MBS®

MANUAL
Universal gateways

Table of contents

1 Introduction

Thank you for using the universal gateway (UGW). This manual describes the design, functions and configuration of the UGW X-series family of products.

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1.3 Product support

In case of technical problems, please contact the manufacturer's service department.

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Website: www.mbs-solutions.de *(German)*
Wiki: http://wiki.mbs-solutions.de/doku.php?id=start *(German)*

1.4 Target group

This manual is intended for specialists trained in control and automation technology with experience in installing, commissioning and using gateways.

Note on disposal

In accordance with European Directive 2012/19/EU (WEEE), the devices are classified as used electronic devices and not as domestic waste for disposal purpose. Use the respective community collection points for disposal.

2 Concepts, functions and gateway design

2.1 Universal gateways

A gateway enables communication between devices which use different communication protocols (data exchange). The job of universal gateways is to connect data points of one network technology with data points of a large selection of other technologies. A typical area of application is the field of technical building service equipment:

- Control technology systems
- DDC systems
- Control units for refrigeration units or CHPs
- Room controllers
- Security technology
- Fire and burglar alarm systems
- Lighting control units

For various reasons, these systems use different communication protocols. They differ in speed, complexity, number of connectible devices, range and the type of information transmitted.

Since each bus system works with its own data formats and protocols (e.g. BACnet IP, EIB/KNX, BACnet MS/TP...), data conversion is performed within the gateway. In order to convert the input format to the output format, an internal intermediate format is used. This enables effective conversion between two or more formats. The internal intermediate format consists of individual data points that are to be regarded as the smallest amount of information.

Schematic design of the gateway (functions and modules)

The UGWs consist of a central message distributor (dispatcher), one or more drivers (e.g. M-Bus, Profibus or BACnet) and an interface configurator.
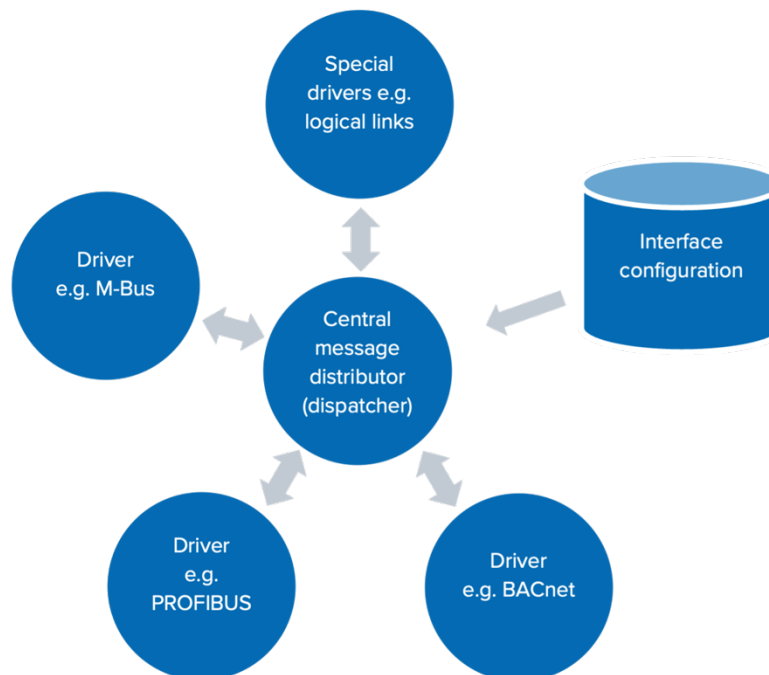
Interface mapping of the serial interface

Assigning gateway serial interfaces to device drivers

X-series	RS232	Terminal (1)	Com1	4-pole	RS232	/dev/ttyS3
X-series	RS485	Terminal (1)	Com1	4-pole	RS485	/dev/ttyS3

2.2 Classification of protocols

Protocols can be classified according to several criteria. These properties must be considered part of using the gateway.

Table 1: Protocol properties

Topology	Point-to-point connection	A point-to-point connection is the connection between two communication partners. Compared to a connection with several participants, the protocol can be simple, since addressing different participants is not necessary.
	Bus	With bus systems, multiple participants can access a transmission medium jointly. The option to connect several devices is laborious: the devices must be uniquely defined, and access to the common transmission medium must be coordinated.
Communication control	MasterSlave, PeerToPeer	
Transmission control	Event-controlled, Polled	
Transmission medium	Cable, wireless	

2.3 Function and properties of data points

Data points are information media which may be physical or virtual in building automation. Each data point is identified by a data point address. Physical data points are digital or analogue input and output elements of a networked field device (assignment of hardware inputs and outputs). Virtual data points are only available in software (e.g. calculated values, set values, counters and command output).

Each data point has an address, a value, a data type, a direction and metadata (name and description). The direction of the data point or data flow comes from the "perspective of the network". An *input data point* therefore receives data from the network, and an *output data point* sends data to the network.

Within the gateway, data points are identified on the basis of a unique **technical address**. A complete data point address consists of a **routing address**, a **data point type ID**, an **address type ID** and a **protocol-specific address**.

> **Example:** Analogue actual value (measured value) and an address which makes the measured value selectable.
>
> **940.Y bac 34.AV 55:**
> Routing address: 940;   Data point type: Y analogue value;   address type: bac;   BACnet address: 34.AV 55

In addition, there may be other properties (plain text or special identifiers), which can for example report that the measuring sensor is out of order. To facilitate data exchanges between different protocols, various data point types are provided in the gateway. These data point types meet the specific requirements of each protocol.

Client-server relationship in relation to data points

In a client-server relationship, a server provides data to connected clients. The server accepts requests from clients, and then sends the requested data. This client-server relationship can be transferred to the relationship of data points among one another.

> **Example:** A field device controls an actuator with feedback. An automation station is intended to set the control variable and evaluate the feedback. The data points **control values** and **feedback** are within the field device, which then acts as the server. Through reading and writing, the automation station accesses these data points and thus acts as the client in this communication. Normally, all data points of a device are client or server data points. For some protocols, both client and server data points are in one device.

Actual value and set values as data points

Actual values are values that are measured or calculated by the server and whose values are transferred to the client.

Set values are values that are meant to affect the behaviour of the server through the client. In the case of set values, whether the value is transferred only by the client to the server or whether the actual value of the set value must also be reported back to the client.

> **Example:** A typical actual value is the mapping of a temperature sensor (measured value).
> A typical set value is a nominal room temperature set value in a room controller.

Analogue, binary, multi-level – more complex types as data points

Data points also differ as to which values are allowed. A differentiation is made between:

- Analogue values (e.g. temperature sensor measured value)
- Binary values (e.g. relay output)
- Multi-level values
  (e.g. status data point with the operating conditions Normal operation, Off, Economy mode and Failure).

In some protocols there are more, sometimes complex data points.

> **Example:** *Utilization times*
> Some of these values cannot be mapped or can only be mapped indirectly in the gateway. They include attributes that can detect whether data points contain a valid value. With set values, there is an automatic value which causes the server to take over control of the data point itself.

Abstract data points in the data point system

For the processing and forwarding of data points within the gateway, information exchangeable via a protocol is shown in a generalized internal data point.

The properties of these internal data points allow the mapping of the most commonly used data points in building automation. The linkage between different data points occurs via these internal data points. Thanks to the decoupled internal data points, it is possible to add more protocols to the gateway without needing to change the entire configuration.

Routing address

The communication driver of the gateway is selected with the routing address. The routing address is specified for each communication driver when constructing the gateway according to a fixed schematic. If a gateway has multiple connections of the same type, the routing address typically increases by one.

> **Example:** If a gateway has two Modbus master connections, the routing addresses 80 and 81 are used.

Data point type as part of address

To be able to use the address to derive specified information concerning possible uses, the address contains a code letter. With this, the direction of data flow and the type of values are determined. The four most important data point types are covered below. For special purposes, other types come into consideration, which will be explained when used.

Five important data point types:

- X – analogue value that is transmitted from the communication partner to the gateway.
- Y – analogue value that can be transmitted in both directions.
- M – binary/multi-level value that is transmitted from the communication partner to the gateway.
- S – binary or multi-level value that can be transmitted in both directions.
- A – string, e.g. used for BACnet Trends or ESPA4.4.4 data points

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Attention:

There may be several meaningful ways to assign a data point type to a data point. The selected data point type must be used consistently. A frequent source of error in the configuration is to use different data point types for the same data point.

Address ID as part of the address

In order to be able to correctly interpret the protocol-specific part of the address, an abbreviation of the communication protocol or the driver name within the gateway is used.

> **Examples:**
> - **mod**   for MODBUS addresses
> - **pnetd**   for Profinet addresses
> - **bac**   for BACnet addresses

Protocol-specific address

The last part of the address is determined by the communication protocol.

Additional examples for data point addresses in the gateway system:

> **70.M eib 4/5/6**
> Routing address 70; data point type M; address type eib; EIB group address 4/5/6

> **940.Y bac 34.AV 55**
> Routing address 940; data point type Y analogue value; address type bac; BACnet address 34.AV 55

2.4 Mapping

The X-series family of products consists of universal gateways (UGWs) handled in a uniform way which command a large selection of supported protocols. The gateways offer data access to a defined range of data points which can be mapped to another area (e.g. LON network variables (NVs) to BACnet objects). Mapping can be configured using a macro-controlled table. By connecting data points of different network technologies, data can be exchanged between these technologies (gateway function).

Mapping possibilities

A mapping basically consists of a source data point and a target data point. Changes in the value of the source data point are transmitted to the target data point. This transfer can be influenced by additional configuration entries. The address of the source data point is entered as a section in the

dispatch file. The address of the target data point is registered on another line under the keyword *target =*.

> **Example of a dispatch.txt file:**
> # Mapping of a 1-bit value from Profinet to MODBUS
> [1190.M pnetd outbit 1.7]
> target = 80.S mod 3 coil 4
> # Mapping of an analogue value from Profinet to MODBUS
> [1190.X pnetd outbyte 3]
> target = 80.Y mod 7 holding 30

The usual procedure for configuring the universal gateway consists of the following steps:

1. Configuration of the network drivers (adapters) contained within the UGW -> Communication parameters
2. Configuration of the data points:
   a. Selection of the data points of the network to be mapped
   b. Selection/creation of corresponding data point counterparts of the other technology
3. Creation of data point connections (e.g. connection of NVs with BACnet objects)

2.5 Configuration and project planning

2.5.1 Control via text files

The gateway is configured using text files. For each driver, there is a file (*.cfg) with communication parameters (e.g. baud rate) and a file (*.txt) in which the driver-specific data points are defined. The file named *dispatch.txt* contains the mappings of the data points of the various protocols. **All text files can be edited or created and imported in advance in the web client of the UGW.**

Example: Downloaded text and configuration files:

Name	Typ	Größe	Erstelldatum
bac1.cfg	CFG-Datei	15 KB	18.07.2018 12:48
bac1.txt	Textdokument	21 KB	18.07.2018 12:48
canopen1.cfg	CFG-Datei	1 KB	17.07.2018 21:28
canopen1.txt	Textdokument	1 KB	17.07.2018 21:29
dispatch.txt	Textdokument	1 KB	18.07.2018 12:48
mbus1.cfg	CFG-Datei	3 KB	18.07.2018 12:50
mbus1.txt	Textdokument	3 KB	18.07.2018 12:50
mbus1.xml	XML-Dokument	7 KB	18.07.2018 12:50
ugwbackup.tgz	WinRAR-Archiv	10 KB	18.07.2018 12:45

All the text files have the same basic layout:
There are so-called *sections* which begin with a line with the data point definition in square brackets. The lines following belong to such a section up to the next section or to the end of the file. The lines following the section name have the structure *keyword = value*.

The files can also include blank and comment lines at any point (introduced by the # character). Capitalisation is taken into account.

Example 1 of file format

# Comment first line of file	comment line
# First data point comment line	
[address1]	Start of section with address *address1*
name = first example data point	key name with value of first example data point
further_properties = 7	Key of further properties with value 7
[address2]	Start of section with address *address2*
# Another comment	comment line
name = second example data point	key name
# Comment last line	comment line

Example 2 of file format

# Data point list	comment line
[S local.BI 1]	Start of section 1
name = Failure Slave 1	key name
bac_description = Failure Slave 1	
query = pe	
writecache = yes	
bac_polarity = 0	
bac_time_delay = 0	
bac_alarm_value = 1	
bac_notify_type = event	
bac_event_enable = (1,1,1)	
bac_inactive_text = available	
bac_active_text = error [Y local.AI 1001]	Start of section 2
name = Slave 1 Value 1	Key name with value of second example data point
query = pe	
writecache = yes	
bac_units = 95	
bac_cov_increment = 0	
bac_resolution = 0.1	

2.5.2 Data point files

The data points to be used and the properties these data points should have are determined in the data point file of each protocol. The file name is derived from a protocol-specific part of the name, a serial number, which is numbered in the event of multiple connections for the same protocol, and the extension *.txt.

> **Example:**   *eib1.txt* and *eib2.txt*.
>
> The name of the protocol-specific part is mentioned in the description of the designated protocol. The address of the data point serves as the section's name. An abbreviation of the address is used. Since the routing address and the data point type have already been determined by the file, they are not indicated again. This means that the full address *60.X eib 2/3/5* is written in the data point list as *X 2/3/5*.

The use of the following keywords is standard:

Table 2: Keywords in the data point files

name	Optionally, you can specify plain text for the data point here. The text is usually only used for commentary purposes within the gateway. In some protocols, e.g. BACnet, the text is used in the protocol.
format	Optionally, protocol-related properties of the data point are described here which cannot be derived solely from the address. For example, it is common to transfer analogue values of many protocols using a scaling factor. This scaling factor must be specified in the configuration so the gateway can interpret this value correctly (protocol-dependent).
writecache	Optional; possible values are YES or NO (default). This parameter only has meaning for those parameters whose value is described by the gateway. If YES, the gateway remembers a value during a failed entry and repeats its entry attempt when, for example, the connection to the device has been restored. If this option is missing or its value is NO, the value is discarded after a failed entry. Usage scenario: Transfer of a binary fault visual via EIB. If the EIB bus is not connected to the gateway at the time of occurrence of the failure, the gateway cannot report the failure. When the connection is restored, the fault condition should generally be transmitted afterwards, at the least. Scenario in which this behaviour is not desired: switching of room lighting. If at the time of the switching the EIB does not work, switching is not to take effect after the event (e.g. after several days).
query	Specifies how the data point should be picked up via the corresponding protocol. With only a few exceptions, which are described separately, the value permanent (*pe*) is used here (default).
Other options	For some protocols, there are other options that need to be projected at this point. The description can be found in the documentation on these protocols.

2.5.3 Configuration files

The file name is derived from a protocol-specific name, a serial number, which is numbered in the event of multiple connections for the same protocol, and the extension *.cfg.

> **Example**:   *eib1.cfg* and *eib2.cfg*

The name of the protocol-specific part is mentioned in the description of the designated protocol.

General communication parameters for each connection are established in the configuration file. Typically, information such as baud rate, individual addresses or poll rates should be indicated. The content consists of a section with a protocol-specific description and configuration entries.

Example configuration file MODBUS Slave modslave1.cfg

```
[MODBUS-SLAVE]
Baudrate = 19200
Databits = 8
Parity = even
Stopbits = 1
Bustype = RS485
Protocol = RTU
Timer = 100
BitCount = 255
WordCount = 16
RelaxedErrors = 1
ResponseTimeout = 4
SlaveTimeout = 300
FrameTimeout = 200
```

2.5.4 Mapping file dispatch.txt

In this file, the allocations (mappings) between the data points are defined. With the keyword **value**, a value can be specified which is to be transmitted to the target data point instead of the source data point value. The keyword **threshold** has two different meanings, depending on the data point type of the source data point.

- If the source data point is an analogue value (data point type X or Y), the specified value has the effect of a threshold. This means that only value changes where the change is greater than the specified threshold can be transferred.
- If the source data point is an integer value (M or S), the target data point is changed only when the value of the source data point is equal to the specified value.

2.5.5 Typical data point schemata

The following examples show schematically how typical data point mappings are constructed. Pseudo-addresses are used here.

Example of actual analogue value

Entry in file protA.txt	Entry in file protB.txt	Entry in file dispatch.txt
[X address1]	[Y parameter 16]	# Mapping the outside temperature
name = outside temperature from protocol A	name = outside temperature to protocol B	[110 protA address1]
query = pe	query = pe	target = 140 protB parameter 16

Example of actual binary value

Entry in file protA.txt	Entry in file protB.txt	Entry in file dispatch.txt
[M address7]	[S parameter 23]	# Mapping the pump failure
name = pump failure from protocol A	name = pump failure to protocol B	[110 protA address7]
query = pe	query = pe	target = 140 protB parameter 23

Example of multi-level set value without feedback

Entry in file protA.txt	Entry in file protB.txt	Entry in file dispatch.txt
[M address8]	[S parameter 29]	# Mapping the pump failure
name = operating status from protocol A	name = operating status to protocol B	[110 protA address8]
query = pe	query = pe	target = 140 protB parameter 29

Example of multi-level set value with feedback

Entry in file protA.txt	Entry in file protB.txt	Entry in file dispatch.txt
[S address8]	[S parameter 29]	# Mapping of the operating status
name = operating status from protocol A	name = operating status to protocol B	[110 protA address8]
query = pe	query = pe	target = 140 protB parameter 29

[140 protB parameter 29]
target = 110 protA address8

Example mapping of a two-stage actual value (1 = day, 2 = night) to two binary values

Entry in file protA.txt	Entry in file protB.txt	Entry in file dispatch.txt
[M address83] name = operating status from protocol A query = pe	[S parameter 129] name = operating status day to protocol B query = pe [S parameter 130] name = operating status night to protocol B query = pe	# Mapping of the operating status [110 protA address83] threshold = 1 value = 1 target = 140 protB parameter 129 [110 protA address83] threshold = 1 value = 0 target = 140 protB parameter 130 [110 protA address83] threshold = 2 value = 0 target = 140 protB parameter 129 [110 protA address83] threshold = 2 value = 1 target = 140 protB parameter 130

Example of configuring M-Bus to BACnet

File: bac1.txt
[Y local.AI 1001]
name = Slave 1 Value 1
query = pe
writecache = yes
bac_units = 95
bac_cov_increment = 0
bac_resolution = 0.1

File: mbus1.txt
[X P26 value 1]
name = Slave 1 Value 1
query = pe

File: dispatch.txt
Slave 1 Value 1
[60 mbus P26 value 1]
target = 940 bac local.AI 1001

2.6 Technical design and operating principle

Technical design of the gateway connection:

Example: Modbus master RTU/BACnet IP
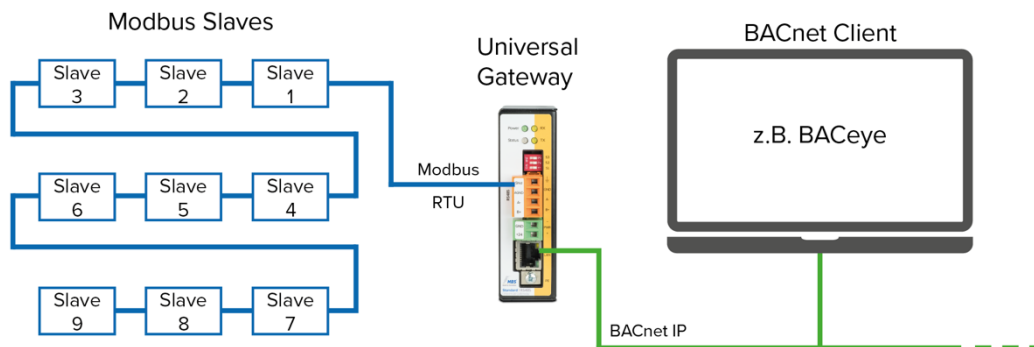
General operating principle:

A gateway generally consists of at least two device parts. In the following image, this is a Modbus master and a BACnet server, for example.

- The Modbus master (RTU) polls the Modbus slave devices for their data points (blue circles).
- The BACnet server itself keeps data points ready and operates the BACnet clients.
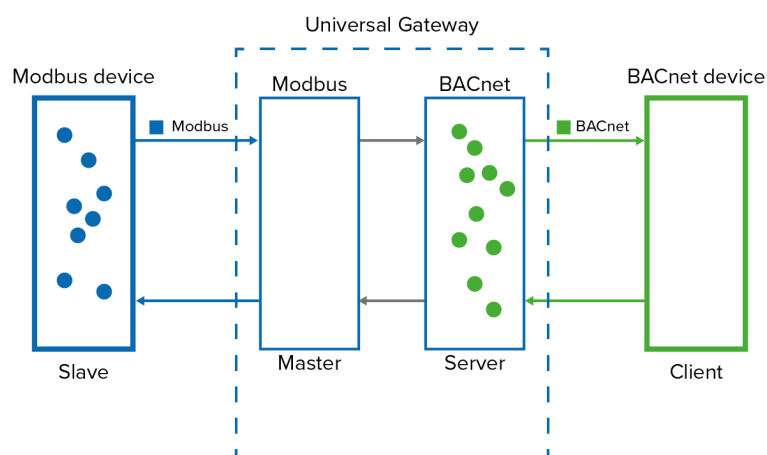
A gateway functions similarly to a network switch, but with different protocols.

The following work steps are required to commission the gateway:

- Configuration of the driver (gateway: *Settings* and *Files* menus, e.g. file "bac1.cfg")
- Configuration of the data points (gateway: *Data Points* and *Files* menus, e.g. "bac1.txt")
- The data point manager establishes the connections between the data points of the various drivers (global dispatch.txt).
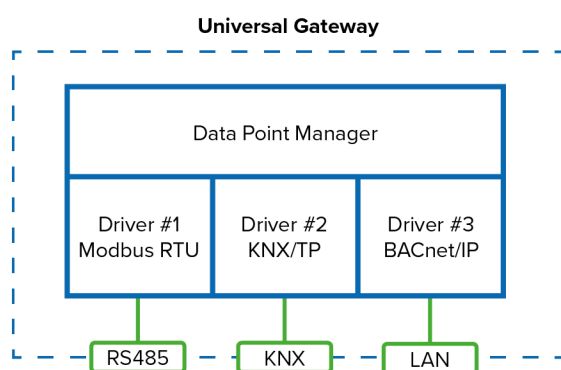
2.7 Status LED

The gateway provides quick orientation of the current operational state via a two-colour status LED. The LED has the colours green and red and as a mixed colour orange. During system initialization, the LED lights up orange. After the initialization phase, the status LED flashes green in normal operation.

Colour code	Definition	Data point
Flashing green	Normal state	
Flashing orange and green	Projected indicator	S LED info
Flashing red and green	A failure parameter on "defect"	S LED warning
Red flashing	Two or more failure parameters on "defect"	S LED error
Red	At least one driver not started properly	

The data points determine the LED colour code with ascending priority. The **_S led warning_** and **_S led error_** parameters are set automatically by the gateway in accordance with the projected failure parameters.

3   Overview of the UGW X-series

SINGLE-X
Standard
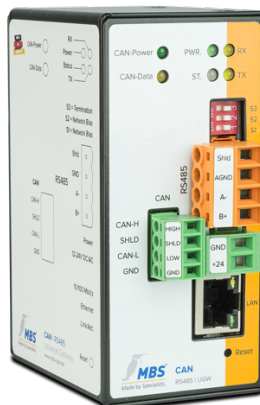
DOUBLE-X
An integrated hardware adapter

TRIPLE-X
Two integrated hardware adapters

Scope of supply

- Universal gateway
- Pluggable screw terminals
- Documentation/Manual

Type label

The type label attached to the casing includes the following information:

- MAC address
- Default IP address
- Other IDs, depending on the protocol (e.g. Neuron ID for LON)
- Included protocols with associated interface.

The included protocols/hardware adapters with associated interface are also shown on the front and left-hand sides of the device.

Communication protocols

With the available communications protocols, universal gateways offer the right solution for almost every requirement. The gateways are configured with text files. They are transferred to the gateway with a browser using an integrated web server. The configuration is retentively saved on the gateway.

Number of data points

A data point corresponds to a unidirectional connection between two data points. The direction of value transmission is irrelevant here.

The number of data points (DP) available is determined by the device type and licence. The number of DPs supplied with the gateway is shown on the device. The number of DPs corresponds to the number of different addresses entered in the file "dispatch.txt" with the keyword *target* =.

With regard to data points, gateways of the X-series are available in five gradations:

- 25 data points

- 200 data points
- 500 data points
- 1,000 data points
- 2,500 data points

Web server

With the integrated web server (web interface), you can configure the gateways using a web browser, save the configuration and call up statistics and documentation. That makes configuring the devices significantly easier, allowing them to be commissioned more quickly. The web interface also enables the use of different upgrade options of the gateway, such as activation on up to 2,500 data points or expansion to include additional communication drivers.

Main functions of the UGW X-series

- Connection of data points between various supported protocols:
  including BACnet, KNX, Modbus, M-Bus, CAN, DALI, KNX, LCN, LON and Profinet
- Display, creation and editing of data points with the web interface
- Automation functions (alarms, trend log recording and scheduling) on a data point basis
- Recording of log files

3.1   Type overview of the UGW X-series

SINGLE-X standard

The UGW SINGLE-X standard is equipped with a 100-BaseT Ethernet port (IP, RJ45) and either an RS232 port **or** an RS485 port.

- LAN – 10/100 MBit Ethernet (RJ45)
- Power – 12 to 24 V AC/DC

Version RS232
- COM1 – RS232 (RxD, TxD, GND and shield)
- DIP switch has no function

Version RS485
- COM1 – RS485 (B+, A-, GND and shield)
- DIP switch (bias, termination resistance)

DOUBLE-X

The UGW DOUBLE-X is based on the SINGLE-X and is outfitted with an additional protocol hardware adapter.

- LAN – 10/100 MBit Ethernet (RJ45)
- Power – 12 to 24 V AC/DC
- A hardware adapter:
  M-Bus, CAN, KNX, DALI, LCN, LON, X-Link or Profinet

Version RS232
- Same as SINGLE-X

Version RS485
- Same as SINGLE-X

TRIPLE-X

The UGW DOUBLE-X is equipped with a 100-BaseT Ethernet port (IP, RJ45), two hardware adapters and either an RS232 port **or** an RS485 port (MS/TP).
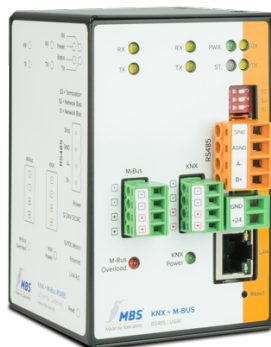
- LAN – 10/100 MBit Ethernet (RJ45)
- Power – 12 to 24 V AC/DC
- Two hardware adapters in the following variants:
  LON – KNX, KNX – M-Bus, Profinet – CAN, Profinet – DALI, Profinet – LON, Profinet – M-Bus, KNX – DALI

Version RS232
- Same as SINGLE-X

Version RS485
- Same as SINGLE-X

3.2 Casing and connections

Casing

Metal casing for rail mounting, DIN top hat rail TS35 as per EN60715

Power supply

Pluggable green screw terminals for connecting the power unit:

- 12 to 24 Volt DC or AC wide range input (terminal type: Würth 691 351 500 002)
- LED for power supply display

Network

10/100 Mbit TP RJ45 socket connector

RS485 or RS232

Pluggable orange-coloured screw terminals for connection of the RS485 or RS232 cable:

- 4-pole Weidmüller socket (type: BLZP 5.08HV/04/180 SN OR BX):
  – RS485: Shld (cable shield), GND (signal ground), A-, B+
  – RS232: Shld (cable shield), GND (signal ground), RxD, TxD
- TX and RX LED for display of transmitted and received signals

Other connections

Depending on the hardware adapters included, e.g. KNX, M-Bus, CAN and LON, the UGW will have other green screw terminals on the front (type: Würth 691 361 300 004). More technical data on the devices can be found on the corresponding technical data sheets.

4   Device views

4.1   Front view of the UGW SINGLE-X standard
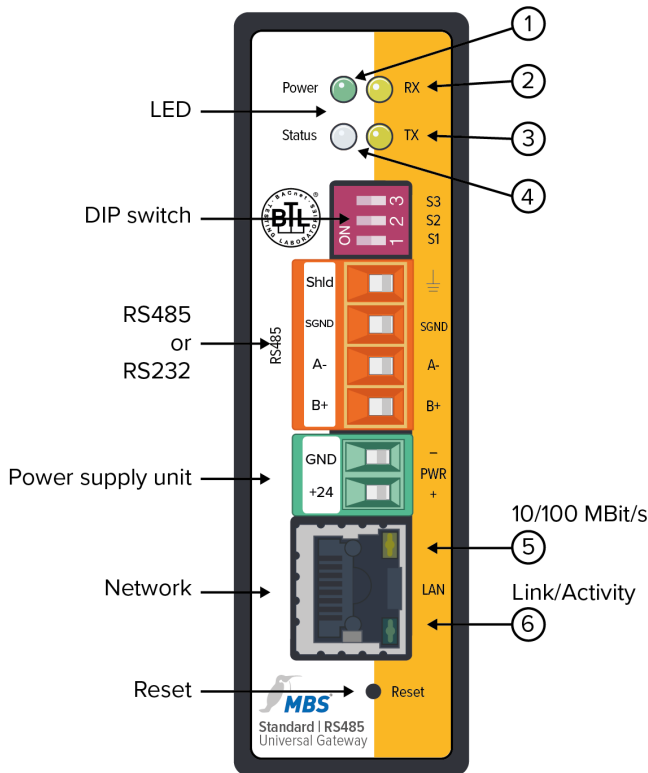
① **Power**
Green LED lights up when the power supply is activated.

② **RX** (RxD, RS485)
Yellow LED lights up when the gateway is receiving data over the serial interface.

③ **TX** (TxD, RS485)
Yellow LED lights up when the gateway is sending data over the serial interface.

④ **Status**
Multi-colour LED indicates the system status of the gateway (see "Status LED" information).

⑤ **10/100 MBit/s**
Yellow LED indicates the network connection speed.

⑥ **Link/Activity**
Green LED indicates the status of the network connection and network activity.

LED
Display of the system status of the gateway using four LEDs.

DIP switches
Activation of the network bias and termination resistance (for RS485 only, see Chap. 5.1.4).

RS485 or RS232
4-pole Weidmüller socket

Power supply unit
2-pole connection for voltage supply

Network
RJ45 socket (LAN)

Reset
Reset button for device restart or initiating specific modes
(see Chap. 6.11)

Status LED:

- Orange for approx. 8 sec:
  System initialisation after switch-on
- Flashing green:
  Normal state, all drivers communicating
- Flashing red and green:
  A communication partner isn't communicating.
- Red flashing:
  More than one communication partner isn't communicating.
- Flashing alternately red and green:
  During the reset process
  (see Chap. 6.11)

4.2 Front view of the UGW DOUBLE-X (LON)
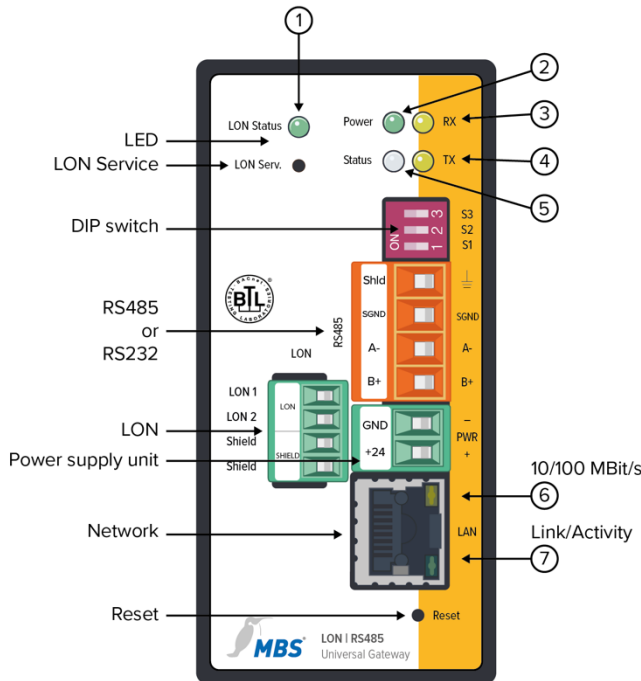
① **LON status**
Green LED lights up during data traffic with the LON network.

② **PWR.** (power)
Green LED lights up when the power supply is activated.

③ **RX** (RxD, RS485)
Yellow LED lights up when the gateway is receiving data over RS485.

④ **TX** (TxD, RS485)
Yellow LED lights up when the gateway is sending data over RS485.

⑤ **ST.** (status)
Multi-colour LED indicates the system status of the gateway (see "Status LED" info box on Page 19).

⑥ **10/100 MBit/s**
Yellow LED indicates the network connection speed.

⑦ **Link/Activity**
Green LED shows the status of the network connection and activity.

LED
Display of the system status of the gateway using five LEDs.

LON Service (service pin)
Service button for commissioning the UGW

DIP switches
Activation of the network bias and termination resistance (RS485 only, see Chap. 5.1.4).

RS485 or RS232
4-pole Weidmüller socket

LON
4-pole connection for the LON network

Power supply unit
2-pole connection for voltage supply

Network 1
RJ45 socket (LAN)

Reset
Reset button for device restart or initiating specific modes
(see Chap. 6.11)

4.3   Front view of the UGW TRIPLE-X (CAN + M-Bus)
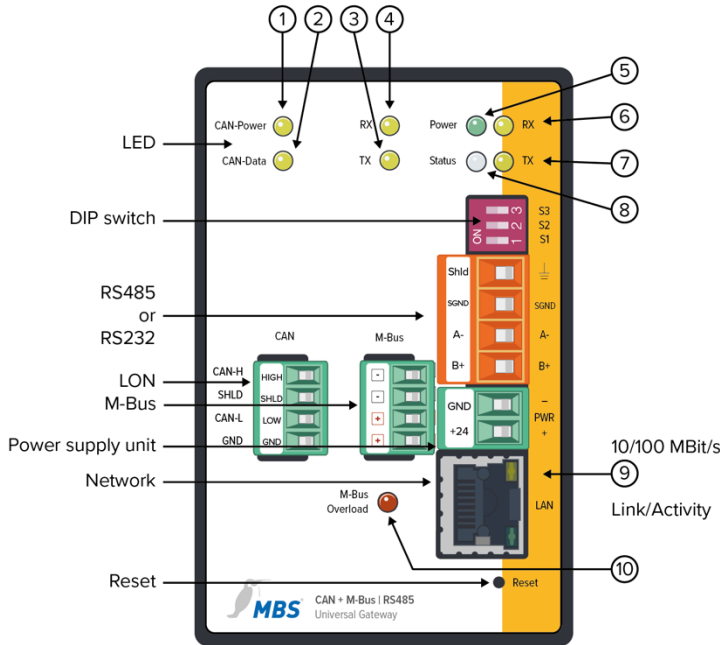
LED
Display of the system status of the gateway using nine LEDs.

DIP switches
Activation of the network bias and termination resistance (for RS485 only, see Chap. 5.1.4).

RS485 or RS232
4-pole Weidmüller socket

CAN
4-pole connection for the CAN network

M-Bus
4-pole connection for the M-Bus network (max. 30 standard loads)

Power supply unit
2-pole connection for voltage supply

Network
RJ45 socket (LAN)

Reset
Reset button for device restart or initiating specific modes
(see Chap. 6.11)

① **CAN power**
Yellow LED lights up when the power supply for the CAN bus (external) is activated.

② **LON data**
Yellow LED lights up during data traffic with the CAN network.

③ **RX**
Yellow LED lights up when the gateway is receiving data over the M-Bus.

④ **TX**
Yellow LED lights up when the gateway is sending data over the M-Bus.

⑤ **PWR.** (power)
Green LED lights up when the power supply is activated.

⑥ **RX** (RxD, RS485)
Yellow LED lights up when the gateway is receiving data over RS485.

⑦ **TX** (TxD, RS485)
Yellow LED lights up when the gateway is sending data over RS485.

⑧ **ST.** (status)
Multi-colour LED indicates the system status of the gateway (see "Status LED" info box on Page 19).

⑨ **10/100 MBit/s**
Yellow LED indicates the network connection speed.

⑩ **Link/Activity**
Green LED shows the status of the network connection and activity.

⑪ **M-Bus overload**
Display of overload of the M-Bus level converter (with more than 30 standard loads, one standard load = 1.5 mA).

4.4   Side view

The following data and schematics are shown on the left-hand side of the casing of the UGW X-series and assigned to the functional elements on the front:

- Designation and diagram of the positions of the LEDs and ports
- Functions of the individual DIP switches
- Location of the reset button
- Type designation of the UGW

UGW SINGLE-X Standard   UGW DOUBLE-X (LON)
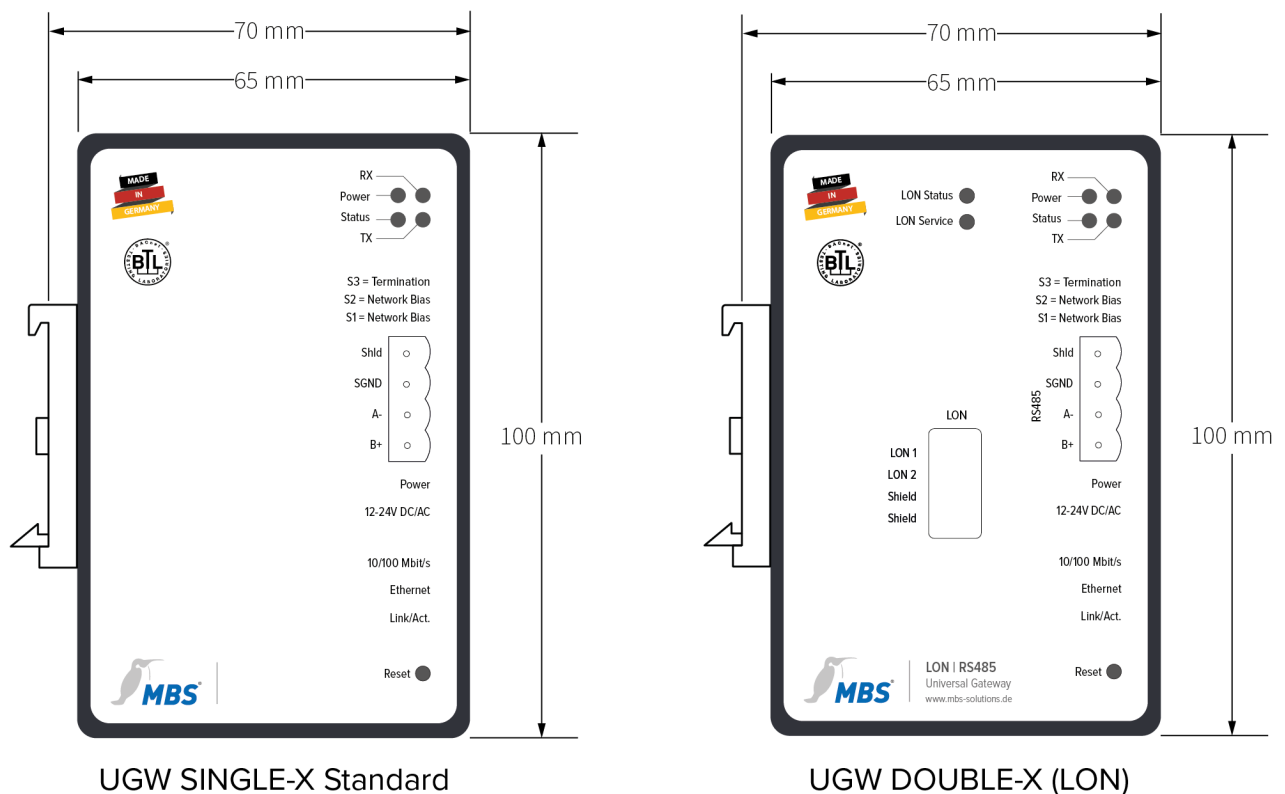
4.5   Sticker

There is a product label on the casing with the following data:

- Ethernet MAC address(s)
- Default IP address
- Included adapters (drivers)
- For LON adapter: Neuron ID

4.6   Rear

On the rear of the casing, there is a DIN top hat rail (TS35 as per EN60715).

5   Commissioning

To commission and configure the gateway, you will also need:

- Power supply unit for the UGW
- Computer
- Installed web browser and PDF reader
- Network cable

The gateway provides an integrated web server for configuration.
Chapter 5.2.1 describes the steps required to access the web server.

5.1   Hardware installation

5.1.1   Assembly

The gateway has a mount at the rear for easy snap-on installation on 35 mm hat rails as per EN60715. Install the gateway in the electrical cabinet and make sure that there is sufficient ventilation to ensure the specified temperature range (0 to 45 °C).

5.1.2   Electrical installation

Connect the gateway to the green, two-pole port with a power supply as per the technical specifications. An international power supply is optionally available if required.

Caution:
Risk of injury due to electrical current on 230 V mains
• Do not use a defective power supply unit or connection lines.
• Do not switch the power supply on until the gateway has been installed and connected.

Attention:
The guarantee will become null and void if the gateway is connected to an unsuitable power supply or the casing is opened. There are no controls inside the casing.

5.1.3   Ethernet network installation

Connect the Ethernet network cable (RJ45 connector) to the LAN socket on the gateway. Use CAT5 UTP or STP cable (or equivalent). Avoid laying cables parallel to power lines, e.g. to motors, frequency converters, etc.

Attention:
Do not connect to a customer network before the gateway has been fully configured.

5.1.4   RS485 network installation

Connect the RS485 network to the 4-pole RS485 port (orange). Observe the instructions for connecting RS485 networks (MS/TP) according to 135-2004 (BACnet standard).

DIP switches S1, S2 and S3 have the following functions for network bias and termination resistance:
S1 and S2:

- Activate the network bias
  (defined 0 V or 5 V level on lines B+ and A-, even if no subscribers are actively transmitting).
- S1 and S2 must always have the same setting here (both ON or both OFF).

S3:

- Activates 120-ohm termination resistance between lines B+ and A-
  (activate if the device is located at one of the two bus ends).
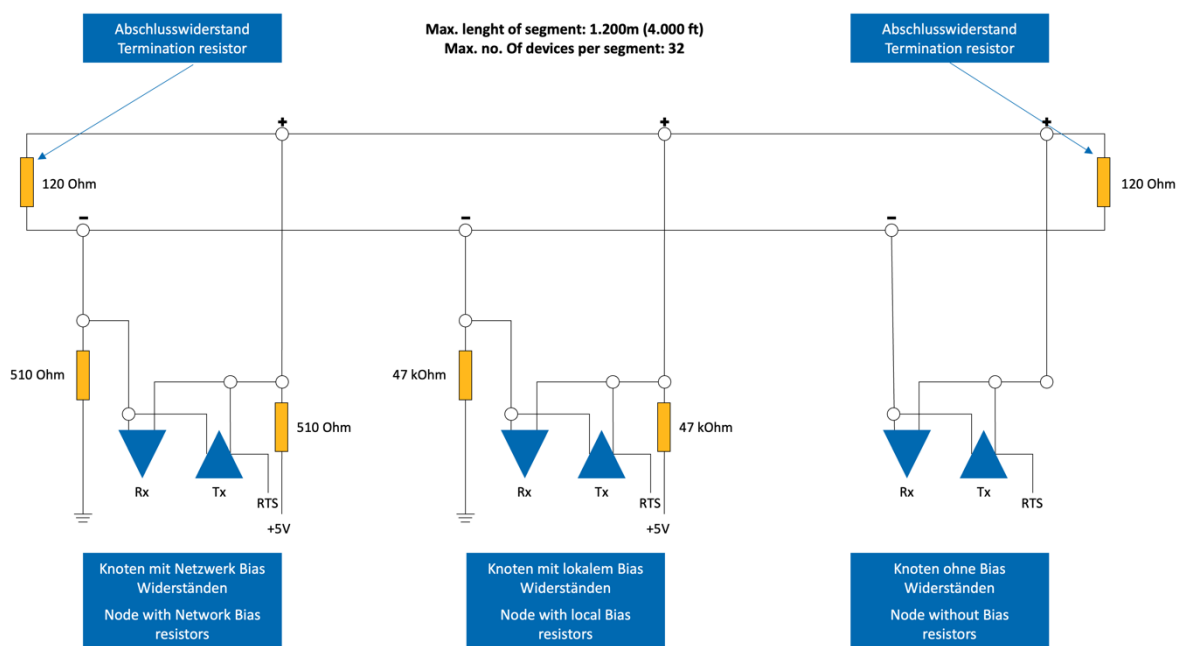
5.1.5 LON, M-Bus or CAN network installation

Connect the LON, M-Bus or CAN network to the respective 4-pole LON, M-Bus or CAN bus ports (green). Comply with the information on connecting LON, M-Bus or CAN networks.

5.2   Configuring the UGW using the web interface

5.2.1 Opening the web interface

The gateway has an integrated web server for configuration. The web server provides the configuration settings in the form of websites. You use the web interface to configure the IP and other settings, and you save the changes with **[Save]**. Following changes to the network configuration, it is sometimes necessary to restart the gateway.

Under factory settings, the web server is accessible at the following IP address:

- IP address: 169.254.0.1
- Network mask: 255.255.0.0

Connect the UGW to your PC with the network cable for configuration.
Enter the IP address of the UGW web server in a web browser: http://169.254.0.1.

> **Note:**
> Note that your computer's LAN connection has to be set appropriately. For a manual setting, define the IP address as 169.254.0.2, for example. The network mask must match that of the gateway.

5.2.2 Calling up the UGW web server and logging in

Web browser support

The integrated web server has been tested with various browsers and operating systems and has been approved. If you have problems with your browser, please notify the support department. Please indicate the exact browser version, the exact version of the operating system and a brief description of the problem for the diagnosis.

Calling up the web server

To access the configuration pages of the UGW, launch your preferred web browser and type the IP address 169.254.0.1 into the address field.

Web server language

The gateway provides the website in both German and English.
Switch the language in the web interface using the respective flag symbols in the top right.

Logging in

Enter the following user name and password (preconfigured administrator access) to sign in to the web server:

- Username: gw
- Password: GATEWAY

The password can be changed using the configuration pages (Menu item *General > User management*).
Click [**Log In**].

6   User interface, operation and functions

When you have successfully logged in, you will see the gateway configuration page with an overview page. The upper menu bar is there for you to navigate this.

Upper menu area

The web interface contains the following menu areas for configuration of the gateway:

- General
- System
- Driver A
- Driver B
- Help
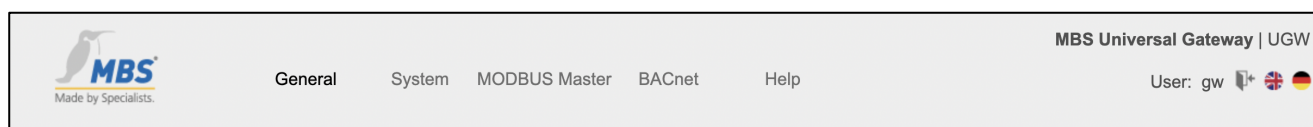
The menu items *General*, *Help* and *System* are always available. The remaining menu items are determined by the universal gateway drivers installed. The freely settable gateway name is also displayed above the menu bar. All gateway settings and functions can be found in the *General* menu area. They are independent of the drivers installed. Documents and diagnostic functions can be accessed via the *Help* menu.

The username of the current user is shown in the top right. The meanings of the symbols are as follows:

	Click the button with the door symbol to log out.
	Click the language button to change the language.

Bottom left-hand menu area

Each menu area includes submenus in the left-hand column which you use to call up the individual configuration pages/views.

6.1 "General" menu

6.1.1 General > Overview

After logging in, the universal gateway loads an overview page for the device.

You can reload and update the page with the **Update** button.

Type: UGW type display

Name, installation location, description: This project-specific information, which can be modified, serves to identify the universal gateway. The name also appears in the upper-left part of the menu and is displayed for you to check when backing up data.

Status LED: This describes the current state of the status LED on the front of the universal gateway.

System start: The time at which the universal gateway system was last started.

Data points: Displays the number of used data points and licensed data points.

CPU-Load: Displays CPU usage in %. Avoid prolonged CPU usage of over 50%.
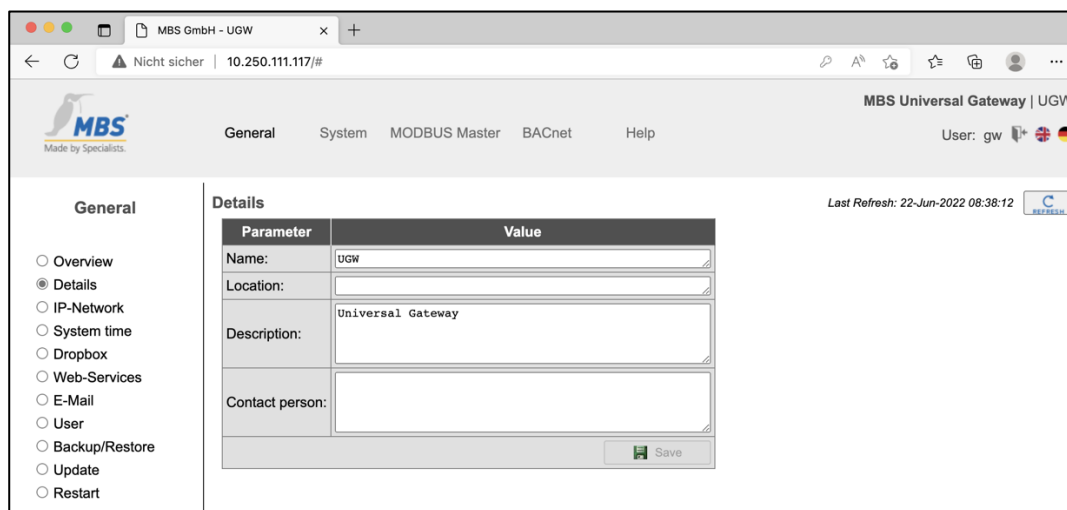
RAM: Displays the size of the used and total RAM in MB. Too little free space can lead to operational problems.

Drivers: Lists the current statuses of the drivers, depending on which drivers are installed. If a driver is not online, this suggests a booting problem or a problem with the configuration of a driver. Use the diagnostics tool in the Help menu to find out more information to solve the problem.

6.1.2 General > Information

In the UGW, you can store information on the device name, the installation location, a description of the UGW and contact partner details. This information is used to better identify the relevant UGW in the network when using several UGWs.

Edit the input fields for this purpose.
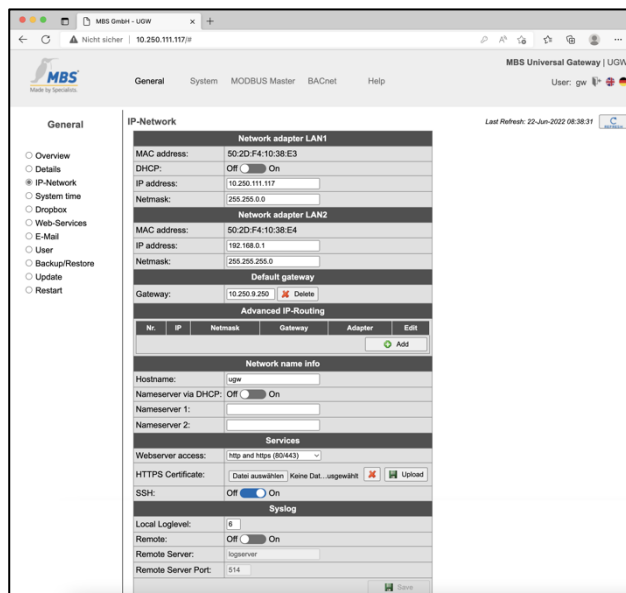
Important:

To save the settings on the configuration pages, click on **[Save]**.
An info dialogue then confirms the application of the entries.

6.1.3 General > IP network

Configure the IP network settings on this configuration page.

Network adapter LAN1 (or LAN2):
For the Ethernet interface(s), configure the IP address, network mask and standard gateway (if required). The network adapter's MAC address is displayed.

Network name:
The host name as well as two name servers can be stated here for name resolution.

Services:
Use the drop-down list *Web server access* to select which protocols to use to access the gateway in the network:

- Active port 80 with unencrypted http protocol
- Active port 443 with encrypted https protocol
- Active ports 80 and 443.

Nameserver 2:		
	https (Port 443)	
	https (80 redirected to 443)	
Webserver Zugriff:	✓ http und https (80/443)	
HTTPS Zertifikat:	Datei auswählen Keine Dat…usgewählt ✖ 💾 Upload	
SSH:	Aus ⬤ An	

Click **[Save]** to apply the changed IP network settings.

The new IP settings are also activated upon saving. It may be necessary to log in again after the IP address has been changed. If IP network services with IP name resolution are required, it is necessary to enter at least one IP name server. The secured https protocol can also be used to access the web server. Enter https:// before the IP address in the web browser here.

Note:

If communication protocols that operate via the network are installed on the gateway, carry out a system restart. This is necessary because the drivers only assume the settings of such protocols when starting the system.

For the exact IP settings, ask your network administrator. If the IP network is not required for gateway operation, leave the default settings as they are. This makes it easier to access the gateway later.

6.1.4 General > System time

The universal gateway has an integrated, battery-powered, real-time clock for time keeping within the system. Several protocols require the current time. The system time must therefore be synchronised. Automatic time synchronisation is advisable. However, this is not possible for every system.

The network time protocol (NTP) is a standard for synchronising clocks in internet protocol communication networks. The time can be set manually and also via an NTP sever or BACnet time synchronisation.

The time zone can be set in order to localise the system. Adjustments are made automatically for daylight saving time based on this time zone.

Configure the time zone for the UGW and the format for the time and date. A complete system restart is required to apply the settings.
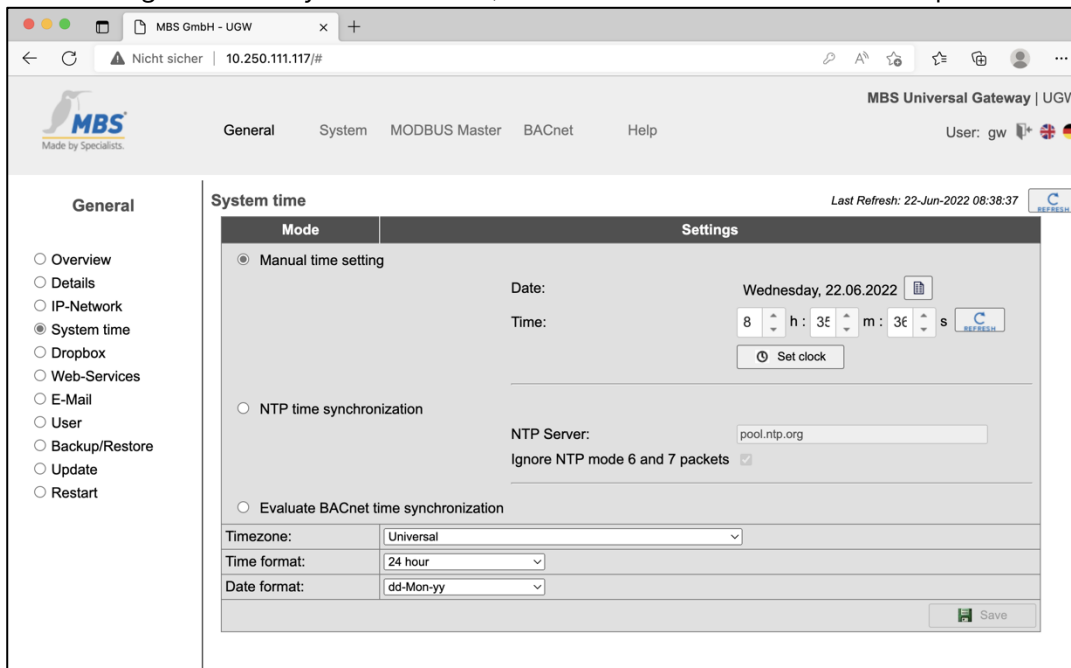
Manual time setting:
This is where you make the manual time setting using the input fields.
With the **Update** button, you copy the current PC time to the input fields for the time setting.
[Set Time] saves the set time in the gateway.

NTP time synchronization
When using NTP time synchronization, the UGW takes its time from the specified NTP server.

Evaluating BACnet time synchronization:
The UGW listens for and evaluates sent BACnet messages for time synchronization.

Note:

Time synchronisation via BACnet can only be used if the BACnet driver is installed and if there is a time synchronisation master in the BACnet network. Please clarify this with the BACnet network coordinator.

For time synchronisation via NTP, it must be possible to access an NTP server from the IP network. Ask the system administrator about this.

6.1.5 General > Dropbox

The dropbox function can be enabled as an option. Contact us or click **[Request]** to order this option by mail.
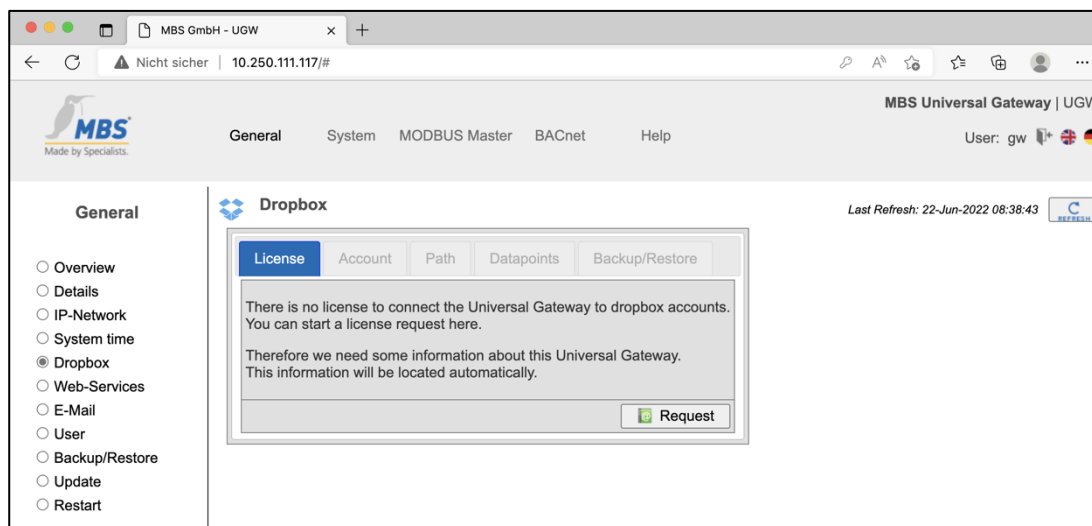
6.1.6 General > Web services

The gateway offers web services for reading data point lists or changing data points. To activate web services, tick the **Web services** box.

You can edit the configuration file for the data point lists (systems) directly.
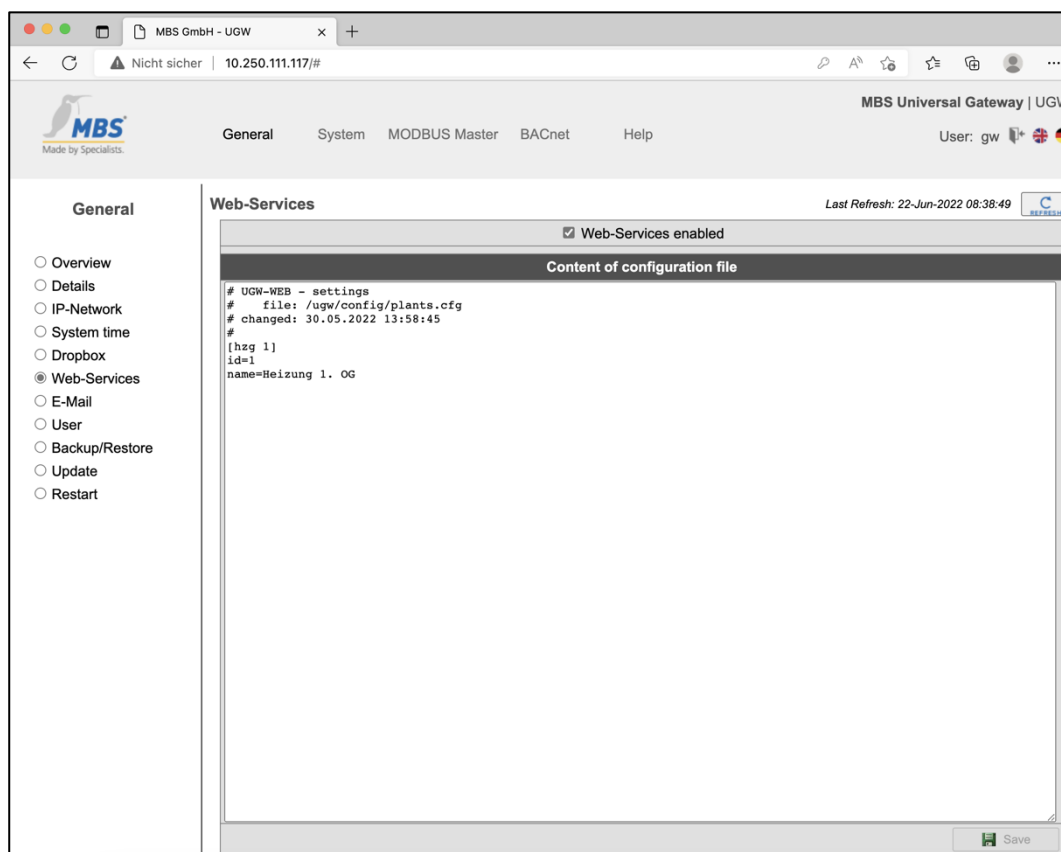
6.1.7 General > Email

Activate and configure the email service on this configuration page.
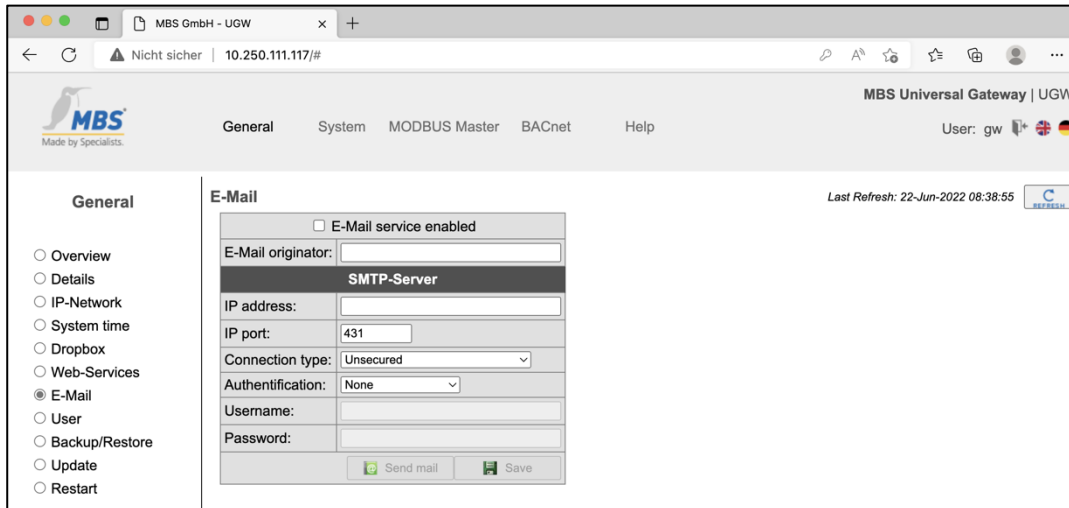
6.1.8 General > User management

The password for the user "gw" can be changed on this configuration page. You also have the option to add additional users. For security reasons, you are required to enter the current password once and then the new password twice.

Click **[Save]** to confirm.
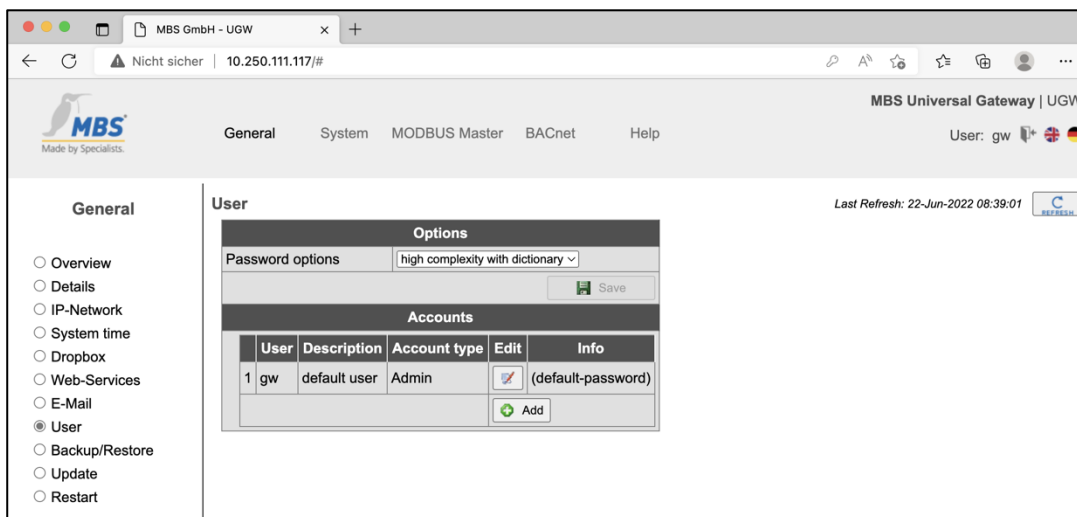
6.1.9 General > Data backup

You can back up and restore the entire gateway configuration. The backup consists of a tgz archive file.
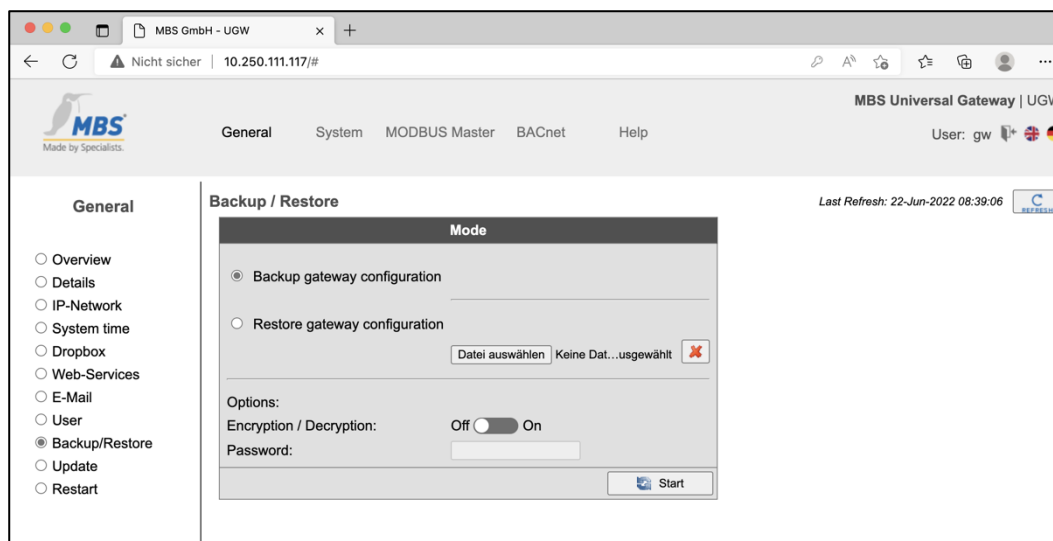
Create gateway data backup:
Use this option to generate a data back-up of the gateway configuration. Click **[Start]** and save the back-up file. The data back-up includes all the gateway's settings and is stored locally on your PC.

Restore gateway data backup:
When you select the *Restore gateway data back-up* option, the gateway reads an available data backup from your local data storage device and restores the configuration.

Use **[Select file]** to load the backup file to the input field and then click **[Start]**. A dialogue box will show the archive contents.

Confirm the information dialog with **[OK]**. After restoring the data back-up, the gateway has to be restarted to make the new configuration take effect.

Note:
It is only possible to restore data backups that are intended for the gateway. It may only be possible to restore parts of faulty data backups.

6.1.10 General > Update

The UGW offers the following options for licence and software updates:

- Request new licence
- Upgrade licence
- Update universal gateway system software
- Configure driver

Request new licence

The current licence is displayed.
To request a licence, click **[Request]**.
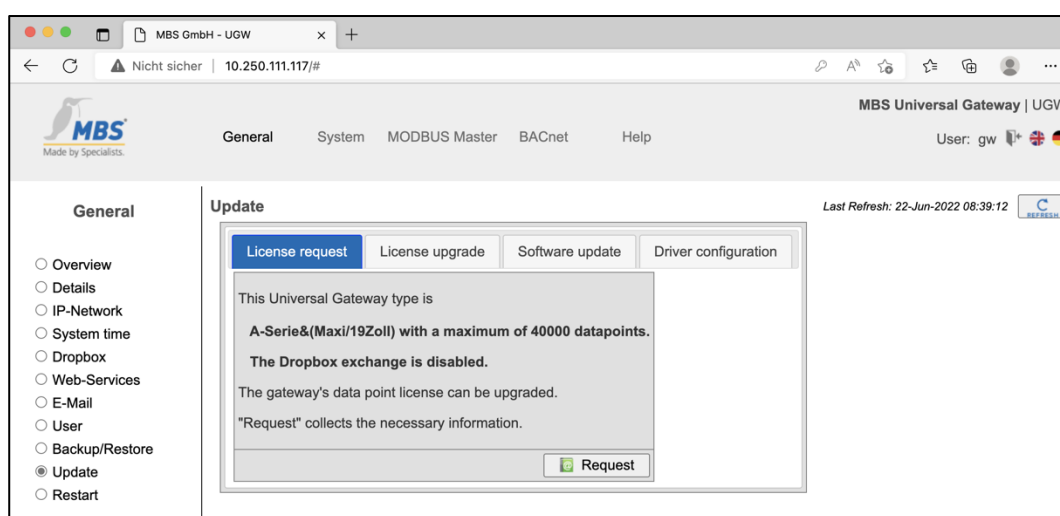
When requesting a new universal gateway licence, the following options are offered:
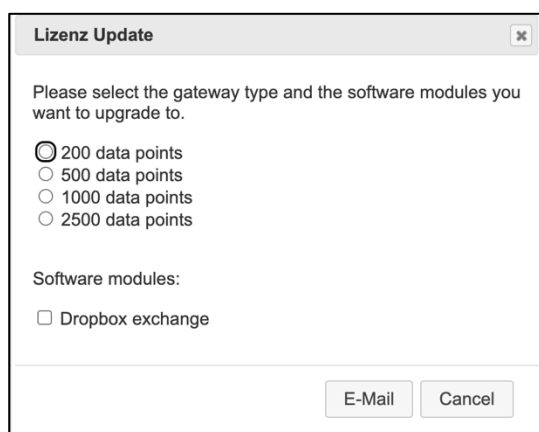
Click **[Email]**. The content of the email is generated automatically with the required information.

Dear support team,

we want to order an Universal Gateway upgrade license.

New gateway type: micro
Software module dropbox: yes

Please don't change anything between the following lines!
****
1F8B08002333BA5A02034550CB6AC33010BC17FA0F62EF75569614296027144A
7B28EDA1A5F42C4B9B60B02563CB79FC7DE524D0DB323B3B8FAD76E7BE63471A
A736861A7881C028B8E8DB70A8614EFB2703BBEDE343F5F3F6FB4FC362030BD8
B58EC2442CCC7D4363C6917360E932500DDFC9066F470FEC68BBD6D700CCDB94
17A52E50142572036CB5A8B8794AB1A79105DBD3C273B11F6CB82C63179D4DB7
68ECFDE5F3EB7E72C84A277BB95B7DB46E8C57793BC436A4A90685B9C87C38D5
205068214BA99EF9861B9458E2AB2EB55EABB55046A1D49938911FE3D0C473EE
70B360ACCA5FA0AD9352296148EF1B63B96AAC46E2D21A8D9CC4C6F36A75A5E5
4CABFCA2ED1F7816FD7E50010000
****

As the recipient, enter **support@mbs‑solutions.de**. The email should not be edited. Send the email with the **Send** command.

Licence upgrade

You can load the new licence with this tab.
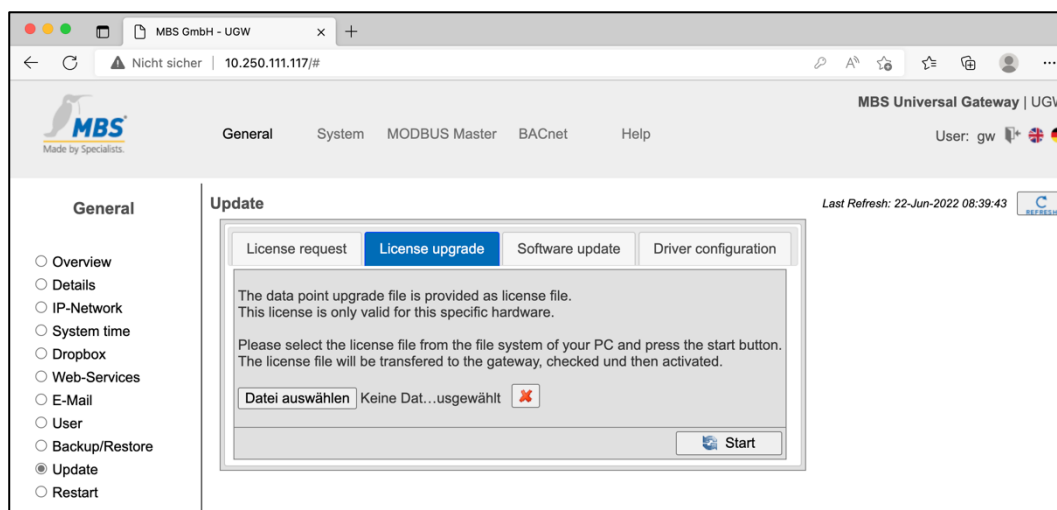
You will receive a licence file from the manufacturer of the universal gateway. This file must be located on your computer and is only valid for your device. It cannot be transferred to other devices.

Load the licence file in the input field with **[Select file]**. Click **[Start]**. The licence file is transmitted to the universal gateway and checked. Only then is the new licence updated."

Softwareupdate

Software additions and fixes mean that it is sometimes necessary to update the universal gateway. You will receive an update file from the manufacturer. This must be stored on your computer and must be selected to update. Please only select files that you have received from the manufacturer for the update.

You can install the new firmware version on the gateway on this configuration page.
These updates may contain bug fixes, improvements or new functions.
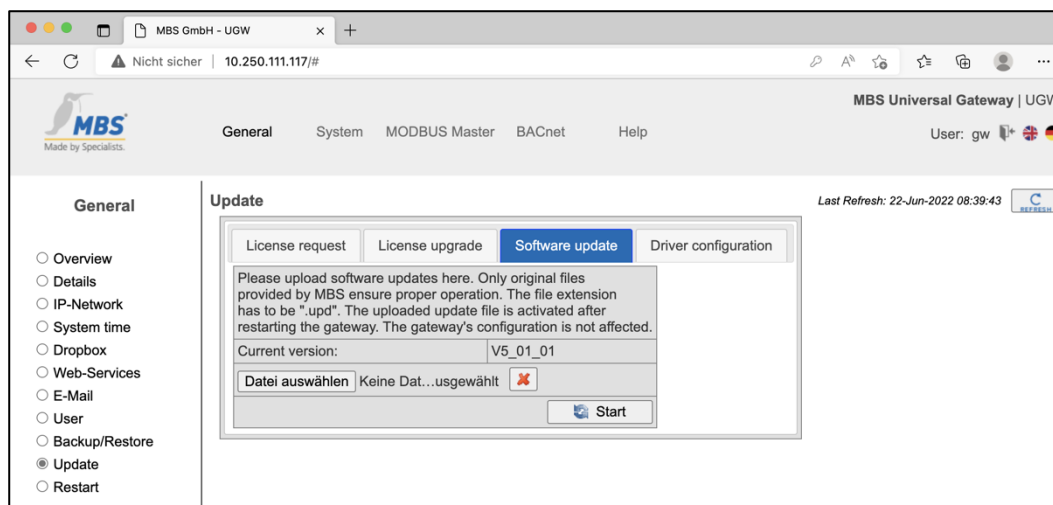
Load the new firmware file in the input field with **[Select file]**.
Transfer the file to the device with **[Start]**.

Driver configuration

Using this tab, you can configure the active drivers and specify the interfaces on which they run.
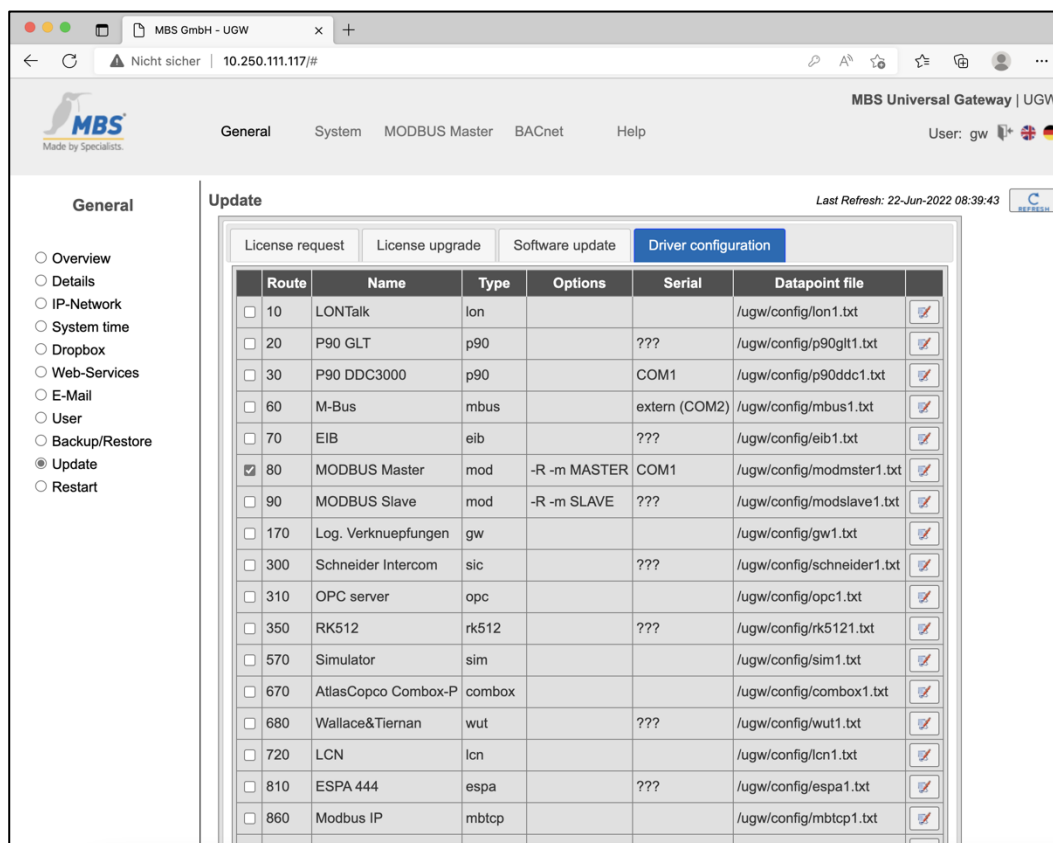
6.1.11 General > Restart

Changing the configuration, importing a data backup or adjusting any other settings requires you to restart the communication software of the gateway.
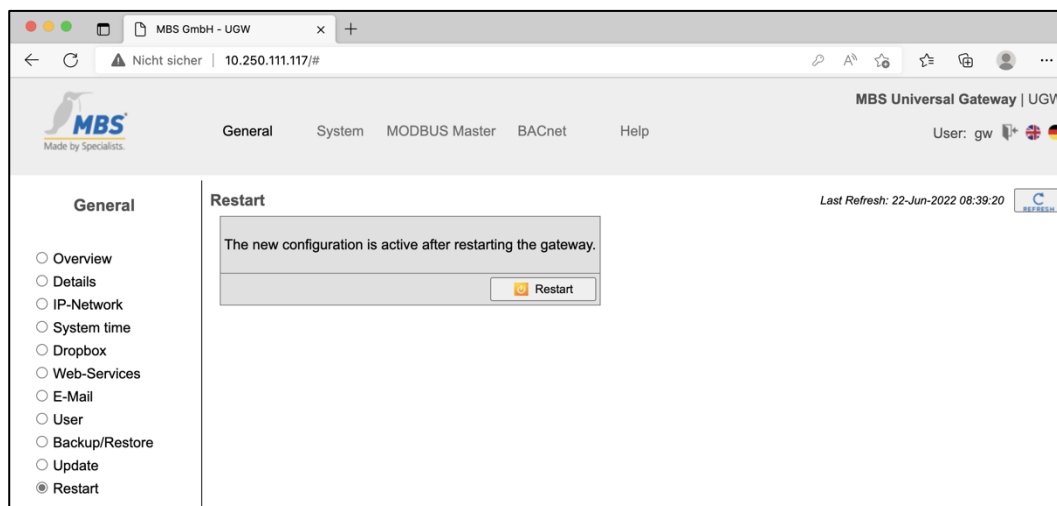
If the system needs to be restarted, this will pop up below the upper menu bar as a **[Restart Required!]** button. Alternatively, you can also carry out a restart using the menu item **General > Restart**.

Click **[Restart]**.
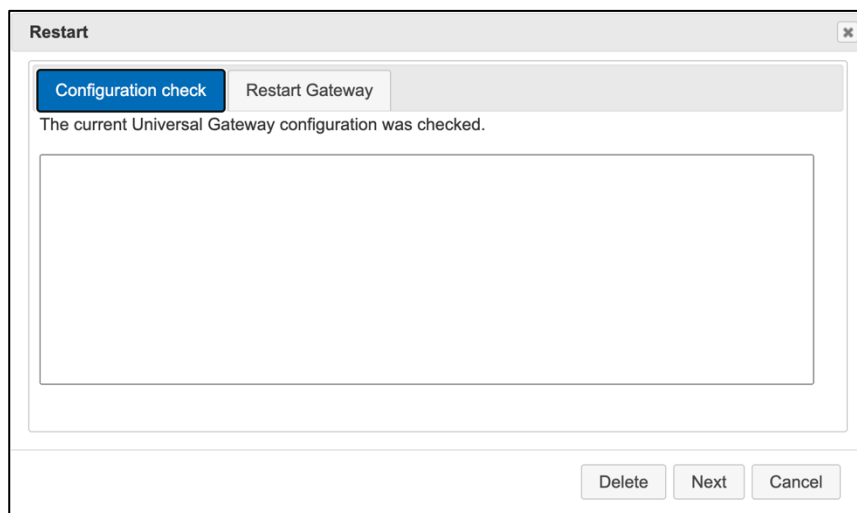
Before restarting, the gateway will check the configuration and display the results of this check. If the configuration is faulty, detailed messages will be shown.

Click **[Next]** or the *Gateway Restart* tab.
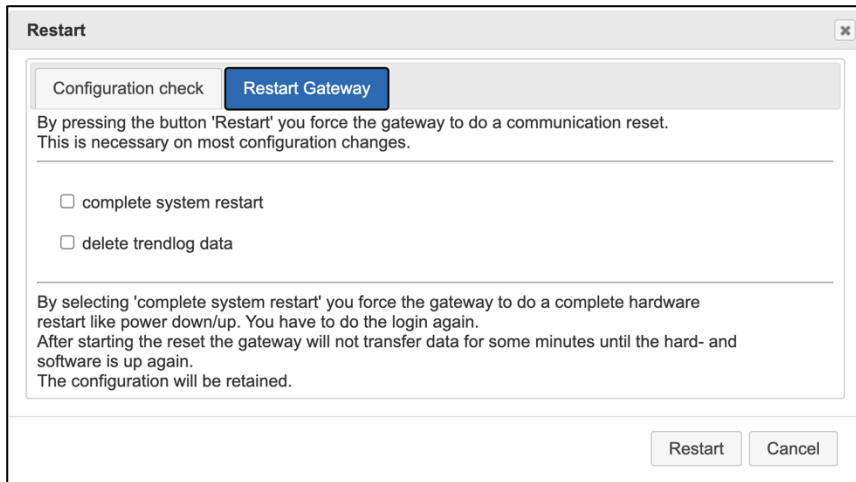
You can select two options (check boxes) for restarting:

- Complete system restart (takes approx. 1 minute):
  Automatically selected when changing certain system settings.
- Delete historical data
  Deletes all data collected up to this point, e.g. *BACnet Trendlog data*. This is necessary to
  conduct a smooth restart without collected test data during commissioning.

If neither of the two options is selected, a simple restart of the communication software is carried out
(duration: approx. 10 seconds).
If a restart is carried out due to a software update, it can take up to 4 minutes.

> **Note:**
> Once the gateway is fully configured, we recommend carrying out a complete system restart,
> deleting all historical data. You should then check if everything was booted properly. This ensures
> that the gateway would restart properly even in the event of a power failure.

Click [**Restart**] again and confirm the information dialog.

6.2 General information on the driver menu areas

Every installed communication driver is listed as a separate menu item in the upper menu bar. The
first submenu item on the left, **Status**, lists the current status of a driver's data points. Some selected
drivers also have their own submenu, which you can use to adjust particular settings for that
communication driver.
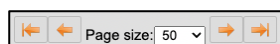
You can scroll through the data point list with the arrow key.

The **Page size** drop-down list allows you to define the maximum number of data points that can be displayed at the same time (10, 50, 100, 250 or 500).

The **Update** drop-down list enables you to determine the time intervals at which the data point list is updated automatically (---, 5, 10, 15, 30 or 60 sec).

Each data point has a unique address and name, as well as other properties such as current timestamp, flags, type and value.

The meanings of the data point flags are as follows:

- Valid value   V
- Sensor fault   F
- Incorrect data point   E
- Local operator value   L
- Set value/actual value automatic mode   -
- Locked, cannot be changed at the moment   O
- Upper limit warning   W
- Upper limit alarm   A

- Upper range of values   S
- Lower limit warning   w
- Lower limit alarm   a
- Lower range of values   s
- Historical value   H
- Value has changed   c
- New data point definition   N
- Deleted data point definition   D
- Changed data point definition   C

Time stamps, types and values are self-explanatory.

Data points that can be changed have two values. The first value is the actual (current) value. The second value is the set (nominal) value, i.e. the last value assigned by the UGW driver.

The **Info** button shows the properties of the selected data point.

The **Edit** button shows the current set value. You can also input a new set value which will be sent to the driver as a command.

6.3 "System" menu area

This communication driver is found on every gateway. This driver's data points provide information on the gateway's internal system status. Like all other data points, these data points can be edited via data point mappings and mapped onto BACnet and/or LON objects, for example.

6.3.1 System > Status

The current statuses of gateway data points are displayed here and can be edited if necessary.

Clicking the **Info** button will show the detailed properties of a data point.

To edit the set value of a data point, click the **Edit** button.
Enter the new set value in the **Set Value** dialog and confirm with **[OK]**.
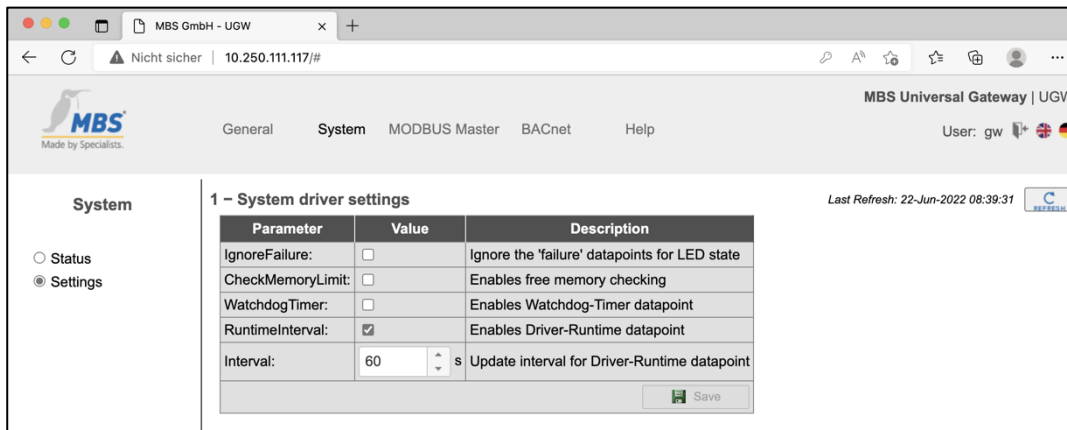
6.3.2 System > Settings

You can make further driver settings on this configuration page.

IgnoreFailure:
So-called *failure* data points exist for communication devices. These show whether communication with a device is working (value 0) or if communication with a device is faulty (value 1). These data points are represented in the gateway's status LED display. Activate the check box to deactivate this setting.

Monitor RAM:
Activate the check box to monitor the available memory space of the gateway. You can then define the lower limit of free RAM on the *Free RAM* row. If available RAM drops below this value, the UGW will restart the communication software.

Confirm with **[Save]**. Then close the information dialog and carry out a simple restart of the communication software to activate the function.

6.4 BACnet menu

BACnet is a widespread network protocol for building automation and stands for "Building Automation and Control network".
If the BACnet driver is installed on the UGW, the BACnet menu area will be displayed.

6.4.1 BACnet > Status

This page displays the current statuses of all BACnet data points. These data points can be used for data point mapping. The **Info** button loads details on the data points. If necessary, you can change BACnet values using the **Edit** button.

6.4.2 BACnet > Settings

You can make general settings for the BACnet driver and for the BACnet data links on this configuration page. Confirm changes with [**Save**]. Then close the information dialog and carry out a simple restart of the communication software.

Start delay:

Here, you can set a start delay for BACnet failure detection.
When restarting the UGW, BACnet communication will only be switched on after this time has elapsed. This allows a remote station to recognise if the UGW has been restarted by the absence of BACnet requests. The value "0 s" sends a *BACnet restart notification* message as an unconfirmed COV notification to the registered recipient when restarting.

DCC/RD password:
You can set a password to protect *DCC* (Device Communication Control) and *RD* (Reinitialize Device) BACnet services. Pay attention to capitalisation (maximum of 50 characters).

Default priority:
Enter the preset priority here.

Disable default NC object:
Deactivate specification of a notification class object (NC) using the check box.

Datalinks:
You can set which BACnet data links are to be used via the *Data links* drop-down list.
The following are supported:

- BACnet IP (Ethernet)
- BACnet MS/TP (two-wire connection) via RS485
- BACnet/SC
- Simultaneous BACnet IP and BACnet MS/TP
- Simultaneous BACnet IP and BACnet/SC
- Simultaneous BACnet MS/TP and BACnet/SC

BACnet PTP:
By ticking this box, you can enable communication via the p*oint-to-point* BACnet half-router in addition to the BACnet data links. This is necessary for BACnet operation with a modem.

A) Gateway mode: Data links = BACnet IP

The following operating types are possible for BACnet IP connection: normally, BACnet BBMD (BACnet Broadcast Management Device) and BACnet Foreign Device. The BACnet BBMD and FD configuration is required for cross-IP-network operation. Ask the BACnet coordinator about the settings for your project.

a) IP mode = normal

Network number:
Defines the network number of the BACnet network for the datalink (value = 1 to 65,534).

> **Note:**
> The network numbers of the configured datalinks must be unique.

LAN name :
Name of the data link interface

UDP port
Defines the UDP port of the BACnet/IP network as a decimal number. The default value is 47808 ("0xBAC0" – hexadecimal).

IP mode:
Defines the gateway's IP mode for this data link.

- *Normal*: Standard operating mode for a BACnet IP data link
- *BBMD*: Operating mode as "BACnet Broadcast Management Device".
- *Foreign Device*: Operating mode as "Foreign Device"

b) IP mode = BBMD

The gateway provides BBMD functionality for its own IP subnetwork and allows logins of external FD or BBMD devices.

Parameter	Value	
Network number:	1	
LAN name:	LAN1 ∨	
UDP-Port:	47808	
IP-Mode:	BBMD ∨	
BBMD		
☐ Direct broadcasts to own ip network (one-hop)		
Broadcast distribution table:		
IP-Address	**UDP-Port**	**Mask**
	⊕ Add	

Direct broadcasts to own ip network (one hop):
This option enables the use of "one hop" mode for BBMD. This mode is seldom used in networks and should only be set if the network planner explicitly plans for this.

Broadcast distribution table:
The table lists all BBMDs which are queried in a broadcast in addition to the devices in the particular network in order to reach the devices from other networks.
With **[Add]**, you can create a new list entry.

c) IP Mode = Foreign device

The gateway is set as a foreign device subscriber to the BACnet network.

BACnet IP	
Parameter	**Value**
Network number:	1
LAN name:	LAN1 ⌄
UDP-Port:	47808
IP-Mode:	Foreign Device ⌄
Foreign Device	
IP-Address BBMD-Server:	
UDP-Port BBMD-Server:	47808
Reregister interval:	300 sec.

IP address BBMD server:
The IP address of the BBMD which is to be used by the UGW for logging in as a foreign device.

UDP port BBMD server:
You can define the UDP port of the BBMD server as a decimal number (default value: 47808 dec. (0xBAC0 hex.)).

Reregister interval:

Time in seconds after which the gateway must newly register with the BBMD.

B) Gateway mode: Data links = BACnet MS/TP

BACnet MS/TP is the connection for BACnet devices via the RS485 (two-wire) interface. The necessary settings can be made here. Ask the BACnet coordinator about the settings for your project.

BACnet MS/TP	
Parameter	**Wert**
Netzwerknummer:	2
MS/TP Adresse:	0
Max. Master:	127
Max. info frames:	1
Serial interface:	COM1
Baudrate:	38400

Network number:
Defines the network number of the BACnet network for the datalink. The value is between 1 and 65,534.

MS/TP address:
Defines the MS/TP MAC address.

Max. master:
The property M*ax. master* defines the highest MAC address for master nodes in the MS/TP subnetwork. The possible value range is between 0 and 127; the default value is 127. If this value is not writeable via BACnet services, it must be 127.

Max. info frames:
Defines the maximum number of telegrams that a master node may send before the token has to be forwarded. The possible value range is between 1 and 127; the default value is 1. If this property is not writeable via BACnet, this value must be 1.

Serial interface:
Defines the serial interface of the datalink.

Baud rate:
Speed of the MS/TP network suitable for the other MS/TP components in use. The value is stated in bit(s); possible values are: 9600, 19200, 38400, 57600, 76800 and 115200 baud. The default value is 76800 baud.

6.4.3 BACnet > Device object

The BACnet device object in the universal gateway has a specific function that the other BACnet objects don't have. APDU parameters for BACnet transmission are set here. The device instance and device name can also be set. These properties are for BACnet device identification and must be unique within the entire BACnet network. For the exact settings, please ask the BACnet planner/coordinator.
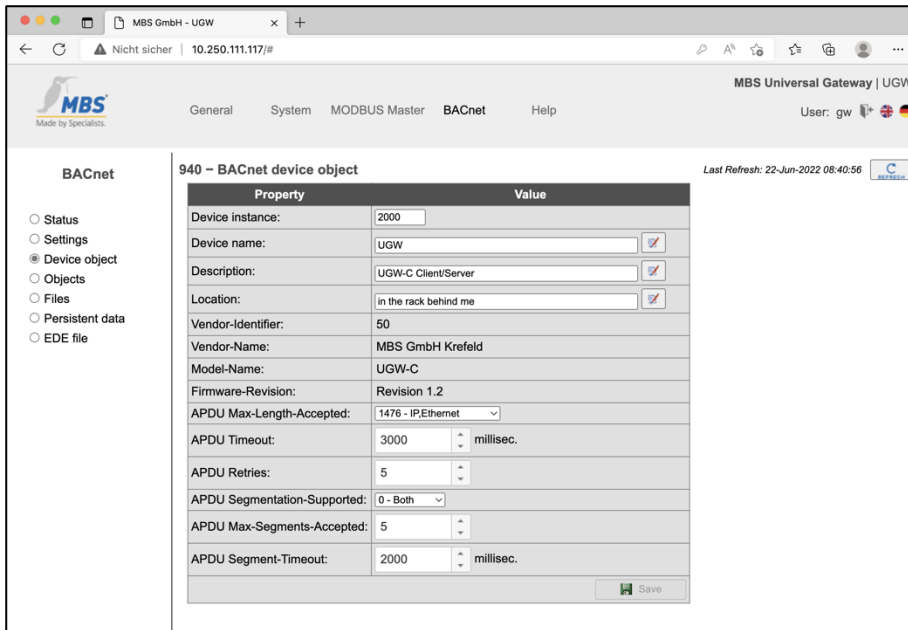
Device instance:
Defines the device instance number of the gateway, which has to be unique within the overall BACnet network. The value range of this property is between 0 and 4,194,302.

Device name:
Defines the UGW device name, which also must be unique.

Description:
Defines the BACnet description of the UGW. This is free descriptive text.

Location:
Defines the BACnet location of the UGW. This is free text for the installation location.

Vendor identifier:
Manufacturer ID for unique identification of the device manufacturer

Vendor name:
Manufacturer name as unique designation of the device manufacturer

Model name:
Model description of the UGW.

Firmware revision:
Firmware version of the UGW software

APDU max length accepted:
Maximum telegram size in bytes
The following values are possible: 50, 206, 480, 1024 and 1476 bytes.

ADPU timeout:
This value in milliseconds defines the period of time after which a telegram that requires confirmation is deemed to have failed in the absence of confirmation. The default value is 3000 ms.

APDU retries:
This value defines how often a failed telegram is to be repeated (default = 5).

APDU segmentation supported:
Possible values: 0-both, 1-transmit, 2-receive, 3-no

APDU max segments accepted:
Defines how many segments are accepted as a maximum.

APDU segment timeout:
This value defines the period of time after which an acknowledgement-dependent, segmented telegram is deemed to have failed in the absence of segment confirmation (default = 2,000 ms).

6.4.4 BACnet > Objects

The BACnet object configuration is displayed here. Data points can be filtered according to object type using the upper panel of buttons. The available BACnet objects are listed below.

The object name and description can be edited directly in the input fields in the object list.

The Edit button opens a dialog with the object-specific properties of the data points. You can edit the properties here (see example below).
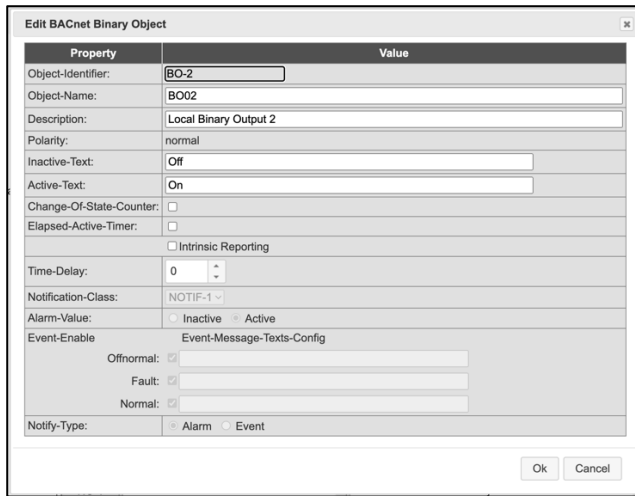
Dialog example of BACnet binary value object:
The dialog for editing a BACnet binary value object is shown as a representative dialog here:
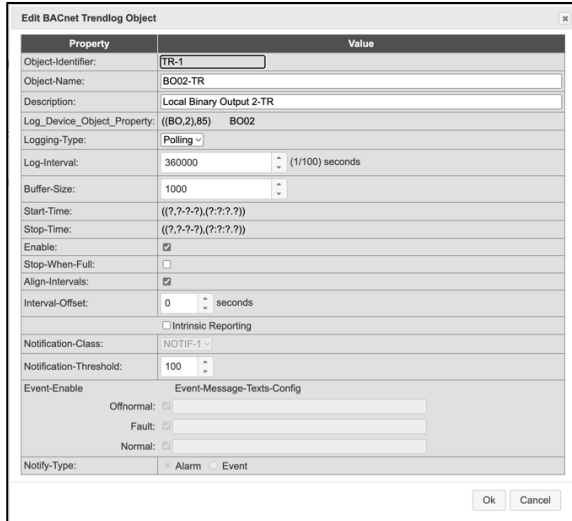
The status texts for the values "0" and "1" can be edited in the *Inactive text* and *Active text* input fields. For this object type, BACnet allows a "change-of-state counter" to be activated. The object is automatically extended to all object properties necessary for this purpose. This also applies for the "elapsed active timer" (operating seconds counter). BACnet alarming is activated for this object with "intrinsic reporting". The "time delay" property determines the report delay in seconds. All further information can be taken from the BACnet standard.

Using the Trend button, you can create a new Trendlog object with this object as the input reference in another dialog.

6.4.5 BACnet > Files

The entire BACnet configuration is saved in three files:

bac1.cfg (driver);   **bac1.txt** (data points);   **dispatch.txt** (global dispatch file)
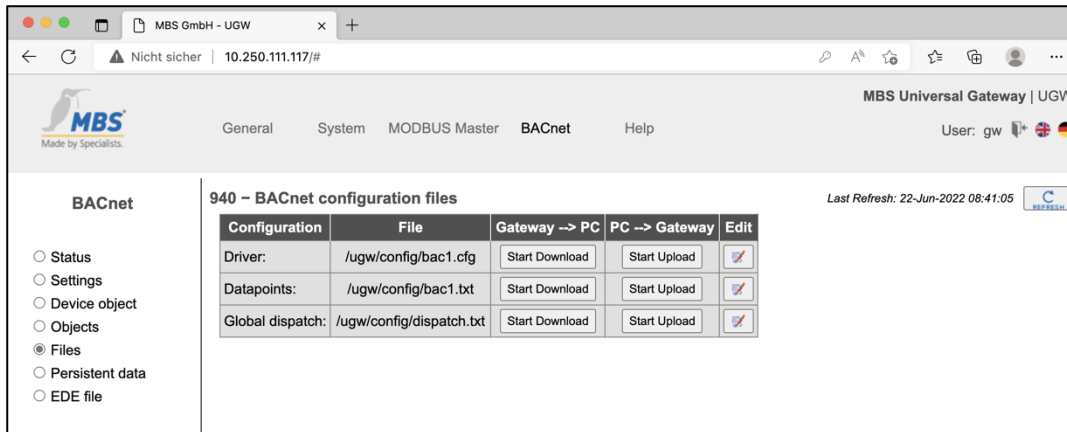
These files can be transferred between the computer and the universal gateway (download/upload) on this page. The **Edit** buttons open text windows in which you can edit the relevant files directly. No further file transfers are required for this.
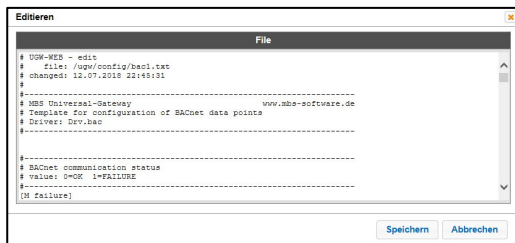
Rows with a hash # at the beginning are comments. Rows without # at the beginning are activated settings.

Confirm the changes with **[Save]** and carry out a simple restart of the communication software.

6.4.6 BACnet > Persistent data

The properties of BACnet objects can be configured in such a way that they can be written via BACnet and a change is saved "persistently*." When a property value is saved persistently, it can mean that there is an "initial" value in the configuration file and a value from persistent memory. This dialog is used to merge these two values again through a decision by the user.

Delete persistent data: If the persistent value is deleted, the original value from the configuration applies.

Use persistent data for configuration: The persistent value is written to the configuration file and deleted from persistence as soon as the persistent value is used.

*Persistent means that the changed value is active when the gateway is restarted (accordingly, non-persistent means that the changed value is "forgotten" after a restart and it begins with the configured value again).
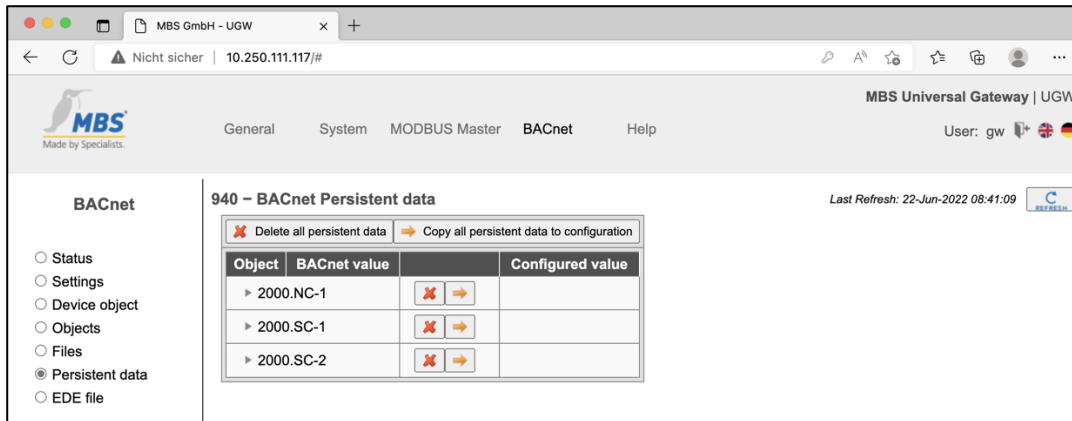
6.4.7 BACnet > EDE file

The BACnet objects and functions configured in the gateway can be shared with other partner companies in projects in the form of a specified CSV file (EDE file, Engineering Data Exchange).

To generate the EDE file automatically on this configuration page and then download it from the universal gateway to your computer, click **[Start]**.
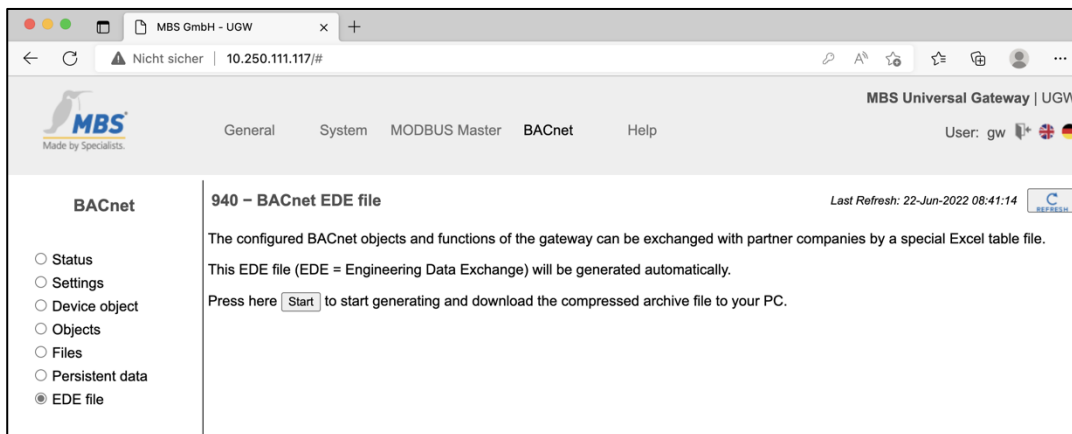
6.5 MODBUS Master menu

The Modbus protocol is a communication protocol based on a master/slave and client/server architecture. The version with serial interface (RS485) is used for the UGW.
If the Modbus Master driver is installed, the MODBUS Master menu will be displayed.

6.5.1 MODBUS Master > Status

This page displays the current statuses of all Modbus Master data points. These data points can be used for data point mapping. The **Info** button loads details on the data points. If necessary, you can change Modbus values using the **Edit** button.
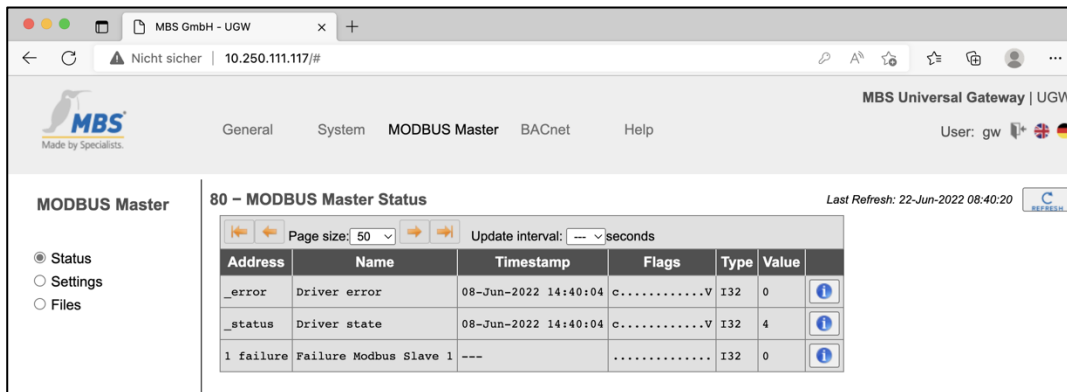
6.5.2 MODBUS Master > Settings

You can edit general settings for the Modbus master driver on this configuration page.
Rows with a hash # at the beginning are classified as comments. Rows without # at the beginning are activated settings.

Confirm changes with **[Save]**. Then close the information dialog and carry out a simple restart of the communication software.
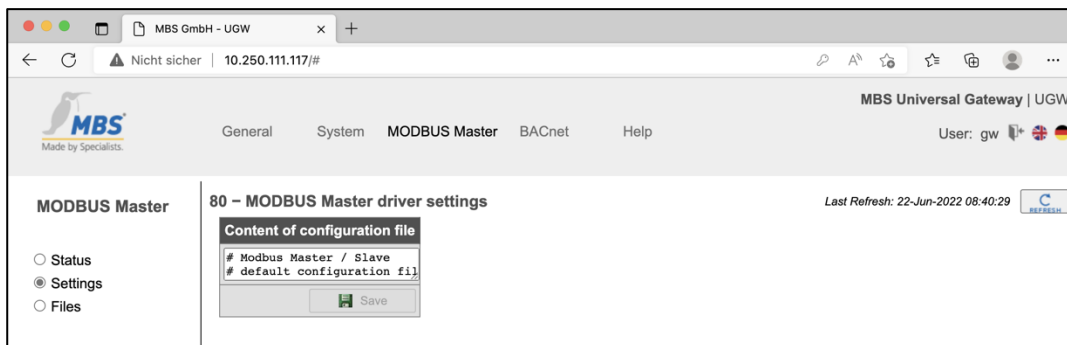
6.5.3 MODBUS Master > Files

The entire Modbus Master configuration is saved in three files:
modmster1.cfg (driver);   **modmster 1.txt** (data points);   **dispatch.txt** (global dispatch file)

These files can be transferred between the computer and the universal gateway (download/upload) on this page. The **Edit** buttons open text dialogs in which you can edit the respective files directly. No further file transfers are required for this.
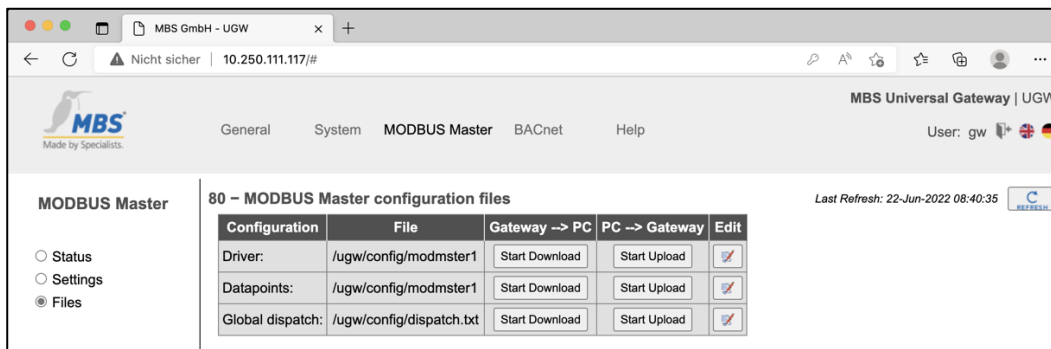
Rows in the text dialogs with a hash # at the beginning are comments.
Rows without # at the beginning are activated settings.

Confirm the changes with **[Save]** and carry out a simple restart of the communication software.

6.6 "LONTalk" menu area

LON (Local Operating Network) is a fieldbus standard primarily used in building automation. If the LONTalk driver is installed, the LONTalk menu area is displayed.

6.6.1 LONTalk > Status

This page displays the current status of all LON data points. LON values can also be edited if necessary. These data points can be used for data point mapping.

The **Info** button loads details on the data points.

6.6.2 LONTalk > Settings

On this page, you can make a host of settings for the LONTalk driver. The possible configuration of the parameters is described in the *Description* column.
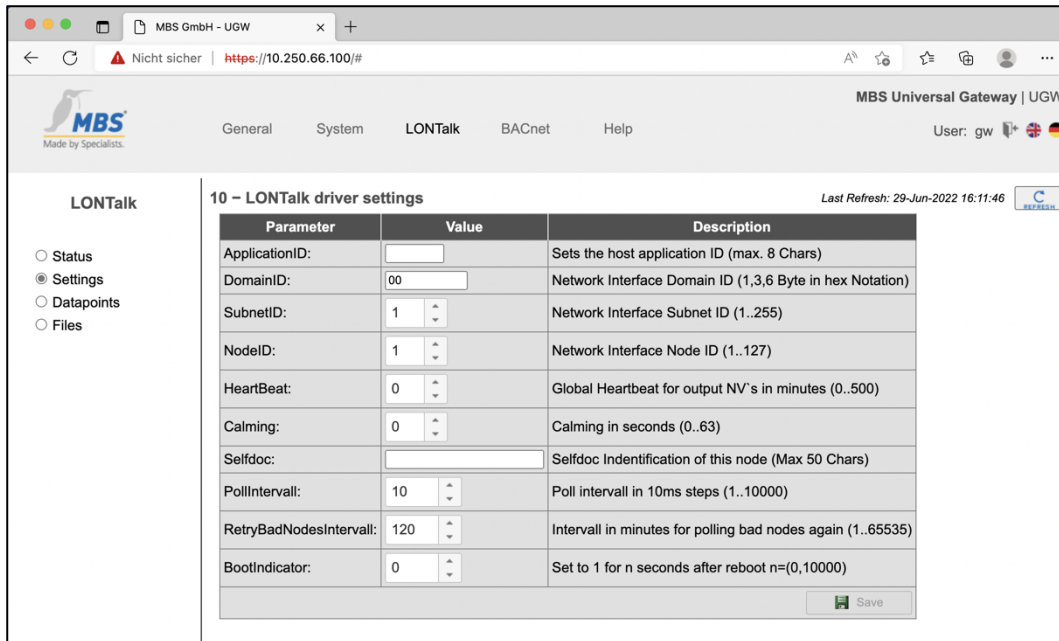
6.6.3 LONTalk > Data points

The LON data point configuration is displayed here. Data points can be filtered by category using the upper panel of buttons. The available LON data points are listed below. *nviBindings* and *nvoBindings* are the LON data points with which the mechanism of the LON binding can be used.
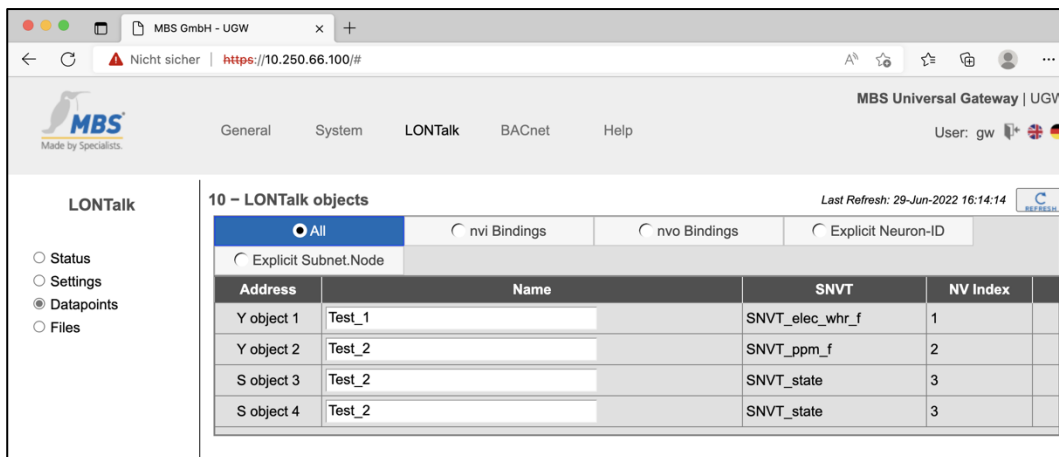
To change the name of a data point in a text dialog, click its name field in the list.

Explicit Neuron ID are the data points that can be polled regularly via the LON Neuron ID. You can adjust the poll interval in the **LONTalk > Settings** menu.
Explicit Subnet.Node are the data points that can be polled regularly via the LON subnet and node specifications. You can adjust the poll interval in the **LONTalk > Settings** menu.

6.6.4 LONTalk > Files

The entire LONTalk configuration is saved in three files:

lon1.cfg (driver);   **lon1.txt** (data points);   **dispatch.txt** (global dispatch file)

These files can be transferred between the computer and the universal gateway (download/upload) on this page. The **Edit** buttons open text dialogs in which you can edit the respective files directly. No further file transfers are required for this.
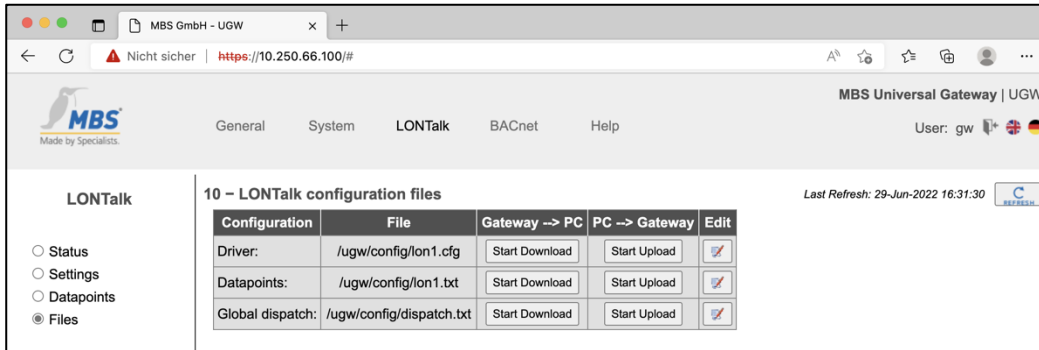
Rows in the text dialogs with a hash # at the beginning are comments.
Rows without # at the beginning are activated settings.

Confirm the changes with **[Save]** and carry out a simple restart of the communication software.

6.7 "M-Bus" menu area

The M-Bus (Meter-Bus) is a two-wire fieldbus for the transmission of energy consumption data. If the M-Bus driver is installed, the M-Bus menu area is displayed.

6.7.1 M-Bus > Status

This page shows the current status of all M-Bus counters with the available data points.
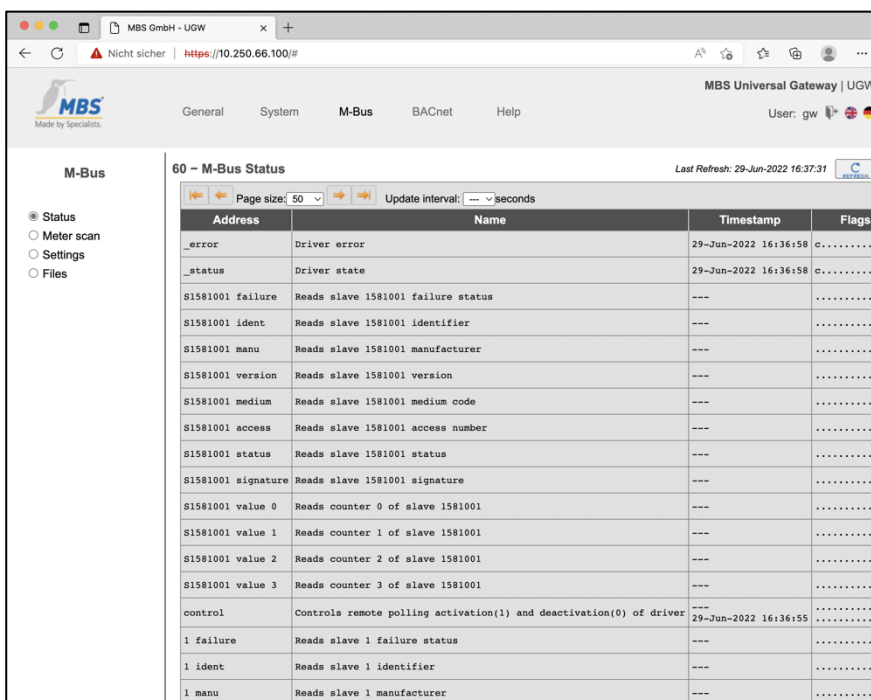
The data points can be used for data point mappings and for mapping BACnet objects, for example. The **Info** button loads details on the data points. Using the **Edit** button, you can activate or deactivate remote settings for the driver.

6.7.2 M-Bus > Counter Scan

On this page, you can search for counters (counter scan) with the gateway on the M-Bus. Using the identified counters, configuration files for the M-Bus and BACnet objects or Profinet data points are then automatically generated.
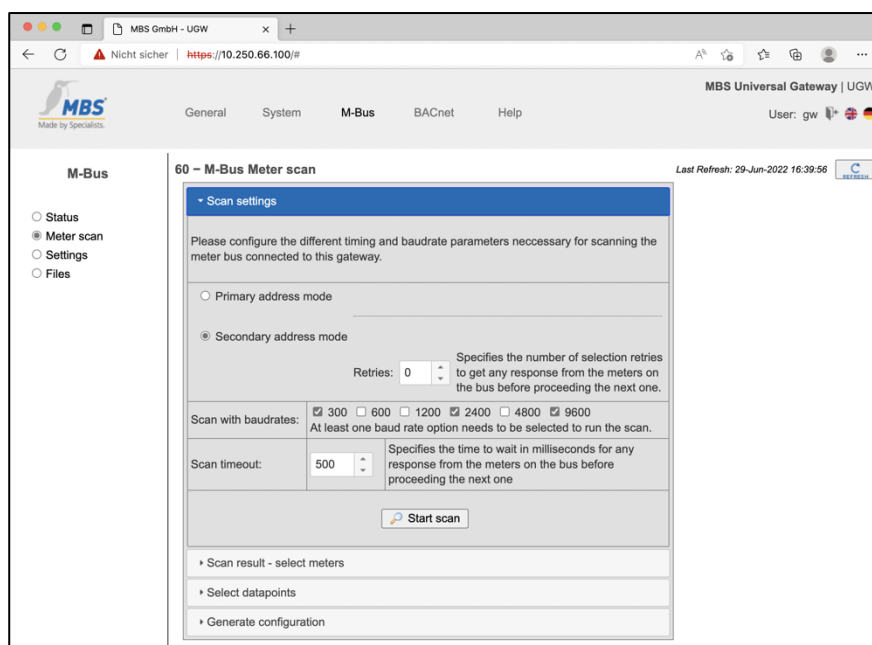
Two M-Bus search options are available:

- Primary address mode
- Secondary address mode

Identified counters are then polled later on in the mode with which they were scanned here. This means that a counter identified in primary address mode, for example, is also polled with the primary address.

Searching using the primary address

In the M-Bus, every counter can be given a unique primary address between 0 and 252. During commissioning, this primary address must be assigned to every counter. During scanning, the addresses of the counter in the specified area are polled individually. A responding counter is considered identified here and is listed as a scan result. Advantages of counter polling via primary address:

- Quick poll
- When a counter is changed, only the same primary address needs to be set in the counter. (This only applies if the same counter is installed again.)

Searching using the secondary address

Each M-Bus counter has a unique identification address, comparable to an Ethernet MAC address. To communicate with a counter via this address, it must be selected using a special M-Bus command. Only then is it possible to poll the counter. This must take place before any attempt to communicate with the counter. Advantages of counter polling via secondary address:

- No previous configuration of primary addresses in the counters necessary.

Scan procedure

The M-Bus scan is carried out in four steps (see the four tabs on the page):

1. *Scan settings*: Make scan settings and start scan.
2. *Scan result – Select counter*: Selection and designation of identified counters or Profinet.
3. *Select data points*: Selection of necessary data points for the counters.
4. *Create configuration*: Creation of M-Bus configuration and BACnet objects for the gateway. Only in this step is the gateway configuration changed.

Following confirmation of a sequence step, the next step (tab) is automatically available. You can also switch between the various steps by clicking the tabs.

Step 1 – Scan settings

You can set the scan mode and other parameters for conducting the M-Bus scan here. Contrary to many other communication buses, M-Bus is permitted to operate counters with different baud rates on the same bus. This is why multiple baud rates can be selected at the same time.

Start the M-Bus scan with **[Scan]**.

The progress with the actual scan status is displayed in a dialogue box.

Step 2 – Scan result – Select counter

When the scan ends, the scan results are displayed. The counter list is combined with any previous scan results. Counters that have been re-identified are given the status *OK*, new counters *New* and non-identified counters **—**.
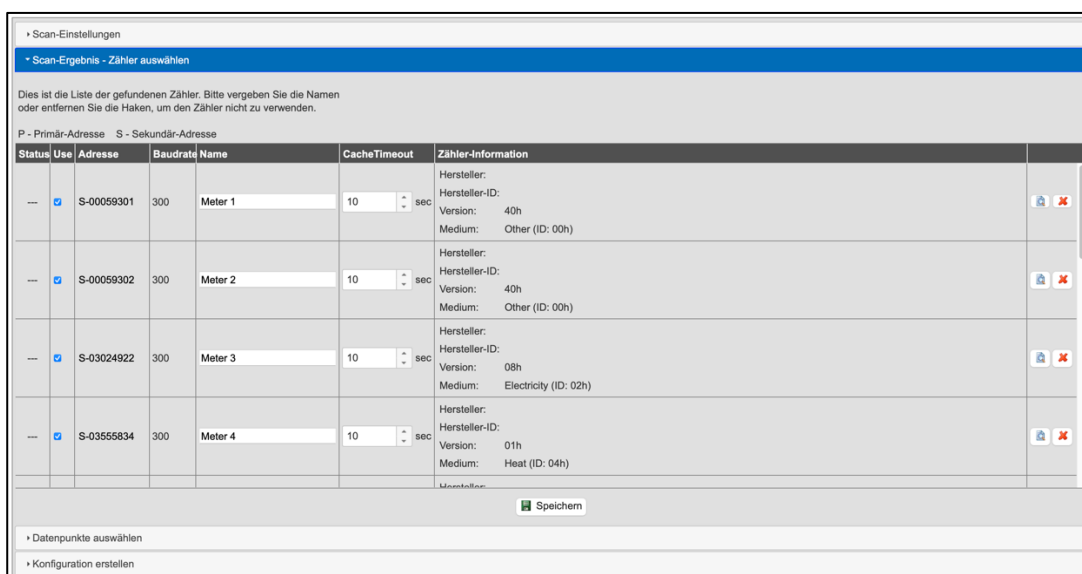
The *Use* check box allows you to determine whether the counter is to be used on the universal gateway or no longer taken into account. Using the button with the cross symbol, you can remove a counter from the list. Using the button with the magnifying glass symbol, you can display additional

counter data.
In the *Name* column, you can issue a unique name to each counter. Complete this step with [**Save**].

Step 3 – Select data points

Next, the data points to be used for every previously selected counter are polled. To improve recognition, the data point values and units from the previous scan are displayed.

A *failure* data point can be found on the **Data point status** tab on the right. This indicates whether communication with the counter is successful or if there is an error.

Complete this step with [**Save And Continue**].

Step 4 – Create configuration

The last step is to create the configuration files and add new counters.

The **Create BACnet object configuration** check box makes it possible to map the M-Bus data points as BACnet objects. This also creates and adds the BACnet object configuration.

Complete the overall counter scan with [**Save**].

6.7.3 M-Bus > Settings

On this page, you can make a host of settings for the M-Bus driver. The possible configuration of the parameters is described in the *Description* column.

6.7.4 M-Bus > Files

The M-Bus configuration is saved in files. They can be exchanged between the PC and the universal gateway here.

The entire M-Bus configuration is saved in four files:

mbus1.cfg (driver);   **mbus 1.txt** (data points);
mbus1.xml (configuration of the manufacturer-specific VIFE codes); **dispatch.txt** (global dispatch file)

These files can be transferred between the computer and the universal gateway (download/upload) on this page. For the upload, a dialog opens in which you can select the file on the PC and transfer it with **[Start]**. The **Edit** buttons open text dialogs in which you can edit the respective files directly. No further file transfers are required for this. Rows in the text dialogs with a hash # at the beginning are comments. Rows without # at the beginning are activated settings.

Confirm the changes with **[Save]** and carry out a simple restart of the communication software.

6.8 "CANopen" menu area

CANopen is a communication protocol based on CAN (Controller Area Network). Like CAN, CANopen is a serial bus system included among the fieldbuses. Pay attention to the jumper for termination of the CAN bus. If the CANopen driver is installed, the CANopen menu area is displayed.

6.8.1 CANopen > Status

This page shows the available CANopen data points. The data points can be used for data point mappings and for mapping BACnet objects, for example.

6.8.2 CANopen > Settings

On this configuration page, you can edit the configuration file of the CANopen driver.
Rows with a hash # at the beginning are classified as comments. Rows without # at the beginning are activated settings.

Confirm the changes with **[Save]** and carry out a simple restart of the communication software.

6.8.3 CANopen > Files

The CANopen configuration is saved in three files:

canopen1.cfg (driver);   **canopen1.txt** (data points);   **dispatch.txt** (global dispatch file)
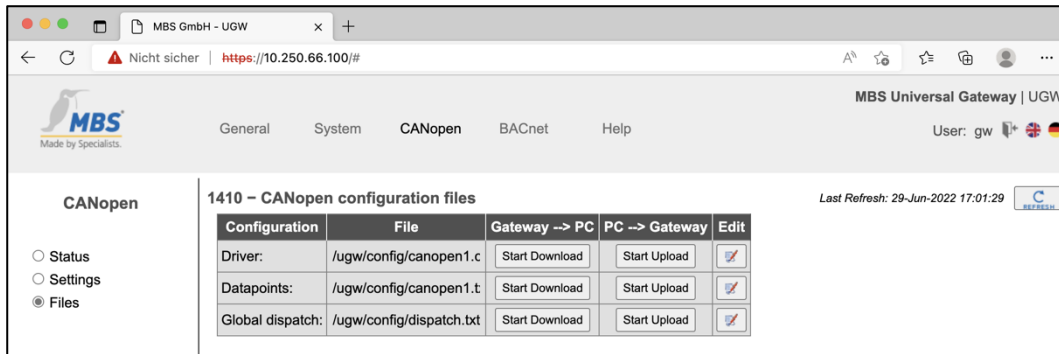
These files can be transferred between the computer and the universal gateway (download/upload) on this page. For the upload, a dialog opens in which you can select the file on the PC and transfer it with [**Start**]. The **Edit** buttons open text dialogs in which you can edit the respective files directly. No further file transfers are required for this.
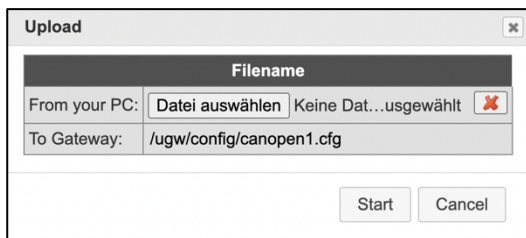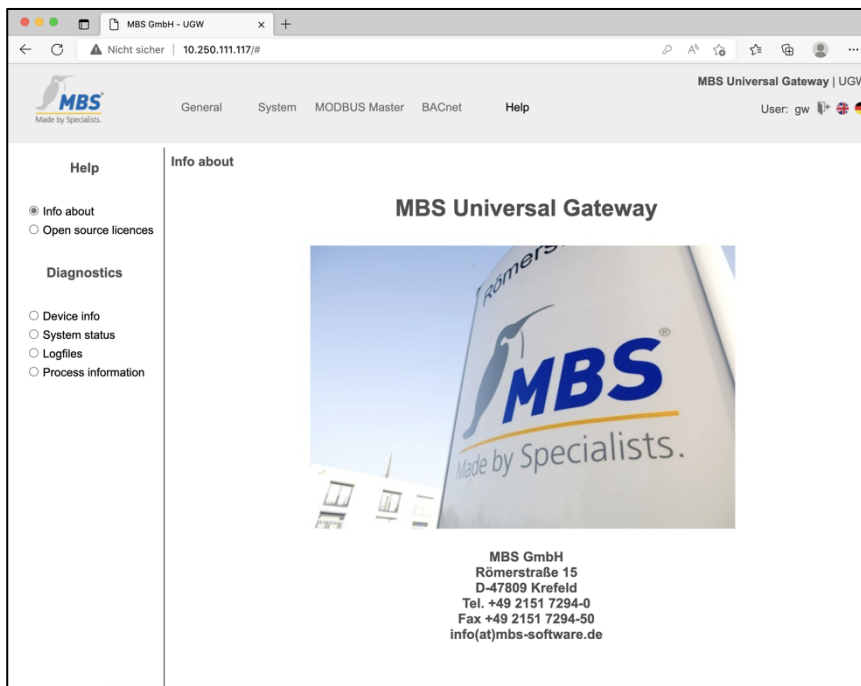

6.9   Help menu

Contact information for the manufacturer and other system data are displayed in the *Help* menu.

6.9.1 Help > Info about

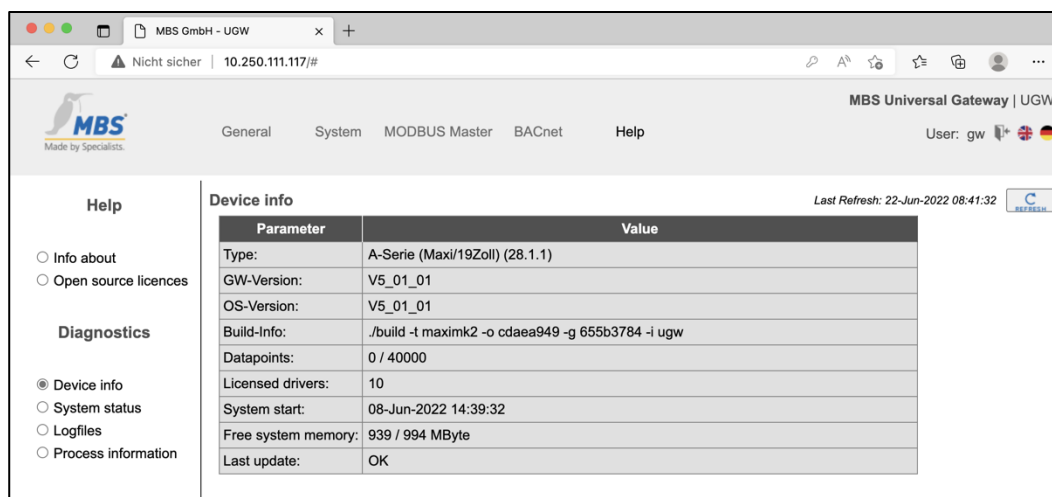This page contains information about the manufacturer of the universal gateway.

6.9.2 Help > Open source licences

"Start Download" makes a list of used open source components available on the universal gateway and their licences.
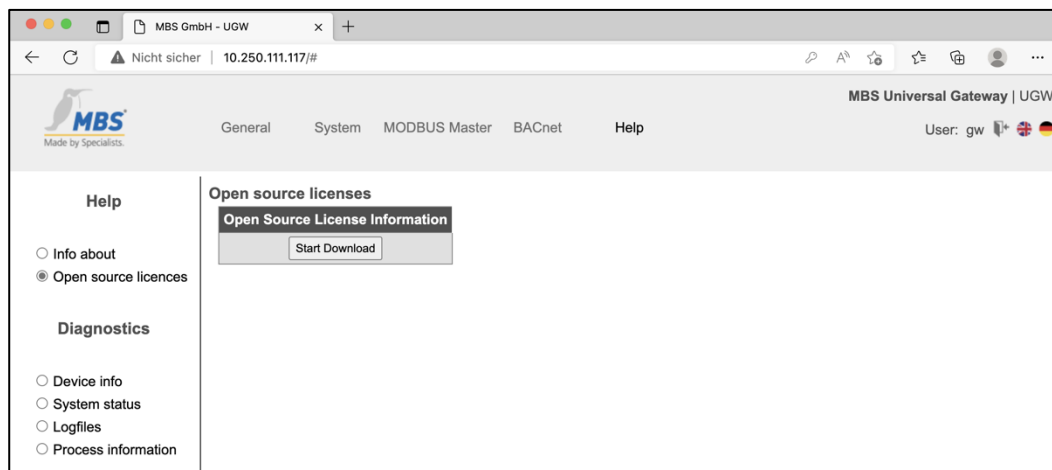
6.9.3 Help > Device info

This page displays general information about the universal gateway.

Type:
Manufacturer's internal hardware designation

Protocol ID:
Manufacturer's internal protocol ID.

GW version:
Version of the gateway operating software

OS version:
Version of the gateway operating system

Build info:
Manufacturer-internal unique ID of the gateway firmware

Data points:
Number of data points used/Number of licenced data points

Licenced drivers:
Number of drivers which may be active at the same time:

System start:
Displays the last time the universal gateway was started.

Free RAM:
Size of used RAM and total RAM in MB
Too little free space can lead to operational problems.

Last update:
Validity of the last firmware update

6.9.4 Help > System Map

This page displays a detailed system map of the gateway. This also includes the driver status, data points and data point maps.

6.9.5 Help > Log files (System)

You can activate/deactivate a more detailed version of the log records for each communication driver using the verbose buttons **[ON]** and **[OFF]**. Log records provide information on how the programme is running and any communication problems. The previous (historical) log outputs can be displayed by clicking **[Display Record]**. Clicking **[Start For 60 Sec.]** provides the current log outputs for 60 seconds after pressing the button. This process can be ended by pressing **[Stop]** at any time.
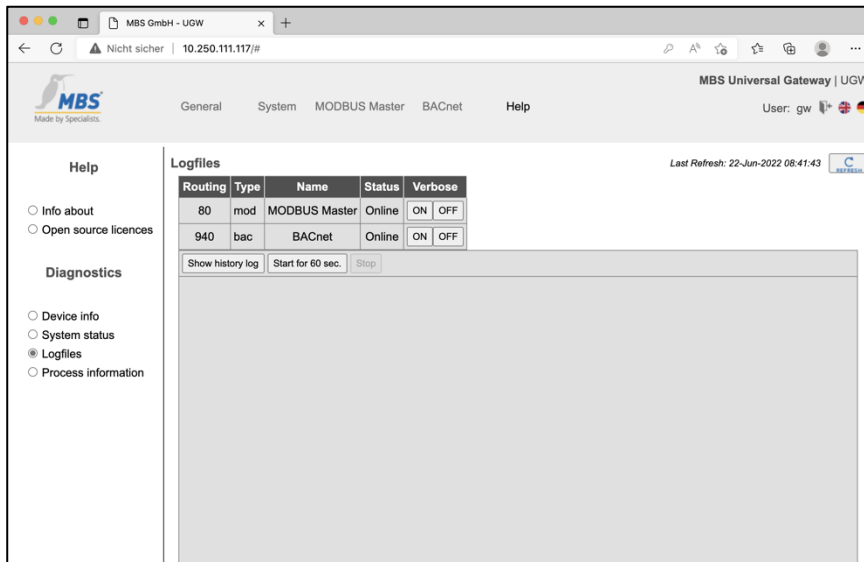
6.9.6 Help > Process Information (System)

The statuses of all operating system processes are provided here. The *Mem* (memory usage) and *CPU* (processor utilisation) columns provide important information on the status of a process.
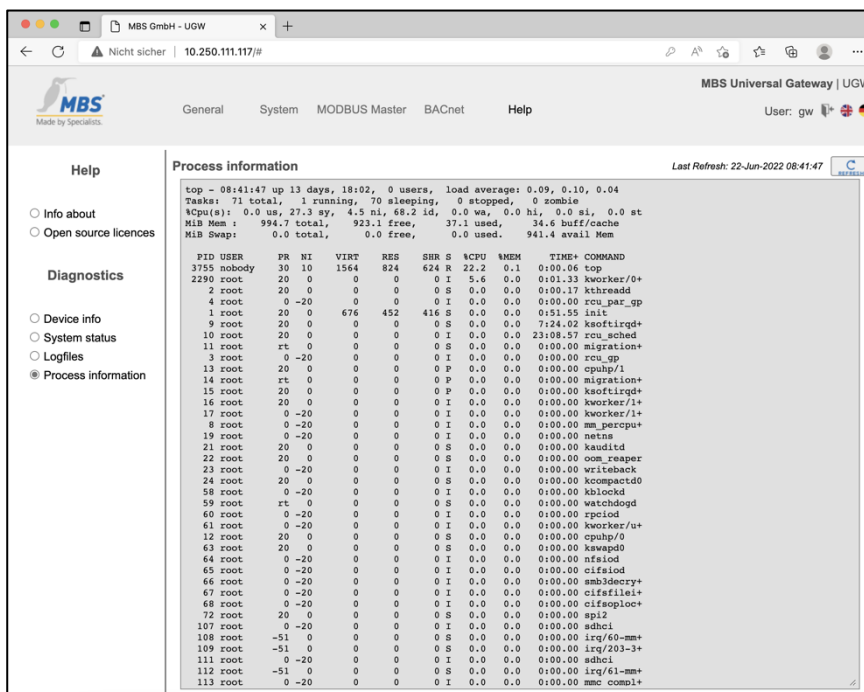
6.10 Exiting the web interface

Click the button with the **door** symbol at the top right and confirm the logout dialog.

6.11 Reset – Options

Hard-Reset

With the hardware-reset button, the device can also be reset without calling up the configuration interface.

Notice

You can find the reset button on the front of the device. The button may only be pressed with a suitable tool.

Depending on the duration of pressing, the following changes are executed:

after 1 second	Restart (Status-LED flashes green quickly)
after 10 seconds	The IP address will be set to 169.254.0.1 (default) until the next restart (Status-LED flashes yellow quickly).
after 30 seconds	Factory reset (Status-LED flashes red quickly)

Soft-Reset

This reset is carried out via the configuration interface. Details on this are explained in the device manual.

7 Appendix

7.1 FAQs

Problem: You want to the access gateway, but do not know the IP address.

Solution 1:
The following solution applies only for gateways up to version 3_00_14.
Starting with version 4_XX, the DHCP server is no longer implemented!

If the computer is set as a DHCP client (default setting), you can use the DHCP server of the gateway to provide an IP address. Press and hold the Reset button of the UGW for at least 10 seconds. When the status LED flashes back and forth between green and red, the DHCP server is activated. Then connect the network cable to your computer; the IP address will be assigned automatically. To access the configuration pages of the gateway web server, launch your web browser and enter the IP address 169.254.0.1 on the address line. Then enter your username and password. The gateway home page is called up and displayed.

The standard setting ex works is:

Username: **gw**
Password: **GATEWAY**

The password can be changed using the menu item ***General > Password***.

Solution 2:
Starting with version 4_XX, the DHCP server is no longer implemented!

If the computer is set as the DHCP client, address issuance occurs automatically (APIPA) if the DHCP server is not present. The computer therefore automatically receives an IP address from the range in which the gateway works with its (default) IP address, 169.254.0.1. This default address can be activated until the next restart by pressing the Reset button (between 5 and 10 seconds).

Solution 3 (computer skills and an installed BACnet protocol required):
When BACnet is installed on the gateway (see sticker on the casing of the device), it can be combined with the Wireshark program (freeware, available at: http://www.wireshark.org) to sniff the network traffic and read out based on the reports. Start by selecting the Wireshark program and then choose Capture Options. Check the settings in the next window and press the Start button. The Capture window will appear. Set the filter to bacnet. Then start the gateway and wait for the output shown in the figure.

The IP is shown under:

Source: 169.254.0.1 (in this example)
Network protocol: BACnet
Info: I–Am–Router-To-Network

Problem: RS485 connection problems

Solution: For RS485 connections, do not connect the GND, especially between switching cabinets with different GND potentials, if possible.

Problem: RS485 A B wires reversed.

Solution: With swapped A and B data lines, connection does not take place. The yellow LED then lights up constantly.