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1. Foreword

Thank you for using an MBS Gateway.

This manual describes the pico | nano | micro | XL | XXL | compact | maxi | 19” product family

**GATEWAY**

A gateway is used to enable communication between devices that use different communication protocols. Its typical area of application is for technical building service equipment. Communication partners are, for example, control systems, DDC systems, control systems for refrigeration and heat power stations, room controller, safety equipment such as fire or burglar alarm systems, lighting controls and others. 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.

**SCHEMATIC DESIGN OF A GATEWAY (FUNCTIONS AND MODULES)**
2. References

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- BACstac is a registered trademark of Cimetrics, Inc.
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- IBM-PC and IBM-AT are registered trademarks of the International Business Machines Corporation (IBM)
- LONTalk is a registered trademark of Echelon, Inc.

2.2 COPYRIGHT

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Telephone: +49 2151 72 940
Fax: +49 2151 72 9450

email: info@mbs-software.de
Internet: http://www.mbs-software.de

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3. MBS Gateway

3.1 TYPE LABEL
The label contains the name of the gateway, the comprised protocols including the corresponding interface, project ID, MAC address, standard IP address, part number and serial number.

3.2 NUMBER OF DATA POINTS
The number of data points available is determined by the device type and licence. It counts the number of the different registered addresses in the dispatch.txt file with the keyword target =.
4. Commissioning

To install the MBS Gateway, you will need the following tools:
- These instructions (included with delivery)
- Computer
- Installed web browser (a list of tested browsers can be found at the end of this chapter)
- Installed PDF reader
- Network cable

The concept of the MBS Gateway configuration
The MBS Gateway provides a conveniently built-in web server that allows for easy configuration. This manual describes the steps required to access the web server.

All documents necessary for further settings, including the user manual, can be found in the help directory of the web server. These can be viewed using the Adobe Acrobat Reader and printed on demand.

Electrical installation
Connect the MBS Gateway to a power supply according to the technical specifications within this document. An international power supply is optionally available if required. The warranty becomes void if the MBS Gateway is connected to an inadequate power supply or the casing is opened. There are no controls inside the casing.

Ethernet network installation
Connect the Ethernet network cable (RJ-45 connector) to the MBS Gateway. Use CAT5 UTP or STP cable (or equivalent). Avoid laying cables parallel to power lines, e.g. to motors, frequency inverters, etc.

Do not connect to a network before the MBS Gateway has been fully configured. Use the network cable for configuration.

4.1 MS/TP OR RS485 NETWORK INSTALLATION
Connect the MS/TP or RS485 network to the orange plug. Observe the instructions for connecting MS/TP or RS485 networks according to 135-2004 (BACnet standard). The MBS Gateway network will provide bias and termination resistors if necessary.
**4.2 CONNECTION TO WEB SERVER**

**Overview**

An IP connection between the computer and the MBS Gateway must be established in order to access the internal web server. The web server provides the configuration settings in the form of websites.

**Activating the DHCP server (optional)**

On request, the DHCP (Dynamic Host Configuration Protocol) automatically provides IP addresses to clients. If your computer is set as a DHCP client (the default), you can use the DHCP server of the gateway to provide an IP address. Press and hold the gateway reset switch for at least 10 but not more than 15 seconds. When the status LED flashes green/red alternately, the DHCP server is enabled. Then connect the network cable to your computer, the IP address will be assigned automatically.

**Using a manual IP address**

If you plan to use an IP address manually, please set your PC to the following settings:

- **IP address:** 169.254.0.2 (or higher)
- **Subnet mask:** 255.255.0.0
- **Standard gateway:** Not entered
4.3 CONNECTION CHECK

The standard IP address of the MBS Gateway is 169.254.0.1; to test the connection, use the ping command. Open a command prompt, and type in the following command:

```
Ping 169.254.0.1 <ENTER>
```

The MBS Gateway responds with an output of the time period:

```
Reply from 169.254.0.1: Bytes=32 time<1ms TTL=64
```

If there is no answer or an error is indicated in the connection, please check the network settings using the command: `ipconfig /ALL <ENTER>`

This command displays the list of NICs and assigned IP configuration.
4.4 Calling up the MBS Gateway web server

To access the configuration pages of the MBS Gateway web server, launch your preferred web browser and type the IP address 169.254.0.1 into the address field. Then enter your username and password.

Default setting on delivery:
Username: gw
Password: GATEWAY

The password can be changed in the menu item Setup.

4.5 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 preferred browser, please notify MBS Support. Please indicate the exact browser version, the exact version of the operating system and a brief description of the problem for the diagnosis.

4.5 INTERFACE MAPPING FOR SERIAL INTERFACES

Assigning gateway serial interfaces to device drivers.

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<td>Sub-D (2) Com2 9-pole RS232 /dev/ttyS1</td>
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</table>
5. User interface and functions

5.1 START

It is necessary to login in order to access the MBS Gateway configuration via the web server.

Please enter your username and password here and confirm by pressing Enter or clicking on the login button. Please pay attention to upper- and lower-case letters.

**The default username is: gw**

**The default password is: GATEWAY**

When you have successfully logged in, you will see the MBS Gateway configuration software overview page. The upper menu bar is for the main navigation of the MBS Gateway configuration area.

The menu items “General” and “Help” are always available. The remaining menu items are determined by the universal gateway drivers installed. The name of the MBS Gateway is also displayed. This can be changed. All MBS Gateway settings and functions can be found in the “General” menu. These are independent of the drivers installed. Documents and diagnosis functions can be accessed via the “Help” menu.

The current username is displayed on the right. The meanings of the symbols are as follows:

- To logout please press this key.

- To display this manual in an individual browser window. You can switch to the manual and the MBS Gateway configuration at any time within your web browser.

- Changing language
5.2 GENERAL MENU – OVERVIEW
The first page displayed is the “Overview” page.

| Type: The universal gateway type is displayed here. |
| Name, installation location, description: This information is displayed to identify the universal gateway. They can be set for the individual MBS Gateway or a particular project. The name also appears in the upper menu area 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: Displays the last time the universal gateway was started. |
| Data points: Displays the number of data points used in relation to the licensed number of data points. |
| CPU load: Displays CPU load in %. This should not be greater than 50% in the long-term. |
| RAM: Displays the size of the used and total RAM in Mbytes. Too little free space can lead to operational problems. |
| Driver status: The current status of a driver is listed depending on the installed drivers. If a driver is not online, this suggests a problem starting or with the configuration of a driver. Other information can be found using the diagnosis tools in the Help menu. |
5.3 GENERAL MENU – INFORMATION
Information for identifying the universal gateway is entered here. This can be set as chosen and created for a particular project. The information is saved on the universal gateway.

This information is not required for operating the gateway, but serves solely for improved identification, particularly when using several universal gateways in a project.

5.4 GENERAL MENU – IP NETWORK
The current setting of the IP address appears. To alter this setting, change the relevant fields and save the settings.
The new IP addresses are activated upon saving. It is necessary to login again after the IP address has been changed. If IP network services with an 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. To do this, enter “https://” before the IP address to activate the universal gateway configuration.

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

For the precise IP settings, please ask the network administrator. If the IP network is not required for gateway operation, leave the standard settings. This makes it easier to access the gateway later.

5.5 GENERAL MENU – SYSTEM TIME

The universal gateway has a battery-powered real-time clock. 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 zone can be set in order to localise the system. Adjustments are made automatically for daylight saving hours based on this time zone. The time display can be adjusted using the configuration software. A complete system restart is required to activate the settings.

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 the NTP, it must be possible to access an NTP server from the IP network. Please ask the system administrator.

5.6 GENERAL MENU – DROPBOX

The dropbox function can be activated optionally – please contact us or use the MBS web server to order this option.
5.7 GENERAL MENU – WEB SERVICES
The MBS Gateway offers web services, e.g. to read data point lists or change data points. These services can be activated or deactivated here. The configuration files for the data point lists can also be edited directly.

5.8 GENERAL MENU – PASSWORD
The password for the user “gw” can be changed here. For security purposes, it is necessary to enter the previous password and re-enter the new password.
5.9 GENERAL MENU – DATA BACK-UP
The entire universal gateway configuration can be backed up. The back-up consists of a zip file archive and is transmitted to your system’s web browser.

This archive can then be exported at a later point in time. To do this, first select the archive on your computer. For purposes of monitoring, the archive is transmitted to the gateway and the content displayed. After confirmation, the data back-up is unzipped and activated after restarting.

It is only possible to export data back-ups that are intended for the universal gateway. It may only be possible to export parts of faulty or defective data back-ups.

5.10 GENERAL MENU – UPDATE
Here you can:
- Request a licence upgrade
- Conduct a licence upgrade
- Update the universal gateway system software
5.10.1 REQUESTING NEW LICENCES

The current licence is displayed. When requesting a new universal gateway licence, the following options are offered:

Press the email key to open your email program. The email will be automatically generated with the required information from your selection and the universal gateway, and the address “support@mbs-software.de” entered as recipient. The email should not be altered and will only be sent when you click the send button in your email program.

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!

1FBD0806C0FD345502034590416BC3A300C0059F1154277A72972ECC690E5302D232B
C6DEB3C0B92DBD27BD921800589D56EF7E58E1E8C022D0053D39061A0D40F1CD0F
5F9A4B50B680068BE1D9A40E20269F28ECA44914AD7
3A1F760F961E3BFE92648481FBD1C378BBD2102455D73E3CEC23C5A3369524
D39CF850616FFDF2DC5C41A17F0B664F4EB0CF77FDF9051C15F5D9E92D79
9D4A0405D53D31A3A678043034A3D39061A0D40F1CD0F5F9A4B50B680068BE1D9A40E20269F28ECA44914AD7
7F2B23A1F76171702B0E60832E248F7E3F9DCA020A184CC55B2CE49A24E5
D428A95421B0BD1D4485642E024EBE2B0A1DB6B49A9334E48D5906A97A5
24A5F030E9A157F9B65584E4DF42FE0E52C2D5061000

---------------------------
5.10.2 UPGRAISING NEW LICENCES
You will receive a licence file from the manufacturer of the universal gateway. This licence file must be stored on your computer and must be selected to upgrade. The licence file is only valid for the device the request was sent from. The licence file cannot be transferred to other devices.

The licence file is transmitted to the universal gateway and checked. The new licence is then updated.

5.10.2 UNIVERSAL GATEWAY SOFTWARE UPDATE
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.
5.11 GENERAL MENU – RESTARTING
After configuration changes, it is often necessary to restart the MBS Gateway communication software. This is displayed in the upper menu bar. You can restart by clicking the Restart button in the menu bar or clicking “General – Restart” in the menu selection. The current universal gateway configuration is checked and the result displayed. You can view the restart page by clicking “Continue”.

![Restart Menu Screenshot](image1)

![Restart Menu Details](image2)
In the case of some system settings, a complete system restart is necessary. This is automatically selected when the dialogue box is opened. A simple restart of the communication software takes approx. 10 seconds; a complete restart takes approx. 1 minute. A restart for a software update may take up to 4 minutes.

“Delete historical data” deletes all data collected, e.g. “historical BACnet Trendlog data”. This is necessary to conduct a smooth restart without collected test data during commissioning.

A complete system restart and deleting the historical data is advisable after the gateway has been completely configured. You should then check if everything has started properly. This ensures that the gateway restarts properly even in the event of a power failure.

5.12 DRIVER MENU ITEMS

Every installed communication driver is listed as a separate menu item in the upper menu bar. The first submenu item always displays the current data point status for a driver. Some selected drivers also have their own submenu, using which special settings can be made for the communication driver. Each data point has a unique address and name, as well as a current time, flags 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 value range s
- Historical value H
- Value has changed c
- Definition of new data point N
- Definition of deleted data point D
- Definition of changed data point C

Time stamps and values speak for themselves.

Some data points can be changed. These data points therefore have two values. The first value is the actual value. The second value is the set (nominal) value, i.e. the last value assigned to the driver. Use the key to open a dialogue box to adjust the new set value and send it to the driver as a command.

5.13 UGW-C DRIVER MENU

This communication driver is found on every MBS 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.
5.13.1 STATUS

The current status of MBS Gateway data points are displayed and can be edited here.

5.13.2 SETTINGS

The following settings can be made for this driver:

IgnoreFailure:

There are “failure” data points in communication with communication devices. These show whether communication with a device is working (value 0) or if communication with the device is faulty (value 1). These data points are considered in the gateway status LED display. This can be switched off with this setting.
5.14 LONTALK DRIVER MENU

If the LONTalk driver is installed on the universal gateway, the LON menu is active.

5.14.1 STATUS

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

5.14.2 SETTINGS

The following settings can be made for this driver:
5.14.3 DATA POINTS

The LON data point configuration is displayed here. Data points for more categories can be displayed via the upper menu bar. “nivBindings” and “nvoBindings” are the LON data points that can be used via the LON binding mechanism. This can be edited by clicking on the name.

“Explicit Neuron-ID” are the data points that can be polled regularly via the LON Neuron-ID. The poll interval can be adjusted under “Settings”.

“Explicit Subnet.Node” are the data points that can be polled regularly via the LON subnet and node entries. The poll interval can be adjusted under “Settings”.

5.14.4 CONFIGURATION FILES

The entire LON configuration is saved in files. These can be transmitted here from and to the universal gateway. You can edit the file directly without transmitting the file using the “Edit” button.

5.15 BACNET DRIVER MENU

If the BACnet driver is installed on the universal gateway, the BACnet menu is active.

5.15.1 STATUS

This page displays the current status of all BACnet data points. BACnet values can also be edited. These data points can be used for data point mapping.
5.15.2 SETTINGS

General settings for the BACnet driver and settings for the BACnet datalinks can be made here.

**Start delay:** A start delay for BACnet failure detection can be set here. When restarting the universal gateway, BACnet communication will only be switched on after this time has elapsed. This allows a remote station to recognise if the universal gateway has been restarted by the absence of BACnet requests. The setting “0” initiates a “BACnet-Restart-Notification” report as a “Global Broadcast” and to the registered recipient.

**DCC/RD password:** The BACnet services “Device-Communication-Control” and “Reinitialize Device” can be password protected.

**Datalinks** The BACnet datalinks to be used can be set here. The following are supported: BACnet IP and BACnet MS/TP. They can be activated simultaneously.

**BACnet PTP** In addition to “BACnet Datalinks”, communication can be activated via the BACnet half router “Point-To-Point”. This is necessary for BACnet operation with a modem.
**BACnet IP:**

The following operating types are possible for BACnet IP connection: Normal, BACnet BBMD (BACnet Broadcast Management Device) and BACnet Foreign Device.

BACnet BBMD and FD configuration is necessary for operation of the entire IP network. Ask the BACnet coordinator about the settings for your project.
**BACnet MS/TP:**

BACnet MS/TP is a connection for BACnet devices via the RS485 (dual cable) interface. The necessary settings can be made here. Ask the BACnet coordinator about the settings for your project.
**BACnet PTP:**

BACnet Point-To-Point is designed for communication via modem. BACnet PTP is a half-router. Together with the other part (dial-up part), it comprises a BACnet router for a complete BACnet network. The BACnet networks must be correspondingly configured. The network number serves to identify a BACnet network. This must be unique throughout the BACnet network.

---

**Connect timeout:** Timeout for the establishment of a modem connection. If no connection is established within this time, it counts as a connection attempt. There are maximum "APDU-Retries" (connection attempts).

**IDLE timeout:** If no "relevant" data is transmitted within this time during a connection, the connection is terminated.

**Automatic dial-up:** Determines which BACnet services are the subject of a connection attempt. This is a list of "confirmed" and "unconfirmed" items with the BACnet enumeration of services.

- C2 – Confirmed Event Notification
- U3 – Unconfirmed Event Notification
- C15 – Confirmed Write Property (triggered via MBS Gateway)
- C16 – Confirmed Write Property Multiple (via MBS Gateway)

**Incoming password:** BACnet PTP password for dialling-up the universal gateway.

**External networks:** The networks that can be accessed externally via BACnet PTP are configured here. The network number specifies the accessible BACnet network. Up to three telephone numbers under which the BACnet counterpart station can be reached can be specified. These are dialled consecutively as part of the "Connect timeout". The password is used to login to the counterpart station.
5.15.3 BACNET DEVICE OBJECT

The BACnet universal gateway device object has a specific role as regards the other BACnet objects. 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 throughout the entire BACnet network. For more detailed settings, ask the BACnet coordinator.

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<th>Property</th>
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<td>Device instance</td>
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<tr>
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<td>Rother</td>
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<td>MBS GmbH, Krefeld</td>
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<tr>
<td>Model-Name</td>
<td>BACNet UGW</td>
</tr>
<tr>
<td>Firmware-Revision</td>
<td>1.2</td>
</tr>
<tr>
<td>APDU Max-Length-Accepted</td>
<td>460 - M/TP,FTP,Ann</td>
</tr>
<tr>
<td>APDU Timeout</td>
<td>5000</td>
</tr>
<tr>
<td>APDU Retries</td>
<td>3</td>
</tr>
<tr>
<td>APDU Segmentation-Supported</td>
<td>0 - Both</td>
</tr>
<tr>
<td>APDU Max-Segments-Accepted</td>
<td>3</td>
</tr>
<tr>
<td>APDU Segment-Timeout</td>
<td>3000</td>
</tr>
</tbody>
</table>
5.15.4 BACNET OBJECTS

The BACnet object configuration is displayed here. Data points can be filtered according to object type via the upper menu bar.

The BACnet “Object name” and “Description” can be directly edited by clicking on them. The object-specific properties can be called up and edited by clicking on the Properties button. By clicking on the Trend button, you can directly create a new trendlog object with this object as an input reference.
Example of BACnet binary value object:
The dialogue box for editing a BACnet binary value object is shown here. The status of the values “0” and “1” can be changed.

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 includes the elapsed active timer. 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.
5.15.5 CONFIGURATION FILES

The entire BACnet configuration is saved in files. These can be transmitted from and to the universal gateway. You can edit the file directly without transmitting the file using the “Edit” button.

5.15.6 EDE FILE

The BACnet objects and functions projected in the gateway can be shared with other partner companies in projects in the form of a specified Excel table. These EDE (engineering data exchange) files are automatically generated and can be accessed on the universal gateway.
5.16 M-BUS DRIVER MENU

If the M-Bus driver is installed on the universal gateway, the M-Bus menu is active.

5.16.1 STATUS

This page displays the current status of all M-Bus counters and the corresponding data points. These data points can be used for data point mapping and for mapping BACnet objects.

5.16.2 M-BUS | COUNTER SCAN

The MBS Gateway offers the option of an M-Bus scan. This searches for M-Bus counters on the bus. Using the identified counters, configuration files for the M-Bus and BACnet objects are then automatically generated.

There are two M-Bus search options available. The identified counters are then polled in a later process as they were identified, i.e. a counter found in a primary address scan is also polled with the primary address. A counter in a secondary address scan is then polled via the secondary address.

5.16.2.1 SEARCHING USING A PRIMARY ADDRESS

In the M-Bus, every counter can be given a unique primary address between 0 and 252. This must be set for every counter during commissioning. During scanning, the addresses in the specified area are polled individually. The identified counters are then listed. Counters that answer are identified.

**Advantage of counter polling via primary address:**

- Counter polling is faster.
- Changing counters simply involves resetting the same primary address for the counter (this is only true as long as the same counter is installed).

5.16.2.2 SEARCHING USING A SECONDARY ADDRESS

Each M-Bus counter has a unique identification, comparable to the Ethernet MAC address. To communicate with a counter via this address, this identification must be selected using a special M-Bus command. Only then is it possible to communicate with the counter. This must take place before any attempt to communicate with
the counter. *Advantage of counter polling via secondary address: No configuration of addresses in the counters necessary.*

### 5.16.2.3 SCAN PROCEDURE

There are four steps to the M-Bus scan.

1. Make scan settings and start scan
2. Selection and designation of identified counters
3. Selection of necessary data points for each counter
4. Creation of M-Bus configuration and BACnet objects for the MBS Gateway. Only in this step is the gateway configuration changed.

You can switch between the various steps by clicking on the tabs.

**Step 1 – Scan settings**

You can set the scan mode and several other parameters for conducting the M-Bus scan here. You can then start the scan.

Contrary to many other communication buses, the M-Bus is permitted to operate counters with different baud rates (transmission speeds). There is hence a selection of different Baud rates. The progress with the actual scan status is displayed in a dialogue box.
Step 2 – Selection and designation of identified counters

When the scan ends, the scan results are displayed. The counter list is combined with a previous scan result. Counters that have been re-identified are given the status “OK”, new counters “new” and non-identified counters “-”.

The “Use” checkbox allows you to determine whether the counter is to be used on the universal gateway or no longer considered. You can remove a counter from the list or call up all the information on a particular counter.

For the counter to be used further, it must be given a unique name.
Step 3 – Data point selection

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

Under the “Data point status” tab there is a “Failure” data point. This indicates whether communication with the counter is successful or if there is an error.
Step 4 – Configuration

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

There is also the opportunity to map the M-Bus data points as BACnet objects. This also creates and adds the BACnet object configuration.
5.16.3 SETTINGS

The following settings can be made for the M-Bus driver:

![M-Bus settings diagram]

5.16.4 CONFIGURATION FILES

The entire M-Bus configuration is saved in files. These can be transmitted from and to the universal gateway. You can edit the file directly without transmitting the file using the “Edit” button.

![M-Bus configuration files diagram]
5.17 HELP MENU

Information on the universal gateway is displayed here.

- **Information on:*** Displays information on the manufacturer of the universal gateway.
- **Online help:** You can view the Universal Gateway Manual as a PDF document here. You can search and even print the manual via the PDF viewer on your web browser.
- **BACnet PICS:** The BACnet PICS (protocol implementation conformance statement) document lists all supported BIBBs, object types, character sets and BACnet communication options.

*To display the file, your web browser must have a PDF viewer. This is usually standard. If you have any questions, please contact your system administrator.*

5.18 HELP MENU – DIAGNOSIS

Communication with connected systems often does not function immediately. The problem can be diagnosed using these tools.

5.19 HELP MENU – DIAGNOSIS – DEVICE INFO

Displays general information on the Gateway.

**Gateway type:** Manufacturer’s internal hardware designation.

**Protocol ID:** Manufacturer’s internal protocol ID.

**Version:** Universal gateway software version.

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

**Data points:** Displays the number of data points used in relation to the licensed number of data points.

**RAM:** Displays the size of the used and total RAM in Mbytes. Too little free space can lead to operational problems.

**Operating system:** Operating system version.
5.20 HELP MENU – DIAGNOSIS – SYSTEM IMAGE

All important information concerning the MBS Gateway is displayed under the System Image menu item. This gives you a compact overview of the system’s status and all installed and configured properties. This output is a snapshot at the time you activated the link. The output is not automatically updated.
5.21 HELP MENU – DIAGNOSIS – LOG FILES

The log output can be activated for every communication driver. These are outputs that can provide information on how the program is running and any communication problems. The historical log outputs can be viewed under “Display mapping”. “Start for 60 sec” provides the current log outputs within 60 seconds of pressing the button. This process can be ended by pressing “Stop” at any time.

5.22 HELP MENU – DIAGNOSIS – PING

The universal gateway IP connection can be checked via this menu item. The output presented after pressing the start button provides information on the accessibility of other network nodes. You must enter the IP address of the node you want to check in the field.
5.23 HELP MENU – DIAGNOSIS – TRACE ROUTE

The universal gateway IP connection can be checked via this menu item. The output presented after pressing the start button provides information on the network path to other network nodes. You must enter the IP address of the node you want to check in the field.

5.24 HELP MENU – DIAGNOSIS – PROCESS INFORMATION

The status of all operating system processes are provided here. The “Mem” (memory usage) and “CPU” (processor utilization) columns provide important information on the process status.
6. Protocol properties and data points

This is a general description only and independent of the existing gateway. With a gateway, different systems (e.g. Ethernet, RS485, ...) are connected to the building automation system for data exchange. Since each bus system works with its own data formats (protocols) (e.g. BACnet, EIB, 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 makes it possible to convert between any two or more formats. The internal intermediate format consists of individual data points that are to be regarded as the smallest amount of information. A data point classically consists of an address and a value.

Example: Analogue actual value (measured value) and an address which makes 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, such as 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.

6.1 CONTROL VIA CONFIGURATION DATA

The configuration of the gateway occurs via text files. There is one file per driver with protocol information (e.g. baud rate) with the extension .cfg and a file containing the definition of data points with the extension .txt. The file named dispatch.txt contains the mappings of the data points of the protocols to each other.

Examples of configuration files

<table>
<thead>
<tr>
<th>Name</th>
<th>Erw.</th>
<th>Größe</th>
<th>Datum</th>
<th>Attr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[.]</td>
<td>&lt;DIR&gt;</td>
<td></td>
<td>12.10.2010 08:35</td>
<td></td>
</tr>
<tr>
<td>ugwc1</td>
<td>txt</td>
<td>719</td>
<td>15.12.2009 15:22</td>
<td>a--</td>
</tr>
<tr>
<td>ugwc1</td>
<td>cfg</td>
<td>273</td>
<td>03.12.2009 11:09</td>
<td>a--</td>
</tr>
<tr>
<td>mbus1</td>
<td>txt</td>
<td>2.672</td>
<td>08.01.2010 21:01</td>
<td>a--</td>
</tr>
<tr>
<td>mbus1</td>
<td>cfg</td>
<td>1.386</td>
<td>08.01.2010 19:39</td>
<td>a--</td>
</tr>
<tr>
<td>driver</td>
<td>cfg</td>
<td>426</td>
<td>08.01.2010 19:55</td>
<td>a--</td>
</tr>
<tr>
<td>dispatch</td>
<td>txt</td>
<td>4.079</td>
<td>08.01.2010 21:01</td>
<td>a--</td>
</tr>
<tr>
<td>bac1</td>
<td>txt</td>
<td>10.293</td>
<td>08.01.2010 21:01</td>
<td>a--</td>
</tr>
<tr>
<td>bac1</td>
<td>cfg</td>
<td>11.279</td>
<td>08.01.2010 20:05</td>
<td>a--</td>
</tr>
</tbody>
</table>

The files all have the same basic structure: there are so-called sections (areas) that begin with a line containing a name 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. Upper and lower case are distinguished.
Example 4.1.1 Example of file format 1

# Comment first line of file
# First data point
[address1]
name = first sample data point
further_properties = 7
[address2]
# Another comment
name = second sample data point
# Comment last line

Example 4.1.2 Example of file format 2

# Data point list
[S 2000.BI 1]
name = 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 2000.AI 1001]
name = Slave 1 Value 1
query = pe
writecache = yes
bac_units = 95
bac_cov_increment = 0
bac_resolution = 0.1
6.2 CLASSIFICATION OF PROTOCOLS

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

**Protocol properties table**

<table>
<thead>
<tr>
<th>Topology</th>
<th>Point-to-point connection</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bus</td>
<td>With bus systems, multiple participants can access a transmission medium jointly. The opportunity to connect several devices is laborious: the devices must be uniquely defined, and access to the common transmission medium must be coordinated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication control</th>
<th>MasterSlave</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PeerToPeer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transmission control</th>
<th>Event-controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Polled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transmission medium</th>
</tr>
</thead>
</table>

6.3 TERM DEFINITION AND PROPERTIES OF DATA POINTS

Data points are differentiated according to different categories. The data points behave differently depending on their classification and must be treated differently according to the gateway configuration.

6.4 CLIENT-SERVER RELATIONSHIP, DATA POINTS

In a client-server relationship, a server is available to connected clients. The server accepts requests from clients, and then sends the requested data to the client. This is similar with regards to the relation of data points to each other.

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 is then the server. Through reading and writing, the automation station accesses these data points and is thus the client in this communication. Normally, all data points of a device are client as well as server data points. For some protocols, it can also happen that both client and server data points are in one device.

6.5 ACTUAL VALUES – SET VALUES, DATA POINTS

Actual values are values that are measured or calculated by the server, and the results are transferred to the client. Set values are values that are meant to affect the behaviour of the server through the client. In set values, another important distinction is 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 example
of an actual value is the mapping of a temperature sensor. A typical set value would be a nominal room temperature set value in a room controller.

6.6 ANALOGUE – BINARY – MULTI-LEVEL – MORE COMPLEX TYPES, DATA POINTS

Data points also differ as to which values are allowed.

We distinguish:

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

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

Example: An example of this is utilization times. At times, such values can not or only indirectly be shown in the gateway. These 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.

6.7 ABSTRACT DATA POINT IN DATA POINT SYSTEM

For the processing and forwarding of data points within the gateway, information that is exchanged by a protocol is shown in a generalized internal data point within the gateway. 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. Due to the decoupled internal data points, it is possible to simply add more protocols to the gateway without needing to change the complete configuration. Thus, the extension of the gateway system by adding another communication protocol in combination with all previously available protocols becomes possible.

6.7 STRUCTURING TECHNICAL ADDRESSES

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 character, an address type character and a protocol-specific address.

Example:

940.Y bac 34.AV 55  
Routing address 940  
Data point type Y analogue value  
Address type bac  
BACnet address 34.AV 55

6.9 ROUTING ADDRESS

With the routing address, called unit, the communication port of the gateway is selected. The routing address is defined for each communication port in the fabrication of the gateway. If a gateway has multiple connections of the same type, the unit typically increases by one. Example: If a gateway has FMS Profibus twice, the routing addresses are 250 and 251.
6.10 DATA POINT TYPE AS PART OF ADDRESS
In order to be able to use the address to derive specified information concerning possible uses, the address may contain a code letter. With this, the direction of data flow and the type of values are determined. The four main types are briefly presented here. For special purposes, other types come into consideration, which will be explained when used.

6.11 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 or 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.

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 the same data point for different data point types.

6.12 ADDRESS IDENTIFICATION AS PART OF ADDRESS
In order to be able to correctly interpret the protocol-specific part of the address, an abbreviation of the communication protocol is used.
Examples:
- mod for MODBUS addresses
- pbfms for Profibus FMS addresses
- bac for BACNet addresses

6.13 PROTOCOL-SPECIFIC ADDRESSES
The last part of the address is determined by the communication protocol.

Example for data point addresses in the gateway system

| 70.M eib 4/5 | Routing address 70 |
| Data point type M |
| Address type eib |
| EIB group address 4/5 |

| 940.Y bac 34.AV 55 | Routing address 940 |
| Data point type Y analogue value |
| Address type bac |
| BACnet address 34.AV 55 |

6.14 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 additionally be modified by 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

# Mapping of 1 bit value from Profibus FMS on MODbus
[250.M fms 22.2.4]
target = 60.S mod 3 coil 4

# Mapping of an analogue value from Profibus FMS on MODbus
[250.X fms 23.4]
target = 60.Y mod 7 holding 30
7. Configuration

7.1 DATA POINT FILES

Which data points are to be used and which properties these data points should have is 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 of a gateway with two EIB connections: 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 key words is standard:

<table>
<thead>
<tr>
<th>Key Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>Optionally, you can specify a 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. This is especially mentioned separately each time in the protocol description.</td>
</tr>
<tr>
<td>format</td>
<td>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 then be specified in the configuration, so the gateway can interpret this value correctly. The available data are protocol-dependent and are described in the respective chapters.</td>
</tr>
</tbody>
</table>
| writecache | Optional, possible values YES or NO (default). This parameter only has meaning for those parameters whose value is described by the gateway. If the option has the value 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 your value is NO, the value is discarded after a failed entry.  
A scenario for a meaningful application of this option would be to make 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 naturally cannot report the failure. When the connection has been restored, the fault condition should generally at least be transmitted afterwards.
A scenario where this behaviour is not desired would be the switching of room lighting. If at the time of the switching the EIB does not work, it is generally not desired that the switching takes place after the event (e.g. after several days). |
| query    | Specifies how the data point should be picked up via the corresponding protocol. Except for a few exceptions, which are described separately, the value permanent, abbreviated as pe, is used here. This value is standard. |
| Other options | For some protocols, there are other options that need to be projected at this point. The description can be found in each of the protocol chapters. |

7.2 CONFIGURATION FILES

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 .cfg.
Example of a gateway with two EIB connections:

*eib1.cfg* and *eib2.cfg*.

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

General parameters for each connection are established in the configuration file for each connection. 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 5.1. Modbus sample configuration file modslave1.cfg**

```plaintext
# Modbus configuration

[MOD]
baudrate = 9600
mode = RS485

# Individual slave address
address = 12
```

**7.3 SCHEMATIC FILE**

In this file, the allocations between the data points are defined. With the keyword value, a value can be specified to represent the source data point value which is to be transmitted to the target data point. The keyword threshold, depending on the data point type of the source data point, has two different meanings. If the source data point is an analogue value (data point type X or Y), then the specified value has the effect of a threshold, which means that only changes in value where the change is greater than the specified threshold are 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.

**7.4 STATUS LED**

The gateway provides quick orientation of the current operational state via a three-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, the status LED flashes green.

Table: status LED during normal operation

<table>
<thead>
<tr>
<th>Colour code</th>
<th>Definition</th>
<th>Data point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green flashing</td>
<td>Normal state</td>
<td>S LED info</td>
</tr>
<tr>
<td>Alternately orange/green flashing</td>
<td>Projected indicator</td>
<td>S LED warning</td>
</tr>
<tr>
<td>Alternately red/green flashing</td>
<td>Usually a failure parameter on defect</td>
<td>S LED error</td>
</tr>
<tr>
<td>Red flashing</td>
<td>All failure parameters on defect</td>
<td></td>
</tr>
<tr>
<td>Permanent red light</td>
<td>At least one driver does not start properly</td>
<td></td>
</tr>
</tbody>
</table>

The data points determine the LED colour code with ascending priority. The warning and error parameters are set automatically by the gateway in accordance with the projected failure parameters. The info parameter is available for the normal dispatch mechanism and may be used for optical signalling of a collective defect, for example.
## 7.5 Typical Data Point Schemata

This section shows schematically, how typical data point mappings are constructed. In the examples, pseudo addresses are used.

### Example of Actual Analogue Value

<table>
<thead>
<tr>
<th>Entry in file protA.txt</th>
<th>Entry in file protB.txt</th>
<th>Entry in file dispatch.txt</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>[X address1]</code></td>
<td><code>[Y parameter 16]</code></td>
<td># Mapping of the outside</td>
</tr>
<tr>
<td><code>name = outside temperature of protocol A</code></td>
<td><code>name = outside temperature to protocol B</code></td>
<td>temperature</td>
</tr>
<tr>
<td><code>query = pe</code></td>
<td><code>query = pe</code></td>
<td><code>[110.X protA address1]</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>target = 140.Y protB parameter 16</code></td>
</tr>
</tbody>
</table>

### Example of Actual Binary Value

<table>
<thead>
<tr>
<th>Entry in file protA.txt</th>
<th>Entry in file protB.txt</th>
<th>Entry in file dispatch.txt</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>[M address7]</code></td>
<td><code>[S parameter 23]</code></td>
<td># Mapping of pump failure</td>
</tr>
<tr>
<td><code>name = pump failure of protocol A</code></td>
<td><code>name = pump failure in protocol B</code></td>
<td><code>[110.M protA address1]</code></td>
</tr>
<tr>
<td><code>query = pe</code></td>
<td><code>query = pe</code></td>
<td><code>target = 140.S protB parameter 23</code></td>
</tr>
</tbody>
</table>

### Example of Multi-Level Set Value Without Feedback

<table>
<thead>
<tr>
<th>Entry in file protA.txt</th>
<th>Entry in file protB.txt</th>
<th>Entry in file dispatch.txt</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>[M address8]</code></td>
<td><code>[S parameter 29]</code></td>
<td># Mapping of pump failure</td>
</tr>
<tr>
<td><code>name = operating status of protocol A</code></td>
<td><code>name = operating status in protocol B</code></td>
<td><code>[110.M protA address8]</code></td>
</tr>
<tr>
<td><code>query = pe</code></td>
<td><code>query = pe</code></td>
<td><code>target = 140.S protB parameter 29</code></td>
</tr>
</tbody>
</table>

### Example of Multi-Level Set Value with Feedback

<table>
<thead>
<tr>
<th>Entry in file protA.txt</th>
<th>Entry in file protB.txt</th>
<th>Entry in file dispatch.txt</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>[S address8]</code></td>
<td><code>[S parameter 29]</code></td>
<td># Mapping of the operational status</td>
</tr>
<tr>
<td><code>name = operating status of protocol A</code></td>
<td><code>name = operating status in protocol B</code></td>
<td><code>[110.S protA address8]</code></td>
</tr>
<tr>
<td><code>query = pe</code></td>
<td><code>query = pe</code></td>
<td><code>target = 140.S protB parameter 29</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>[140.S protB parameter 29]</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><code>target = 110.S protA address8</code></td>
</tr>
</tbody>
</table>
Sample mapping of a two-stage actual value (1 = day, 2 = night on two binary values.)

Entry in file protA.txt
[M address83]
name = operating status of protocol A
query = pe

Entry in file protB.txt
[S parameter 129]
name = day mode in protocol B
query = pe
[S parameter 130]
name = night mode in protocol B
query = pe

Entry in file dispatch.txt
# Mapping of the operational status
[110.S protA address83]
threshold = 1
value = 1
target = 140.S protB parameter 129
[110.S protA address83]
threshold = 1
value = 0
target = 140.S protB parameter 130
[110.S protA address83]
threshold = 2
value = 0
target = 140.S protB parameter 129
[110.S protA address83]
threshold = 2
value = 1
target = 140.S protB parameter 130

Example of projecting MBus to BACnet

File: bac1.txt
[Y 2000.AI 1001]
name = Slave 1 Value 1
query = pe
writecache = yes
bac_units = 95
bac_cov_increment = 0
bac_resolution = 0.1

File: dispatch.txt
# Slave 1 Value 1
[60.X mbus P26 value 1]
target = 940.Y bac 2000.AI 1001

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

**Problem:** You want to access MBS Gateway and do not know the IP address.

**Solution 1:**

If your computer is set as a DHCP client (the default), you can use the DHCP server of the MBS Gateway to provide an IP address. Press and hold the compact reset switch for at least 10 but not more than 15 seconds. When the status LED flashes green/red alternately, the DHCP server is enabled. Then connect the network cable to your computer, the IP address will be assigned automatically. To access the configuration pages of the MBS Gateway web server, launch your preferred web browser and type the IP address 169.254.0.1 into the address field. Then enter your username and password. Default setting on delivery:

Username: gw  
Password: GATEWAY

The password can be changed in the menu item Setup. The MBS Gateway home page is polled and displayed.

**Solution 2:** (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 to read out on the basis of the reports. Start by selecting the Wireshark program and 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 MBS Gateway, and wait for the output shown in the picture.

The IP is shown below:

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

![Image](image-url)

**Problem:** You do not know the password to log on to the web console.
**Solution:** In this case, you can only revert the MBS Gateway back to the factory settings.

**Attention: In this case, you will lose all settings and parametrizations of the compact**

To set the MBS Gateway back to the default setting, press and hold the reset button for longer than 15 seconds. The status LED flashes orange, and after copying the factory configuration a restart will be made.

Then the gateway should be reset to the default settings:

- **IP address:** 169.254.0.1
- **Username:** gw
- **Password:** GATEWAY

**Problem:** RS485 connection problems

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

**Problem:** RS485 A B wires reversed.

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