non-condensing	
Input voltage	24 VDC (±5 %) SELV	
Current consumption	300 mA (max.)	
Power consumption	2.0 W (idle) 10 W (max.)	
Mechanical rating	IP20	
Mounting	DIN rail (EN 50022)	
Certifications	See <a href="http://www.anybus.com/support">www.anybus.com/support</a>	

