

Automation Gateway Modbus



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WAGO Kontakttechnik GmbH & Co. KG

Hansastraße 27
D - 32423 Minden

Phone: +49 571/887 – 0
Fax: +49 571/887 – 844169
E-Mail: ✉ info@wago.com
Internet: 🌐 www.wago.com

Technical Support

Phone: +49 571/887 – 44555
Fax: +49 571/887 – 844555
E-Mail: ✉ support@wago.com

Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

E-Mail: ✉ documentation@wago.com

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

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Table of Contents

Terms	5
1.1 Typographical Conventions.....	5
1.2 Legal Information	6
Security	8
2.1 General Safety Regulations	8
2.2 Indirect Safety	8
Visualization Minimum Requirements	9
Software Versions.....	10
Software Update.....	11
WBM Settings	13
6.1 Change WBM Passwords	14
6.2 Set the IP-Adress	15
6.3 Setting the Date and Time	16
Application.....	17
7.1 Open the Web Visualization	17
7.2 Logging into the Application	17
7.3 General.....	18
7.4 Data Backup.....	19
7.5 Projekteinstellungen	21
7.6 Information	23
7.7 Data Points.....	25
7.7.1 CAN Status.....	27
7.7.2 Modbus Settings.....	28
7.7.2.1 Modbus TCP.....	30
7.7.2.2 Modbus RS485.....	31
7.7.3 Filter	32
7.7.4 Show Datapoints	33
7.7.5 Data Point Configuration	34
7.7.5.1 Data Point Table.....	34
7.7.5.2 Select.....	34
7.7.6 Export Data Point List.....	36
Modbus	38
8.1 General.....	38
8.2 Device ID.....	38
8.3 Supported Function Codes	38
8.4 Modbus Object Types	38
8.5 Extended Data Types (32-Bit).....	39

- 8.6 Substitute Values & Exception Codes..... 39
- 8.7 Addressing Data Points..... 39
- 8.8 Default Settings..... 40
- 8.9 Modbus Error Codes..... 41
- Multi-Boiler Mode..... 42**
- 9.1 CAN Status - Multi-Boiler Mode..... 42
- 9.2 Data Point Table - Multi-Boiler Mode..... 43
- Modbus RS485..... 44**
- Quick Start Guide..... 46**
- Diagnostic..... 47**
- 12.1 PFC200 Indicators (750-8212)..... 47
 - 12.1.1 “SYS” Diagnostic LED..... 48
 - 12.1.2 “RUN” Diagnostic LED..... 48
 - 12.1.3 “I/O” Diagnostic LED..... 48
 - 12.1.4 “MS” Diagnostic LED..... 48
 - 12.1.5 “NS” Diagnostic LED..... 48
 - 12.1.6 “U1” Diagnostic LED..... 49
 - 12.1.7 “U2-U6” Diagnostic LED..... 49
- 12.2 WAGO 750-652 Serial Interface..... 50
- 12.3 WAGO 750-658 CAN Module..... 51
- 12.4 Alarm Banner Messages..... 52
- Setup..... 53**
- Appendix..... 54**
- 14.1 Protected Rights..... 54

Terms

1.1 Typographical Conventions





Number Notation

100	Decimals: Normal notation
0x64	Hexadecimals: C-notation
'100'	Binary: In single quotation marks
'0110.0100'	Nibbles separated by a period

Text Formatting

<i>italic</i>	Names of paths or files
bold	Menu items, entry or selection fields, emphasis
Code	Sections of program code
>	Selection of a menu point from a menu
"Value"	Value entries
[F5]	Identification of buttons or keys

Cross References / Links

	Cross references/links to a topic in a document
	Cross references / links to a separate document
	Cross references / links to a website
	Cross references / links to an email address

Action Instructions

- ✓ This symbol identifies a precondition.
- 1. Action step
- 2. Action step
 - ⇒ This symbol identifies an intermediate result.
- ⇒ This symbol identifies the result of an action.

Lists

- Lists, first level
 - Lists, second level

Figures

Figures in this documentation are for better understanding and may differ from the actual product design.

Notes

DANGER

Type and source of hazard

Possible consequences of hazard that also include death or irreversible injury

- Action step to reduce risk

WARNING

Type and source of hazard

Possible consequences of hazard that also include severe injury

- Action step to reduce risk

CAUTION

Type and source of hazard

Possible consequences of hazard that include at least slight injury

- Action step to reduce risk

NOTICE

Type and source of malfunction (property damage only)

Possible malfunctions that may restrict the product's scope of functions or ergonomics, but do not lead to foreseeable risks to persons

- Action step to reduce risk

Note


Notes and information

Indicates information, clarifications, recommendations, referrals, etc.

1.2 Legal Information

Intellectual Property

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Third-party trademarks are referred to in the product documentation. The “®” and “™” symbols are omitted hereinafter. The trademarks are listed in the Appendix ( **Protected Rights [▶ 54]**).

Subject to Change

The instructions, guidelines, standards, etc., in this manual correspond to state of the art at the time the documentation was created and are not subject to updating service. The installer and operator bear sole responsibility to ensure they are complied with in their currently applicable form. WAGO Kontakttechnik GmbH & Co. KG retains the right to carry out technical changes and improvements of the products and the data, specifications and illustrations of this manual. All claims for change or improvement of products that have already been delivered – excepting change or improvement performed under guarantee agreement – are excluded.

Security

2.1 General Safety Regulations

- This documentation is part of the product. Therefore, retain the documentation during the entire service life of the product. Pass on the documentation to any subsequent user of the product. In addition, ensure that any supplement to this documentation is included, if necessary.
- Any actions related to the use of WAGO software may only be performed by qualified staff with sufficient knowledge to use the respective PC system.
Steps in which files are created or changed on a PC system may only be performed by qualified employees with sufficient knowledge in the administration of the PC system used in addition to file creation or modification.
Steps that change the PC system's behavior within a network may only be performed by qualified employees with sufficient knowledge of administration of the responsible network.
- Comply with the laws, standards, guidelines, local regulations and accepted technology standards and practices applicable at the time of installation.

2.2 Indirect Safety

- If automation solutions are implemented that can cause personal injury or major property damage in the event of failure, you must take appropriate measures to ensure that the system remains in a safe operating state even in the event of failure.
- Give all products in a network different IP addresses.
- Never connect a PC on which a DHCP server is installed to a global network. In larger networks, there is usually already a DHCP server that can cause collisions and subsequent network failure.
- Use only the latest security software.
- Uninstall or disable all software components or programs on your PC that are not required for the intended use.
- If there are access problems, check whether the **e!RUNTIME** runtime system is activated on the connected devices. Use a software tool (depending on the hardware) to perform the check or use the Web-Based Management System.

Visualization Minimum Requirements

Min. 1280 x 720 screen resolution is recommended to use the Automation Gateway web visualization.

The following browsers have been successfully tested with the Automation Gateway:

- Google Chrome Version 72.0
- Mozilla Firefox Version 65.0
- Microsoft Edge Version 44.17763

i Note

Web Visualization

Only one browser (client) at a time can access Automation Gateway web visualization.

i Note

Other Browsers

It may be possible to use other browsers. Functional limitations cannot be ruled out.

i Note

Modbus knowledge is required!

This manual describes connecting the Automation Gateway Modbus (TCP/RTU) to a Modbus master. It is assumed that the user has a basic knowledge of Modbus.

Software Versions

The Automation Gateways are delivered with pre-installed software from the factory. The software may be out of date. Furthermore, incompatibility with the Viessmann heat generator cannot be excluded. It is therefore recommended to always use the latest software version of the Automation Gateway.

Note

Software Versions

The current software versions of the Automation Gateway and the interface for the heat generator can be downloaded from the WebVisu “Information” menu under “Version Gateway” / “Version Interface”. See also “Information”.

Section “Software Update” below describes in detail how to update the Automation Gateway software.

Software Update

The software update requires you to download the following installation files at [Automation Gateway](#) as a zip archive.

Note

The existing settings are retained!

The configuration parameters of the data points (selection) as well as the user administration (gateway / WBM) are cached during installation on the micro SD card and are retained after the update.

Note

You need the WAGOupload software!

The steps described below require that you have downloaded WAGOupload version 1.12.0.0 or higher. The software is available at www.wago.com for download free of charge.

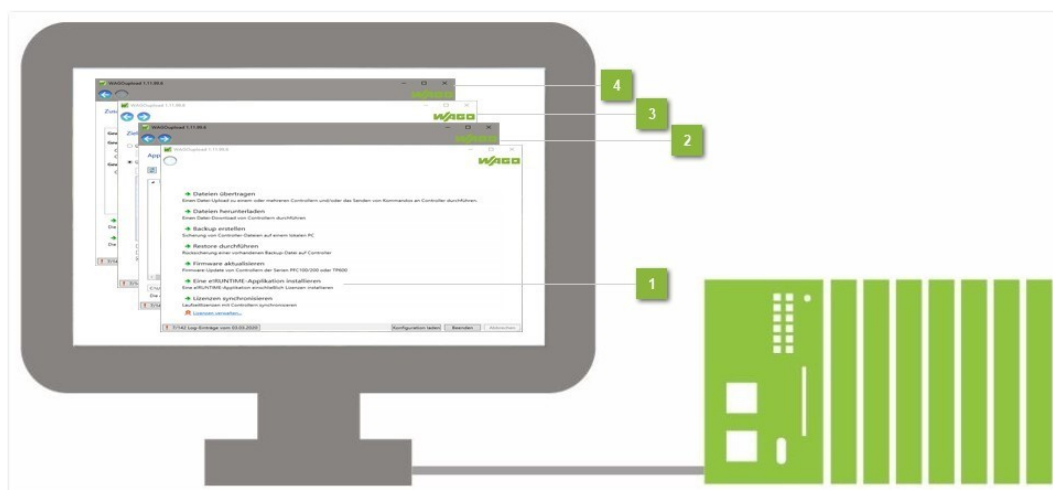


Figure 1: WAGOupload Installation

Launch WAGOupload [1]

1. Launch the “WAGOupload” software.
2. Select the menu item “Install an e!RUNTIME Application”.

Note: If the WAGOupload execution file “.exe” is in the same directory as the installation file “.appload”, WAGOupload starts in a simplified view. Step 2 “Select an Application Installation File” is skipped.



Figure 2: WAGOupload Simplified View

Select Application File [2]

1. In the file browser, navigation to the “/Software” subfolder of the ZIP archive.
2. Select the installation file with the .appload extension.

Select Target Controller [3]

1. In the dialog, enter the IP address of your controller or launch the search function. The identified devices are listed.
2. Select the controller where the application should be installed.

i Note

Assign an IP address!

The target controllers must have an IP address to allow installation via WAGOupload. See also Section [🔗 Set the IP-Address \[▶ 15\]](#).

Start Installation [4]

A summary of the settings previously made is displayed. The installation can then be started. The software is installed on the device after the reboot.

i Note

The IP address is retained when the software is updated!

After the software update, the previously set IP address of the Automation Gateway is retained.

i Note

Observe the WAGOupload manual!

Detailed information on using WAGOupload can be found in the software manual, which is also available to download at www.wago.com.

WBM Settings

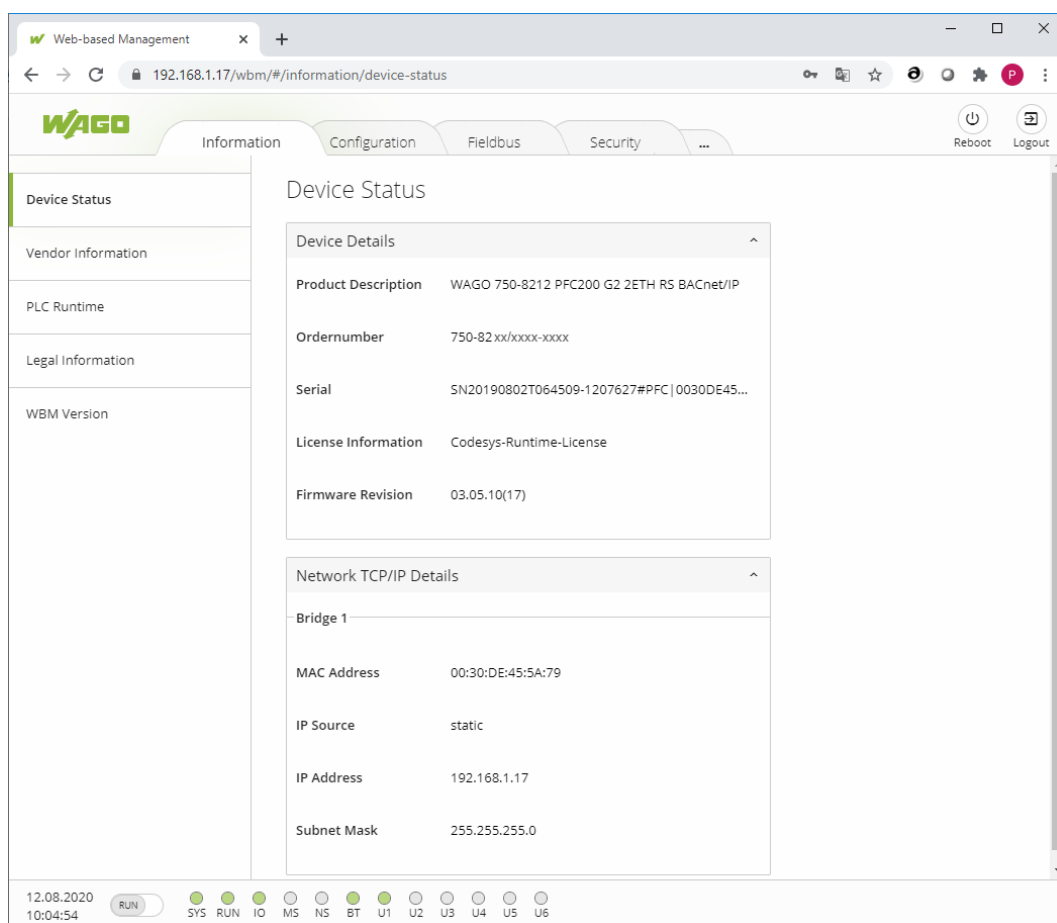


Figure 3: WBM Settings

You can call up Web-Based Management (WBM) in the Internet browser by entering the following: “`https://<Controller-IP>/wbm`” (here: `https://192.168.1.17/wbm`). A login dialog appears. By entering the WAGO default user “admin” and the associated password (see table at [🔑 Change Password \[▶ 14\]](#)), the page above opens.

As long as the password corresponds to the initial state as delivered, a security message is displayed on the page. Bypassing of the security message (Default Password Security message: you are using the default password!) must be approved to open the WBM.

6.1 Change WBM Passwords

The screenshot shows the WAGO WBM User Configuration interface. The left sidebar contains a menu with items: PLC Runtime, Networking, Clock, Administration, Package Server, Mass Storage, Software Uploads, Ports and Services, Cloud Connectivity, SNMP, and Users (highlighted). The main content area is titled 'WBM User Configuration' and has tabs for Information, Configuration (selected), Fieldbus, Security, and Diagnostic. A blue notification bar at the top states: 'Changes will take effect immediately. For reasons of security, we strongly recommend that you change all passwords including those of Linux ® users. For details, please refer to the manual.' Below this is a 'Change Passwords' dialog box with the following fields: 'Select User' (dropdown menu showing 'admin'), 'Old Password' (text input), 'New Password' (text input), and 'Confirm Password' (text input). A 'Set Password' button is located at the bottom right of the dialog box.

Figure 4: Figure : Change Passwords

To change the passwords, please follow these steps:

1. Login as the user "admin" and confirm this by clicking **[Submit]**
 - ⇒ If you have not yet changed the password, the following message appears: „Default Password Security message: you are using the default password!“
2. In the WBM, switch to the tab "Configuration".
3. Then click to the submenu **Users**.
4. Assign new passwords for the default users in the "Change Password" dialog.

User name	Rights	Default Password
admin	All (Administrator)	wago
user	Limited	user

i Note

Change passwords!

The default passwords are documented in these instructions and thus do not offer adequate protection. Change the passwords to meet your particular needs! If you do not change these passwords, a warning will appear each time you call up a website after logging in.

i Note

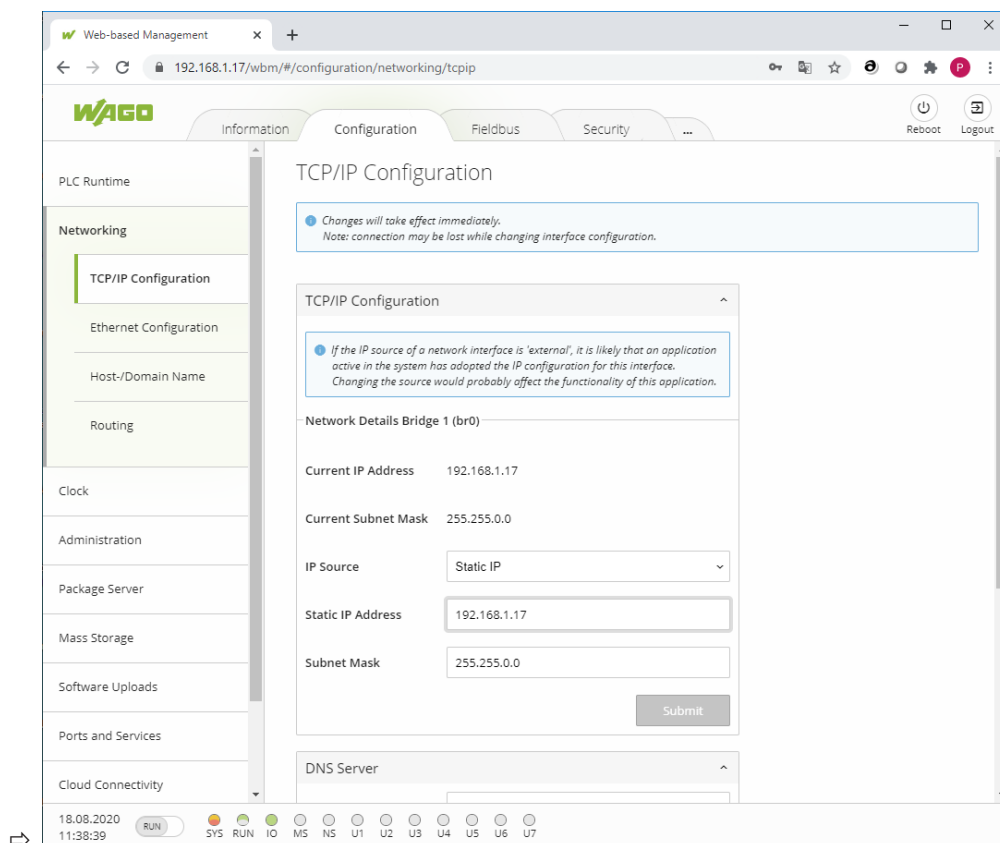
Forgotten password!

If you have forgotten the password for a gateway, please contact Viessmann Support at [Automation Gateway](#).

6.2 Set the IP-Adress

The IP address of the Automation Gateway is 192.168.1.17 by default. Follow the steps below to change the IP address in the Automation Gateway WBM:

1. Launch the Web-based Management (WBM) in the browser by entering the following in the address bar: "https://<Controller-IP>/wbm" (here: https://192.168.1.17/wbm).
2. In the Configuration tab, navigate to the Networking TCP/IP menu (you may need to log in with the WBM username and password, see "[Change Passwords Login \[▶ 14\]](#)").



3. Confirm your entry by clicking the **[Submit]** button.
 - ⇒ The IP address is applied immediately.

6.3 Setting the Date and Time

The system clock for the WAGO controller should be set to the current time and date, so that e.g., alarm messages in the alarm banner display the correct timestamp.

Time and date can be set in the web-based management of the Automation Gateway in the "Configuration" tab in the **Clock** menu. These settings are described in detail in the manual for the WAGO 750-8101 PFC Controller.

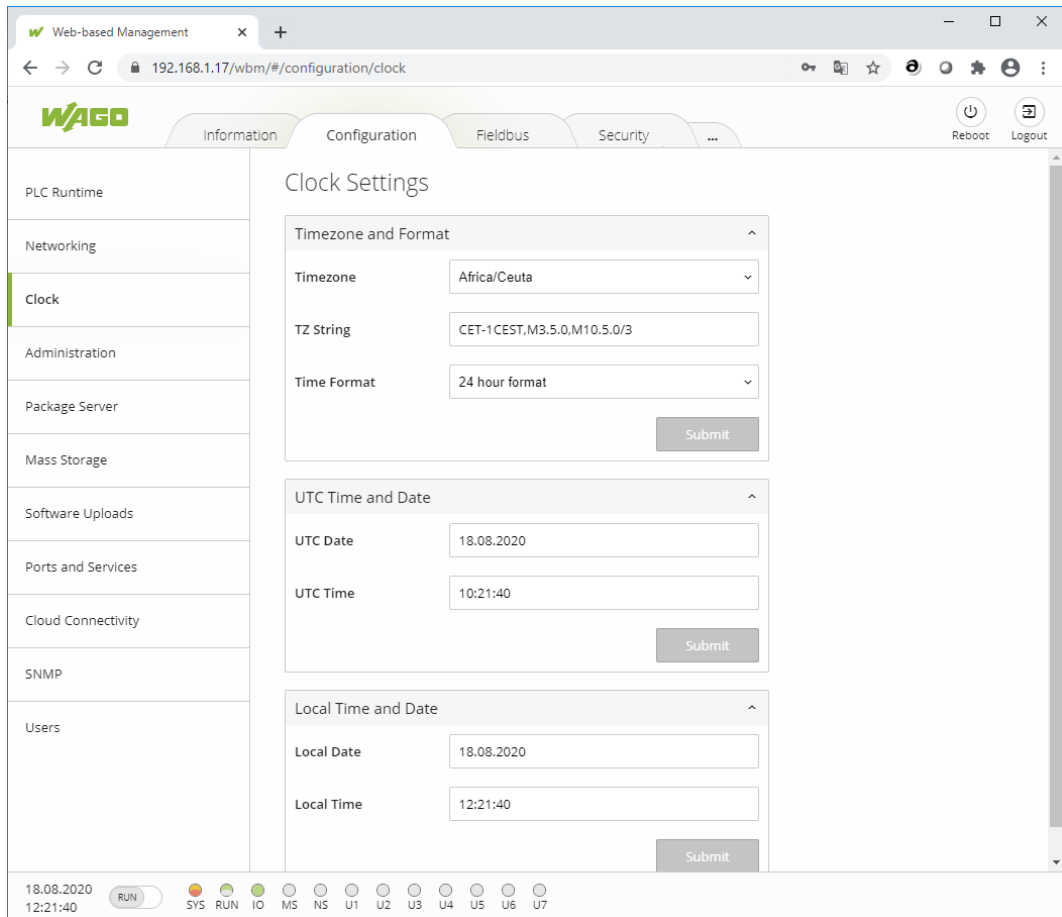


Figure 5: Figure : Setting the Date and Time

Note

More information is available in the respective product manuals!

You can find more information about using the Web-based Management in the product manuals of the respective controllers. You can download the manuals in the download area under www.wago.com.

Application

7.1 Open the Web Visualization

The “Automation Gateway” application is called up in the Web browser via the following link: “https://<Controller-IP>/webvisu/webvisu.htm” (e.g., <https://192.168.1.17/webvisu/webvisu.htm>).

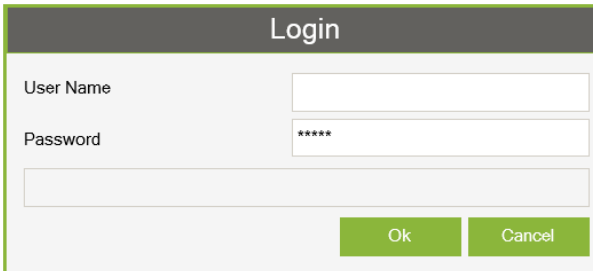
Note

Browser Utilization

You can find details about using the Web browser in Section Visualization Minimum Requirements

7.2 Logging into the Application

1. Click the [**Login**] button. The “Login” dialog opens.



⇒

2. Log in using your username and password.
 3. Confirm your entry by clicking [**OK**].
- ⇒ After a successful login, the main window opens.

7.3 General

You can find **Information**, **Project settings** and **Data backup** submenus in the “General” tab that are described in the sections below.

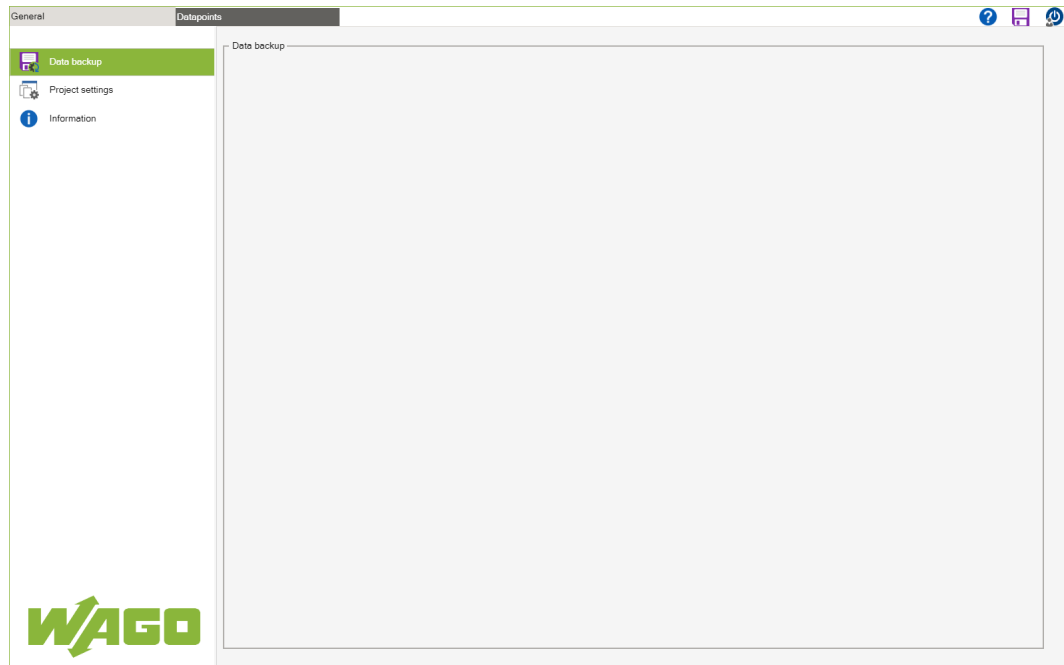


Figure 6: Figure : General

7.4 Data Backup

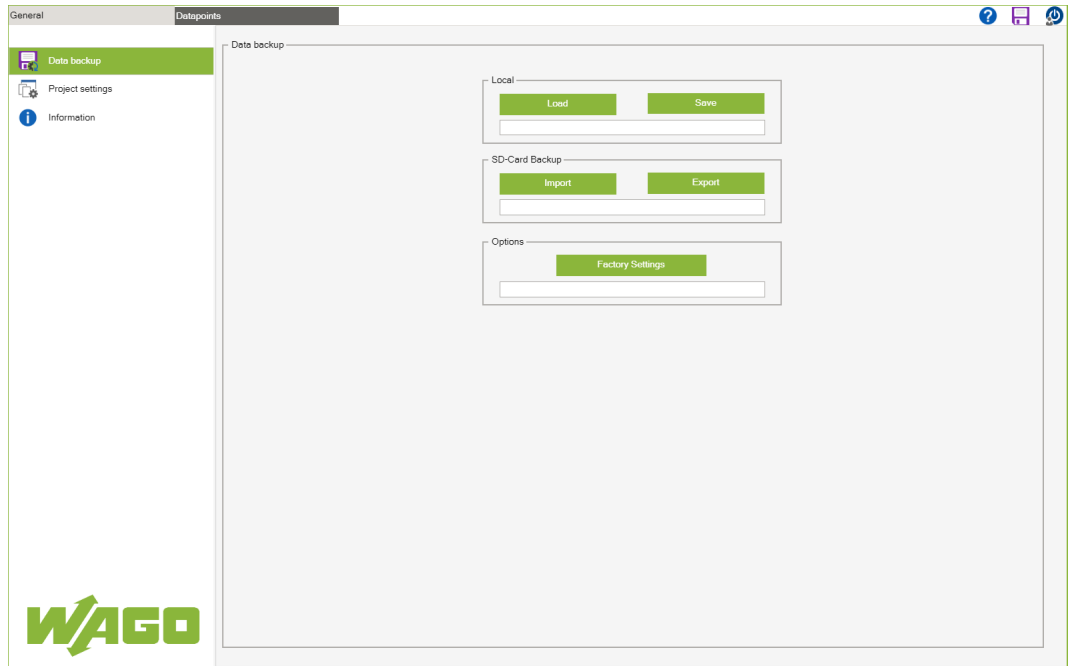


Figure 7: Figure : Data Backup

The buttons at the top right are described in Section General Buttons.

Local

Designation	Description
Load	Click the [Load] button to load the project settings from the internal memory of the Automation Gateway.
Save	Click the [Save] button to save the project settings to the internal memory of the Automation Gateway. Note: To apply change settings in the Automation Gateway, you have to back up the local. Otherwise, any changed settings are lost after rebooting the gateway!

SD Card Backup

The backup function can be used, for example, to transfer an analog configuration to multiple gateways.

Designation	Description
Import	Click the [Import] button to open the following dialog: <div data-bbox="687 1565 1294 1765" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Load project settings from SD-Card?</p> <div style="display: flex; justify-content: center; gap: 20px;"> Yes Cancel </div> </div> <p>Click [Yes] to load the project settings from external memory (SD card). All settings saved in the Automation Gateway are lost and replaced by the data loaded from the SD card.</p> <p>Click [Cancel] to cancel the operation.</p> <p>Note: This function is only available if there is an SD card with the content of a "VAG_Config.Recipes.txtrecipe" file in the SD card slot of the Automation Gateway.</p>

Designation	Description
Save	Click the [Save] button to save the project settings to the internal memory of the Automation Gateway.
Export	<p>Click the [Export] button to open the following dialog:</p> <div style="border: 1px solid green; padding: 10px; text-align: center;"> <p>Would you like to save the project settings internal before exporting to SD-Card?</p> <p>Yes No Cancel</p> </div> <p>Click [Yes] to first save the project settings to the internal memory of that Automation Gateway and then to export the project settings to the SD card.</p> <p>Click [No] to export the project settings to the SD card.</p> <p>Click [Cancel] to cancel the operation.</p> <p>Note: This function is only available if there is an SD card in the SD card slot of the Automation Gateway.</p> <p>Note: The export function can be used, for example, to execute an analog configuration on multiple gateways.</p>

Options

Designation	Description
Factory Settings	<p>Click the [Factory Settings] button to open the following dialog:</p> <div style="border: 1px solid green; padding: 10px; text-align: center;"> <p>Reset to factory default?</p> <p>Ok Cancel</p> </div> <p>Click [OK] to reset all project-specific settings to the values specified by the manufacturer and to then save them to the internal memory of the Automation Gateway.</p> <p>Note: The project settings are part of the project-specific settings (Project Information, Units and Language).</p> <p>Note: User passwords are not reset to the factory settings.</p> <p>Note: To apply change settings in the Automation Gateway, you have to back up the local. Otherwise, any changed settings are lost after rebooting the gateway!</p> <p>Click [Cancel] to cancel the operation.</p>

7.5 Projekteinstellungen

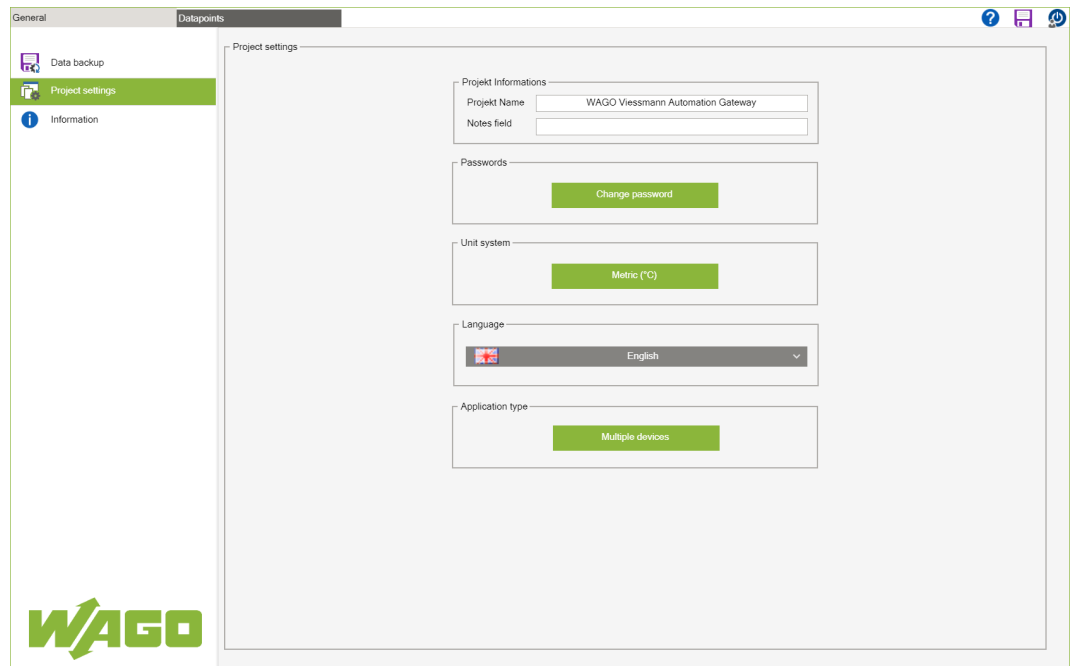
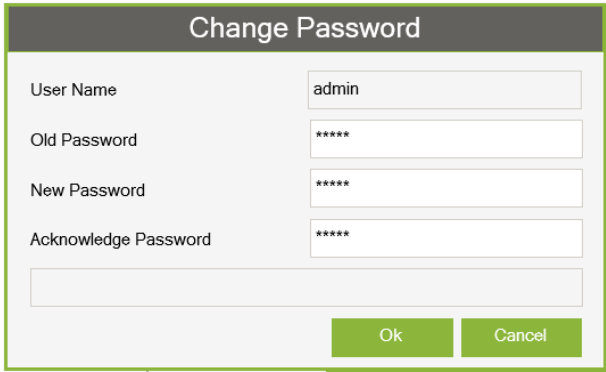


Figure 8: Project Settings

Project Information

Name	Description
Project name	80-character input field for the project name
Note field	100-character input field for notes

Change Password

Name	Description
Change password	<p>Click the [Change password] button to open the dialog to change the password.</p>  <p>You must enter the old and the new passwords in this dialog. You must confirm the password for security reasons.</p> <p>Click [Ok] to change the password and close the dialog. If an error is made in putting the password, the dialog remains open with the corresponding error message.</p> <p>Click [Cancel] to cancel the operation.</p>

Units

Bezeichnung	Beschreibung
Units	You can define the unit settings for all dimensions of the Automation Gateway. You can choose between the metric and imperial unit systems.

Language

Name	Description
Language	You can select the language for the user interface and datapoints in this selection field: <ul style="list-style-type: none">• German• English• French

Application type

Name	Description
Application type	In the selection field, you can choose between "Single device" or "Multiple devices". If "Single device" is selected, the gateway supports only one heat generator. If "Multiple devices" is selected, the gateway supports up to eight heat generators simultaneously (for further details, see chapter " Multiple boiler operation [▶ 42] ").

7.6 Information

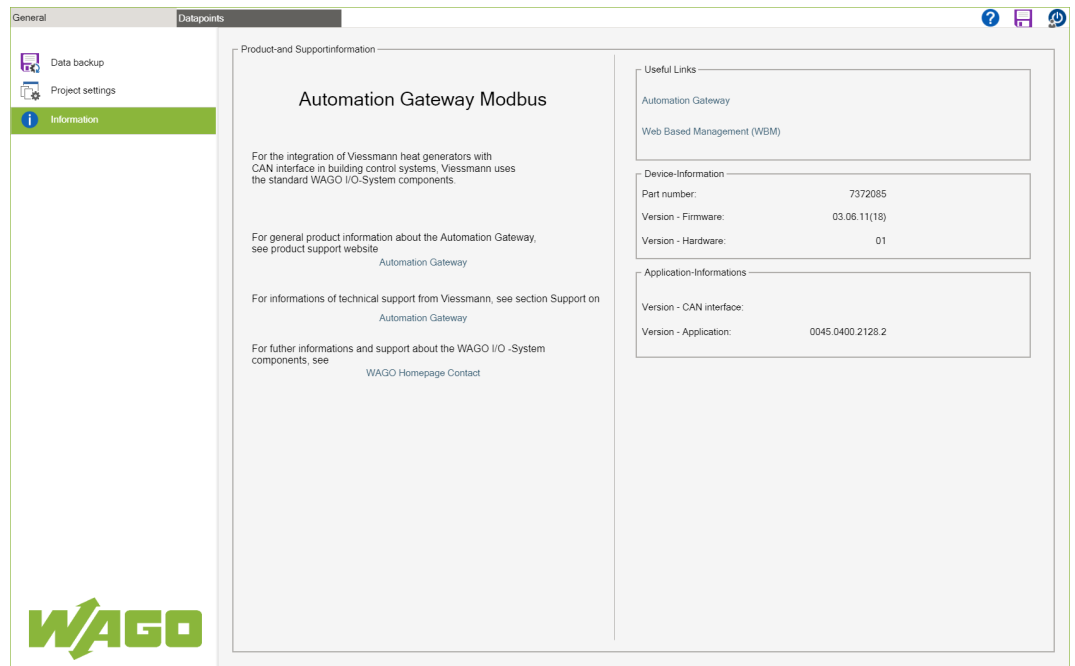


Figure 9: Information

Product and Support Information

Contact information at WAGO Kontakttechnik GmbH & Co. KG and Technical Support at Viessmann.

Useful Links

Designation	Description
Automation Gateway	Click the link to open a new browser window with the URL for the WAGO Automation Gateway information website. Note: If the browser pop-up window is blocked, clicking the link will not open a new browser window.
Web-Based Management (WBM)	Click the link to open a browser window with the URL for Web-Based Management of the Automation Gateway.

i Note

Note the hardware!

The Automation Gateway Modbus operates on the WAGO controller with item No. 750-8212.

Device Information

Designation	Description
Item Number	Viessmann item number of the Automation Gateway (Modbus or BACnet).
Version - Firmware	Firmware version of the Automation Gateway (Modbus or BACnet).
Version - Hardware	Hardware version of the Automation Gateway (Modbus or BACnet).

Application Information

Designation	Description
Version – CAN Interface	Software version of the heat generator interface
Version - Application	Automation Gateway software version Note: The version is only displayed when there is an active connection to the heat generator.

7.7 Data Points

General		Datapoints							
CAN		Modbus	Show datapoints	Export data point list	Filter				
Lead device	Lag device 1	Lag device 2	Lag device 3	Lag device 4	Lag device 5	Lag device 6	Lag device		
No.	Selection	Group function	Datapoint name	Tech. reference	Unit	Value	Read/write permissions	Modbus type / address	
1	<input checked="" type="checkbox"/>	Automation gateway	Connection to the heat generator	---	Status	1	ro	ST-10009	
2	<input checked="" type="checkbox"/>	External request	Flow temperature set point	1604	°C	0.0	rw	HO-40002	
3	<input checked="" type="checkbox"/>	External request	External demand	921.0	Status	0	rw	HO-40003	
4	<input checked="" type="checkbox"/>	External request	External demand: Status	921.1	Status	0	ro	IN-30001	
5	<input checked="" type="checkbox"/>	External request	Set DHW temperature	1167	°C	50.0	rw	HO-40004	
6	<input checked="" type="checkbox"/>	External request	DHW operating program: Set	538.0	Status	0	rw	HO-40005	
7	<input checked="" type="checkbox"/>	External request	DHW operating program: Actual	538.1	Status	0	ro	IN-30002	
8	<input type="checkbox"/>	External request	Operating program, heat generator: Set	1605.0	Status	0	rw	HO-40006	
9	<input checked="" type="checkbox"/>	External request	Operating program, heat generator: Actual	1605.1	Status	0	ro	IN-30003	
10	<input checked="" type="checkbox"/>	External request	HC1 set	537.0	Status	0	rw	HO-40007	
11	<input checked="" type="checkbox"/>	External request	HC1 actual	537.1	Status	0	ro	IN-30004	
12	<input type="checkbox"/>	External request	HC1: Set temp.	1627.0	°C	20.0	rw	HO-40008	
13	<input type="checkbox"/>	External request	HC2 set	1612.0	Status	0	rw	HO-40009	
14	<input type="checkbox"/>	External request	HC2 actual	1612.1	Status	0	ro	IN-30005	
15	<input type="checkbox"/>	External request	HC2: Set temp.	1628.0	°C	20.0	rw	HO-40010	
16	<input type="checkbox"/>	External request	HC3 set	1613.0	Status	0	rw	HO-40011	
17	<input type="checkbox"/>	External request	HC3 actual	1613.1	Status	0	ro	IN-30006	
18	<input type="checkbox"/>	External request	HC3: Set temp.	1629.0	°C	20.0	rw	HO-40012	
19	<input type="checkbox"/>	Device operation	Flow temperature	268.0	°C	96.7	ro	IN-30008	
20	<input type="checkbox"/>	Device operation	Outside temperature	274.0	°C	0.0	ro	IN-30009	
21	<input type="checkbox"/>	Device operation	Flue gas temperature	331.0	°C	0.0	ro	IN-30011	

Figure 10: Figure : Data Points

CAN Status

Click the **[CAN Status]** button to display all information related to the CAN-Bus. The dialog is described in the Section CAN Status.

MODBUS Settings

Click the **[Modbus Settings]** button to display all Modbus-related information. The dialog is described in the Section [Modbus Settings](#) [▶ 28].

Show Data Points

Designation	Description
Show Data Points	<p>Click the [Show data points] button to open the following dialog:</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Show datapoints</p> <p>Are you sure you want to perform this action?</p> <p>Yes Cancel</p> </div> <p>Click [Yes] to query the availability of data points in the heat generator. This function is described in Section Data Points > Show Data Points [▶ 33] in detail.</p> <p>Click [Cancel] to cancel the operation.</p>

Export Data Point List

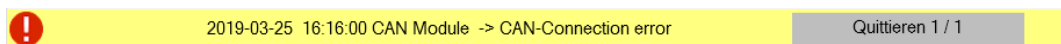
Designation	Description
Export Data Point List	<p>Click the [Export Data Point List] button to open the following dialog:</p> <div style="border: 1px solid green; padding: 10px; text-align: center;"> <p>Create data point list as a CSV file?</p> <p>Ok Cancel</p> </div> <p>[OK] generates a data point list as a CSV file. You can find a detailed description of this function in Section Data Points > Export Data Point List [36].</p> <p>Click [Cancel] to cancel the operation.</p>

Filter

Click the **[Filter]** button to display a filter dialog. The dialog is described in the Section Filter.

Alarm Banner

If an error is detected in the Automation Gateway Modbus, an error message is displayed with the timestamp in the alarm banner. The timestamp is only displayed on the gateway and not transferred to the building control system. A typical error message appears as follows:



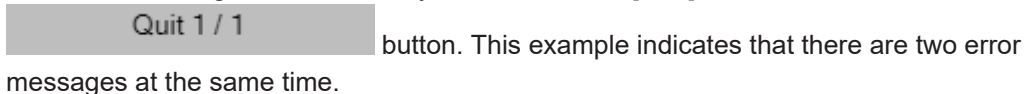
To acknowledge the alarm, click the **[Ack]** button. If the error persists, the acknowledged error message appears again in the alarm banner after a few seconds.

You can find a detailed description of all alarm banner error messages in Section [Alarm Banner – Messages \[52\]](#).

i Note

Error messages!

Multiple error messages can arise in the Automation Gateway at the same time. The number of messages is indicated by a number in the **[Ack]**



i Note

Contact Support!

If the remedy does not lead to the error messages being permanently acknowledged, please contact Viessmann Support at [Automation Gateway](#).

Data Points

All data points available in the heat generator are displayed in tabular form. The user can switch the data points ON/OFF and configure the data points. Data Point configuration is described in Section [Data Point Configuration \[▶ 34\]](#).

7.7.1 CAN Status

This section describes the communication status between the Automation Gateway and the heat generator (application type single boiler).

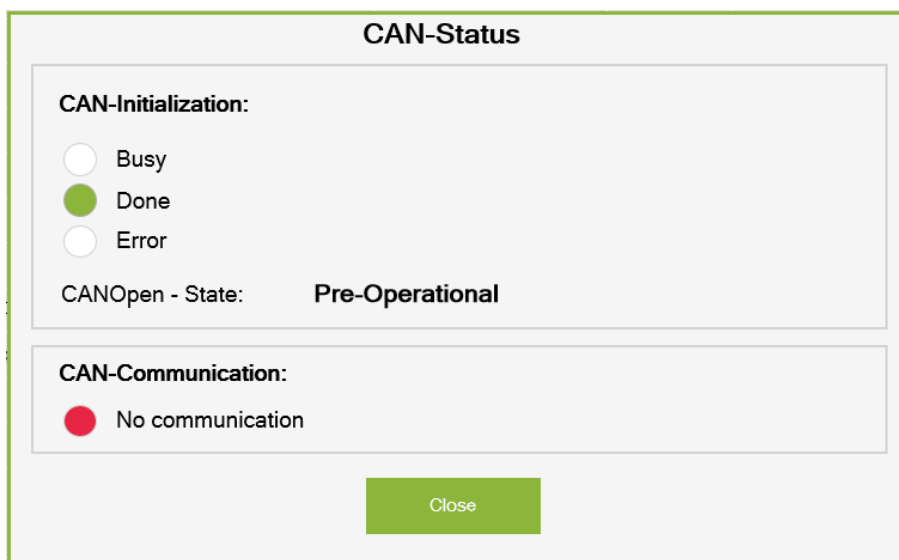


Figure 11: CAN Status for "Single Boiler" Application Type

CAN-Initialization

Describes the initialization phase of the CAN connection.

Table 1: CAN Initialization

State	Light Color	Description	Corrective Action
Running	Green	Initializing	---
Completed	Green	Initialization completed successfully	---
Error	Red	An error has occurred during CAN initialization.	Please contact Viessmann Support under Automation Gateway .

CAN Communication

Indicates the communication status between the Automation Gateway and heat generator status:

Table 2: CAN Communication

State	Light Color	Description	Corrective Action
Active	Green	Connection with the heat generator	---
No communication	Red	No connection with the heat generator	Check CAN connection (plug, line, terminating resistor, heat generator ON). If you cannot eliminate the error, please contact Viessmann Support at Automation Gateway .

Note**CAN Status in Cascade Mode**

If “Multi-boiler” application type is selected under “Cascaded Devices” under Project Settings the area for CAN communication looks different than shown above. For more details, see Section [CAN Status in Cascade Mode \[▶ 42\]](#).

7.7.2 Modbus Settings

To establish communication between the Modbus slave/server (Gateway) and a Modbus master/client device, the communication parameters must first be configured accordingly.

Modbus settings

Device parameters

Unit ID: 1

Communication Settings

Modbus RS485

Frame type: RTU

Baud rate: 19200

Data bits: 8

Parity: Even

Stop bits: One

Close

Figure 12: MODBUS settings

Device parameters

Designation	Description
Device ID	<p>Each Modbus slave (master) requires a unique address (device ID). The master needs this address to identify the slave in the network.</p> <p>The value range of the device ID is between 1 and 247.</p> <p>Note: For Modbus communication based on TCP/IP, this parameter is irrelevant since communication occurs via the unique IP address of the Automation Gateway. If there is a Modbus TCP/RTU Converter on the Automation Gateway Modbus TCP, the device ID may be required for unique identification of the Gateway on the serial bus.</p> <p>Note: In a serial network (e.g., RS485 – Modbus RTU/ASCII) with multiple slaves, care must be taken that the Automation Gateway must have unique device ID, so that a Modbus master can address the right slave device. The device ID may only appear once in the serial network. Otherwise, communication problems may arise.</p>

Communication Settings

The specific Modbus connection settings are made in this area. The Automation Gateway Modbus supports two different transmission methods:

- Modbus TCP/IP
- Modbus RS485

The protocol-specific settings of the above transmission method are described in detail in the subsections below.

7.7.2.1 Modbus TCP

For communication via Modbus TCP, the “**Modbus TCP**” option must be selected. In this method, data is transmitted as TCP/IP packets via the X1 / X2 network connections of the controller (750-8212).

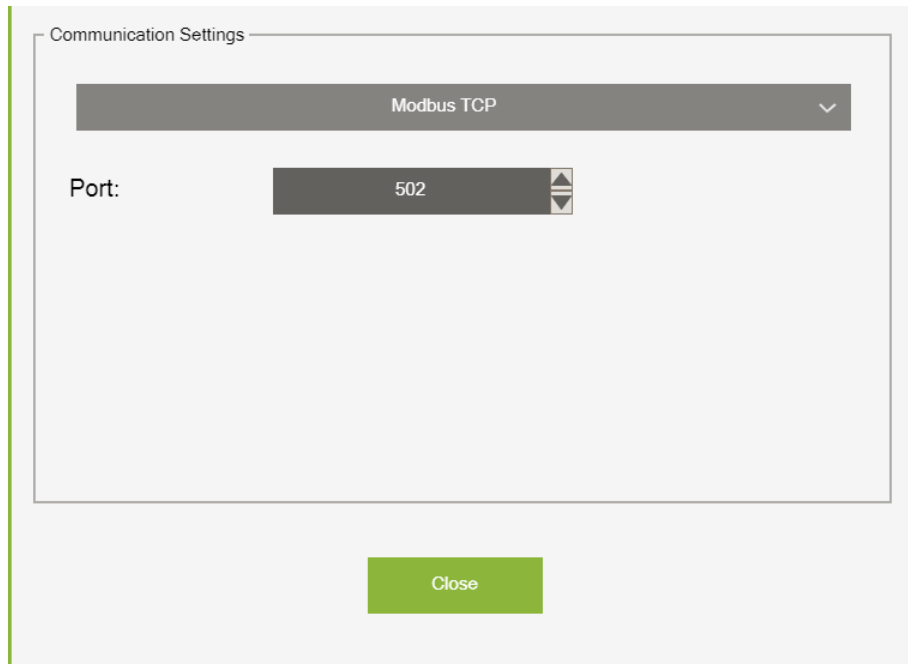


Figure 13: Modbus TCP

Table 3: Modbus TCP Settings

Designation	Description
Transmission Method	The transmission method for Modbus is selected in the selection field.
Port	The port can be set user specific for the Modbus TCP server. Port 502 is set by default in the Gateway.

7.7.2.2 Modbus RS485

For communication via a serial Modbus connection, the “**Modbus RS485**” option must be selected.

Communication Settings

Modbus RS485

Frame type: RTU

Baud rate: 19200

Data bits: 8

Parity: Even

Stop bits: One

Figure 14: Modbus RS485

Table 4: Modbus RS485 Settings

Designation	Description
Transmission Method	The transmission method for Modbus is selected in the selection field.
Frame Type	For “Modbus RS485”, there are two transmission methods: <ul style="list-style-type: none"> • RTU (Data is transmitted in binary form.) • ASCII (Data is encoded using the ASCII character set and transmitted in readable strings.)
Baud Rate	A predefined selection of baud rates is available. “19200 baud” is set by default.
Data Bits	Depending on the requirement, the selection is set to a value between “7” and “8” data bits.
Parity	Depending on the requirement, the selection is set to a value between “None”, “Even” and “Odd”.
Stop Bits	Depending on the requirement, the selection is set to a value between “One” and “Two” data bits.

Note

Important Note about the “Modbus RS485” Option

All connected serial Modbus devices must have identical settings for the communication parameters (protocol type, frame type, baud rate, data bits, parity and stop bits). If not the case, connection problems can occur with the master-slave communication.

7.7.3 Filter

The filter dialog give you the option to filter the datapoint table based on certain criteria. That means that only the required datapoints are displayed in the table.

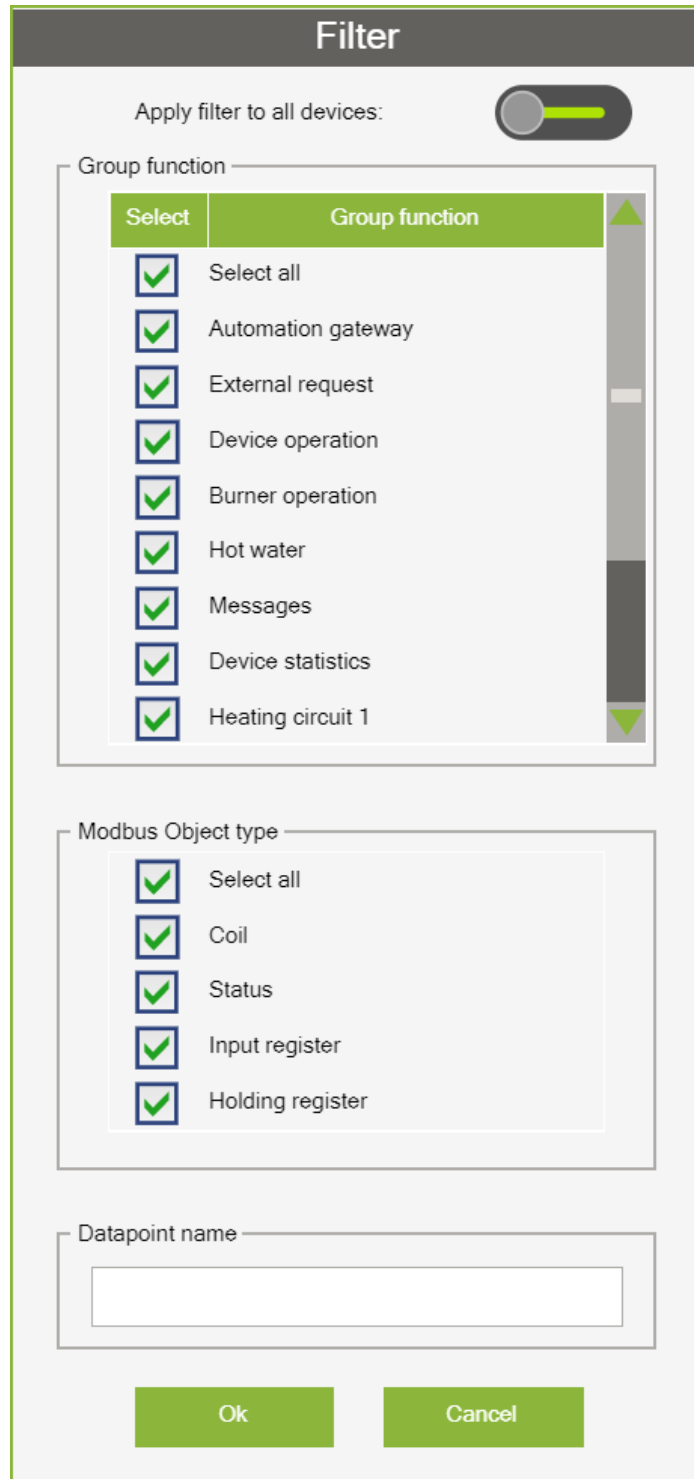
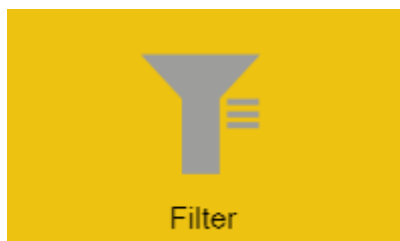


Figure 15: Filter

Apply filters to all devices

Note: This function is only visible if the heating system type "Cascaded devices" has been selected! If the switch is activated, the filter settings are applied to all devices or registers.

The background color of the [**Filter**] button indicates if a filter has been set. Orange indicates that a filter has been set.



Group function

The datapoints can be filtered by group function.

Modbus data type

The datapoints can be filtered by Modbus data type.

Data point name

The input field gives you the option to filter by a certain search term in the data point name.

7.7.4 Show Datapoints

This function checks the availability of all datapoints in the heat generator for the Automation Gateway and displays them in a datapoint table.

To update the datapoints, the following points must be met:

- CAN communication must be successfully initialized.
- The status indicator for CAN communication is green.

i Note

Note CAN Status!

The information above is available in the "CAN-Status" dialog.

After executing the [**Show datapoints**] action successfully, the following dialog opens:

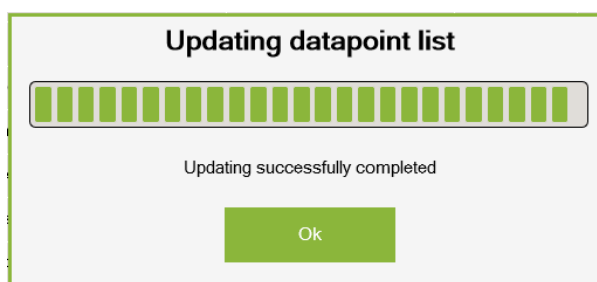


Figure 16: Figure : Datapoint List

All datapoints available in the heat generator are displayed in a datapoint table in the tab (Datapoints).

7.7.5 Data Point Configuration

This section describes configuration options for data points that are described in more detail in the subsections below.

- Description of the data points table
- Selecting and deselecting data points

7.7.5.1 Data Point Table

No.	Selection	Group function	Datapoint name	Tech. reference	Unit	Value	Read/write permissions	Modbus type / address
1	<input checked="" type="checkbox"/>	Automation gateway	Connection to the heat generator	---	Status	1	ro	ST-10009
2	<input checked="" type="checkbox"/>	External request	Flow temperature set point	1604	°C	0.0	rw	HO-40002
3	<input checked="" type="checkbox"/>	External request	External demand	921.0	Status	0	rw	HO-40003
4	<input checked="" type="checkbox"/>	External request	External demand: Status	921.1	Status	0	ro	IN-30001
5	<input type="checkbox"/>	External request	Set DHW temperature	1167	°C	50.0	rw	HO-40004
6	<input checked="" type="checkbox"/>	External request	DHW operating program: Set	538.0	Status	0	rw	HO-40005
7	<input checked="" type="checkbox"/>	External request	DHW operating program: Actual	538.1	Status	0	ro	IN-30002
8	<input type="checkbox"/>	External request	Operating program, heat generator: Set	1605.0	Status	0	rw	HO-40006
9	<input checked="" type="checkbox"/>	External request	Operating program, heat generator: Actual	1605.1	Status	0	ro	IN-30003
10	<input checked="" type="checkbox"/>	External request	HC1 set	537.0	Status	0	rw	HO-40007
11	<input checked="" type="checkbox"/>	External request	HC1 actual	537.1	Status	0	ro	IN-30004
12	<input type="checkbox"/>	External request	HC1: Set temp.	1627.0	°C	20.0	rw	HO-40008
13	<input type="checkbox"/>	External request	HC2 set	1612.0	Status	0	rw	HO-40009
14	<input type="checkbox"/>	External request	HC2 actual	1612.1	Status	0	ro	IN-30005
15	<input type="checkbox"/>	External request	HC2: Set temp.	1628.0	°C	20.0	rw	HO-40010
16	<input type="checkbox"/>	External request	HC3 set	1613.0	Status	0	rw	HO-40011
17	<input type="checkbox"/>	External request	HC3 actual	1613.1	Status	0	ro	IN-30006
18	<input type="checkbox"/>	External request	HC3: Set temp.	1629.0	°C	20.0	rw	HO-40012
19	<input type="checkbox"/>	Device operation	Flow temperature	268.0	°C	96.7	ro	IN-30008
20	<input type="checkbox"/>	Device operation	Outside temperature	274.0	°C	0.0	ro	IN-30009
21	<input type="checkbox"/>	Device operation	Flue gas temperature	331.0	°C	0.0	ro	IN-30011

Figure 17: Figure : Data Point Table

Table 5: Data Point Table


Designation	Description
Select	Manually selects/deselects data points. This function is described in Section Data Point Configuration > Selection [▶ 34] .
Group Function	Describes the group function of a data point.
Data Point Name	Displays the data point names.
Technical Reference	Indicates the technical identification of the data point in the Viessmann heat generator.
Unit	Displays the physical units of the data points.
Value	Displays the current data point value. Note: The value range of individual data points can be viewed in the customer data point list, which can be made available by a Viessmann branch office.
Read and Write Permissions	Read and write permissions are displayed here.
Modbus Type / Address	The Modbus data point type and the register address of the data points are shown here.

7.7.5.2 Select

No data points are selected by default. If a data point is required on the Modbus side, it must be selected in the data point table.

Note**Selecting data points!**

The following points must be met to select/deselect data points:

1. Function “ **Show Data Points [▶ 33]**” has been executed successfully.
 2. There are entries in the data point table.
-

7.7.6 Export Data Point List

This section describes creating the data point list as a CSV file. The Export Data Point List contains all active data points with additional information. The data point list can be used for documentation purposes and for support when creating a project.

Note

Show Data Points

To generate the export file, the **[Show data points]** function must be executed successfully.

Click the **[Export Data Point List]** button to write all data points with the “Selection” property to the CSV file. Then click the **[Download]** button to download the export file from the controller.

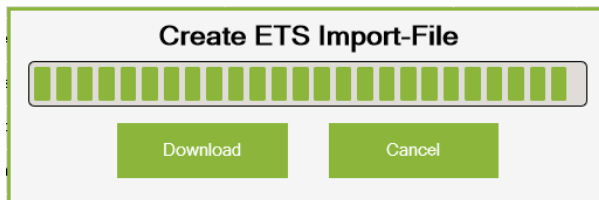


Figure 18: Downloading the CSV File

Click the **[Download]** button to open the following pop-up window:

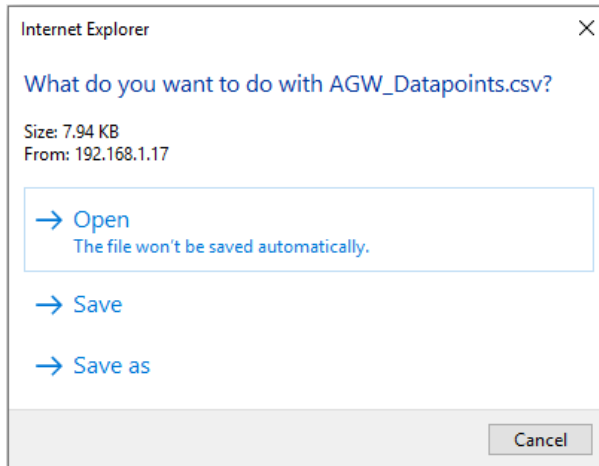


Figure 19: Export Data Point List

Note

Pop-Up Window

The appearance of the pop-up window can vary depending on the browser type.

 **Note**
You may need to adjust the browser settings!

If the browser blocks the pop-up window to download the file, you must adjust the browser settings (allow pop-up for this page). Depending on the browser type, the **[Export Data Point List]** function must be executed again.

Selecting “Save As” saves the data point list as a CSV file to the computer locally.

You can open the downloaded file “**AGW_Datapoints.csv**” using any spreadsheet program (e.g., Microsoft Excel). The export file lists all available data points with additional information (group name, data point name, technical reference, read parameter, write parameter and Modbus ID).

	A	B	C	D	E	F	G
1	No.	Group name	Datapoint name	Technical reference	Factor - reading	Factor - writing	ID
2	1	Automation gateway	Connection to the heat generator	---	1	1	ST-10009
3	2	External request	Flow temperature set point	1604	0,1	10	HO-40002
4	3	External request	External demand	921.0	1	1	HO-40003
5	4	External request	External demand: Status	921.1	1	1	IN-30001
6	5	External request	DHW operating program: Set	538.0	1	1	HO-40005
7	6	External request	DHW operating program: Actual	538.1	1	1	IN-30002
8	7	External request	Operating program, heat generator: Actual	1605.1	1	1	IN-30003
9	8	External request	HC1 set	537.0	1	1	HO-40007
10	9	External request	HC1 actual	537.1	1	1	IN-30004
11	10	External request	HC2 set	1612.0	1	1	HO-40009
12	11	External request	HC2 actual	1612.1	1	1	IN-30005

Figure 20: Data Point List as CSV File

Modbus

8.1 General

The Automation Gateway Modbus is defined as a slave/server device. The building management system (BMS), for example, can be implemented as a Modbus master. The Modbus master must query the gateway via defined registers to receive data from the heat generator via the gateway. The Automation Gateway Modbus responds passively to the BMS queries.

Each Modbus register contains 16 bits of user data. A 32-bit value, for example, is transmitted in two registers (Register_L / Register_H). A serial (e.g., RS485) or Ethernet-based TCP connection are used for Modbus communication.

The communication is described in detail in the following subsections.

8.2 Device ID

The slave address specifies which Modbus device network is to be addressed (see Section [🔗 Modbus Settings > Modbus RS485 \[▶ 31\]](#) for further details).

8.3 Supported Function Codes

The Automation Gateway as a Modbus slave (server) supports the following function codes:

- FC01 (0x01) Read Coils
- FC03 (0x03) Read Holding Registers
- FC04 (0x04) Read Input Registers
- FC05 (0x05) Write Single Coil
- FC06 (0x06) Write Single Register
- FC15 (0x0F) Write Multiple Coils
- FC16 (0x10) Write Multiple Registers

8.4 Modbus Object Types

The table below provides an overview of the Modbus object types with possible function codes.

Table 6: Modbus Object Types

Object Types	Abbreviation	Function codes	Master access	Values
Discrete inputs / Status	ST	FC02	Read only	Binary
Coils	CO	FC01, FC05, FC15	Read & write	Binary
Input register	IN	FC04	Read only	Analog
Holding register	HO	FC03, FC06, FC16	Read & write	Analog

8.5 Extended Data Types (32-Bit)

Since the standardized Modbus register has a size of 16 bits, data points with a size > 16 bits (e.g., DWORD with 32 bits) must be transmitted in two successive 16-bit registers.

Example:

Input Register - Data Point Technical Reference 535.0 - Fuel cell power supply of type UNSIGNED32:

Lo - Word (Bit 15 ... 0): Register_Low : 30080

Hi - Word (Bit 31 ... 16): Register_High: 30081

Note

Important Note on 32-Bit Data Types!

With 32-bit data types as input registers, two registers must be read on the Modbus master side and converted into a 32-bit data type (DWORD). With holding registers, care must be taken when writing that a 32-bit value on the Modbus master side is converted into two 16-bit values and then written to two registers!

8.6 Substitute Values & Exception Codes

If there is access with “read only” permission to unavailable* Modbus registers on the gateway/slave side, special substitute values are transmitted to the master for input registers and the “Discrete Inputs”.

Table 7: Modbus Register Substitute Values

Object Type	Substitute values (dec/hex)
Input Register	32768 / 0x8000h
Discrete Inputs (Status)	0 / 0x00h

If there is access with “read/write” permission to unavailable* Modbus registers of the "Holding Register" type and “Coils”, the following exception codes are transmitted to the Modbus master. More details on exception codes are available at “Modbus > Modbus Errors”.

Table 8: Modbus Register Exception Codes

Error type	Object Type	Exception code
Register not available	Holding Register / Coils	0x02h (Illegal data access)
Value range violation	Holding Register	0x03h (Wrong value range)

* Registers not available on the heat generator side or are not selected in the data point table.

8.7 Addressing Data Points

For each Modbus object type, certain register ranges have been defined in the Automation Gateway Modbus.

Table 9: Addressing Data Points

Object Type	Modbus address range
Coils	1 - 9999

Object Type	Modbus address range
Discrete inputs / Status	10001 - 19999
Input register	30001 - 39999
Holding register	40001 - 49999

When addressing the registers in the Automation Gateway, the first register address (start address) in the gateway must be “0”. This means that the register addresses in the Automation Gateway are “0-based”. There are manufacturers who use the “1” as the start address and are therefore “1-based”. When using a Modbus master that is “1-based”, an offset must be taken into account in the addressing.

Example:

If the master (1-based) wants to read register 30001 in the Automation Gateway, the master must specify address 30002 in the request.

Multi-Device / Single Operation Register Definition

The register definition (i.e., which data point of the heat generator is assigned to which Modbus register) can be found in the customer data point list of the respective heat generator from Viessmann.

If the gateway is used as a single device, the address range of the object types is in the specified ranges:

Object Type	Modbus address range
Coils	1 ... 1000
Discrete inputs / Status	10001 ... 11000
Input register	30001 ... 31000
Holding register	40001 ... 41000

If you switch to “Cascaded devices,” the register address range of the master device is in the same ranges as for the single device (see above). However, the address range of the object instances for the slave devices starts with an offset of “+ 1000” depending on the numbers on the registers.

Example (Coils):

Master device: 1 ... 1000, Slave device 1: 1001 ... 2000, Slave device 2: 2001 ... 3000.

8.8 Default Settings

If you reset the Automation Gateway Modbus to the factory settings, the following default settings (communication parameters) are loaded.

Table 10: Default Settings

Transmission Mode	Settings
Modbus TCP	Port: 502
Modbus RS485	Protocol type: RS485 half duplex Frame type: RTU Baud rate: 19200 Parity: Even Stop bit: One Data bits: 8

8.9 Modbus Error Codes

If something fails when requesting a Modbus master (client) to the Modbus slave (server), the slave sends a response to the master in the form of an error code.

The table below describes the possible error codes (exception codes) of the Automation Gateway Modbus.

Table 11: Modbus Error Codes

Code	Designation	Explanation
01	ILLEGAL FUNCTION	Unsupported function code
02	ILLEGAL DATA ADDRESS	Invalid register address
03	ILLEGAL DATA VALUE	Value outside the valid range
04	SLAVE DEVICE FAILURE	Request can not be processed

Multi-Boiler Mode

Multi-boiler mode has advantages when it comes to criteria such as “high power requirement” and “high reliability”. The master device takes over control and thus controls the slave devices. If the power requirement increases, then several heat generators take over the heat supply at the same time. In addition, the cascade increases reliability, since if one heat generator fails, another device will continue to generate heat (increased operational reliability). Additional information on the topic is available at [Automation Gateway](#).

Application Type Selection

The gateway can be switched to multi-boiler mode under Project Settings > Application Type. In multi-boiler mode, the gateway supports communication between up to eight heat generators at the same time. The connection status of the connected devices can be checked under CAN Status.

See also

[Projekteinstellungen \[21\]](#)

9.1 CAN Status - Multi-Boiler Mode

The “CAN Communication” area in the “CAN Status” dialog differs from single-unit mode in multi-boiler mode. As shown in the figure, the connection status of the connected heat generators can be read. For more details, see Section [CAN Status \[27\]](#).

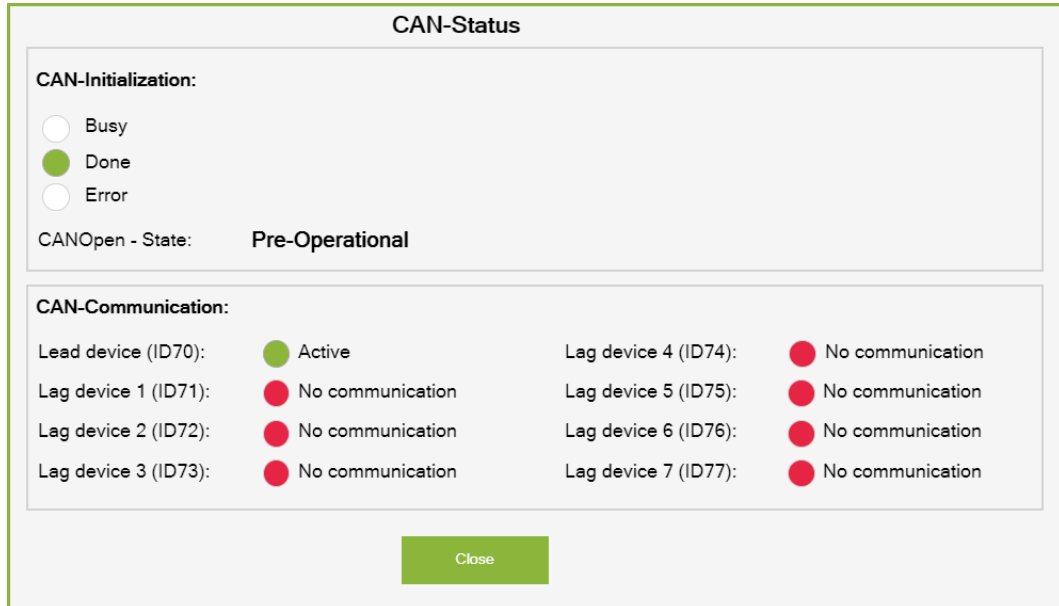


Figure 21: CAN Status in Multi-Boiler Mode

Note**Setting the Device Type on the Heat Generator**

To display the connection status of the connected heat generators correctly, you must first configure each heat generator in the cascade (master device / slave device). You can find more information in the start-up manual for the heat generator in the Section [Automation Gateway](#).

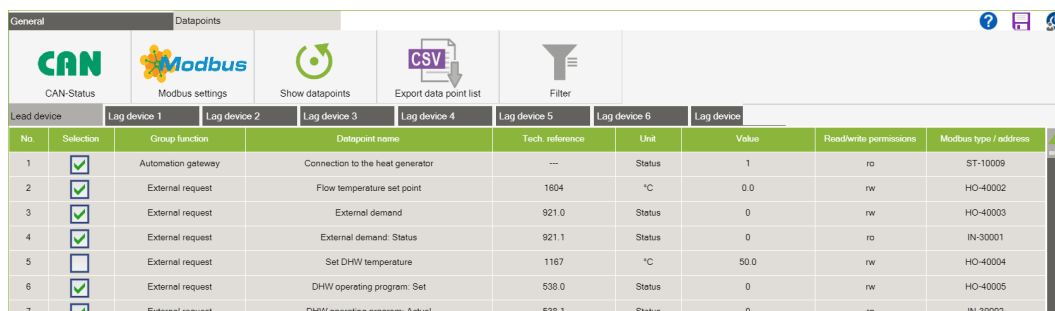
Relationship between the device IDs of the heat generator and the designations in the gateway:

Master device	Slave Device 1 .. 7
Device ID 70	Device ID 71-77

The heat generator must be assigned to the above device ID area to ensure communication with the gateway.

9.2 Data Point Table - Multi-Boiler Mode

The heat generators are mapped in tabs in the data point table in multi-boiler operation. By switching the tabs, the data points of the selected device are displayed in a table. A maximum of eight heat generators can be linked in multi-boiler operation (max. 1 master unit and 7 slave units). Regardless of the number of heat generators connected to the gateway, all tabs are always displayed. The current connection status to the heat generator is available at "CAN Status". Further details on selecting data points and communication between the building control system and the heat generator is available in Section [Data Point Configuration \[▶ 34\]](#).



Lead device	Lag device 1	Lag device 2	Lag device 3	Lag device 4	Lag device 5	Lag device 6	Lag device 7	
No.	Selection	Group function	Datapoint name	Tech. reference	Unit	Value	Read/write permissions	Modbus type / address
1	<input checked="" type="checkbox"/>	Automation gateway	Connection to the heat generator	---	Status	1	ro	ST-10009
2	<input checked="" type="checkbox"/>	External request	Flow temperature set point	1604	°C	0.0	rw	HO-40002
3	<input checked="" type="checkbox"/>	External request	External demand	921.0	Status	0	rw	HO-40003
4	<input checked="" type="checkbox"/>	External request	External demand: Status	921.1	Status	0	ro	IN-30001
5	<input type="checkbox"/>	External request	Set DHW temperature	1167	°C	50.0	rw	HO-40004
6	<input checked="" type="checkbox"/>	External request	DHW operating program: Set	530.0	Status	0	rw	HO-40005
7	<input checked="" type="checkbox"/>	External request	DHW operating program: Actual	530.1	Status	0	ro	IN-30002

Figure 22: Data Points - Cascading

Note**Number of Data Points**

Depending on the type of heat generator, the number of data points can differ from device to device. Which data points a heat generator supports is available in the respective device manual, see [Automation Gateway](#).

Modbus RS485

The on-board RS485 interface of the WAGO controller is used for serial Modbus communication. The interface has the designation “X3 RS232/485” on the device and is assigned as follows:

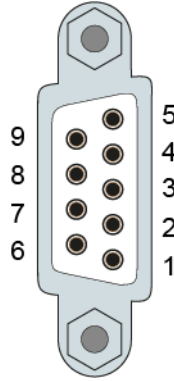


Figure 23: Communication interface RS-232/RS-485 - X3

Table 12: Legend for Figure “Communication Interface RS-232/RS-485 - X3”

Contact	Signal	Description
1	NC	Not assigned
2	NC	Not assigned
3	A (Tx/Rx+)	Transmit/receive data +
4	NC	Not assigned
5	FB_GND	Ground
6	FB_5V	Power Supply
7	NC	Not assigned
8	B (Tx/Rx-)	Transmit/receive data -
9	NC	Not assigned
Housing	Shield	Shield

To minimize reflection at the end of the line, the RS-485 line must be terminated at both ends by a cable termination. If required, one pull-up or pull-down resistor may be used. These resistors ensure a defined level on the bus when no subscriber is active, i.e., when all subscribers are in “Tri-state”.

i Note

Attention — bus termination!

The RS-485 bus must be terminated at both ends. No more than two terminations per bus may be used. No termination may be used in stub or branch lines; branch lines must be kept as short as possible. Operation without proper termination of the RS-485 network may result in transmission errors!

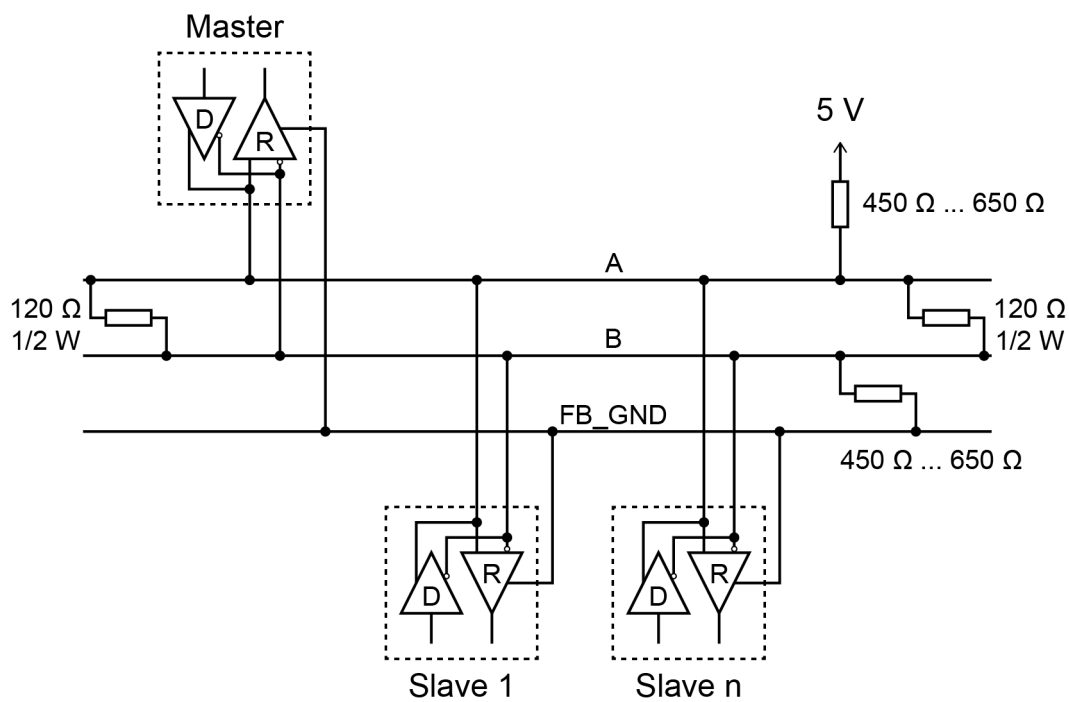


Figure 24: RS-485 Bus Termination

Note

Note further details!

Further details on connecting the Modbus RS485 are available in the connection diagram (see Section [Setup \[53\]](#)).

Quick Start Guide

Perform the following steps:

1. Check the CAN initialization (see Section “CAN Status”).
2. Check CAN communication with the heat generator (see Section “CAN Status”).
3. Check that there are no error messages in the alarm banner. If necessary, remove them first, see also [🔗 Diagnostics > Alarm Banner Messages \[▶ 52\]](#).
4. Execute the “Show data points” function, see Section [🔗 Data Points > Show Data Points \[▶ 33\]](#).
5. Enable the required data points on the Modbus page (see Section [🔗 Data Points > Data Point Configuration > Selection \[▶ 34\]](#)).
6. Save the project settings, see Section General Buttons > Data Backup.

Diagnostic

For diagnostic purposes, the LED display elements of the WAGO hardware and the error messages in the Automation Gateway's alarm banner are explained below.

Note

Further information

Detailed documentation on the WAGO hardware can be found in the corresponding manuals on the [WAGO Homepage](#).

12.1 PFC200 Indicators (750-8212)

The PFC200 Controller (750-8212) has the following status LEDs:

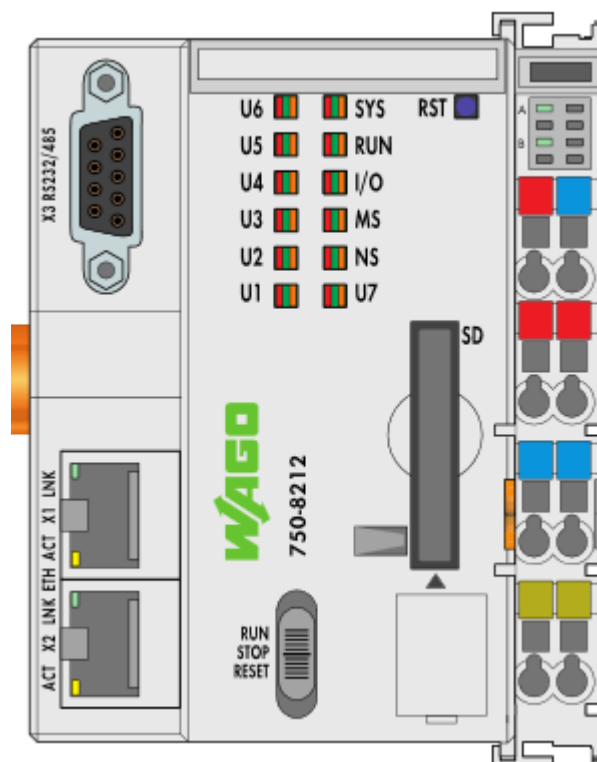


Figure 25: PFC200 Status LEDs

Table 13: PFC200 Indicators (750-8212)

Status LED	Colors
SYS	Red/Green/Orange/Off
RUN	Red/Green/Orange/Off
I/O	Red/Green/Orange/Off
MS	Red/Green/Orange/Off
NS	Red/Green/Orange/Off
BT	Red/Green/Orange/Off
U1	Red/Green/Orange/Off
U2-U7	Red/Green/Orange/Off

The next subsection describes the individual status LEDs of the PFC200 in detail.

12.1.1 “SYS” Diagnostic LED

Status	Explanation	Remedy
Green	Ready to operate - System start completed without errors.	---
Yellow	Device is in startup/boot process and the RST button is not pressed.	---

12.1.2 “RUN” Diagnostic LED

Status	Explanation	Remedy
Green	Applications loaded and all in the “RUN” status	--
Red	Applications loaded and all in the “STOP” status	Set the mode selector switch to “RUN” to start the application.
Red, goes out briefly	Warm start reset completed	---

12.1.3 “I/O” Diagnostic LED

Status	Explanation	Remedy
Green	Data cycle on the local bus, normal operating status.	---
Orange flashing	Startup phase, the local bus is being initialized. The startup phase is indicated by rapid flashing for about 1 ... 2 seconds.	Wait until initialization has been completed.
Red	A hardware fault is present.	Please contact Viessmann Technical Support at Automation-Gateway . It must be checked which module caused the error.
Red, flashing (2 Hz)	An error which may be able to be eliminated is present.	First, try to eliminate the error by switching the device (power supply) off and then back on. Check the entire node structure for any errors. If you cannot eliminate the error, contact Viessmann Support at Automation-Gateway
Red flashing (flashing sequence)	There is a local bus error.	Please contact Viessmann Support at Automation-Gateway .
Off	Program was not fully loaded.	Restart the device. If you cannot eliminate the error, contact Viessmann Support at Automation-Gateway .

12.1.4 “MS” Diagnostic LED

Status	Explanation	Remedy
Off	No error	---
Red flashing (flashing sequence)	Error	Please contact Viessmann Support at Automation-Gateway .

12.1.5 “NS” Diagnostic LED

The “NS” diagnostic LED has no function.

12.1.6 “U1” Diagnostic LED

Status	Explanation	Corrective Action
Green	The connection to the heat generator is active.	---
Red	The CAN interface has the status “Bus Off” (short circuit or other major fault).	Check CAN connection (plug, line, terminating resistor, heat generator ON). If you cannot eliminate the error, please contact Viessmann Support at Automation Gateway .
Other	Error	Please contact Viessmann Support under Automation Gateway .

12.1.7 “U2-U6” Diagnostic LED

The “U2-U6” diagnostic LEDs have no function.

12.2 WAGO 750-652 Serial Interface



Figure 26: Diagnostic LED 753-652 Serial Interface

Table 14: Diagnostic LED 753-652 Serial Interface

LED	Designation	Status	Explanation
A	Function	Green	Ready for operation and uninterrupted internal data bus communication
		Red	Not ready for operation or no or interrupted internal bus communication
B	TxD (transmit)	Off	No signal transmission TxD
		Green	Signal transmission TxD present 1)
C	RxD (receive)	Off	No signal transmission RxD or input open
		Green	Signal transmission RxD present 1)
		Red	Signal transmission RxD present 1), but some characters received are defective. (parity, data frame or overrun error has occurred) 3)
D	Transmission status	Off	No transmission error
		Green	Output buffer is full
		Yellow	Receive buffer is full -> There are more than 2304 characters in the receive buffer.
E	Operation Mode	Green	RS-485 half-duplex, DMX
		Yellow	RS-422 full-duplex, data exchange
		Red	RS-232
F	Data flow control	Off	No data flow control
G	Data Exchange Mode	Off	Data exchange mode is OFF 5)
		Yellow	Data exchange mode is initialized
		Green	Data exchange mode is ON
		Yellow flashing	Data exchange mode is ON, but there is no communication (timeout)
H	DMX	Off	DMX is OFF

1) With high baud rates, the pulses are so short that the on state cannot or can hardly be detected with the naked eye.

3) Defective characters are not transmitted by the I/O module to the fieldbus coupler/controller.

5) Firmware Version 03 or higher

12.3 WAGO 750-658 CAN Module

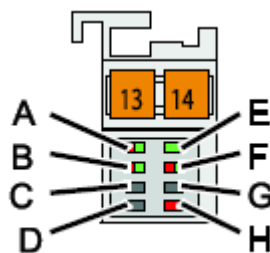


Figure 27: CAN Module 750-658 Diagnostic LED

Table 15: CAN Module 750-658 Diagnostic LED

LED	Designation	Status	Explanation
A	CAN Status	Green	CAN bus properly initialized.
		Red	Error on the CAN bus. CAN bus not initialized.
B	K-Bus RUN	Green	Local bus data transfer possible.
		Off	Local bus data transfer not possible.
C	Not assigned	---	---
D	Not assigned	---	---
E	CAN-Rx	Green	CAN telegram received.
		Red	CAN telegram could not be received.
F	CAN-Tx	Green	CAN telegram sent.
		Red	CAN telegram could not be sent.
G	Not assigned	---	---
H	Int. error	Red	Internal error: <ul style="list-style-type: none"> • Buffer overflow • Error in mailbox communication • Parameter channel error • Register communication error

12.4 Alarm Banner Messages

The following error messages can be displayed in the alarm banner.

Table 16: Alarm Banner Messages

Weighting	Notification	Description	Corrective Action
Error	CAN Module -> CAN connection error	Connection problem to the CAN bus.	Heat generator must be ON. Check interconnecting cable to the heat generator.
Error	CAN Module -> Initialization fail	An error occurred during the CAN-Bus initialization phase.	Check if the heat generator supports the Automation Gateway. You can find more information in the document "Supported Heat Generators" at Automation Gateway .
Error	CAN Module -> Show data points failed	Initialization of the CAN object for the heat generator has failed.	Check if the heat generator is ON and connect it to the gateway.
Error	Modbus -> Error message from the Modbus server.	The WAGO Modbus server signals an error.	The error message in the alarm banner describes the cause. Details at "Diagnostics -> Modbus Error Messages".

You can find a detailed description of the alarm banner in Section „[Data Points > Alarm Banners \[▶ 25\]](#)“.

Setup

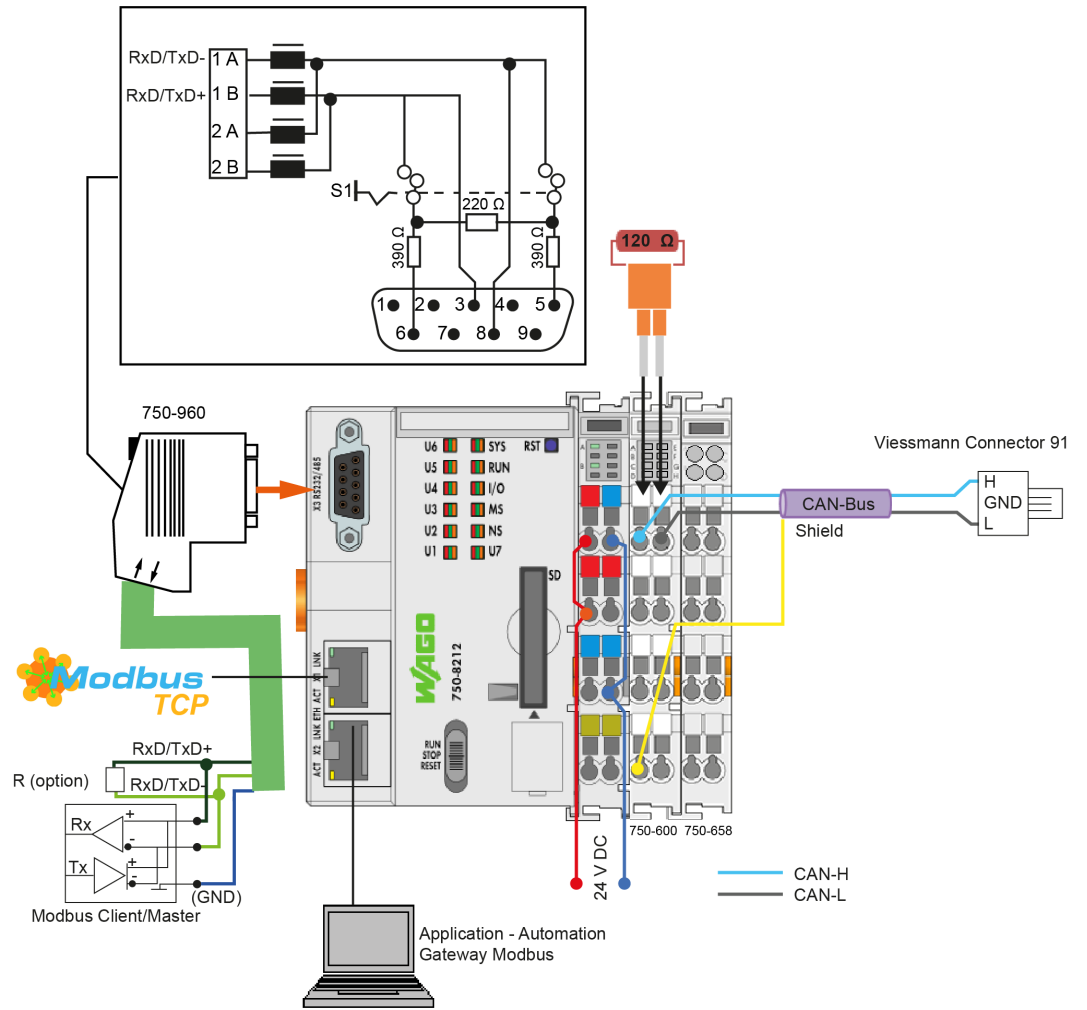


Figure 28: Figure : Automation Gateway Modbus (RS485 Half Duplex) Connection Diagram

Appendix

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List of Figures

Figure 1	WAGOUpload Installation	11
Figure 2	WAGOupload Simplified View	12
Figure 3	WBM Settings	13
Figure 4	Figure : Change Passwords.....	14
Figure 5	Figure : Setting the Date and Time	16
Figure 6	Figure : General	18
Figure 7	Figure : Data Backup	19
Figure 8	Project Settings.....	21
Figure 9	Information	23
Figure 10	Figure : Data Points	25
Figure 11	CAN Status for “Single Boiler” Application Type	27
Figure 12	MODBUS settings.....	28
Figure 13	Modbus TCP	30
Figure 14	Modbus RS485	31
Figure 15	Filter	32
Figure 16	Figure : Datapoint List.....	33
Figure 17	Figure : Data Point Table	34
Figure 18	Downloading the CSV File	36
Figure 19	Export Data Point List	36
Figure 20	Data Point List as CSV File.....	37
Figure 21	CAN Status in Multi-Boiler Mode.....	42
Figure 22	Data Points - Cascading	43
Figure 23	Communication interface RS-232/RS-485 - X3	44
Figure 24	RS-485 Bus Termination.....	45
Figure 25	PFC200 Status LEDs	47
Figure 26	Diagnostic LED 753-652 Serial Interface	50
Figure 27	CAN Module 750-658 Diagnostic LED.....	51
Figure 28	Figure : Automation Gateway Modbus (RS485 Half Duplex) Connection Diagram.....	53

List of Tables

Table 1	CAN Initialization.....	27
Table 2	CAN Communication	27
Table 3	Modbus TCP Settings	30
Table 4	Modbus RS485 Settings	31
Table 5	Data Point Table	34
Table 6	Modbus Object Types	38
Table 7	Modbus Register Substitute Values.....	39
Table 8	Modbus Register Exception Codes.....	39
Table 9	Addressing Data Points	39
Table 10	Default Settings.....	40
Table 11	Modbus Error Codes.....	41
Table 12	Legend for Figure “Communication Interface RS-232/RS-485 - X3”	44
Table 13	PFC200 Indicators (750-8212).....	47
Table 14	Diagnostic LED 753-652 Serial Interface.....	50
Table 15	CAN Module 750-658 Diagnostic LED.....	51
Table 16	Alarm Banner Messages.....	52

WAGO Kontakttechnik GmbH & Co. KG

Postfach 2880 · D - 32385 Minden
Hansastraße 27 · D - 32423 Minden

✉ info@wago.com
🌐 www.wago.com

Headquarters	+49 571/887 – 0
Sales	+49 (0) 571/887 – 44 222
Order Service	+49 (0) 571/887 – 44 333
Fax	+49 571/887 – 844169

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