

User Manual

Anybus[®] M-Bus to Modbus-TCP Gateway

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P. About This Document

For more information, related documentation, etc., please visit the HMS website www.anybus.com.

P.1 Related Documents

Document	Author
-	-

P.2 Document History

Revision List

Revision	Date	Author(s)	Chapter(s)	Description
1.00	2015-02-26	ThN	All	First official release
1.10	2016-04-08	ThN	1, 6, A	Added model with max 80 loads

P.3 Conventions & Terminology

The following conventions are used throughout this manual:

1. Numbered lists provide sequential steps.
- Bulleted lists provide information, not procedure steps.

P.3.1 Notes and warnings



This indicates additional important information.



This indicates important instructions that must be followed to avoid equipment failure or damage.

P.3.2 Font conventions

Reboot system Menu command or button in graphical user interface.

`MBUS_MAXRETRY` Parameter entry in a source file.

P.3.3 Glossary

Abbreviation	Explanation
CSV	Character-Separated Values
DNS	Domain Name System
DI	Digital Input
DO	Digital Output
DIN	Deutsches Institut für Normung, German standardization body
DLDE	Direct Local Data Exchange (EN 62056-21, IEC 1107)
DLDE RS	DLDE communication via RS-232 or RS-485
DLMS	Gateway Language Message Specification
I/O	In- / Output
ESD	ElectroStatic Discharge
FNN	Forum Netztechnik/Netzbetrieb Forum for network technology / network operation (committee of VDE)
FTP	File-Transfer Protocol
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HTTP	Hypertext Transfer Protocol
ID	Identification, Identifier
IP	Internet Protocol or. IP address
LED	Light-Emitting Diode
M-Bus	Meter-Bus (EN 13757-2/3)
MAC	Medium Access Control or MAC address
MUC	Multi Utility Communication, MUC-Controller
OEM	Original Equipment Manufacturer
PEM	Privacy Enhanced Mail
PPP	Point-to-Point Protocol
PPPoE	Point-to-Point Protocol over Ethernet
RFC	Requests For Comments
RSSI	Received Signal Strength Indicator
RTC	Real Time Clock
RTOS	Real Time Operating System
S0	S0 interface (pulse interface, EN 62053-31)
SIM	Subscriber Identity Module
SML	Smart Message Language
SMTP	Simple Mail Transfer Protocol
SNTP	Simple Network Time Protocol
TCP	Transmission Control Protocol
TLS	Transport Layer Security
UTC	Coordinated Universal Time
VDE	Verband der Elektrotechnik Elektronik Informationstechnik e.V. (association for electrical, electronic & information technologies)
WAN	Wide Area Network
wM-Bus	Wireless Meter-Bus (EN 13757-3/4)
XML	eXtensible Markup Language

P.4 Support

For general contact information and support, please refer to the HMS website www.anybus.com.

Important User Information

This document contains a general introduction as well as a description of the technical features provided by the Anybus M-Bus to Modbus-TCP Gateway, including the PC-based configuration software. The document only describes the features that are specific to this product.

The reader of this document is expected to be familiar with PLC technology and communication systems in general. The reader is also expected to be familiar with the Microsoft® Windows® operating system.

Liability

Every care has been taken in the preparation of this manual. 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 gateway 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 US 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.

<p>Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.</p> <p>ESD Note: This product contains ESD (Electrostatic Discharge) sensitive parts that may be damaged if ESD control procedures are not followed. Static control precautions are required when handling the product. Failure to observe this may cause damage to the product.</p>

1. General Information

1.1 Introduction

The M-Bus (Meter-Bus) is defined in the standard EN 13757, and is an established and well known interface for automated meter reading. Ease of installation (simple two-wire system with powering by the bus) and robustness are the most important features. M-Bus has its own physical layer and protocol, so a translation is necessary to connect it to other systems.

In the field of automation, Modbus TCP is one of the most common communication standards. The Anybus M-Bus to Modbus-TCP Gateway allows the direct transmission of meter data to a control system (PLC, DDC etc.) using Modbus TCP.

The Anybus M-Bus to Modbus-TCP Gateway supports operating up to either 20 or 80 meters (standard loads) on the M-Bus depending on the selected gateway version. A powerful protocol stack is implemented. It handles the complete data handling on the Anybus M-Bus to Modbus-TCP Gateway compliant to the standard. All available meters on the market can be read out and processed without further manual configuration. The meter data is available for other systems without effort.

The Anybus M-Bus to Modbus-TCP Gateway serves as a Modbus TCP slave gateway (Modbus TCP server) via its Ethernet port. The PLC as a Modbus master (Modbus TCP client) can access meter data via a network connection. The data is available in different Modbus registers.

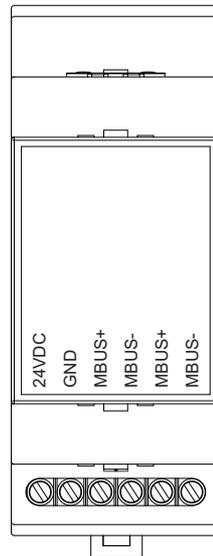
The Anybus M-Bus to Modbus-TCP Gateway reads out the meters autonomously, which is why an initial configuration of the gateway is necessary. A built-in web interface simplifies this process. Via this web interface all the functionality of the gateway is available to the user. In addition to basic system configuration values can be selected to be available via Modbus, M-Bus scans can be performed, and the current data is reported. Remote control or remote service is also facilitated through the web interface.

The Anybus M-Bus to Modbus-TCP Gateway comes in a 2U enclosure and is intended for standard 35 mm DIN rail mounting.

1.2 Description

1.2.1 Connections

The Anybus M-Bus to Modbus-TCP Gateway has the following connections:



Connector	Pin assignment	Note
Power supply	24 VDC: positive power supply GND: negative power supply	24 VDC ($\pm 5\%$), Screw clamp Cross sectional area 2.5 mm ²
M-Bus connectors	MBUS+: positive bus line (2x) MBUS-: negative bus line (2x)	Screw clamp Cross sectional area 2.5 mm ² MBUS+ and MBUS- are shorted each
Ethernet interface	1: TX+ 2: TX- 3: RX+ 4: Termination 5: Termination 6: RX- 7: Termination 8: Termination	According to TIA-568A/B

2. Installation

2.1 Startup

After connecting the supply voltage the gateway will boot up automatically.

The following calls are made on system startup:

- Configuration of the network interface (Ethernet) via DHCP or static configuration
- Providing a RAM drive as drive C:
- Obtaining the system time via SNTP
- Starting the main program

The main program provides the entire functionality including the web interface of the gateway.

2.2 Network configuration

The gateway is configured through the built-in web interface, see [3. Configuration](#).

To be able to access the web interface, the IP address of the gateway must be in the same subnet (IP address range) as your local network. If you are unsure about the configuration of your network, please consult your network administrator.

Default network configuration of Anybus M-Bus to Modbus-TCP Gateway

Static IP address	192.168.1.101
Subnet mask	255.255.255.0
Gateway	192.168.1.254

If the default IP address of the gateway (192.168.1.101) is not within your subnet range, you can change the IP address using *CHIPtool*, a free Windows®-based application which can be downloaded [here](#).

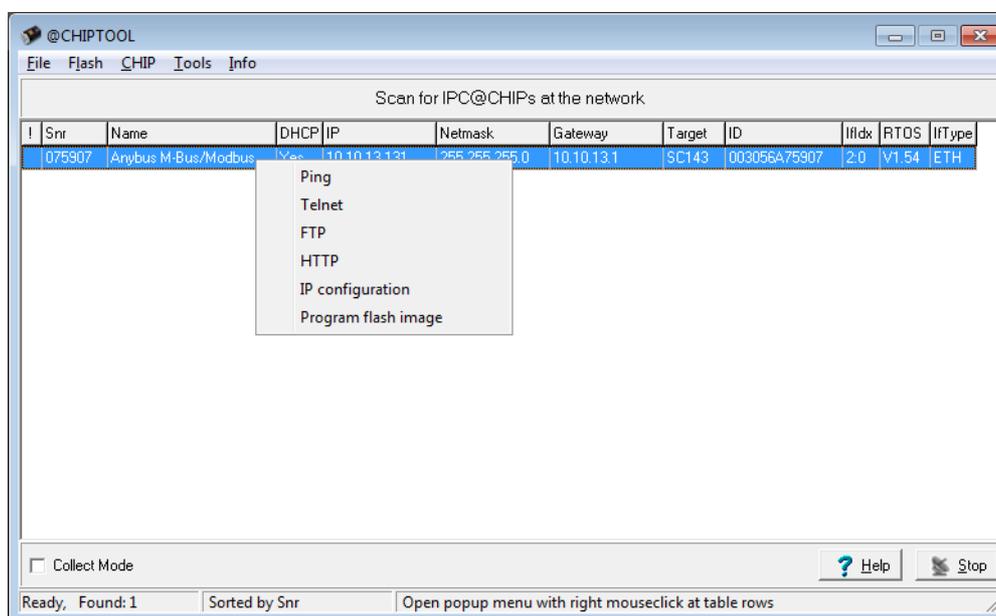
If the link above does not work, go to the main Beck IPC GmbH download web page <http://www.beck-ipc.com/en/download/index.asp> and search for “CHIPtool”.



Changing the network configuration may restrict accessibility. If the network parameters have been correctly set by an administrator you should not change them.

2.2.1 CHIPtool

1. Download and install CHIPtool, then start it using the link in the Windows Start Menu.
The first window will show a list of all detected devices in the local network.

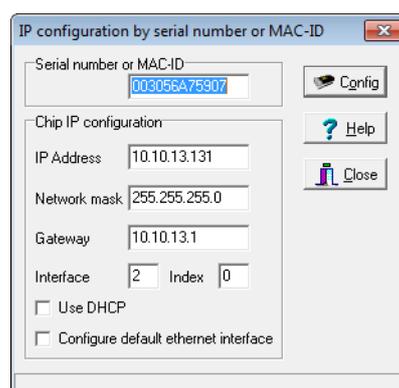


2. Right-click on the gateway that you wish to configure, then select **IP configuration** from the context menu.
3. If your network has a DHCP server, check **Use DHCP** for automatic configuration.
If your network does not have a DHCP server, change the **IP Address**, **Network mask** and **Gateway** settings manually to match your network.



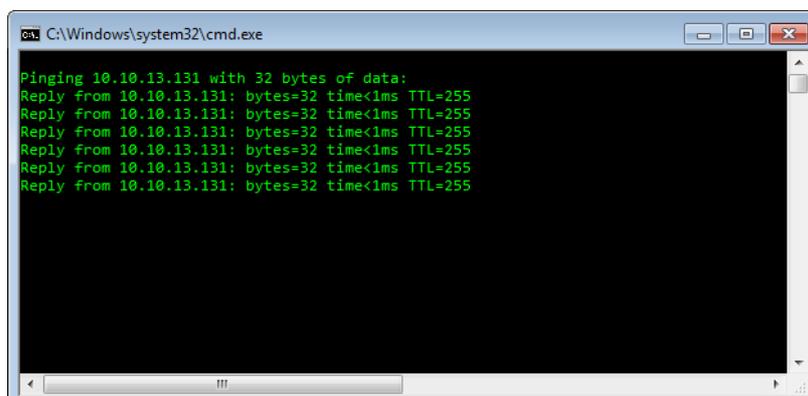
If **Use DHCP** is checked but the gateway is *not* able to obtain an IP address dynamically, it will choose a random IP address in the range 169.254.xxx.xxx.

4. Press **Config** to save the IP configuration to the gateway.



Connection test (ping)

The **Ping** command in the CHIPtool context menu can be used for testing the connection. It will open a Windows command line window and run a standard ping command.



```

C:\Windows\system32\cmd.exe

Pinging 10.10.13.131 with 32 bytes of data:
Reply from 10.10.13.131: bytes=32 time<1ms TTL=255

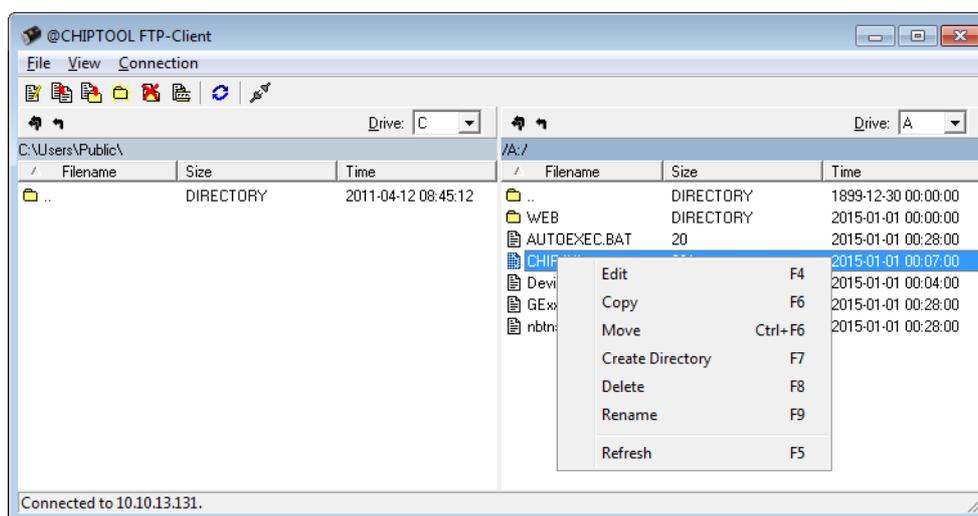
```

File access (FTP)

The **FTP** command in the CHIPtool context menu opens a built-in FTP client, allowing access to the file system in the gateway. FTP access is restricted to certain users, see also [3. Configuration](#).

After logging in, the FTP client will open a file manager window where the left half shows the file system in your computer, and the right half the the file system in the gateway. Right-clicking on a file or folder will open a context menu with file commands.

See also [7.3 FTP connection](#).



Changes to the files and file system should only be carried out by trained personnel as it may restrict the functionality of the gateway.

Web access (HTTP)

The **HTTP** command in the CHIPtool context menu will open the web interface of the gateway in the default browser.

3. Configuration

The Anybus M-Bus to Modbus-TCP Gateway is normally configured via the web interface, which gives access to all gateway parameters, meter configuration and services. The gateway can also be configured by uploading configuration files directly to the gateway via FTP, see [7. Advanced features](#).



Changes to the files and file system should only be carried out by trained personnel as it may restrict the functionality of the gateway.

3.1 The web interface

Auto login

The first time you access the web interface you will be automatically logged in with the default username and password. 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 need to enter a valid username and password and click **Login**. See also [3.1.6 User tab](#).



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.

Default users and passwords

User	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 (C:/log/)

3.1.1 General tab

The **General** tab shows an overview of the current gateway configuration..

The screenshot shows the 'General configuration' tab of the Anybus M-Bus - Modbus TCP Gateway. The interface includes a navigation menu with tabs for General, Meter, Configuration, Server, Security, User, and Service. The 'General configuration' section contains the following fields:

- Device name: Anybus M-Bus/Modbus
- Serial number: 75907
- DHCP:
- IP address: 10.10.13.131
- Subnet mask: 255.255.255.0
- Gateway address: 10.10.13.1
- DNS IP: (empty)
- Free memory Flash (kB): 3263
- System date (local): 1/3/2006
- System time (local): 7:16 PM
- SNTP server: ptbtime1.ptb.de

At the bottom of the configuration area, there are 'Reload' and 'Save' buttons. A 'Print' button is located at the bottom right of the window.

Field	Description	Write access
Gateway name	Name of the gateway (displayed in CHIPtool)	Yes
Serial number	Serial number of the gateway	No
DHCP	Enable automatic network configuration	Yes
IP address ^a	IP address of gateway	Yes
Subnet mask ^a	Subnet mask of gateway	Yes
Gateway address ^a	IP address of your local network gateway (not to be confused with the Anybus M-Bus to Modbus-TCP Gateway)	Yes
DNS IP ^a	IP address of DNS server	Yes
Free Memory Flash (kB)	Free storage space on internal memory of the controller	No
System date (local)	Current local system date	Yes
System time (local)	Current local system time	Yes
SNTP Server	Address of time server	Yes

a. If **DHCP** is checked, the network parameter fields will be disabled

Reload discards the changes made on the page and reloads the currently active settings.

Save saves the changes and reinitializes the gateway.

If the network configuration is changed, the gateway will be available under the new IP address after you click **Save**. All established network connections to the gateway will be terminated and logged in users will be logged out automatically.



Changing the network configuration may restrict accessibility. If the network parameters have been correctly set by an administrator you should not change them.



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.

3.1.2 Meter tab

The **Meter** tab displays a list of connected meters and allows you to search, add and edit entries.

The screenshot shows the 'Meter' tab in a software interface. At the top, there are navigation tabs: General, Meter, Configuration, Server, Security, User, and Service. Below these is a section titled 'Connected meters' containing a table with the following columns: Interface, S, Serial, MAN, Medium, Version, Link, Value, Scale, Unit, Cycle, User label, Description, and Register. The table lists several meters, including M-Bus devices with various serial numbers and configurations. A context menu is open over one of the entries, showing options: Edit, Add meter, Add value, Activate, Deactivate, and Delete. At the bottom of the interface, there are buttons for Reload, Readout, Scan, Add, Delete, Save, and Print.

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		14877789	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

The meter list is initially empty. After connecting one or several meters to the gateway, click **Scan** to start populating the list. The scan is configured on the **Configuration** tab.

See also [5. Acquiring and processing meter data](#).



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

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

The list is additively expanded with each scan, and existing meters will not be deleted even if they are not available anymore.

The meter configuration can be changed with the buttons in the bottom area of the page, or by right-clicking a meter entry. Meters entries and meter value entries can – within the limitations of the used interface – be automatically searched, created, deleted or edited.

Meter entries and meter value entries can be selected with a single mouse click. Multiple selections are possible by holding the SHIFT or CTRL keys.

When activating or deactivating a meter, its meter values are automatically enabled or disabled according to the hierarchy. If a meter is inactive, it is activated by enabling one of its meter values.

Meter tab fields

Field	Description	Write access
Interface	Interface of meter (M-Bus)	No
S	Entry status – E indicates that value has been edited	Yes
Serial	Serial number of meter	No
MAN	Manufacturer of meter (abbreviation)	No
Medium	Medium of meter (see 5.2.1 Predefined Media ID Values)	No
Version	Version number of meter	No
Value	Meter reading or measurement value	No
Scale	Scale factor (scientific notation)	No
Unit	Unit (see 5.2.1 Predefined Media ID Values)	No
Cycle	Readout interval in seconds (entering 0 means using the 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 (see 5.2.1 Predefined Media ID Values)	No
Register	Modbus register address, in steps of 10 (see 5.2.4 Modbus register layout)	Yes
Active	Activates the transfer of meter or meter value via Modbus TCP	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 (see [3.1.3 Configuration tab](#)).

Timestamps transmitted within the M-Bus protocol are automatically assigned to the other meter values where possible. Therefore, some of these may not appear in the list.

The configuration parameter MUC_SHOWTIMESTAMPENTRIES offers the possibility to manually enable the display of all time stamps (see [7.4.1 System configuration file](#)).

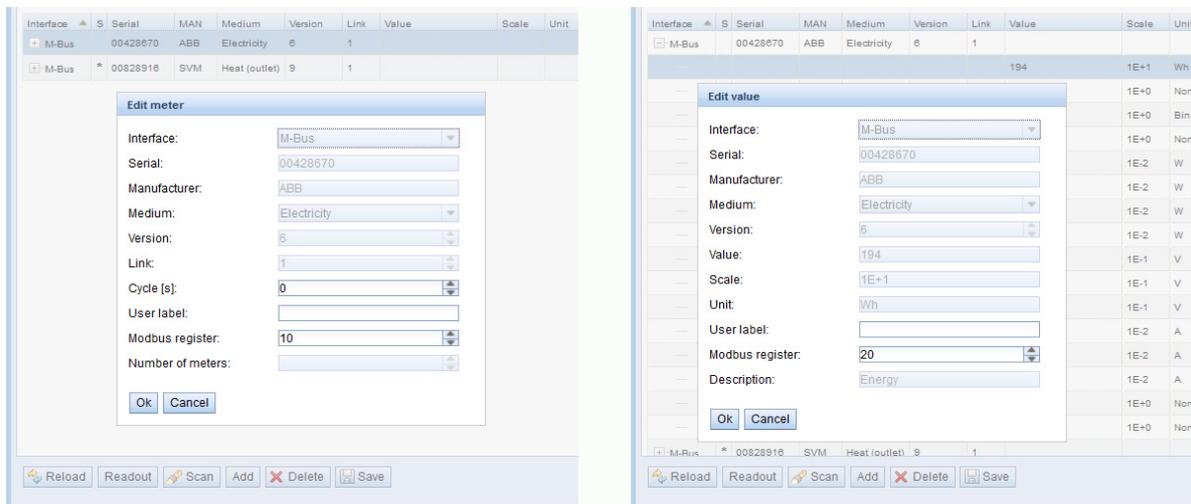
If a scan or a change in the meter list is terminated with the error message “Webserver capacity exceeded”, see [6.3.6 Webserver capacity error message](#).

Meters that are not found during a scan, or that do not support an automated scan, can be added manually to the meter list using the button **Add** or the context menu entry **Add meter**.

See also [5.1.2 Adding meters manually](#).

Editing meter and value entries

Meter and value entries can be configured by right-clicking the entry and selecting **Edit** in the context menu, or by double-clicking the entry. 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 in seconds can be set independently for each meter in the field **Cycle**. If no value is entered the global readout interval is used, see [3.1.3 Configuration tab](#).

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

Valid characters in User Label:	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 all meters via the context menu choices **Allocate** and **Deallocate**. When the configuration is saved, the Modbus addresses will be checked for duplicates. If duplicate addresses are detected an error message will be shown.

Buttons at bottom of page

Readout will update all values regardless of their normal readout interval. This momentary readout may take some time to create depending on the number of meters that are connected. The normal readout cycle is not affected by a momentary readout.

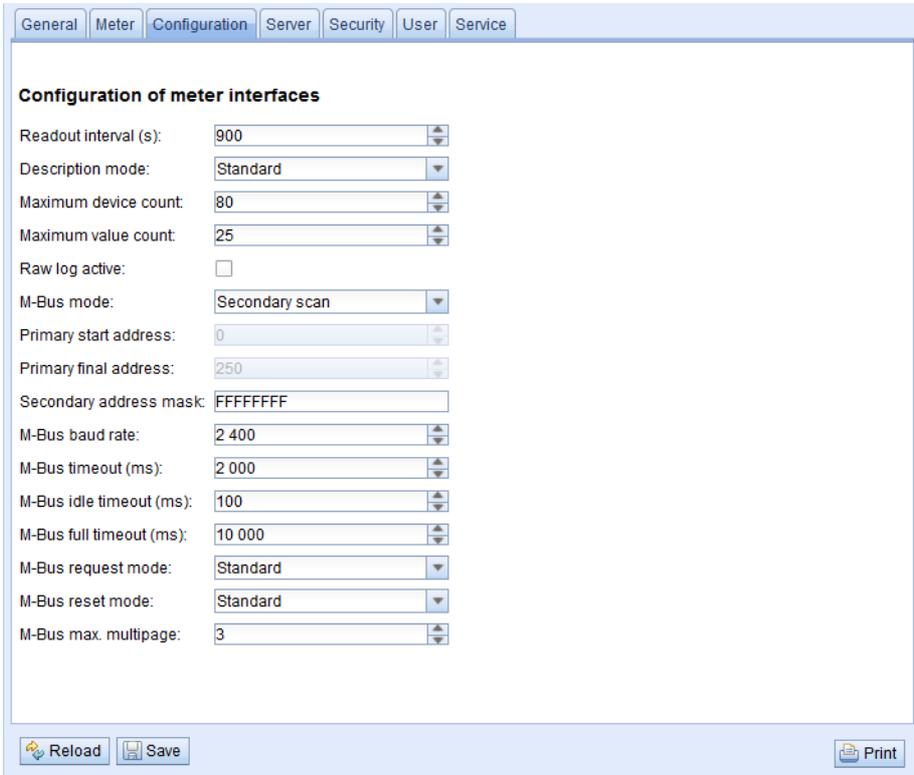
Delete will delete the selected entry in the meter list. Individual meter value entries can not be deleted.

Reload discards the changes made on the page and reloads the currently active settings.

Save saves the changes and reinitializes the gateway.

3.1.3 Configuration tab

The **Configuration** tab provides global meter settings.



The screenshot shows a web interface with a navigation bar at the top containing tabs: General, Meter, Configuration (selected), Server, Security, User, and Service. Below the navigation bar is a section titled "Configuration of meter interfaces". This section contains various configuration parameters, each with a label and a control element (text input, spinner, or dropdown menu). At the bottom of the configuration area, there are three buttons: "Reload" (with a refresh icon), "Save" (with a floppy disk icon), and "Print" (with a printer icon).

Parameter	Value
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 discards the changes made on the page and reloads the currently active settings.

Save saves the changes and reinitializes the gateway.

Configuration tab fields

Field	Description	Write access
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 on the website:</p> <p>None: No display of description</p> <p>Standard: Display of common value description</p> <p>Extended: Extended display of value description (parameters will be displayed if they differ from 0):</p> <p>Notation:Description [Memory No.] <Tariff> {min max error}</p> <p>Example:Energy [2] <1> {max}</p> <p>Extended with DIF/VIF: Extended display including DIF and VIF raw data</p> <p>Notation:Description [Memory No.] <Tariff> {Value Type} # XX XX XX ...</p> <p>Example:Energy [2] <1> # 8C 11 04</p> <p>Extended with raw data: Extended display including the raw data of the complete meter value entry.</p> <p>Notation corresponds to Extended with DIF/VIF:</p> <p>Example:Energy [2] <1> # 8C 11 04 96 47 06 00</p> <p>DIF/VIF:</p> <p>Display of DIF/VIF raw data</p> <p>Raw data:</p> <p>Displays the raw data of the complete meter value entry</p> <p>After changing this parameter a readout is needed to update the meter list and to display the relevant data.</p>	Yes
Maximum gateway count	Limitation of the number of meters to scan. (0: no limitation). Already configured meters are not limited by this parameter.	Yes
Maximum value count	Limitation of the number of meter value entries to read during a readout (0: no limitation). Already configured meter value entries are not limited by this parameter.	Yes
RAW log active	Activates the raw data log.	Yes
M-Bus mode	M-Bus scan mode (secondary, reverse secondary or primary search)	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 (in ms)	Yes
M-Bus idle timeout	M-Bus timeout until end of reception (in ms)	Yes
M-Bus full timeout	M-Bus timeout (complete) for reception of a whole data packet (in ms)	Yes
M-Bus request mode	<p>Mode of the M-Bus readout (REQ_UD2):</p> <p>Standard: Readout with REQ_UD2</p> <p>Extended 1: Readout with Get-All-Data (DIF/VIF 7F 7E) and REQ_UD2</p> <p>Extended 2: 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>None: no reset</p> <p>Standard: Send SND_NKE to primary address of the meter or broadcast address when using secondary addressing</p> <p>Extended 1:</p> <p>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>Extended 2: 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

3.1.4 Server tab

The **Server** tab provides settings for the Modbus TCP interface.

The screenshot shows a web interface with tabs: General, Meter, Configuration, Server, Security, User, Service. The 'Server' tab is active. Below the tabs is a section titled 'Configuration of server connection'. It contains two fields: 'Modbus Mode' with a dropdown menu showing 'Modbus TCP', and 'Modbus Port' with a text input field containing '502'. At the bottom of the configuration area are three buttons: 'Reload' (with a refresh icon), 'Save' (with a floppy disk icon), and 'Print' (with a printer icon).

Field	Description	Write access
Modbus Mode	Select Modbus TCP (normal mode) or dummy data (see 4.2.1 Dummy data)	Yes
Modbus Port	Port number to which the Modbus TCP client (master) should connect	Yes

Reload discards the changes made on the page and reloads the currently active settings.

Save saves the changes and reinitializes the gateway.

3.1.5 Security tab

The **Security** tab allows enabling/disabling of FTP and Telnet access to the gateway.

The screenshot shows a web interface with tabs: General, Meter, Configuration, Server, Security, User, Service. The 'Security' tab is active. Below the tabs is a section titled 'Security configuration of internal server'. It contains two checkboxes: 'FTP server active:' which is checked, and 'Telnet server active:' which is also checked. At the bottom of the configuration area are three buttons: 'Reload' (with a refresh icon), 'Save' (with a floppy disk icon), and 'Print' (with a printer icon).

Field	Description	Write access
FTP server active	Enable/disable FTP access	Yes
Telnet server active	Enable/disable Telnet access	Yes

Reload discards the changes made on the page and reloads the currently active settings.

Save saves the changes and reinitializes the gateway.

3.1.6 User tab

The **User** tab allows you to create and manage users and assign them specific access rights. The following users are pre-configured on delivery:

User	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 full 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 (C:/log/)

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	FTP
admin	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0	1	<input checked="" type="checkbox"/>													
web	<input type="checkbox"/>	<input type="checkbox"/>	1	-1	<input checked="" type="checkbox"/>	<input type="checkbox"/>												
ftp	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0	-1	<input type="checkbox"/>	<input checked="" type="checkbox"/>												

Access rights to the different tabs of the web interface and to the FTP server can be set individually for each user by ticking the check boxes. Most of the choices are self-explanatory.

Change password means that the user is allowed to change his/her password.

Sessions indicates the currently active sessions for this user.

Maximum sessions indicates the maximum number of simultaneous sessions allowed for the user, where -1 means unlimited.

To edit the password and the max session setting, either double-click on a user entry or right-click on the user entry and select **Edit**. To change the password, tick the **Set password** checkbox, then enter the new password in the **Password** field.

Edit User

Username:

Set password:

Password:

Maximum sessions:

FTP Access:

Ok Cancel



The admin user can not be edited this way. To change the admin password, log in as admin and click **Change password** at the top of the web page.



If you lose the admin password the unit must be reset. Please contact Anybus support for assistance.

User tab fields

Field	Description	Write access
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	Maximum 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



New users can be added by clicking the **Add** button, or by right-clicking anywhere in the user list and selecting **Add** from the context menu.

Add User

Username:

Set password:

Password:

Maximum sessions:

FTP Access:

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.

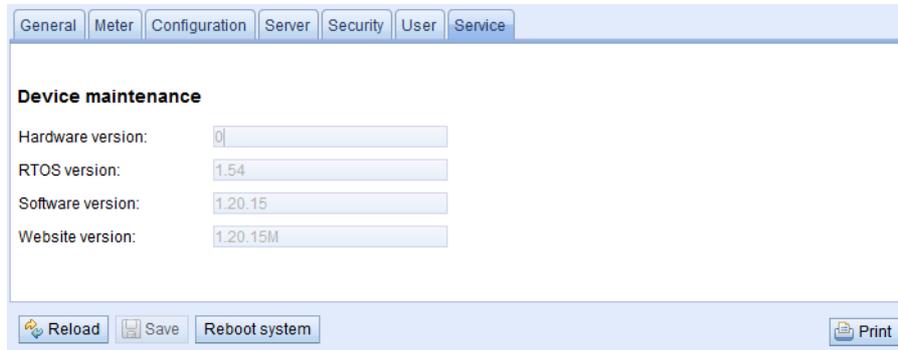
Delete deletes the selected user.

Reload discards the changes made on the page and reloads the currently active settings.

Save saves the changes and reinitializes the gateway.

3.1.7 Service tab

The Service tab provides information about the hardware and software for maintenance use. The values on this tab are read-only.

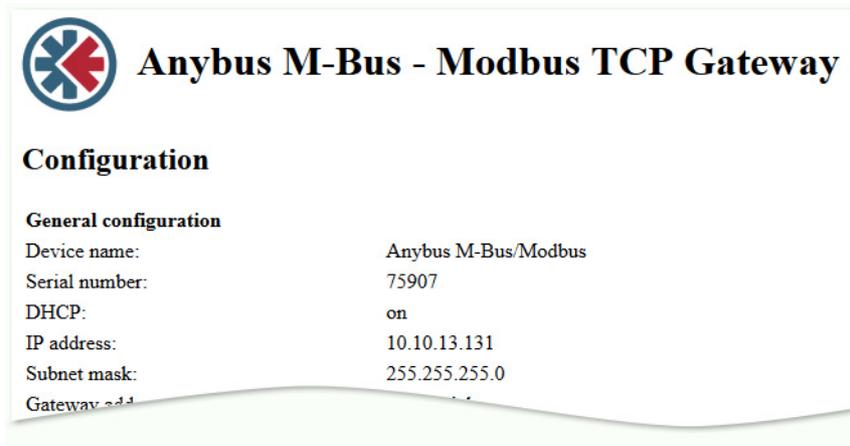


Reload will refresh the information.

Reboot will restart the gateway. All internal processes will be reinitialized after the reboot.

3.1.8 Print page

Clicking the **Print** button (bottom right) will export the complete configuration as a print-formatted HTML page in a new browser tab or window.



The **Meter Configuration** section of the print page is output in a table format that can be copied and pasted directly into a spreadsheet.

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

4. Modbus TCP specification

The Modbus protocol was originally developed by the company Modicon (now Schneider Electric) for the communication with their controllers. Data is transmitted in the terms of 16 Bit registers (integer format) or as status information in terms of data bytes. Over the years, the protocol has been continuously expanded. Modbus TCP is a variant of Modbus and part of the standard IEC 61158.

A full specification for Modbus can be found here: www.modbus.org

The Modbus protocol is a *single master protocol*. The master controls the entire communication and monitors timeouts (no response from the addressed gateway). The connected gateways are only allowed to respond to requests by the master.

The Anybus M-Bus to Modbus-TCP Gateway is a type of Modbus TCP server, a *Modbus TCP slave*.

Modbus TCP communication requires an established connection between a client (e.g. a PC or PLC) and the gateway over a specified TCP port. The default port number is 502. See also [3.1.4 Server tab](#).

If a firewall is installed between the gateway and the client, make sure that the configured TCP port is open in the firewall.

4.1 Function codes

The following Modbus function codes are supported by the gateway:

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 Gateway Identification	Reading of gateway 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 Gateway Identification) is used with `MEI=0x03`, the gateway will respond with identification data. The values 0x01 and 0x02 are supported as Gateway ID code, allowing to retrieve basic and regular gateway identification data:

Code	Name	Data type	Example	Type
0x00	VendorName	String	HMS	Basic
0x01	ProductCode	String	1036	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	Modbus TCP Gateway	Regular

4.2 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 word order of 32 bit and 64 bit values can be changed within the system configuration file by setting the parameter MODBUS_SWAP, see [7.4.1 System configuration file](#).

4.2.1 Dummy data

For checking the data layout on the Modbus master side the gateway can be configured to generate dummy data (see [3.1.4 Server tab](#)). The following data will be represented via the Modbus interface according to the register layout described in [5.2.4 Modbus register layout](#):

Address	Value	Description	Decoded value
0	0x0002	Serial number of gateway, upper word	0x2993A
1	0x993A	Serial number of gateway, lower word	
2	0x0001	Version of the communication protocol	1
3	0x006F	Firmware version of gateway	0x6F = 111: Version 1.11
4	0x519C	Timestamp of gateway system time, upper word	0x519CC16D = 1369227629: Wednesday, May 22nd 2013, 15:00:29 GMT+2
5	0xC16D	Timestamp of gateway system time, lower word	
6	0x0000	Empty field	
7	0x0100	Type field of register set in upper byte	0x01: Gateway 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
21	0x0000	Meter value (integer)	
22	0x00BC	Meter value (integer)	Calculation: 12345678 * 10 ⁻⁴ = 1234.5678 Wh
23	0x614E	Meter value (integer), lowest word	
24	0x449A	Meter value (float), upper word	0x449A522B = 1234.567800
25	0x522B	Meter value (float), lower word	
26	0xFFFC	Scaling factor (exponent to base 10)	0xFFFC = -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	

5. 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 available meters must be configured correctly. Required meters or meter values must be enabled by the checkbox **Active** and must have a valid register address.
- The read out meter data must be transmittable from the gateway to a PLC via Modbus TCP.
- The PLC must be able to interpret the meter data format.

5.1 Meter configuration

5.1.1 Scanning for meters

It is possible to search for meters automatically on the M-Bus interface. The meters primary or secondary addresses are used in an iterative scan process. When the scan process has been completed all detected meters will appear in the meter list.

Scan mode (primary or secondary) is selected on the **Configuration** tab (see [3.1.3 Configuration tab](#)). The scan process itself is started from the **Meter** tab (see [3.1.2 Meter tab](#)).

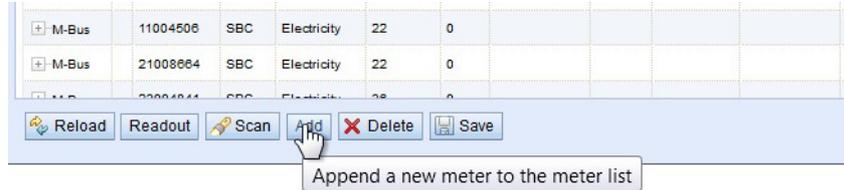
The M-Bus interface allows mixed configurations, i. e. it is possible to scan for primary addresses first and then for secondary addresses in a second run. Newly detected meters are appended to the existing list. Meters found in both runs stay in the list and remain unchanged if already configured. If a meter is found for the first time during the primary search, the primary address is used for all further requests. This applies also to secondary search and secondary addressing.

M-bus supports both primary and secondary addressing when accessing a meter. Secondary addressing is recommended if the meters should be recognized and read out without additional configuration. However, the read-out process is slower than with primary addressing. If all meters are pre-configured with a unique primary address it is recommended to use primary addressing, narrowed down to the limits for the primary addresses according to the expected values. The big advantage of primary addressing is that meters of the exact same type and configuration (although with different serial numbers) can be swapped without reconfiguring the gateway.

Automated allocation of the primary addresses or setting of parameters and registers of meters by the gateway is available on request.

5.1.2 Adding meters manually

Meters that are connected to the M-Bus interface of the gateway but not found automatically during a scan can be added manually from the **Meter** tab, see [3.1.2 Meter tab](#). The configuration of the meter must be known to be able to add it manually.



Add meter

Interface:

Serial:

Manufacturer:

Medium:

Version:

Link:

Encryption key:

Cycle [s]:

User label:

Number of meters:

Ok Cancel

The fields in the **Add meter** dialog correspond to the fields in the meter list. It is possible to configure the interface to which the meter is connected, the serial number of the meter, the 3-letter manufacturer code (see www.dlms.com), the medium, the version number, and the desired update cycle. You can also add a custom **User label** for identification purposes. The fields are explained in [3.1.2 Meter tab](#).

The parameter **Number of meters** makes it possible to create more than one meter at the same time with the same configuration.

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

5.2 Meter data format

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

5.2.1 Predefined Media ID Values

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

5.2.2 Predefined measurement value types

Index	Description
0	None
1	Error flags (Gateway type specific)
2	Digital output
3	Special supplier information
4	Credit
5	Debit
6	Volts
7	Ampere
8	Reserved
9	Energy
10	Volume
11	Mass
12	Operating time
13	On time
14	Power
15	Volume flow
16	Volume flow ext
17	Mass flow
18	Return temperature
19	Flow temperature
20	Temperature difference
21	External temperature
22	Pressure
23	Timestamp
24	Time
25	Units for H. C. A.
26	Averaging duration
27	Actuality duration
28	Identification
29	Fabrication
30	Address
31	Meter specific description - can be used to specify custom value types (text based)
32	Digital input
33	Software version
34	Access number
35	Gateway type
36	Manufacturer
37	Parameter set identification
38	Model / Version
39	Hardware version
40	Metrology (firmware) version
41	Customer location
42	Customer
43	Access code user
44	Access code operator
45	Access code system operator
46	Access code developer
47	Password
48	Error mask

Index	Description
49	Baud rate
50	Response delay time
51	Retry
52	Remote control (gateway specific)
53	First storagenum. for cyclic storage
54	Last storagenum. for cyclic storage
55	Size of storage block
56	Storage interval
57	Vendor specific data
58	Time point
59	Duration since last readout
60	Start of tariff
61	Duration of tariff
62	Period of tariff
63	No VIF
64	wM-Bus data container
65	Data transmit interval
66	Reset counter
67	Cumulation counter
68	Control signal
69	Day of week
70	Week number
71	Time point of day change
72	State of parameter activation
73	Duration since last cumulation
74	Operating time battery
75	Battery change
76	RSSI
77	Day light saving
78	Listening window management
79	Remaining battery life time
80	Stop counter
81	Vendor specific data container
82	Reactive energy
83	Reactive power
84	Relative humidity
85	Phase voltage to voltage
86	Phase voltage to current
87	Frequency
88	Cold/Warm Temperature limit
89	Cumulative count max. power
90 - 255	Reserved

5.2.3 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 ³	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 ³ /h	Cubic meter per hour
16	m ³ /min	Cubic meter per minute
17	m ³ /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 ³	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

5.2.4 Modbus register layout

The Anybus M-Bus to Modbus-TCP Gateway uses a fixed address structure of 10 Modbus registers per address. 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 (like 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	Data 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 Gateway 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 gateway 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	Data 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	Data 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

Example configuration of Modbus addresses via the web interface:

<input type="checkbox"/> MBus	66600106	LUG	Heat (outlet)	2					10	<input checked="" type="checkbox"/>
—					4	1e+0	s	Actuality Duration	0	<input type="checkbox"/>
—					4	1e+0	s	Averaging Duration	0	<input type="checkbox"/>
—					267	1e+3	Wh	Energy	20	<input checked="" type="checkbox"/>
—					372876	1e-2	m ³	Volume	0	<input type="checkbox"/>
—					0	1e+2	W	Power	0	<input type="checkbox"/>

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

Address	Value	Name	Decoded value
Gateway entry			
0	0x0002	Serial number	0x0002993A
1	0x993A		
2	0x0001	Protocol version	1
3	0x006F	Version	Version = 0x006F = 111 → v1.11
4	0x519C	Time stamp	0x519CC16D = 1369227629 =
5	0xC16D		Wednesday, 2013-05-22, 15:00:29 GMT+2
6	0x0000	Reserved	
7	0x0100	Type field / reserved	Type = 1 → gateway entry
8	0x0000	Reserved	
9	0x0000	Reserved	
Meter entry			
10	0x03F8	Serial number	0x03F83CAA = 66600106
11	0x3CAA		
12	0x32A7	Manufacturer ID	0x32A7 = '0011.0010.1010.0111' 1st letter: '0111.0010.1010.0111' → 0x0C = 12 → L 2nd letter: '0111.0010.1010.0111' → 0x15 = 21 → U 3rd letter: '0111.0010.1010.0111' → 0x07 = 7 → G
13	0x0204	Version / medium	Version = 2 Medium = 4 = Heat (outlet)
14	0x519C	Time stamp	0x519CC16D = 1369227629 =
15	0xC16D		Wednesday, 2013-05-22, 15:00:29 GMT+2
16	0x0000	Reserved	
17	0x0200	Type field / reserved	Type = 2 → meter entry
18	0x0000	Reserved	
19	0x0000	Reserved	
Meter value entry			
20	0x0000	Meter value (integer)	0x000000000000010B = 267
21	0x0000		Resulting value: 267 * 10 ³ Wh
22	0x0000		
23	0x010B		
24	0x4882	Meter value (floating point)	0x48825F00 = 267000.000000 Wh
25	0x5F00		
26	0x0003	Scale factor	Factor = 10 ³
27	0x0005	Type field / unit	Type = 0 → meter value entry Unit = 5 → Wh
28	0x519C	Time stamp	0x519CBBB3 = 1369226163 =
29	0xBBB3		Wednesday, 2013-05-22, 14:36:03 GMT+2

6. Troubleshooting

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

If you still cannot solve your problem, please contact Anybus support.

6.1 Hardware errors

6.1.1 Gateway does not respond

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

1. Check that the power supply is connected with the correct polarity.
2. Check that the power supply voltage is approximately 24 VDC measured between terminals “24VDC” and “GND”.

6.1.2 Current consumption too high

After powering the gateway, current consumption rises above 500 mA.

1. Check that the M-Bus connection voltage is approximately 36 VDC measured between terminals “MBUS+” and “MBUS-”.
2. Disconnect the gateway from the M-Bus.
 - Check if the current consumption is back to normal.
 - Measure the M-Bus connection voltage again.
3. Check if the Ethernet LEDs are flashing.

6.2 Network errors

6.2.1 Web interface and FTP server not accessible

The gateway web interface and the FTP server are not accessible.

1. Run CHIPtool and check if the gateway appears in the list (see [2.2.1 CHIPtool](#)).
 - If the gateway is not visible in CHIPtool, continue to [6.2.2 No network connection](#).
 - If the gateway is visible in CHIPtool, run a connection test (ping).
 - Try to access the FTP server from CHIPtool.
2. If the gateway responds to ping and can be accessed with the FTP client in CHIPtool, but is not accessible from a browser or an external FTP client, check that the gateway is within your network subnet (see [2.2 Network configuration](#)) and that it is not blocked by firewall settings. If you are unsure, contact your network administrator.
3. If the web interface start page is visible but the default user is not logged in, check if you can log in using admin credentials. You can also try clearing the web browser cache (see the documentation for your browser).

6.2.2 No network connection

The gateway cannot be accessed and is not visible in CHIPtool.

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 the activity LED is flashing green.
 - Check the corresponding LEDs on the remote terminal (PC, switch, etc.).
 - If necessary, replace the cables and try again.
2. If the gateway still does not appear in CHIPtool, check that communication is not blocked by a firewall. If you are unsure, contact your network administrator.
3. If the gateway appears in CHIPtool, 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 PC instead.



A cross-over Ethernet cable may be needed for a direct connection between the gateway and a PC.

Using a direct connection between the PC and gateway, the following example IP configuration can be used. No other network gateways must be connected to the PC except the gateway.

PC	
IP	192.168.1.10
Subnet mask	255.255.0.0
Anybus M-Bus to Modbus-TCP Gateway	
IP	192.168.1.101
Subnet mask	255.255.0.0

6.2.3 No write access to the web interface

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

1. Check if you are logged in as a user with write access (see [3.1.6 User tab](#)). If not, log out and log in as another 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.
- 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.

6.2.4 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 from its default value by editing the system parameter `WEBCOM_TIMEOUT` (see [7.4.1 System configuration file](#)).

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.

6.2.5 FTP login failure

FTP login fails, or the file list is empty.

1. Log in to the web interface as admin and check the FTP user password.
2. Try logging in to the FTP server as admin and check the communication log.
3. If the 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.
(Passive mode can be selected at login in the CHIPtool FTP client.)
4. Check the network configuration (see [2.2 Network configuration](#)) and that the gateway is not blocked by firewall settings. If you are unsure, contact your network administrator.

6.3 Meter reading errors

6.3.1 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 M-Bus connection voltage is approximately 36 VDC measured between terminals “MBUS+” and “MBUS-”.
3. Check that the M-Bus interface (M-Bus mode) is enabled in the **Configuration** tab (see [3.1.3 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 **M-Bus 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.
Meters that do not respond to every request will be found easier by increasing the number of retries the gateway makes. See [7.4.1 System configuration file](#).

6.3.2 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. See [3.1.3 Configuration tab](#).
2. Try search masks or limiting the address space to perform a gradual scan of the M-Bus.
See also [6.3.1 No meters are detected](#).
3. If possible, disconnect the detected 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.
Meters that do not respond to every request will be found easier by increasing the number of retries the gateway makes. See [7.4.1 System configuration file](#).

6.3.3 Meters are detected but have no data

Some meters may contain an erroneous declaration of the secondary address. This is why these meters are not addressable for meter readouts, although they are visible in the meter list.

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 [7.4.1 System configuration file](#).

6.3.4 Scanning takes too long

Under certain circumstances, performing a scan of the M-Bus can take a very long time (>1 h).

- Try working with search masks or limiting the address space to perform a gradual scan. See [3.1.3 Configuration tab](#).
- Decrease the value of the system parameter `MBUS_MAXRETRY`. See [7.4.1 System configuration file](#).
- Select a different scan mode, either on the **Configuration** tab (see [3.1.3 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.

6.3.5 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.

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`. See [7.4.1 System configuration file](#).

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.

Try working with search masks or limiting the address space to perform a gradual scan. See [3.1.3 Configuration tab](#).

If possible, try to split the bus and scan each bus segment separately.

6.3.6 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 of the web interface (see [3.1.3 Configuration tab](#)) can be used to set the limitation:

- **Description mode** set to **Standard** or (if not needed) set to **None**.
- **Maximum gateway count** set to the default value of 20 or 80, or to a lower value.
- **Maximum value count** set to the default value of 25 or to a lower value.
- **M-Bus request mode** set to **Standard** (deactivates the request of partly extensive additional data of the meter).
- **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 [7.4.2 Meter configuration file](#). 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.

6.4 Meter data transmit error

6.4.1 Meter data not transmitted via Modbus

- Check that the parameters for the Modbus communication (IP and port) are set correctly. See [3.1.4 Server tab](#).
- If possible, check the network communication with the remote system using a network analyzer such as [Wireshark](#).

7. Advanced features

7.1 Software update

In order to provide new features to the Anybus M-Bus to Modbus-TCP Gateway, the operating system and gateway software can be updated using CHIPtool (see [2.2 Network configuration](#)).

The update consists of two steps. In the first step, the operating system (RTOS) on the controller is updated. In the second step the firmware of the gateway is transferred. In most cases, updating the RTOS is not necessary.

The current version numbers of RTOS and the gateway software can be found in the **Service** tab of the web interface. See [3.1.7 Service tab](#).



Software updates should only be carried out by trained personnel as there is a risk of restricting functionality or damaging the gateway.



The integrity of the software files must be confirmed before updating. Corrupted software files may restrict the functionality of the gateway.

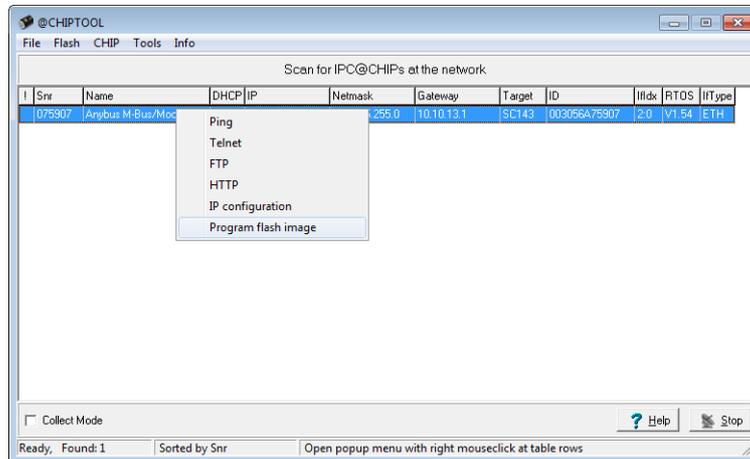


A continuous power supply must be ensured during an update. A power failure during a software update may damage the gateway.

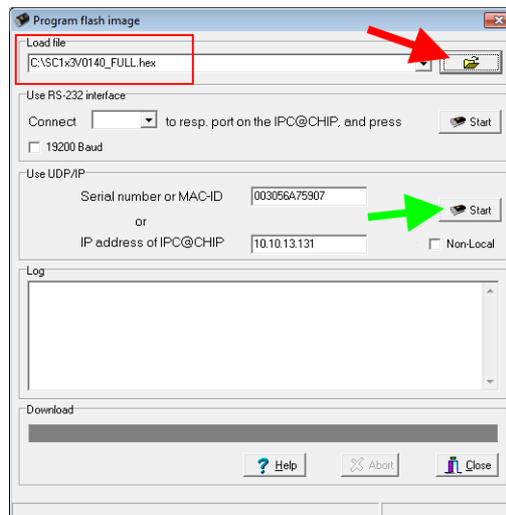
7.1.1 Updating the operating system (RTOS)

RTOS is provided as an image file named “SC1x3V0[version]_FULL.hex”, where [version] represents the RTOS version (e.g. 154).

1. Start CHIPTool and right-click on the gateway that is to be updated.
In the context menu, select **Program flash image**.



2. In the dialog that opens, click  to browse to and select the RTOS image file on your computer, then click **Start** in the section Use UDP/IP. Do not change any other settings.



You will be asked for the administrative password to start the update.
See also [3.1 The web interface](#).

The gateway will reboot automatically when the update has been completed.

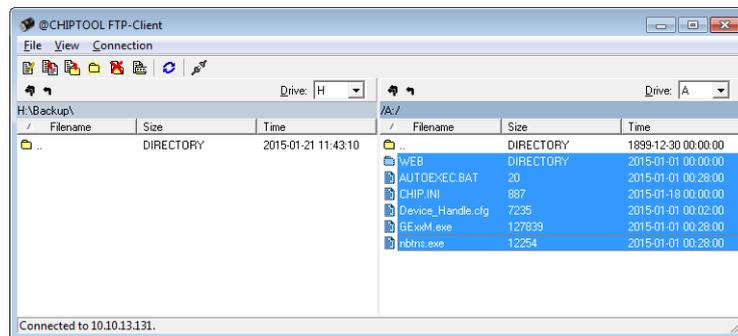
7.1.2 Updating application software (firmware)

The Anybus M-Bus to Modbus-TCP Gateway application software is provided as a zip archive.

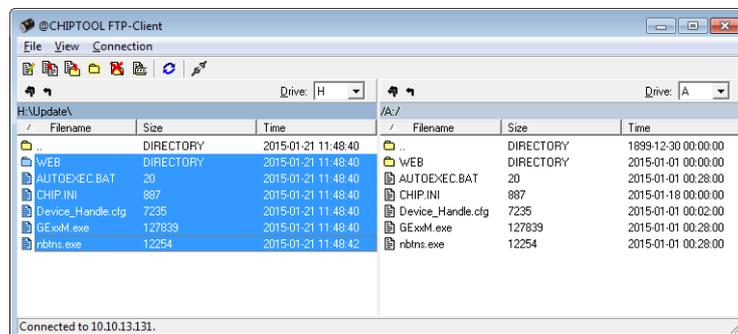
1. Unpack the contents of the zip archive to an empty directory on your PC.
2. Open the web interface and log in as admin.
3. On the **Service** tab, check that the button **Reboot system** is active (not grayed out).



4. Log in to the FTP server as admin.
5. Select all files and folders in drive A:\ and download them to an empty directory on your PC. This is your backup in case the update fails.



6. Go to the directory where you unzipped the update archive and upload the contents to A:\, replacing the existing files and folders.

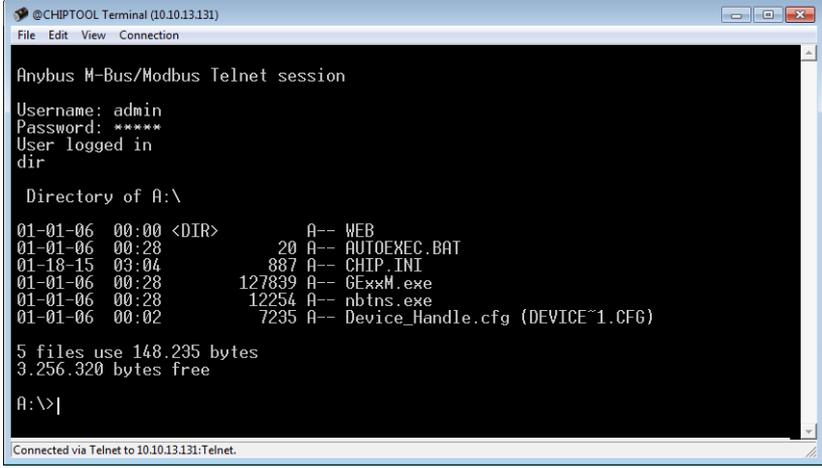


7. Exit the FTP connection and restart the gateway by clicking **Reboot system**.
8. After rebooting the gateway, clear the web browser cache (see the documentation for your browser) and reload the web interface start page.

7.2 Telnet connection

Administrative access to the gateway can be obtained using a standard Telnet client connecting to the gateway with admin credentials. There is also a Telnet client built into CHIPtool.

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



```
@CHIPTOOL Terminal (10.10.13.131)
File Edit View Connection

Anybus M-Bus/Modbus Telnet session
Username: admin
Password: *****
User logged in
dir

Directory of A:\
01-01-06 00:00 <DIR>          A-- WEB
01-01-06 00:28              20 A-- AUTOEXEC.BAT
01-18-15 03:04             887 A-- CHIP.INI
01-01-06 00:28          127839 A-- GExxM.exe
01-01-06 00:28          12254 A-- nbtns.exe
01-01-06 00:02           7235 A-- Device_Handle.cfg (DEVICE~1.CFG)

5 files use 148.235 bytes
3.256.320 bytes free

A:\>|

Connected via Telnet to 10.10.13.131:Telnet.
```

7.3 FTP connection

The file system in the gateway can be accessed with any standard FTP client, or with the FTP client built into CHIPtool.

The file system consists of two drive volumes: A: containing the system software and configuration files, and C: containing the log files.

Logging in to the FTP server as admin provides access to both drives. Other FTP users will only have access to the logfile directory C:/log.

7.4 Configuration files

The A:/ directory of the gateway contains configuration files for the system and for the connected meters. The configuration files are updated when changes are made via the web interface, but can also be edited manually. Some parameters can only be changed by editing the configuration files manually.



When editing configuration files you must use an UTF-8 capable text editor, such as [Notepad++](#). Since the configuration files do not contain a byte order mark (BOM), your editor may need to be manually set to use UTF-8 encoding.



The configuration files should only be edited by trained personnel as there is a risk of restricting functionality of the gateway.

7.4.1 System configuration file

The file A:/chip.ini is the main system configuration file which contains general system parameters. The parameters are arranged in two groups. Parameters that are not explicitly configured in chip.ini are set to their default values.

Manual changes to the configuration file will take effect after the gateway has been rebooted.

Parameter	Description	Valid range	Default value
Group [IP]			
ADDRESS	IP address of gateway	0.0.0.0 - 255.255.255.255	Not set
NETMASK	Subnet mask of gateway	0.0.0.0 - 255.255.255.255	Not set
GATEWAY	IP address of gateway	0.0.0.0 - 255.255.255.255	Not set
DHCP	Enabling DHCP look-up	0, 1	1
TCPIPMEM	Memory for the webserver in kB	60-1000	280
Group [gateway]			
NAME	Name of gateway shown in CHIptool	Text, max. 20 characters	Anybus M-Bus/Modbus
Group [SOLVIMUS]			
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 M-Bus interface	0, 1	1
MBUS_FREEZE STORAGEENUM	Storage number for meter data on Freeze command	0 - 4294967295	0
MBUS_FULLTIMEOUT	Maximum timeout for reading a meter (in 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_MAXPRIMARY ADDRESS	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_MINPRIMARY ADDRESS	Lower limit of address range for M-Bus primary scan	0 - 250	0

Parameter	Description	Valid range	Default value
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 read-out	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_SECMASK MANUFACTURER	Predefined manufacturer ID for secondary scan	Exactly 4 characters, 0-9 each or 0xFFFF	0xFFFF
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 (in ms)	0 - 65535	2000
MBUS_WAKEUPENABLE	Enables specific wake-up request	0, 1	0
METER_MAXALL VALUECOUNT	Limits the total number of meter values (0: no limit)	0 - 65535	0
METER_MAXgateway COUNT	Limits the number of meters (0: no limit)	0 - 65535	0
METER_MAXVALUE COUNT	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	A:\gateway_handle.cfg
METER_TIME	Interval for meter read-out (in s), huge amount of data may arise on short cycle times and with many meters	10 - 4294967295	900
MODBUS_DEBUGOUT	Enables the debug output of Modbus data.	0, 1	0
MODBUS_ENABLE	Enables the Modbus slaves	0, 1	0
MODBUS_NWPORT	Network port of the Modbus slave	0 - 65535	502
MUC_CONFIG_VER	Version of configuration file	1, 2	2 (explicit)

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 Bit1: Storage-number, tariff, value type Bit2: DIF/VIF raw data Bit 3: Complete raw data of meter value entry	0-16	1
MUC_SETgatewayS	Activates writing of meter values	S0, ALL, NONE	S0
MUC_PROTOCOL_VERSION_MUC_SHOWTIMESTAMP_ENTRIES	Protocol version for CSV and XML dataExplicit display of the meter timestamp.	0, 1, 2, 3	30
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
SNTPIP	Address of time server (SNTP)	Text, max. 40 characters	ptbtime1.ptb.de
WATCHDOG_IDLE	Timeout for watchdog during idle state (in s)	1 - 4294967295	120
WATCHDOG_PROCESS	Timeout for watchdog during busy state (in s)	1 - 4294967295	900
WATCHDOG_READOUT	Timeout for watchdog during read-out (in s)	1 - 4294967295	4 times the read-out cycle, at least: WATCHDOG_PROCESS
WATCHDOG_SCAN	Timeout for watchdog during scan process (in s)	1 - 4294967295	1800
WEBCOM_TIMEOUT	Timeout for a web session, user is logged out automatically after that period (in ms)	1 - 4294967295	30000

7.4.2 Meter configuration file

Meter configuration is stored in the file A:/gateway_handle.cfg. If this file does not already exist it will be generated when the meter list in the Meter tab of the web interface is populated.

Only entries which differ from the default values are stored (except “version”).

Manual changes to the configuration file will take effect after the gateway has been rebooted.

The file is in XML format and has the following structure:

Parent element	Element name	Description	Default value	Example
	version	Version of XML specification	-	0x06
	meter	Parent element for each meter	-	-
meter	interface	Interface to meter		M-Bus
meter	serial	Serial number of meter, leading "0x"	0xFFFFFFFF	0x30101198
meter	manufacturer	Manufacturer of meter (abbreviation)	Not set	SLV
meter	version	Version of meter	Not set	0x01
meter	medium	Medium of meter ^a	Not set	Electricity
meter	primaryaddress	Primary address of meter (M-Bus or S0)	0	0x03
meter	addressmode	Used mode for addressing 0: Secondary, 1: Primary	0	0
meter	readoutcycle	Specific read-out interval (in s)	0	900
meter	maxvaluecount	Limit for number of meter values	0	12
meter	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
meter	active	Enables logging of meter data or transmission via WAN interface	1	1
meter	rss	Received Signal Strength Indicator at last reception (wM-Bus)	0	123
meter	register	Allocated Modbus register	0	20
meter	value	Parent element for meter values	-	-
value	description	Description of value ^a	None	Energy
value	unit	Unit of value ^a	None	Wh
value	encodetype	Coding of value	NODATA	INT32
value	scale	Scale factor (scientific notation)	1e0	1e-3
value	valuetype	Type of value: instantaneous, maximum, minimum, errorstate	instantaneous	instantaneous
value	storagenum	Storage number of value	0	2
value	tariff	Tariff information for value	0	3
value	confdata	Generic data, OBIS code for value (X-X.X.X.X*X; X=0...255) (column OBIS-ID in tab Meter)	Not set	0x01 0x00 0x01 0x08 0x00 0xFF
value	active	Enables logging of value data or transmission via WAN interface	1	1
value	register	Allocated Modbus register	0	30
value	user	User specific text, max. 50 characters (column User label in tab Meter)	Not set	OG-1-Re

a. See [5.2.1 Predefined Media ID Values](#)

A. Technical Specifications

A.1 General

A.1.1 Dimensions and weight

- Width: 35 mm
- Height: 89 mm
- Depth: 58 mm
- Weight: 80 g

A.1.2 Installation

This gateway is intended for installation in a switch cabinet.

- Operating temperature: 0–50 °C
- Humidity: 10–95 % relH
- Protection class: IP20
- DIN rail mounting: 35 mm DIN rail

A.1.3 Customs declaration

- TARIC: 85176200

A.2 Electrical

A.2.1 Power supply

This gateway needs an external power supply.

For pin assignments, see [1.2 Description](#).

- Input voltage: 24 ±5 VDC
- Connector wire range: ≤ 2.5 mm²
- Power consumption: 2 W idle state, 10 W max
- Protection: Reverse polarity
Overvoltage (transient)

A.2.2 Meter interfaces

M-Bus interface compliant with EN 13757-2.

For pin assignments, see [1.2 Description](#).

- U_{space}: 36 V
- U_{mark}: 24 V
- Connector wire range: ≤ 2.5 mm²
- Max number of loads: 20
- Max continuous current load: 140 mA
- Max baud rate: 38400 baud

A.2.3 Communication interfaces

The gateway has a single network communication interface.

- Ethernet compliant with IEEE 802.3
- 100 Base-TX
- RJ-45 connector

A.2.4 Galvanic isolation

The Ethernet interface is galvanically isolated from the supply voltage.

- Galvanic isolation 1000 V

A.2.5 Processing unit

- Microprocessor architecture: 80x86
- Clock frequency: 96 MHz
- RAM memory: 8 MB
- Flash memory (internal): 8 MB
- Operating system: RTOS (proprietary)