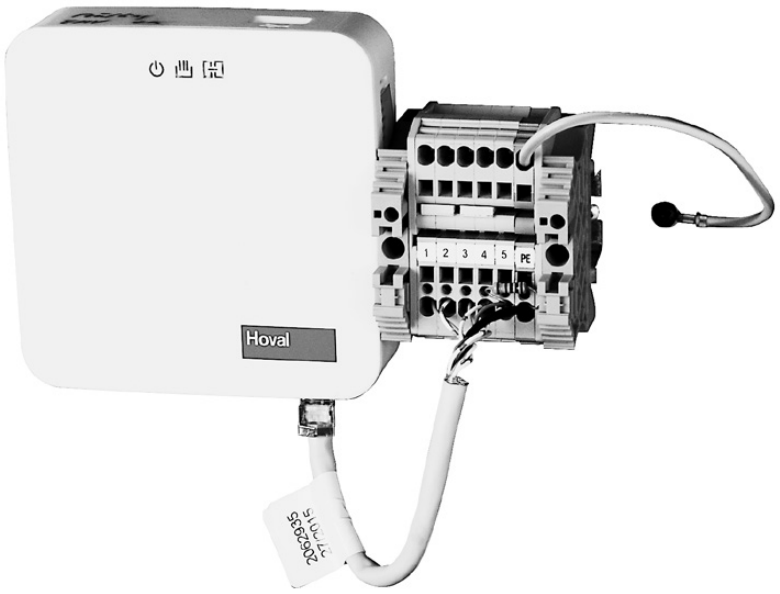
Technical information
Installation instructions

Hoval

TopTronic® E Gateway module Modbus TCP/RS485

Hoval TopTronic® E Modbus TCP/RTU interface



These instructions are applicable to the following types:

2-TopTronic® E GW-Modbus TCP/RS485

Hoval products may only be installed and commissioned by appropriately qualified experts. These instructions are intended exclusively for the **specialist**. Electrical installations may only be carried out by a qualified electrician.

1. Important notes

1.1 Intended use

The gateway is the connection point between the Hoval CAN bus and a Modbus interface via TCP or RS485 (RTU). The gateway enables users to access and operate their Hoval heating system via Modbus.
The Hoval technician must ensure software compatibility within the TTE components and that the gateway software is up to date.

These instructions describe how to connect, install and commission the interface.

1.2 Explanation of the symbols

1.2.1 Warnings

NOTICE

... indicates a situation of possible danger which can lead to damage to property if not avoided.

"Warning: dangerous electrical voltage" as a warning for accident prevention.
Ensures that people do not come into contact with electrical voltage. The danger sign with the black lighting symbol warns against the danger of electrical voltage.

1.2.2 Symbols

Provides important information.

2. Technical information

2.1 Installation location in the wall housing/ control panel

Delivery:
TopTronic® E Gateway module Modbus on top-hat rail

The TopTronic® E Gateway module Modbus can be installed in the wall housing, in the control panel or in the heat exchanger

2.1.1 Modbus TCP dimensional drawing

(all dimensions in mm)

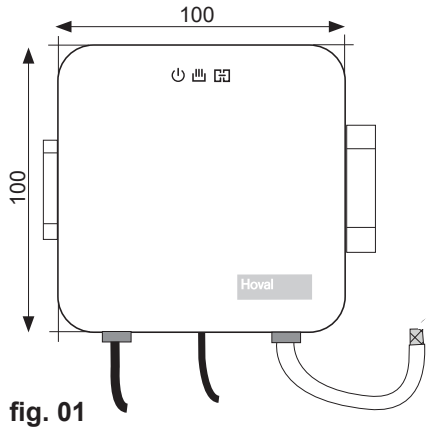


fig. 01

Dimensions:
W = 100
H = 100
D = 27 (including top-hat rail: 42)

2.1.2 Modbus RS485 dimensional drawing

(all dimensions in mm)

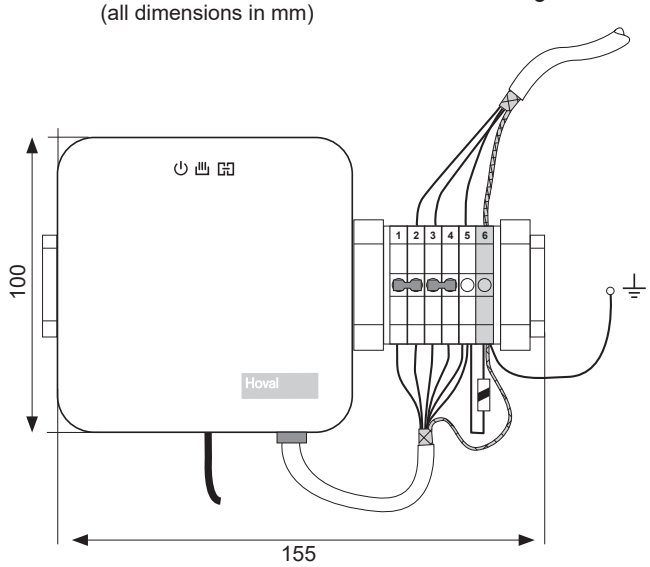


fig. 02

Dimensions:
W = 155
H = 100
D = 47 (terminal block including top-hat rail: 55)

2.2 Connections of the gateway

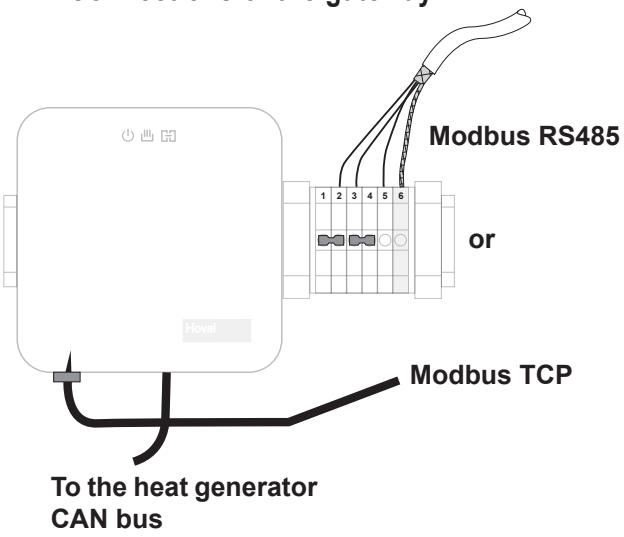


fig. 03

2.2.1 Back

On the back, the CAN bus can be connected to the terminal.

fig. 04

CAN bus	The terminals permit direct wiring to the Hoval CAN bus
CAN+	CAN bus data line
CAN-	CAN bus data line
12 V DC	12 V power supply via CAN bus
GND	Earth CAN bus

! **NOTICE**

The earth must always be connected to all CAN bus subscribers.
This also applies when a mains adapter is used.

2.3 Technical data for the TopTronic® E Modbus interface

2.3.1 Connections on the underside

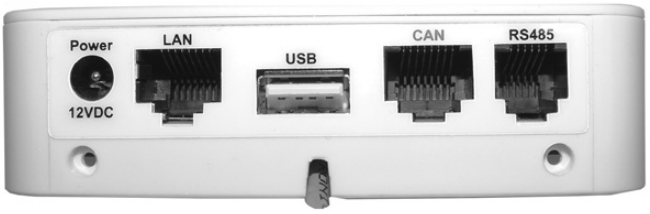


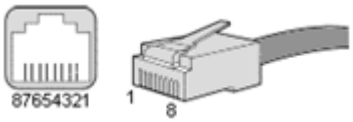
fig. 05

Power	Connection for the external power supply (only use the supplied mains adapter)
LAN	Modbus TCP interface
USB	Not used
CAN	Connection for Hoval CAN bus, pluggable connection RJ45
RS 485	Modbus RS485 interface

! **NOTICE**

Do not confuse CAN bus with LAN. Ethernet hardware can be damaged by the 12 V voltage of the CAN bus!

2.3.2 CAN pin assignment on RJ45



RJ45 pin	Signals
1	CAN_H
2	CAN_L
7	CAN_GND
8	CAN_12VDC++

Electrical safety
- Protection class (according to EN 60529): IP 20
- Complies with EN 50491-3
- Safety extra-low voltage SELV 24 V DC

EMC requirements
- Complies with EN 61000-6-2, EN 61000-6-3, EN 50491-5-1, EN 50491-5-2 and EN 50491-5-3
- According to EMC Directive (residential and functional building)

Environmental conditions
- Ambient temp. during operation: 0 to +45°C
- Storage temperature: -20 to +60°C
- Rel. humidity (not condens.): 20 % to 80 %

Mechanical data
- Housing: plastic
- Weight: approx. 500 g

Ethernet
- 10BaseT (10 Mbit/s)
- Supported protocols: UDP/IP, TCP/IP, DHCP and static IP

Power supply
- External supply: 12 V DC
- Power consumption: < 800 mW

Connections
- RJ45 LAN connector
- RS 485
- CAN bus

3. Installing and connecting the gateway

3.1 Installing the gateway in the wall housing or control panel

- Install the gateway in the wall housing or control panel.
- It may be necessary to remove the gateway and the connector base from the top-hat rail prior to this.

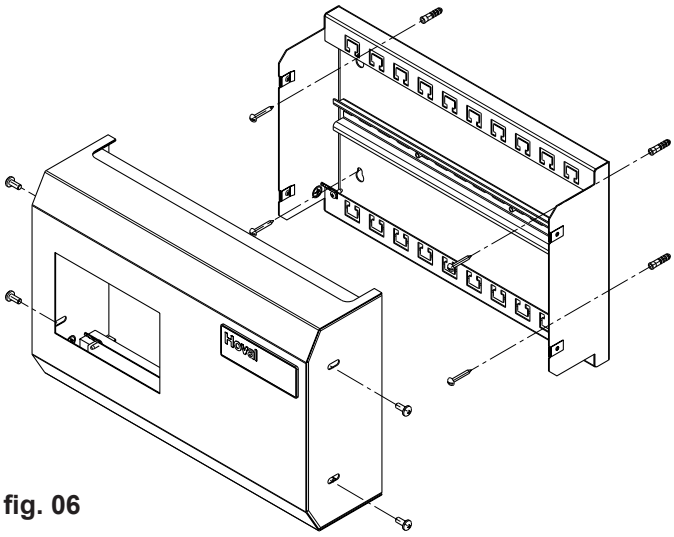
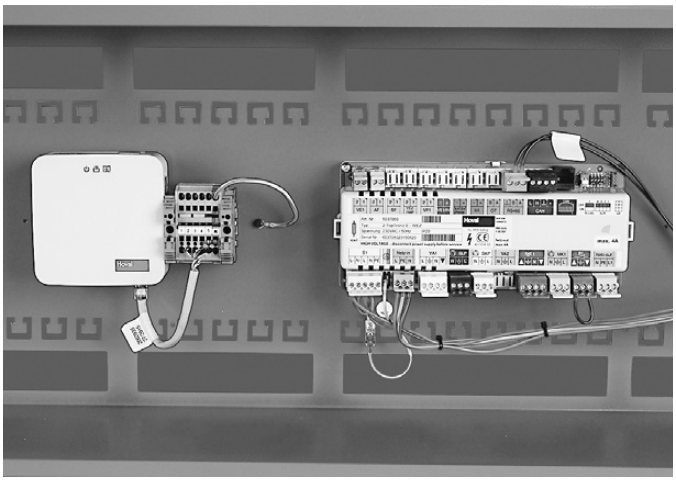


fig. 06

3.2 Installing the gateway in the heat generator

If, after installing all modules and extensions, there is still space in the heat exchanger, this can be used for the gateway.

- See also “Technical Information Installation Instructions” in the “Electrical connection” chapter.



Installation example: UltraGas with Modbus RS485 gateway

fig. 07

3.3 Connection for the heat generator (WEZ / CAN bus)

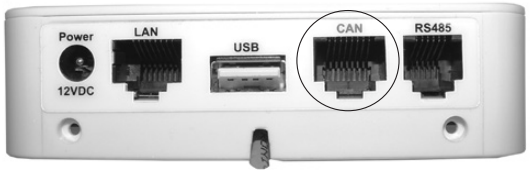
There is a danger of electric shock.
The heat generator can only be de-energised by disconnecting it from the mains (fuse).

NOTICE

The gateway can be connected to the CAN bus at any point on the bus system.

- In doing so, ensure that the CAN bus is correctly terminated.

1. Plug the CAN bus into the gateway



or establish the CAN connection via the terminals on the back of the gateway.

If installing the gateway in the heat exchanger, continue to point 3:

2. Expose a basic or controller module in the heat generator, wall housing or control panel according to the “Technical Information Installation Instructions” in the “Electrical connection” chapter.

3. Connect the Hoval CAN bus to a basic or controller module (fig. 08) according to chapter 2.3.2

4. Route the cable according to the "Technical Information Installation Instructions" in the "Electrical connection" chapter.

NOTICE

The CAN bus cable must have strain relief applied.

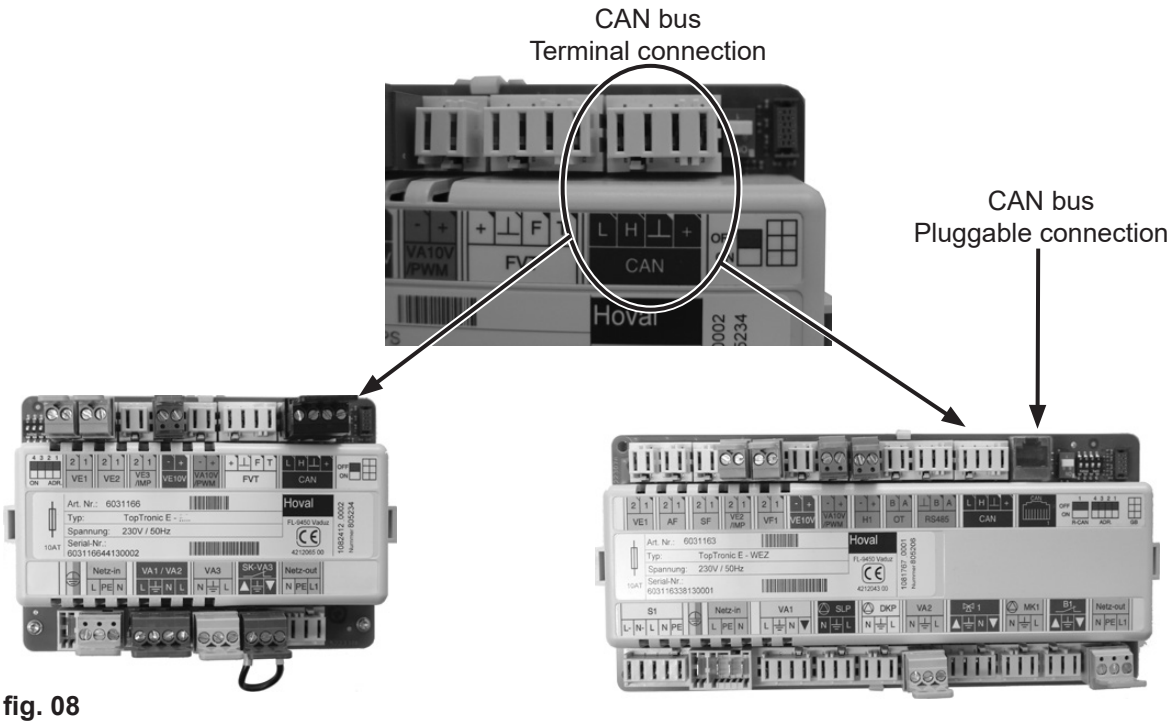


fig. 08

3.4 Connection for the Modbus TCP

(If using Modbus RS485, proceed to point 3.5)

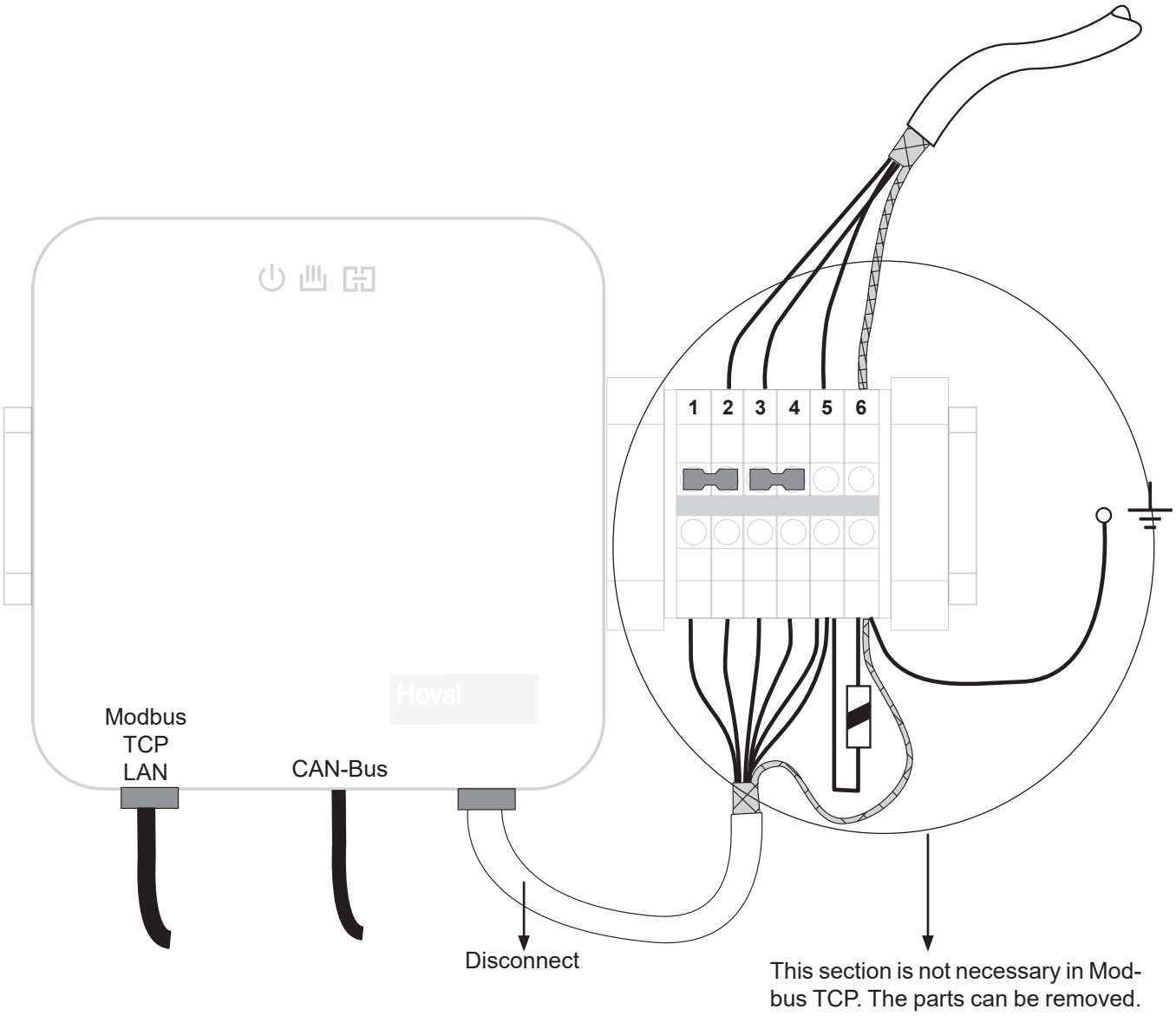


fig. 09

3.5 Connection for the Modbus RS485

The RS485 interface and the terminal strip supplied are assigned as follows:

- Connect Modbus RS485
- Install earth cable

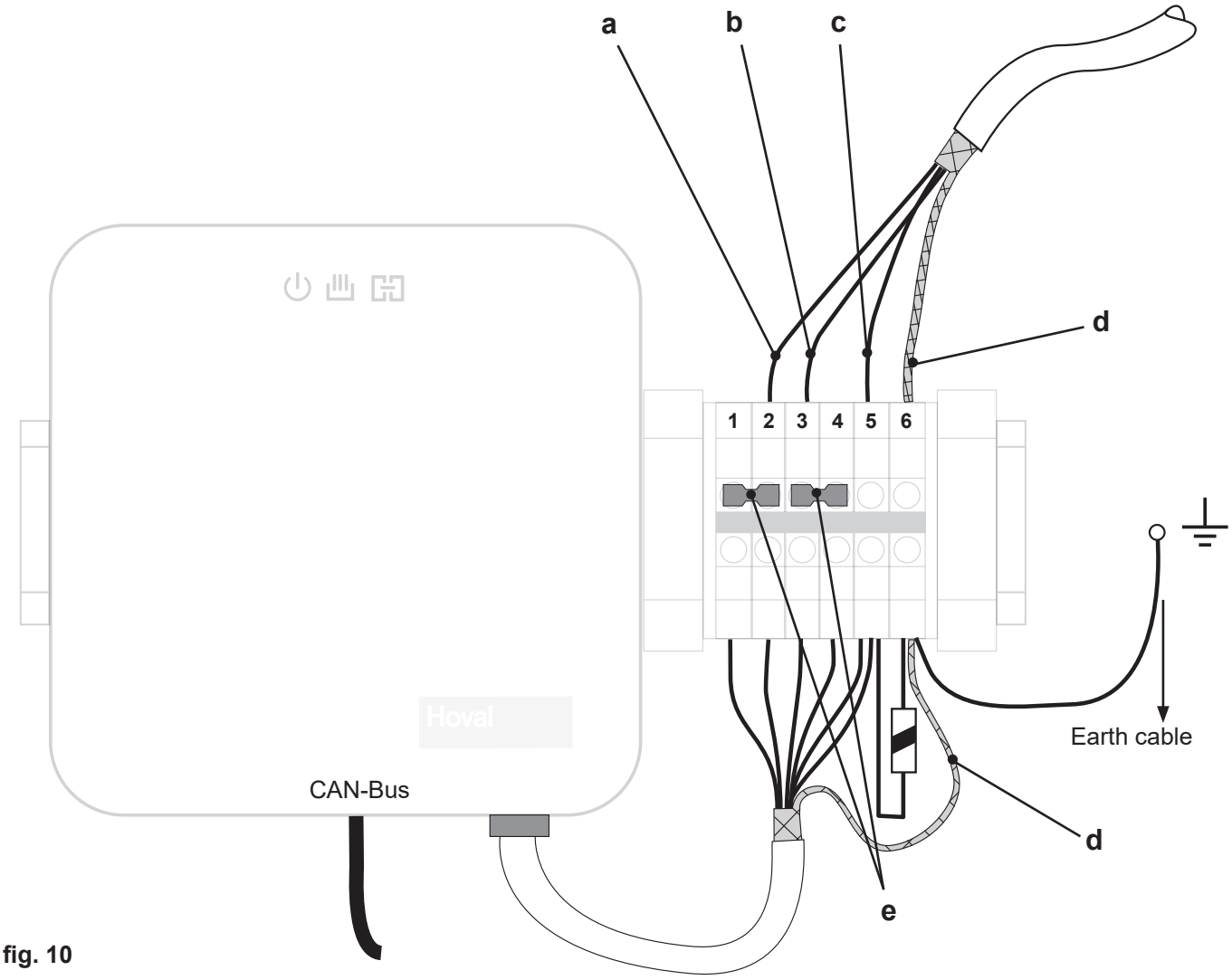


fig. 10

Modbus RS485 connection
a. RXTX+
b. RXTX-
c. GND
d. Supply line shielding on PE
e. Bridges for bus terminating resistors (can be inserted into the bottom or the top)

> **!** **NOTICE**
>
> Remove the bridges to deactivate the bus terminating resistors.
> (Factory setting: terminated)

3.6 LED lights on the gateway

For commissioning it is important to know what status the gateway is currently in. The LEDs indicate the current status for this purpose.

The LED electrical power supply is green, all other LEDs are dark.

- Gateway is in boot status, i.e. the operating system is starting up – can take up to 60 seconds.

fig. 11

Left LED, "Power supply": • Power supply via CAN bus or external supply	**Green**
Middle LED "CAN bus" • Connecting to the CAN bus • Connection to the CAN bus established • No connection to the CAN bus	**Flashing blue** **Blue** **Red**
Right LED, "Network" • No network connection / no Internet connection or general connection problem	**Red**
• No connection to HovalDesk and HovalConnect (there is an Internet connection in place, however)	**Flashing red**
• No time synchronisation / no connection to NTP, or no authentication for encrypted connection possible	**Magenta (violet)**
• HovalConnect is not authorised and no connection to HovalDesk	**Yellow**
• HovalConnect is not authorised and connection to HovalDesk	**Alternating green/yellow (every 6 seconds)**
• Only connection to HovalConnect (HovalConnect is authorised)	**Blue**
• Only connection to HovalDesk	**Green**
• Connection to HovalConnect and HovalDesk	**Alternating blue/green (every 6 seconds)**
• Data logging active on USB stick	**Flashing cyan**

4. Commissioning the TopTronic® E Gateway module Modbus

The settings described below can be performed on the control module of the system.

4.1 Connecting the Modbus TCP to the gateway

1. Launch the TopTronic® E control module and select
   - Main menu > Service.

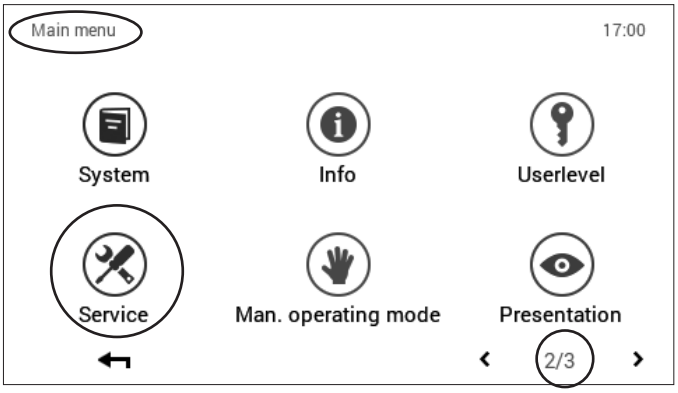


fig. 12

Service > TTE-GW > General > Gateway general
> All data points > Internet access

2. Select network (=cable connection)
   and confirm with “OK”.
   > **Network** is set as standard.

3. DHCP (router gives the address)
   - DHCP > Yes is set as standard.
   - Open and select DHCP > Yes > Apply IP changes > Apply and confirm with “OK”.
   - This automatically searches for and sets the correct IP address. The TopTronic® E gateway is installed.

For Modbus TCP, DHCP should be set to “No” and a static IP address should be given as the IP address cannot be changed as a result.

4. Set a fixed IP address, this setting can be carried out by a specialist.
   - Set DHCP > No.
   - Open > IP address, enter the required IP address and confirm with “OK”.
   - Open > Subnet mask, enter the required subnet mask and confirm with “OK”.
   - Open > Default gateway, enter the required IP address and confirm with “OK”.
   - Open and select > Apply IP changes > Apply and confirm with “OK”.
   - The TopTronic® E gateway is installed.

A reliable IP mask must be entered in the subnet even if the system does not have a default gateway. Port 502 is reserved for Modbus/TCP.

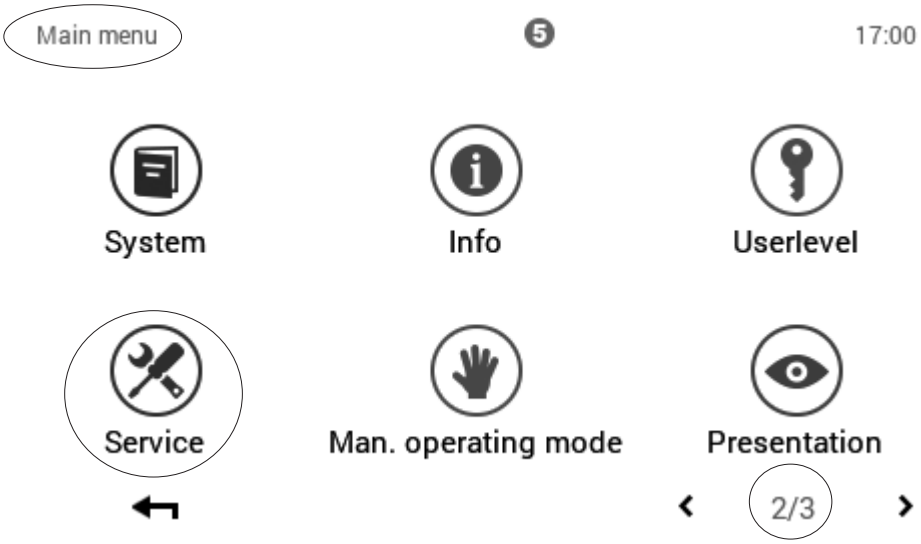
5. The Modbus is configured via TTE-GW > Modbus > Settings.
   - Active: Activates or deactivates the Modbus service
   - UnitID: not relevant for Modbus TCP
   - Mode: Modbus TCP
   - Parity: not relevant for Modbus TCP
   - Baud rate: not relevant for Modbus TCP

6. When the connection has been established, the gateway is restarted; the control module continues to operate. The gateway must be restarted manually if it does not restart automatically.
   Service > TTE-GW > General > Settings
   > All data points > Restart

The restart can take a few minutes.

4.2 Connecting the Modbus RS485 (RTU) to the gateway

1. Launch the TopTronic® E control module and select Main Menu > Service.



2. Under TTE-GW > Modbus > Settings, the Modbus configuration is performed.
   - Active: Activates or deactivates the Modbus service
   - UnitID: Modbus address of the gateway for Modbus RTU
   - Mode: Modbus RTU (via RS485)
   - Parity: Even, uneven or none. This setting must be the same on all units in the RS485 bus system.
   - Baud rate: This setting must be the same on all units in the RS485 bus system.
   - **Modbus RTU default setting:**
     Baud rate: 19200 bps
     Parity: even
     Stop bit: 1
     With parity: “none”, 2 stop bits must be used!
     The changeover takes place automatically at the gateway.

3. When the connection has been established, the gateway is restarted; the control module continues to operate. The gateway must be restarted manually if it does not restart automatically.
   Service > TTE-GW > General > Settings
   > All data points > Restart

The restart can take a few minutes.

5. General Modbus information

On the gateway, Modbus RTU is implemented via RS485 and Modbus TCP via Ethernet. Either Modbus RTU or Modbus TCP can be used. The two protocols cannot be used at the same time.

The following Modbus function codes are implemented:

- Function 03 (03hex) Read Holding Registers (reading off data points)
- Function 04 (04hex) Read Input Registers (reading off data points)
- Function 06 (06hex) Write Single Register (reading off data points)

However, no more than 10 to 15 data points should be read at the same time as this can cause the time for generating the response to increase significantly.
You are advised to keep the request interval greater than 1 s when requesting 10 data points simultaneously.

Modbus uses the terms “register” and “address”. Whilst the registers begin with the number 1, the addresses start with 0. The data point list uses Modbus addresses to address the data points.

6. Data point list

The complete data point list can be downloaded from
www.hoval.com/misc/TTE/TTE-GW-Modbus-datapoints.xlsx

6.1 Important columns

Modbus address
Address by which the data point on the Hoval CAN bus via Modbus can be addressed

UnitName
Name of the TopTronic® E module

UnitId
Hoval CAN bus module address (Explanation further below)

DatapointName
Name of the data point in the Hoval CAN bus

TypeName
Indicates whether a data point is unsigned (U) or signed (S). The length in bit of the data point is also given. (e.g. U8, S16, S32)

Decimal
The number of decimal places that the value has. (e.g. if the value 263 (decimal) is transmitted and “Decimal” is 1, the value is represented as 26.3.)

FunctionGroup name
Indicates the Hoval CAN bus data point function group where the value can be found (e.g. heating circuits)

Function name
Indicates the Hoval CAN bus data point function where the value can be found (e.g. heating circuits 1)

Steps
Indicates the number of valid steps when adjusting values. (e.g. 5 -> value may only take on 0, 5, 10, etc.)

Min. value
Smallest possible value

Max. value
Largest possible value

Writable
“Yes” if the value is writable.

Commentary
Comments

Text 0 to text 31

If a selection is possible on control module, this column indicates the value that represents the selection.

(e.g. text 0 is “Standby”, text 1 is “Week 1” -> Value 0 of the Modbus data point represents “Standby”, value 1 represents “Week 1”)

6.2 Module addresses

The “UnitId” column indicates the Hoval CAN bus address of the module that is to be addressed. If, for example, an MWA is configured with number “1” via the control module, this corresponds to the “UnitId” “385” in the Modbus data point list.

Name of the Hoval TopTronic® E module	Start address	End address
WEZ	1	16
SOL	65	80
PS	129	144
FW	193	205
HK/WW	257	272
MWA	385	400
GLT	449	464
HV	513	528
BM	1025	1087
GW	1153	1160

6.3 Special data points

6.3.1 Four-byte or eight-byte data points

If a data point of the Hoval CAN bus is longer than 2 bytes (U32, S32, S64), the data point is distributed to 2 or 4 Modbus data points. This is suffixed with “high” for high bytes and “low” for low bytes.

Example of a solar module with address 16:

Modbus address	Unit name	Data point Id	Data point name	Steps	Min. value	Max. value	Writable
1298	SOL	2034	Total yield collector_high	1	0	0	No
1299	SOL	2034	Total yield collector_low	1	0	0	No

65,570 kWh total yield for collector 1 is transferred as follows:

Modbus ID 1298: high byte: 1
Modbus ID 1299: low byte: 34

If you count the high and low bytes together (34 + 1*65,536), the result is 65,570 kWh.

6.3.2 Active errors

Active errors are complied of 9 Modbus addresses. There is only an error if the “Active error X_error_type” data point has a different value to 0xFF.

Active error 1_appearance_time	Time of the appearance in minutes since midnight
Active error 1_appearance_date	Date of the appearance in days since 1.1.1900
Active error 1_disappear_time	Time of the disappearance in minutes since midnight
Active error 1_disappear_date	Date of the disappearance in days since 1.1.1900
Active error 1_source	Hoval CAN bus address of the module in which the error occurred.
Active error 1_function_group	Hoval CAN bus data point function group where the error occurred
Active error 1_function_number	Hoval CAN bus data point function where the error occurred
Active error 1_error_type	Error type
Active error 1_error_code	Error code

The meanings of “error type” and “error code” can be taken from the respective manuals of the modules.
Example of an error on the H-Gen module with address 1:

Modbus ID 1565 => 476 = 7:56 a.m. (time since midnight in minutes)
Modbus ID 1566 => 42932 = 17/07/2017 (date since 01/01/1900)
Modbus ID 1567 => 480 = 8:00 a.m. (time of disappearance)
Modbus ID 1568 => 42932 = 17/07/2017 (date since 01/01/1900) date of disappearance
Modbus ID 1569 => 1 = CAN bus address
Modbus ID 1570 => 60 = automatic unit (function group)
Modbus ID 1571 => 4 FFA200 (operation number)
Modbus ID 1572 => 3 blocking
Modbus ID 1573 => 21 = blocking switch active

Legend:

Function number	Error type
1 = BIC960	1 = General info active
2 = OFA200	2 = Warning
3 = ECR461	3 = Blocking
4 = FFA200	4 = Locking system
5 = BIC335	
6 = IC3	
7 = WFA200	
8 = BIC970	
254 = FA general	

6.3.3 LIST data types

If a text selection can be made for a data point on the control module (e.g. “Standby”, “Week 1”, “Week 2”, etc.), the LIST data type manages the text that is represented by a number. Fields “Text 0” to “Text 31” of the data point list indicate which number means what and which text it represents. If, for example, the value of a LIST data point is “2”, the setting, which is entered in the “Text 2” column in the data point list, is active.
The value in the “Min. value” column regulates which selection is permissible. This value represents a bit pattern, which is laid over the 32 text columns and masks the texts that can be selected.

6.4 Essential data points

6.4.1 The following lists contain a selection of important data points. TTE-WEZ

This list applies to the heat generator module with **address 1**; the full data point list must be consulted for heat generator modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
1477	WEZ	1	AF1 - outdoor sensor 1	S16	1	General	General	1	0	0	No	Outdoor sensor 1 (AF1, local HW input)
1513	WEZ	1	Supply actual	S16	1	Heating circuit	Heating circuit 1	1	0	0	No	
1514	WEZ	1	Supply actual	S16	1	Heating circuit	Heating circuit 2	1	0	0	No	
1515	WEZ	1	Supply actual	S16	1	Heating circuit	Heating circuit 3	1	0	0	No	
1500	WEZ	1	Hot water actual SF	S16	1	Hot water	Hot water 1	1	0	0	No	
1539	WEZ	1	WEZ status	U8	0	Auto unit	FA general	1	0	0	No	Burner status
1531	WEZ	1	WEZ set value	S16	1	Auto unit	FA general	1	0	0	No	WEZ set value
1525	WEZ	1	WEZ temperature	S16	1	Auto unit	FA general	1	0	0	No	WEZ temperature
1536	WEZ	1	WEZ output	U8	0	Auto unit	FA general	1	0	0	No	WEZ output
1528	WEZ	1	Burner flame	U8	0	Auto unit	FA general	1	0	0	No	Burner flame
1487	WEZ	1	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 1	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
1488	WEZ	1	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 2	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
1489	WEZ	1	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 3	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
1481	WEZ	1	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 1	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
1483	WEZ	1	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 2	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
1485	WEZ	1	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 3	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
1490	WEZ	1	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 1	10	100	900	Yes	Flow reference value with constant requirement heating
1491	WEZ	1	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 2	10	100	900	Yes	Flow reference value with constant requirement heating
1492	WEZ	1	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 3	10	100	900	Yes	Flow reference value with constant requirement heating

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
1478	WEZ	1	Heating operation choice	LIST	0	Heating circuit	Heating circuit 1	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
1479	WEZ	1	Heating operation choice	LIST	0	Heating circuit	Heating circuit 2	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
1480	WEZ	1	Heating operation choice	LIST	0	Heating circuit	Heating circuit 3	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
1563	WEZ	1	Emissions test output limitation	U8	0	Heat gen.	Heat gen.	1	1	100	Yes	Can be requested for each H-Gen, can be changed continuously as parameter, initialise emissions at start
1564	WEZ	1	Activate emissions test	U8	0	Heat gen.	Heat gen.	1	0	1	Yes	Activate emissions test #0 = OFF, #1 = ON
1561	WEZ	1	Operation choice Heat generator	LIST	0	Heat gen.	Heat gen.	1	0x00000013	0	Yes	The following operating modes can be selected: #0 = Heat generator off #1 = Automatic mode #4 = Manual heating #5 = Manual cooling
1562	WEZ	1	Set temperature Manual operating mode	S16	1	Heat gen.	Heat gen.	10	0	1100	Yes	Set value for the heat generator flow temperature in manual operating mode.
19484	WEZ	1	Manual operating mode Reference output value (output limitation)	U8	0	Heat gen.	Heat gen.	1	0	100	Yes	Fixed value manual operating mode

This list applies to the heat generator module with **address 2**; the data point list must be consulted for heat generator modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
1610	WEZ	2	AF1 - outdoor sensor 1	S16	1	General	General	1	0	0	No	Outdoor sensor 1 (AF1, local HW input)
1646	WEZ	2	Supply actual	S16	1	Heating circuit	Heating circuit 1	1	0	0	No	
1647	WEZ	2	Supply actual	S16	1	Heating circuit	Heating circuit 2	1	0	0	No	
1648	WEZ	2	Supply actual	S16	1	Heating circuit	Heating circuit 3	1	0	0	No	
1633	WEZ	2	Hot water actual SF	S16	1	Hot water	Hot water 1	1	0	0	No	
1672	WEZ	2	WEZ status	U8	0	Auto unit	FA general	1	0	0	No	Burner status
1664	WEZ	2	WEZ set value	S16	1	Auto unit	FA general	1	0	0	No	WEZ set value
1658	WEZ	2	WEZ temperature	S16	1	Auto unit	FA general	1	0	0	No	WEZ temperature
1669	WEZ	2	WEZ output	U8	0	Auto unit	FA general	1	0	0	No	WEZ output
1661	WEZ	2	Burner flame	U8	0	Auto unit	FA general	1	0	0	No	Burner flame
1620	WEZ	2	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 1	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
1621	WEZ	2	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 2	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
1622	WEZ	2	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 3	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
1614	WEZ	2	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 1	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
1616	WEZ	2	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 2	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
1618	WEZ	2	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 3	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
1623	WEZ	2	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 1	10	0	1100	Yes	Flow reference value with constant requirement heating
1624	WEZ	2	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 2	10	0	1100	Yes	Flow reference value with constant requirement heating
1625	WEZ	2	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 3	10	0	1100	Yes	Flow reference value with constant requirement heating

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
1611	WEZ	2	Heating operation choice	LIST	0	Heating circuit	Heating circuit 1	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
1612	WEZ	2	Heating operation choice	LIST	0	Heating circuit	Heating circuit 2	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
1613	WEZ	2	Heating operation choice	LIST	0	Heating circuit	Heating circuit 3	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
1696	WEZ	2	Emissions test output limitation	U8	0	Heat gen.	Heat gen.	1	1	100	Yes	Can be requested for each H-Gen, can be changed continuously as parameter, initialise emissions at start
1697	WEZ	2	Activate emissions test	U8	0	Heat gen.	Heat gen.	1	0	1	Yes	Activate emissions test #0 = OFF, #1 = ON
1694	WEZ	2	Operation choice Heat generator	LIST	0	Heat gen.	Heat gen.	1	0x00000013	0	Yes	The following operating modes can be selected: #0 = Heat generator off #1 = Automatic mode #4 = Manual heating #5 = Manual cooling
1695	WEZ	2	Set temperature Manual operating mode	S16	1	Heat gen.	Heat gen.	10	0	1100	Yes	Set value for the heat generator flow temperature in manual operating mode.
19489	WEZ	2	Manual operating mode Reference output value (output limitation)	U8	0	Heat gen.	Heat gen.	1	0	100	Yes	Fixed value manual operating mode

Comment:

Room set temperature for heating circuit:

1) „Set “Heating operation choice” to constant and
2) set required temperature below “Normal room temp. heating oper”.

Cascade management in TTE

Example: H-Gen with address 1, heating circuit 1

MOD ID	*TTE ID*	*Value*	*Description*
1478	03-050		Heating operation choice
1481	03-051		Normal room temperature heating operation

Flow set temperature for heating circuit / Temp. setpoint for cascade

1) In the heating circuit, the parameter for an external constant requirement must be set in the case of a variable input. This variable input must be permanently bridged.
2) Caution: Ensure that the maximum flow temperature limitation 07-008 by the TTE controller has a high setting.
3) On the TTE controller, the control strategy 03-032 must be set to 3 (constant control).
4) The required flow set temperature can be set using 07-036.
5) Set the minimum flow temperature 07-002 to 0.
6) The pump heating circuit must be actuated externally because the circulating pump on the TTE controller runs as long as the corresponding variable input is bridged.

Cascade management in TTE

Example: WEZ with address 1, heating circuit 1

MOD ID	*TTE-ID*	*Value*	*Description*
	30-046	5	Allocation ext. constant req. input (5=VE2)
	07-008	90	Flow maximum temperature
	03-032	3	Control strategy (3=Constant control)
1490	07-036	Modbus	Flow reference value with constant requirement
	07-002		Flow minimum temp.

Domestic hot water reference value to heat generator or cascade

1) The SF input must be permanently bridged.
2) On the TTE controller, the domestic hot water mode 05-011 must be set to 4 (domestic hot-water thermostat).
3) Set the operation choice 05-050 to 4 (constant normal mode).
4) Set the charging reference value elevation 05-001 to 0
5) Make sure that the maximum domestic hot-water reference value limit 05-057 is set high (factry-set to 65 °C).
6) The desired domestic hot-water reference value can be set via 05-051.

Cascade management in TTE

If the hot-water reference value is transmitted separately to the TTE system, the TTE cascade manager can respond specifically to it. (e.g. faster connection, H-Gen required output can be set separately for hot water)

Example: H-Gen with address 1, domestic hot water

MOD ID	*TTE ID*	*Value*	*Description*
	05-011	4	Domestic hot water charging mode (4 = domestic hot-water thermostat)
	05-057	65	Maximum domestic hot water reference value limit
	05-050	4	Domestic hot-water operation choice (4 = constant normal mode)
	05-001	0	Charging reference value elevation
1497	05-051	Modbus	Desired domestic hot-water reference value (10 degrees = no request)

Temperature and/or output setpoint at heat generator: (The cascade management is external in both versions.)

1) Set “Heat generator operation choice” to manual mode (0-OFF, 4=heating, 5=cooling)
2) Set “Manual mode output setpoint” (output limitation)
3) Set “Manual mode set temperature”

Remarks:
+ With an output specification alone, a high manual mode temperature setpoint (or a low one in the case of cooling) should ideally be sent at the same time. This means that only the specified output limitation intervenes.
+ With a temperature specification alone, there is no need to set an output setpoint.
+ If multiple heat generators are each being directly controlled in the CAN bus group, the heat generator assignment of the TTE cascade manager must be switched off.
(heat generator addr. 1, cascade manager 1-8, in each case 04-022 : 0)
The cascade management is external in both versions.

Example: Separate control of 2 heat generators (connected via TTE CAN bus)
Heat generator 1

MOD ID	*TTE-ID*	*Description*
1562	09-020	Manual mode temperature setpoint (heat generator addr. 1 - heat generator)
19484	09-058	Manual mode output setpoint (output limitation, heat generator addr. 1 - heat generator)
1561	09-075	Heat generator operation choice (0=OFF, 4=HEAT, 5=COOL, heat generator addr. 1-heat generator)

Heat generator 2

MOD ID	*TTE-ID*	*Description*
1695	09-020	Manual mode temperature setpoint (heat generator addr. 2 - heat generator)
19489	09-058	Manual mode output setpoint (output limitation, heat generator addr. 2 - heat generator)
1694	09-075	Heat generator operation choice (0=OFF, 4=HEAT, 5=COOL, heat generator addr. 2-heat generator)

Heat generator 3

MOD ID	*TTE ID*	*Description*
1828	09-020	Manual mode temperature reference value (H-Gen addr. 3 – H-Gen)
19494	09-058	Manual mode output reference value (power limitation, H-Gen addr. 3 – H-Gen)
1827	09-075	H-Gen operation choice (0=OFF, 4=HEAT, 5=COOL, H-Gen addr. 3 – H-Gen)

+ at heat generator addr. 1, cascade manager 1+2, in each case 04-022 : 0 parameter setting (heat generator target address)

6.4.2 TTE-HK/WW

This list applies to the HK/WW module with **address 9**; the full data point list must be consulted for HK/WW modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
4457	HK/WW	265	AF1 - outdoor sensor 1	S16	1	General	General	1	0	0	No	Outdoor sensor 1 (AF1, local HW input)
4490	HK/WW	265	Supply actual	S16	1	Heating circuit	Heating circuit 1	1	0	0	No	
4491	HK/WW	265	Supply actual	S16	1	Heating circuit	Heating circuit 2	1	0	0	No	
4492	HK/WW	265	Supply actual	S16	1	Heating circuit	Heating circuit 3	1	0	0	No	
4487	HK/WW	265	Room actual	S16	1	Heating circuit	Heating circuit 1	1	0	0	No	
4488	HK/WW	265	Room actual	S16	1	Heating circuit	Heating circuit 2	1	0	0	No	
4489	HK/WW	265	Room actual	S16	1	Heating circuit	Heating circuit 3	1	0	0	No	
4480	HK/WW	265	Hot water actual SF	S16	1	Hot water	Hot water 1	1	0	0	No	
4479	HK/WW	265	Hot water setpoint	S16	1	Hot water	Hot water 1	1	0	0	No	Calc. ref. value for the hot water temp.
4489	HK/WW	265	SLP hot water charging pump	U8	0	Hot water	Hot water 1	1	0	1	No	
4470	HK/WW	265	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 1	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
4471	HK/WW	265	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 2	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
4472	HK/WW	265	Manual mode set temperature	S16	1	Heating circuit	Heating circuit 3	5	100	900	Yes	In manual operation, the flow temperature is controlled at the reference value set here.
4461	HK/WW	265	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 1	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
4463	HK/WW	265	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 2	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
4465	HK/WW	265	Normal room temp. heating oper.	S16	1	Heating circuit	Heating circuit 3	5	100	300	Yes	The parameter selects the required setpoint for the room temperature during normal heating operation.
4473	HK/WW	265	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 1	10	0	1100	Yes	Flow reference value with constant requirement heating
4474	HK/WW	265	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 2	10	0	1100	Yes	Flow reference value with constant requirement heating
4475	HK/WW	265	Flow setpoint constant req. heating	S16	1	Heating circuit	Heating circuit 3	10	0	1100	Yes	Flow reference value with constant requirement heating

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
4458	HK/WW	265	Heating operation choice	LIST	0	Heating circuit	Heating circuit 1	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
4459	HK/WW	265	Heating operation choice	LIST	0	Heating circuit	Heating circuit 2	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling
4460	HK/WW	265	Heating operation choice	LIST	0	Heating circuit	Heating circuit 3	1	0x01D3	0	Yes	The setting determines the operation choice of the heating circuit: #0 = Standby mode #1 = Week 1 #2 = Week 2 #4 = Constant #5 = Eco mode #7 = Manual operating mode heating #8 = Manual operating mode cooling

6.4.3 TTE-PS

This list applies to the PS module with **address 15**; the full data point list must be consulted for PS modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
17384	PS	143	Status buffer	U8	0	Buffer	Buffer	0	0	0	No	Buffer function operating state: Charging control: #0 = No requirement, OFF #1 = Requirement, low temp., PLP off (discharge protection) #2 = Requirement, charging running #3 = Requirement, setpoint achieved, follow-on active #4 = Requirement, setpoint achieved #6 = Forced energy #7= Skimming function Discharge control: #0 = No requirement (WEZ release) #2 = Requirement, setpoint not achieved, UPE in direction of WEZ or YPEL regulates constantly to PEF #3 = Requirement, UPE changeover delay, UPE/YPEL in direction of WEZ #4 = Requirement, setpoint achieved, UPE/YPEL in direction of buffer #6 = Forced energy #8 = Preferential operation SmartGrid #9 = Forced acceptance SmartGrid
17385	PS	143	Buffer setpoint	S16	1	Buffer	Buffer	1	0	0	No	Buffer setpoint
17386	PS	143	Buffer PF/KPF2 actual	S16	1	Buffer	Buffer	1	0	0	No	Buffer PF/KPF2 actual
17387	PS	143	Buffer PF2/KPF actual	S16	1	Buffer	Buffer	1	0	0	No	Buffer PF2/KPF actual

6.4.4 TTE-SOL

This list applies to the SOL module with **address 16**; the full data point list must be consulted for SOL modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
1291	SOL	80	TKO1 collector temperature	S16	1	Collector	Collector 1	1	-300	3000	No	TKO1 collector temperature
1371	SOL	80	TKR collector return temp.	S16	1	Collector	Collector 1	1	0	1000	No	TKR collector return temperature
1372	SOL	80	PS curr. speed solar pump	U8	0	Collector	Collector 1	1	0	100	No	PS curr. speed solar pump
1298	SOL	80	Total yield collector_high	S32	0	Collector	Collector 1	1	0	0	No	Total yield collector
1299	SOL	80	Total yield collector_low	S32	0	Collector	Collector 1	1	0	0	No	Total yield collector
1369	SOL	80	Vset volume flow solar circuit	S16	2	Collector	Collector 1	1	0	0	No	Vset volume flow solar circuit
1296	SOL	80	Operating hours PS solar pump	U16	0	Collector	Collector 1	1	0	65535	No	Below 81 reset of operating hours (only change to "0" possible)
1300	SOL	80	Current collector output	S16	1	Collector	Collector 1	1	0	32767	No	Current collector output
1359	SOL	80	Solar controller status	U8	0	Collector	Collector 1	1	0	3	No	Solar functions status #0 = Switched off #1= Charging active #2= Fault #3= Warning / info
1361	SOL	80	TU storage tank bottom temp.	S16	1	Solar storage tank	Solar storage tank 1	1	0	1000	No	Current temperature in the solar storage tank bottom.

6.4.5 TTE-FW

This list applies to the FW module with **address 1**; the full data point list must be consulted for FW modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
5309	DH	193	AF1 - outdoor sensor 1	S16	1	General	General	1	0	0	No	Outdoor sensor 1 (AF1, local HW input)
5325	DH	193	Room setpoint	S16	1	Heating circuit	Heating circuit 1	1	0	0	No	
5326	DH	193	Room setpoint	S16	1	Heating circuit	Heating circuit 2	1	0	0	No	
5345	DH	193	Hot water setpoint	S16	1	Hot water	Hot water 1	1	0	0	No	Calc. ref. value for the hot water temp.
5346	DH	193	Hot water actual SF	S16	1	Hot water	Hot water 1	1	0	0	No	
5366	DH	193	Room actual	S16	1	Heating circuit	Heating circuit 1	1	0	0	No	
5367	DH	193	Room actual	S16	1	Heating circuit	Heating circuit 2	1	0	0	No	
5371	DH	193	Supply actual	S16	1	Heating circuit	Heating circuit 1	1	0	0	No	
5372	DH	193	Supply actual	S16	1	Heating circuit	Heating circuit 2	1	0	0	No	
5480	DH	193	Current energy_high	U32	3	M-Bus	M-Bus 1	1	0	0	No	
5481	DH	193	Current energy_low	U32	3	M-Bus	M-Bus 1	1	0	0	No	
5482	DH	193	Current power_high	U32	1	M-Bus	M-Bus 1	1	0	0	No	
5483	DH	193	Current power_low	U32	1	M-Bus	M-Bus 1	1	0	0	No	
5488	DH	193	Current flow rate_high	U32	0	M-Bus	M-Bus 1	1	0	0	No	
5489	DH	193	Current flow rate_low	U32	0	M-Bus	M-Bus 1	1	0	0	No	
5490	DH	193	Current volume_high	U32	1	M-Bus	M-Bus 1	1	0	0	No	
5491	DH	193	Current volume_low	U32	1	M-Bus	M-Bus 1	1	0	0	No	
5492	DH	193	Current flow temperature	S16	1	M-Bus	M-Bus 1	1	0	0	No	
5493	DH	193	Current return temperature	S16	1	M-Bus	M-Bus 1	1	0	0	No	
5494	DH	193	Current differential temperature	S16	1	M-Bus	M-Bus 1	1	0	0	No	

6.4.6 TTE-MWA

This list applies to the MWA module with **address 13**; the full data point list must be consulted for MWA modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
15011	MWA	397	Current energy_high	U32	3	M-Bus	M-Bus 1	1	0	0	No	
15012	MWA	397	Current energy_low	U32	3	M-Bus	M-Bus 1	1	0	0	No	
15043	MWA	397	Current power_high	U32	1	M-Bus	M-Bus 1	1	0	0	No	
15044	MWA	397	Current power_low	U32	1	M-Bus	M-Bus 1	1	0	0	No	
15075	MWA	397	Current volume_high	U32	1	M-Bus	M-Bus 1	1	0	0	No	
15076	MWA	397	Current volume_low	U32	1	M-Bus	M-Bus 1	1	0	0	No	
15077	MWA	397	Current flow rate_high	U32	0	M-Bus	M-Bus 1	1	0	0	No	
15078	MWA	397	Current flow rate_low	U32	0	M-Bus	M-Bus 1	1	0	0	No	
15079	MWA	397	Current flow temperature	S16	1	M-Bus	M-Bus 1	1	0	0	No	
15080	MWA	397	Current return temperature	S16	1	M-Bus	M-Bus 1	1	0	0	No	
15081	MWA	397	Current differential temperature	S16	1	M-Bus	M-Bus 1	1	0	0	No	
24555	MWA	397	Active energy import 1_high2	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24556	MWA	397	Active energy import 1_low2	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24557	MWA	397	Active energy import 1_high1	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24558	MWA	397	Active energy import 1_low1	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24559	MWA	397	Active energy export 1_high2	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24560	MWA	397	Active energy export 1_low2	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24561	MWA	397	Active energy export 1_high1	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24562	MWA	397	Active energy export 1_low1	S64	3	M-Bus	M-Bus 1	1	0	0	No	
24563	MWA	397	Current active power total high2	S64	1	M-Bus	M-Bus 1	1	0	0	No	
24564	MWA	397	Current active power total low2	S64	1	M-Bus	M-Bus 1	1	0	0	No	
24565	MWA	397	Current active power total high1	S64	1	M-Bus	M-Bus 1	1	0	0	No	
24566	MWA	397	Current active power total low1	S64	1	M-Bus	M-Bus 1	1	0	0	No	

6.4.7 TTE-HV

This list applies to the HV module with **address 8**; the full data point list must be consulted for HV modules with other addresses.

Modbus address	Unit name	UnitId	DatapointName	Type name	Decimal	FunctionGroup name	Function name	Steps	Min. value	Max. value	Writable	Commentary
23622	HV	520	Op. choice ventilation	LIST	0	Ventilation	Ventilation	1	0x00000037	0	Yes	
23623	HV	520	Normal ventilation modulation	U8	0	Ventilation	Ventilation	1	15	100	Yes	
23624	HV	520	Eco ventilation modulation	U8	0	Ventilation	Ventilation	1	15	100	Yes	
23625	HV	520	Ventilation modulation	U8	0	Ventilation	Ventilation	1	15	100	No	
23626	HV	520	Humidity set value	U8	0	Ventilation	Ventilation	1	30	65	Yes	
23627	HV	520	Humidity extract air	U8	0	Ventilation	Ventilation	1	0	100	No	
23628	HV	520	VOC extract air	U8	0	Ventilation	Ventilation	1	0	100	No	
23629	HV	520	VOC outdoor air	U8	0	Ventilation	Ventilation	1	0	100	No	
23630	HV	520	Air quality control	LIST	0	Ventilation	Ventilation	1	0x00000003	0	Yes	
23631	HV	520	Status vent. regulation	U8	0	Ventilation	Ventilation	1	0	0	No	
23632	HV	520	Outside air temp.	S16	1	Ventilation	Ventilation	1	-300	500	No	