

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) |
| DLDERS | 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.

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

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

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.

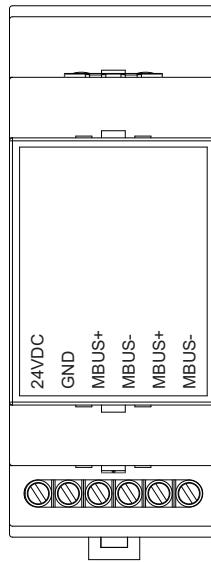
The Anybus M-Bus to Modbus-TCP Gateway reads out the meters autonomously, which is why an initial configuration of the gateway is necessary. A built-in web interface simplifies this process. Via this web interface all the functionality of the gateway is available to the user. In addition to basic system 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](#).

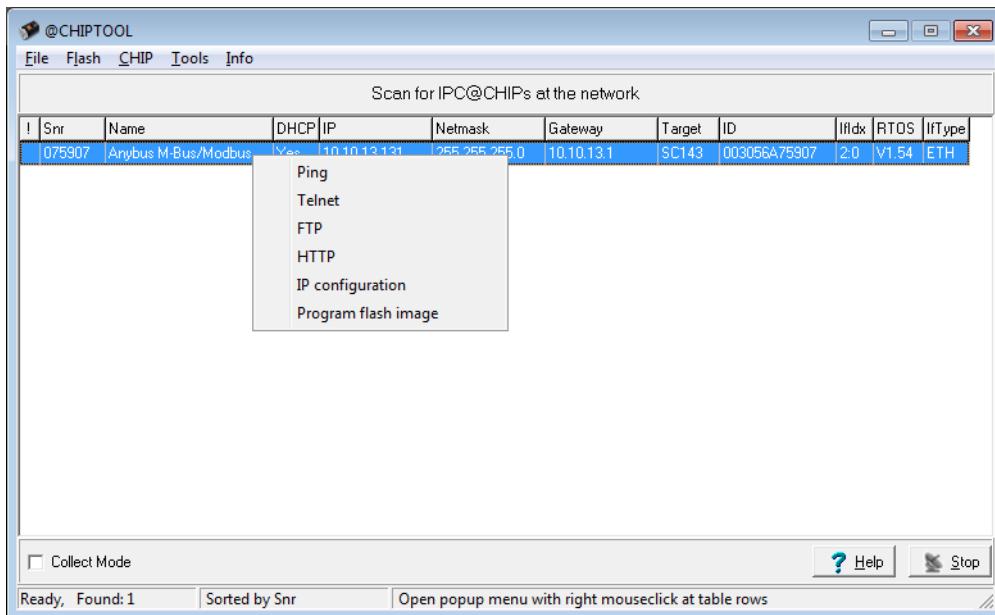
If the link above does not work, go to the main Beck IPC GmbH download web page <http://www.beck-ipc.com/en/download/index.asp> and search for “CHIPtool”.



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

- 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.

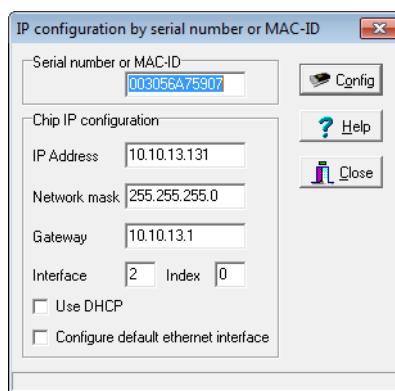


- Right-click on the gateway that you wish to configure, then select **IP configuration** from the context menu.
- If your network has a DHCP server, check **Use DHCP** for automatic configuration.
If your network does not have a DHCP server, change the **IP Address**, **Network mask** and **Gateway**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



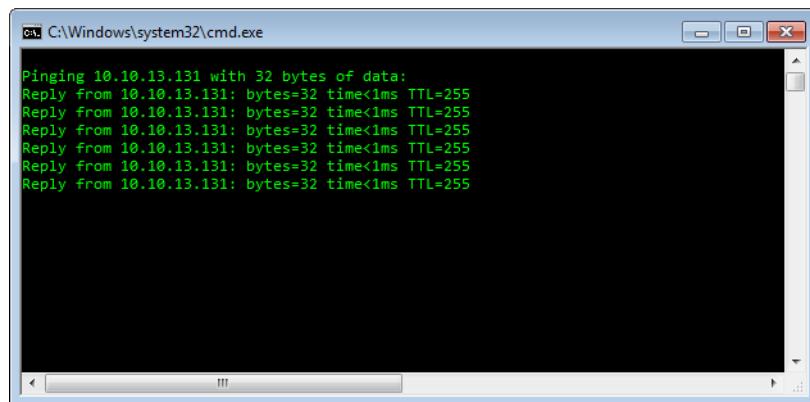
If **Use DHCP** is checked but the gateway is *not* able to obtain an IP address dynamically, it will choose a random IP address in the range 169.254.xxx.xxx.

- 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.



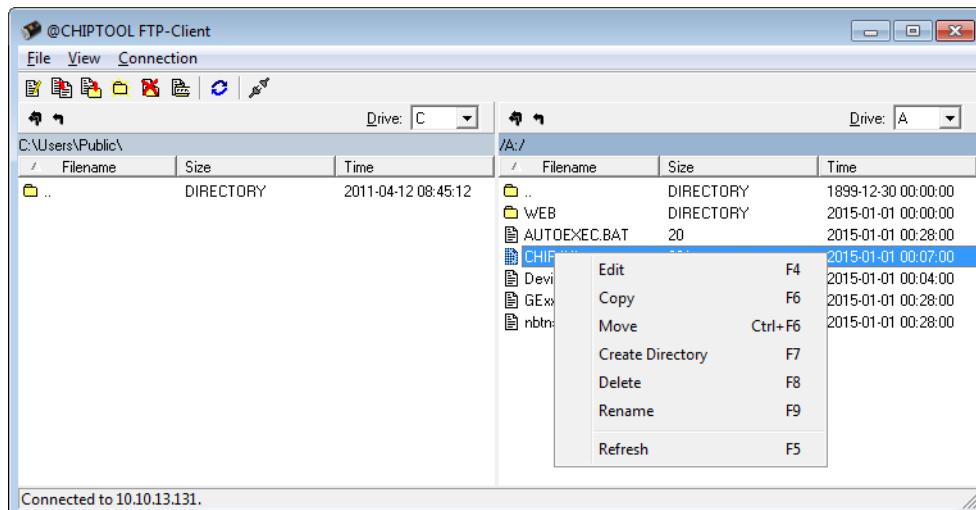
```
C:\Windows\system32\cmd.exe
Pinging 10.10.13.131 with 32 bytes of data:
Reply from 10.10.13.131: bytes=32 time<1ms TTL=255
```

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 configuration interface for the Anybus M-Bus - Modbus TCP Gateway. At the top, there is a logo and the title "Anybus M-Bus - Modbus TCP Gateway". On the right, there are links for "Logout", "Change password", and "Logged in as 'admin'". Below the title, a navigation bar includes tabs for General, Meter, Configuration, Server, Security, User, and Service. The General tab is selected. The main area displays "General configuration" settings:

- 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: (disabled)
- Free memory Flash (kB): 3263
- System date (local): 1/3/2006
- System time (local): 7:16 PM
- SNTP server: ptptime1.ptb.de

At the bottom of the configuration panel, there are buttons for "Reload", "Save", and "Print".

| 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.

| 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 | | 35300748 | 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 |

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](#)).

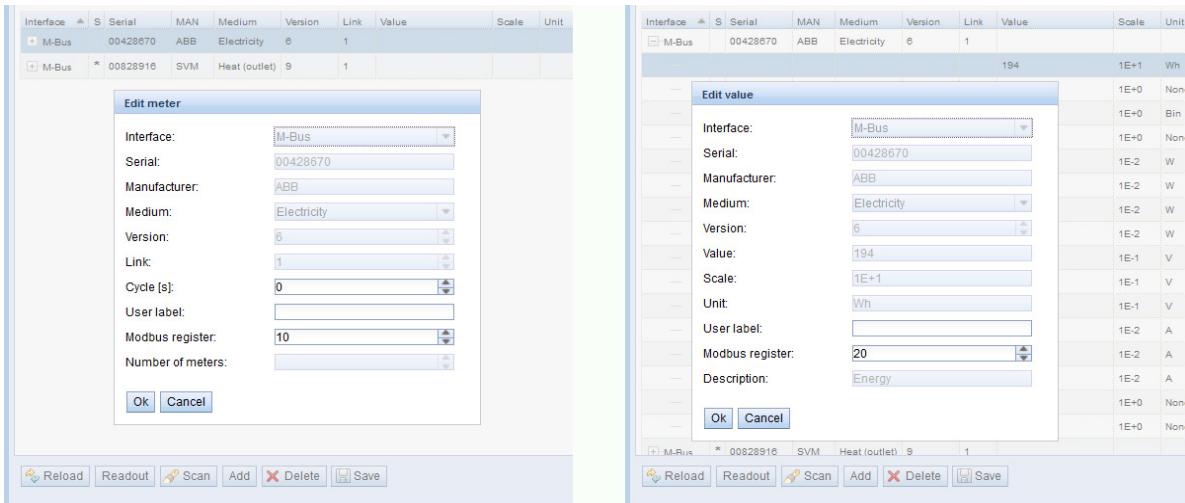
If a scan or a change in the meter list is terminated with the error message “Webserver capacity exceeded”, see [6.3.6 Webserver capacity error message](#).

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 ! \$ % & / () = ? + , . * |
| Unvalid 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 the 'Configuration' tab selected in a top navigation bar. The main content area is titled 'Configuration of meter interfaces'. It contains various configuration parameters for M-Bus communication:

| Setting | Value |
|-------------------------|----------------|
| Readout interval (s) | 900 |
| Description mode | Standard |
| Maximum device count | 80 |
| Maximum value count | 25 |
| Raw log active | (unchecked) |
| M-Bus mode | Secondary scan |
| Primary start address | 0 |
| Primary final address | 250 |
| Secondary address mask | FFFFFF |
| 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 |

At the bottom of the configuration panel are three buttons: 'Reload' (with a circular arrow icon), 'Save' (with a disk icon), and 'Print' (with a printer icon).

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 configuration interface with tabs at the top: General, Meter, Configuration, Server (selected), Security, User, Service. The main area is titled "Configuration of server connection". It contains two settings: "Modbus Mode" set to "Modbus TCP" and "Modbus Port" set to "502". At the bottom are buttons for Reload, Save, and Print.

| 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 configuration interface with tabs at the top: General, Meter, Configuration, Server, Security (selected), User, Service. The main area is titled "Security configuration of internal server". It contains two settings: "FTP server active" with a checked checkbox and "Telnet server active" with a checked checkbox. At the bottom are buttons for Reload, Save, and Print.

| 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 checked="" type="checkbox"/> | 1 | -1 | <input checked="" type="checkbox"/> | |
| ftp | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 0 | -1 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

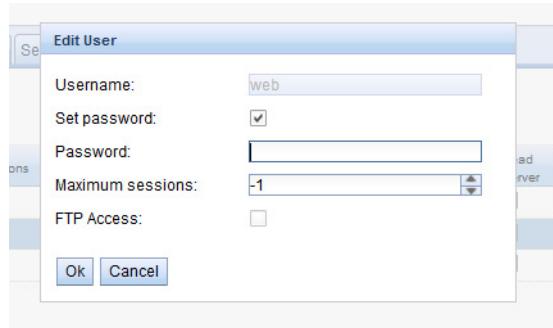
Access rights to the different tabs of the web interface and to the FTP server can be set individually for each user by ticking the check boxes. Most of the choices are self-explanatory.

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.



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: | <input type="text"/> |
| Set password: | <input checked="" type="checkbox"/> |
| Password: | <input type="password"/> |
| Maximum sessions: | -1 |
| FTP Access: | <input type="checkbox"/> |
| Ok Cancel | |

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.

Device maintenance

Hardware version: 0

RTOS version: 1.54

Software version: 1.20.15

Website version: 1.20.15M

Reload Save Reboot system Print

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.

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

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 | Serial | MAN | Medium | Version | Link | Value | Scale | Unit | Cycle | User label | Description | Register |
|-----------|----------|-----|-------------|---------|------|----------|-------|------|-------|------------|------------------------------------|----------|
| M-Bus | 00428670 | ABB | Electricity | 6 | 1 | 194 | 1E+1 | Wh | | | Energy | 10 |
| | | | | | | D325-101 | 1E+0 | None | | | Metrology (firmware) version | 20 |
| | | | | | | 1600 | 1E+0 | Bin | | | Error flags (Device type specific) | 30 |
| | | | | | | 7 | 1E+0 | None | | | Special supplier information | 40 |
| | | | | | | 0 | 1E-2 | W | | | Power | 50 |
| | | | | | | 0 | 1E-2 | W | | | Power (vendor specific) | 60 |
| | | | | | | 0 | 1E-2 | W | | | Power (vendor specific) | 70 |
| | | | | | | | | | | | 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: |
| 5 | 0xC16D | Timestamp of gateway system time, lower word | Wednesday, May 22nd 2013, 15:00:29 GMT+2 |
| 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: |
| 15 | 0xC164 | Timestamp of the meter, lower word | Wednesday, May 22nd 2013, 15:00:20 GMT+2 |
| 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 | 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: |
| 29 | 0xBBB3 | Timestamp of meter value, lower word | Wednesday, May 22nd 2013, 14:36:03 GMT+2 |

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](#)).

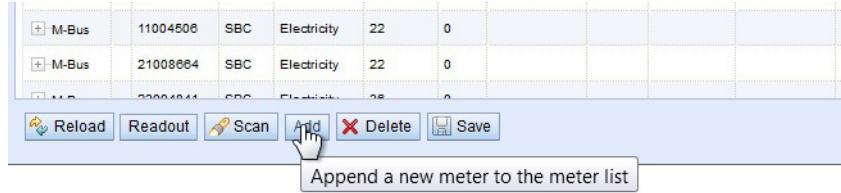
The M-Bus interface allows mixed configurations, i. e. it is possible to scan for primary addresses first and then for secondary addresses in a second run. Newly detected meters are appended to the existing list. Meters found in both runs stay in the list and remain unchanged if already configured. If 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: | M-Bus |
| Serial: | 12345678 |
| Manufacturer: | SLV |
| Medium: | Electricity |
| Version: | 12 |
| Link: | 0 |
| Encryption key: | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| Cycle [s]: | 0 |
| User label: | Building 2 |
| Number of meters: | 1 |

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: Value1: 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 | | | | | | | |
| — | | | | | 4 | 1e+0 | s | | | | |
| — | | | | | 4 | 1e+0 | s | | | | |
| — | | | | | 267 | 1e+3 | Wh | | | | |
| — | | | | | 372876 | 1e-2 | m^3 | | | | |
| — | | | | | 0 | 1e+2 | W | | | | |

| | | |
|--------------------|----|-------------------------------------|
| | 10 | <input checked="" type="checkbox"/> |
| Actuality Duration | 0 | <input type="checkbox"/> |
| Averaging Duration | 0 | <input type="checkbox"/> |
| Energy | 20 | <input checked="" type="checkbox"/> |
| Volume | 0 | <input type="checkbox"/> |
| 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 | | |
| Meter entry | | | |
| 10 | 0x03F8 | Serial number | 0x03F83CAA = 66600106 |
| 11 | 0x3CAA | | |
| 12 | 0x32A7 | Manufacturer ID | 0x32A7 = '0011.0010.1010.0111' 1st letter: '_011.00_____._____' → 0xC = 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 | 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 | | |
| Meter value entry | | | |
| 20 | 0x0000 | Meter value (integer) | 0x000000000000000010B = 267 Resulting value: 267 * 10^3 Wh |
| 21 | 0x0000 | | |
| 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.

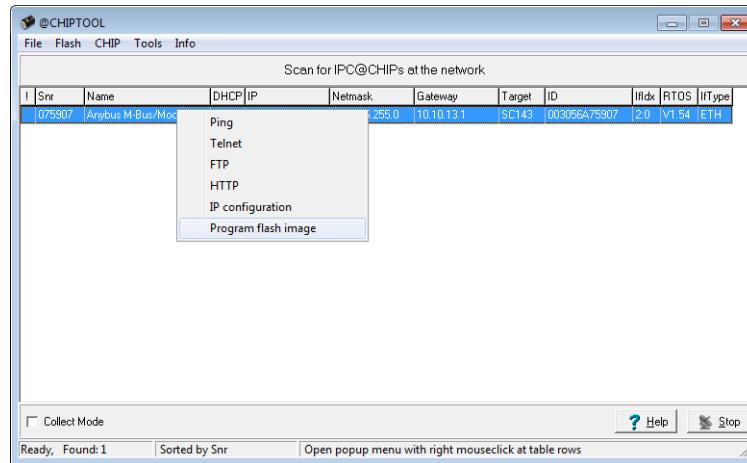


A continuous power supply must be ensured during an update. A power failure during a software update may damage the gateway.

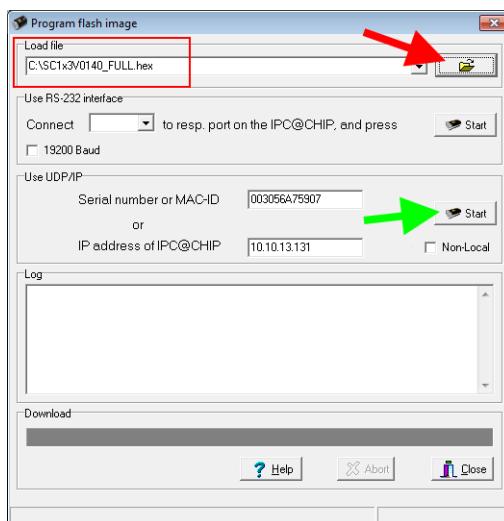
7.1.1 Updating the operating system (RTOS)

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.

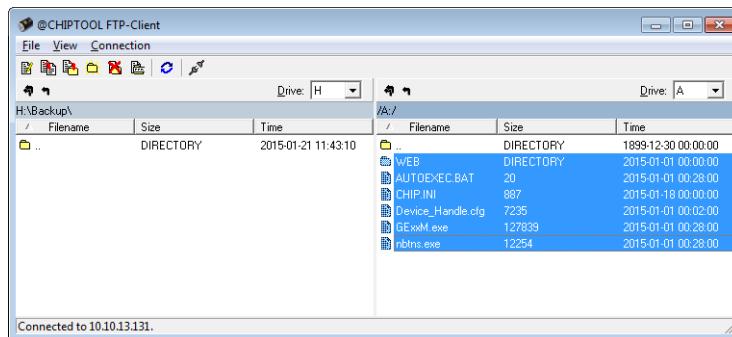
7.1.2 Updating application software (firmware)

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

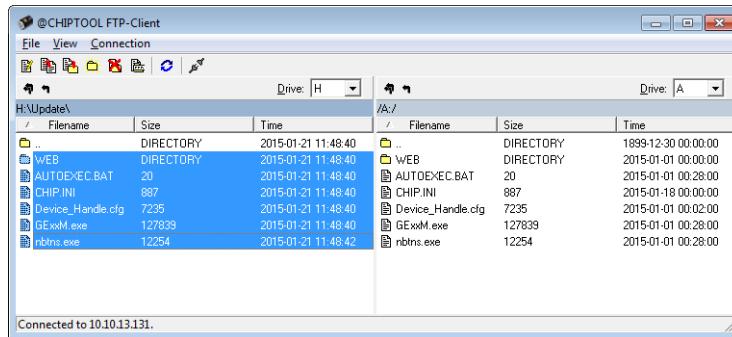
1. Unpack the contents of the zip archive to an empty directory on your PC.
2. Open the web interface and log in as admin.
3. On the **Service** tab, check that the button **Reboot system** is active (not grayed out).



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 - 255.255.255.255 | Not set |
| NETMASK | Subnet mask of gateway | 0.0.0 - 255.255.255.255 | Not set |
| GATEWAY | IP address of gateway | 0.0.0 - 255.255.255.255 | Not set |
| DHCP | Enabling DHCP look-up | 0, 1 | 1 |
| TCPPIPMEM | 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 STORAGENUM | 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, SECONDARYSCANALLOCVERSE | 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 descriptor 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 | rssi | 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](#).

- Uspace: 36 V
- Umakr: 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)