eTR 101 Modbus
Room Temperature Control Unit

Manual
Article numbers
30180/84 (white), 30181/85 (black)

1.   Safety and use instructions

Installation, testing, operational start-up and troubleshooting should only be performed by a qualified electrician.

⚠ **CAUTION!**
Live voltage!

- Inspect the device for damage before installation. Only put undamaged devices into operation.
- Comply with the locally applicable directives, regulations and provisions for electrical installation.
- Immediately take the device or system out of service and secure it against unintentional switch-on if risk-free operation is no longer guaranteed.

Use the device exclusively for building automation and observe the operating instructions. Improper use, modifications to the device or failure to observe the operating instructions will invalidate any warranty or guarantee claims.
Operate the device only as a fixed-site installation, i.e. only in assembled condition and after conclusion of all installation and operational start-up tasks, and only in the surroundings designated for it.
Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

For information on installation, maintenance, disposal, scope of delivery and technical data, please refer to the installation instructions.

2.   Description

The **Room Temperature Control Unit eTR 101 Modbus** measures the room temperature and displays the current value. The target temperature can be changed using the + and - touch buttons.

The **eTR 101 Modbus** is a Modbus server with RS485 interface and RTU protocol. Modbus client, e.g. PC, SPS or MC, can read the measured values and other settings with "Function 04h (read input registers)" or with "Function 06H (write single register)" and "Function 10H (write multiple registers)" adjust, for example, the display of the setpoint or the basic setpoint shifts.

Functions:
- **Temperature** measurements.
- **Display** of the current temperature or the setpoint and the basic setpoint shifts
- **2 touch keys** (+/-) for changing the target temperature or the basic setpoint shifts

3.   Views and device operation

3.1.   Adjust room temperature

Depending on the setting from the modbus client, the **Room Temperature Control Unit eTR 101 Modbus** displays the current room temperature value or the setpoint or the shift compared to the basic setpoint. Using the client, the operating mode, the type and the brightness of the display, along with other values, can be set.

Possibility A: Display off

The LED display is off. Manual changing of the target temperature using the +/- keys is *not* possible.

Possibility B: Current temperature displayed (room temperature)

The current room temperature is displayed. Manual changing of the target temperature using the +/- keys is *not* possible.
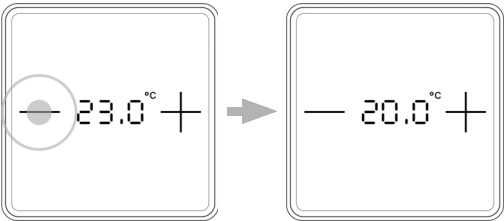
Possibility C: Display of the target temperature or basic target temperature

Depending on the setting, the current setpoint or the shift compared to the basic setpoint is displayed. The target temperature can be adjusted by pressing the +/- keys.

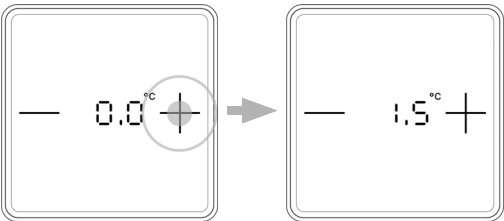**Setpoint** display (absolute value):
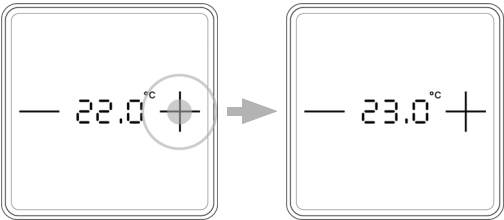
Press +:
Increase room temperature
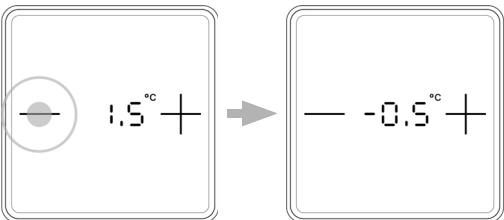(Target temperature is increased)

Press -:
Lower room temperature
(Target temperature is lowered)

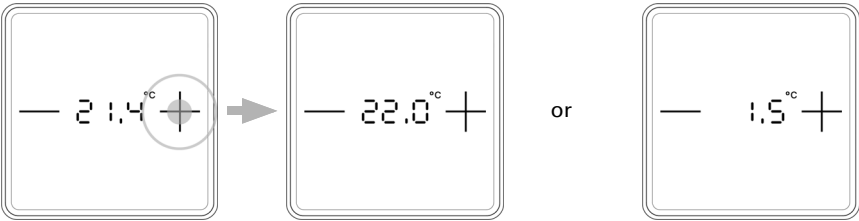Display of the **basic setpoint shift** (change compared to the basic setpoint of the controls):

Press +:
Increase room temperature
(Basic setpoint shift, PLUS direction)

Press -:
Lower room temperature
(Basic setpoint shift, MINUS direction)

Possibility D: Display of the current temperature and the target temperature / basic setpoint shift

In normal mode, the current room temperature is displayed. Touching the keys changes the display to the target temperature or the basic setpoint shift, depending on the setting. Changes with + or - become visible. The display returns to room temperature if a touch key is not pressed for 5 seconds.

Gently press touch key **+ or -**: The current **target temperature** (or the basic setpoint shift) is displayed.

Press +: Increase room temperature
(Target temperature / basic setpoint shift is increased).

Press -: Lower room temperature
(Target temperature / basic setpoint shift is lowered).

General information:

The increments for the change and the possible setting range are specified using the modbus client.

4.   Transmission protocol

Apart from register 0, 1, 4 and 5, the values communicated by the client are stored per register in the server.

Register	Parameter	Data type	Range	Starting value	Function	Raw value (Example)	Value with unit (Example)
0	Actual temperature	Signed 16bit	Signed 16 bit*		Output	253	25.3 °C
1	Sensor Fault 1 = On, 0 = Off	Unsigned 16bit	0 or 1		Output	1	1
2	Actual temperature offset	Signed 16bit	-5 to +5K	0	Input/Output	15	1.5 °C
3	LED brightness %	Unsigned 16bit	0 to 100%	80	Input/Output	55	55 %
4	LED On Off 1 = On, 0 = Off	Unsigned 16bit	0 or 1	1	Input/Output	1	1
5	LED Auto Off Activation	Unsigned 16bit	0 or 1	1	Input/Output	1	1
6	LED Auto Off Time	Unsigned 16bit	1 to 255	10	Input/Output	1	1
7	LED display Temp 1 = On, 0 = Off	Unsigned 16bit	0 or 1	1	Input/Output	1	1
8	Substations Type operation 0 = not used, 1 = basic setpoint shift (a), 2 = setpoint (b)	Unsigned 16bit	0 to 2	1	Input/Output	1	1
9a	Basic setpoint shift PLUS Max	Unsigned 16 bit	0 to +5K	3	Input/Output	30	3.0 °C

Register	Parameter	Data type	Range	Start ing value	Func-tion	Example Raw value	Example Value with unit
10a	Basic setpoint shift MINUS Max	Unsigned 16 bit	0 to +5K	3	Input/ Output	30	3.0 °C
11a	Basic setpoint shift	Signed 16 bit	MINUS to PLUS	0	Input/ Output	15	1.5 °C
12a	Basic setpoint shift step	Unsigned 16 bit	0.1 to +2K	0.5	Input/ Output	5	0.5 K
9b	Target value max	Unsigned 16 bit	3 to 40°C	25	Input/ Output	250	25 °C
10b	Target value min	Unsigned 16 bit	3 to 40°C	18	Input/ Output	180	18 °C
11b	Target value	Unsigned 16 bit	Min to Max	21	Input/ Output	210	21 °C
12b	Target value step	Unsigned 16 bit	0.1 to +2K	0.5	Input/ Output	5	0.5 K

*) Before the first measurement, and if there is a defective sensor, register 0 (temp. sensor measurement value) is "-32768".

4.1. Function 04H read input registers

Query from client

Byte no.	Variable		Explanation
0	Server address	xx	
1	Command	04H	Read input registers
2	Start address high byte	xx	Register start address
3	Start address low byte	xx	
4	Word count high byte	xx	Number of registers to be read
5	Word count low byte	xx	
6	CRC low byte	xx	
7	CRC high byte	xx	

Sample query string for reading all data for server address 1:
01H, 04H, 00H, 00H, 00H, 0DH, 31H, CFH

Response from server

Before the first measurement, and if there is a defective sensor, register 0 (temp. sensor measurement value) is "-32768".

Byte no.	Register Address	Variable		Explanation
0		Server address	xx	
1		Command	04H	Read input register
2		Number of bytes	xx	
3	0	Actual temperature high byte	xx	
4		Actual temperature low byte	xx	
5	1	Sensor Fault high byte	xx	
6		Sensor Fault low byte	xx	
7	2	Actual temperature offset high byte	xx	
8		Actual temperature offset low byte	xx	
9	3	LED brightness % high byte	xx	
10		LED brightness % low byte	xx	
11	4	LED On Off high byte	xx	
12		LED On Off low byte	xx	
13	5	LED Auto Off Activation high byte	xx	
14		LED Auto Off Activation low byte	xx	
15	6	LED Auto Off Time high byte	xx	
16		LED Auto Off Time low byte	xx	
17	7	LED display high byte	xx	
18		LED display low byte	xx	
19	8	Substations Type high byte	xx	
20		Substations Type low byte	xx	
21	9a	Basic setpoint shift PLUS Max high byte	xx	
22		Basic setpoint shift PLUS Max low byte	xx	
23	10a	Basic setpoint shift MINUS Max high byte	xx	
24		Basic setpoint shift MINUS Max low byte	xx	
25	11a	Basic setpoint shift high byte	xx	
26		Basic setpoint shift low byte	xx	
27	12a	Basic setpoint shift step high byte	xx	
28		Basic setpoint shift step low byte	xx	
21	9b	Target value max high byte	xx	
22		Target value max low byte	xx	
23	10b	Target value min high byte	xx	
24		Target value min low byte	xx	
25	11b	Target value high byte	xx	
26		Target value low byte	xx	
27	12b	Target value step high byte	xx	
28		Target value step low byte	xx	
29		CRC low byte	xx	
30		CRC high byte	xx	

4.2. Function 06H write single register

Command from client

Byte no.	Variable		Explanation
0	Server address	xx	
1	Command	06H	Write single register
2	Address high byte	xx	Register address
3	Address low byte	xx	
4	Value high byte	xx	Value of the register to be written
5	Value low byte	xx	
6	CRC low byte	xx	
7	CRC high byte	xx	

Sample string for writing a target temperature of 21.5°C for server address 1:
01H, 06H, 00H, 0BH, 00H, D7H, B8H, 56H

Response from server

Byte no.	Variable		Explanation
0	Server address	xx	
1	Command	06H	Write single register
2	Address high byte	xx	Register address
3	Address low byte	xx	
4	Value high byte	xx	Written value
5	Value low byte	xx	
6	CRC low byte	xx	
7	CRC high byte	xx	

4.3. Function 10H write multiple registers

Command from client

Byte no.	Variable		Explanation
0	Server address	xx	
1	Command	10H	Write multiple registers
2	Start address high byte	xx	Register start address
3	Start address low byte	xx	
4	Word count high byte	xx	Number of registers to be written
5	Word count low byte	xx	
6	Number of bytes	xx	
7	Value high byte	xx	Value of the register to be written
8	Value low byte	xx	
...			
	CRC low byte	xx	
	CRC high byte	xx	

Sample string for writing the register 9, 10, 11 and 12 with the values:

Basic setpoint shift, maximum: +3.0K
Basic setpoint shift, minimum: -3.0K
Basic setpoint shift: 0K
Basic setpoint shift Increment: 0.5K

String: 01H, 10H, 00H, 09H, 00H, 04H, 08H, 00H, 1EH, 00H, 1EH, 00H, 00H, 00H, 05H, 3CH, 66H

Response from server

Byte no.	Variable		Explanation
0	Server address	xx	
1	Command	10H	Write multiple registers
2	Address high byte	xx	Register address
3	Address low byte	xx	
4	Word count high byte	xx	Number of written registers
5	Word count low byte	xx	
6	CRC low byte	xx	
7	CRC high byte	xx	