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USER GUIDE

TRM-MOD-230

Produal

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PRODUAL

PART OF BEMSIQ GROUP

TRM room thermostat

USER GUIDE

Made in Finland

5 years warranty

MANAGEMENT SYSTEM CERTIFICATION DNV ISO 9001 · ISO 14001 Finland

Contents

1 Introduction....3
1.1 About this user guide....3
1.2 Intended use....3

2 Safety precautions....4

3 Main components....5

4 Functional description....6
4.1 Voltage output....6
4.2 Relay outputs....6
4.3 Inputs....7
4.4 Operation modes....8
4.5 Timer....9

5 Commissioning....10
5.1 Mounting....10
5.2 DIP switch settings....11
5.3 Wiring....12
5.4 Connecting external sensors....15
5.4.1 Connecting an external temperature sensor....15
5.4.2 Connecting a changeover sensor....16
5.5 Configuring settings using the device menu....17
5.5.1 General settings....17
5.5.2 Control settings....18
5.5.3 Input settings....19
5.5.4 Fan settings....20
5.5.5 Communication settings....21

6 Operating instructions....22
6.1 Starting and stopping operation....22
6.2 Adjusting the temperature setpoint....22
6.3 Selecting the operation mode....22
6.4 Adjusting the fan speed....23
6.5 Setting the timer....23
6.6 Locking and unlocking the buttons....24

7 Modbus....25
7.1 Modbus properties....25
7.2 Modbus function codes....25
7.3 Device identification objects....25
7.4 Holding registers....25

8 Disposal....29

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1 Introduction

The TRM room thermostat measures and controls room temperature. You can use it as a controller in many traditional HVAC applications, including 2- and 4-pipe fan coil applications, and air conditioning with heating and cooling functions.

This room thermostat has six relay outputs: three for 3-speed fan, two for valve control and one for a condensate pump or a heater. It also has one voltage output (0...10 V) for an EC fan.

The TRM room thermostat has one resistive input and one dual-mode input. You can connect an external *NTC 50* temperature sensor to the resistive input, for example, to measure return air temperature. The dual-mode input allows you to connect an external *NTC 50* temperature sensor to the thermostat for heating/cooling changeover in a 2-pipe system. Alternatively, you can connect an occupancy sensor to the dual-mode input to start and stop the thermostat according to occupancy status. Another option is to connect a simple ON/OFF switch to the dual-mode input for switching the thermostat on and off.

The room thermostat has a backlit, easy-to-read LCD display with 0.1 °C resolution. Users can easily adjust the temperature setpoint using the buttons adjacent to the display. The thermostat also has a built-in timer for switching the thermostat off.

This room thermostat has an RS-485 connection for Modbus RTU communication.

Commissioning the room thermostat is simple. You can select the basic configuration with DIP switches according to your application. You can configure other settings through the device menu or via Modbus communication.

This room thermostat can be flush mounted on the wall or installed directly into a HVAC unit. The thermostat is compatible with the 503 flush mounting boxes. Two 20 x 3.5 mm universal screws are included in the product package.

1.1 About this user guide

This user guide contains important information about the installation, wiring, configuration and use of the product. Read this guide carefully before you install the product, connect the wires, or operate the product. Make sure that you fully understand all instructions before you start work. If you are not sure what the instructions mean, contact the seller or the manufacturer.

Follow all instructions in this user guide carefully. Always obey the applicable local rules and regulations.

The original instructions were written in English. If there are differences between the English instructions and the translations, refer to the English instructions.

If you find a mistake in the English instructions or in the translations, please send the details to the manufacturer.

1.2 Intended use

This room thermostat is intended to be used for measuring and controlling temperature in room environment. It is intended to be connected to a building automation system in the HVAC/R industry.

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2 Safety precautions

The product is developed, manufactured and tested according to high quality standards. However, instructions for safe use must be followed when installing, using or disposing the product or parts of product.

Read this user guide carefully before you commission, use or service this device. To avoid any kind of damage to people or property, follow the instructions carefully. Produal is not liable for any hazards, injury to people, or damage to property caused by incorrect installation or misuse of the device.

To avoid electrical shock or damage to equipment, disconnect power before you install or service the product. Use only proper wiring that is rated for the full operating voltage and maximum current in the system. The wiring must also withstand fault conditions.

To avoid fire and/or explosion, do not use the product in potentially flammable or explosive atmosphere.

Make sure that the product is not damaged before installation. Do not drop the product or use excessive force during installation. Do not use the product if you can see any damages.

After installation, the product will be part of a system whose specifications and performance characteristics are not designed or controlled by Produal. Refer to national and local authorities to ensure that the installation is functional and safe.

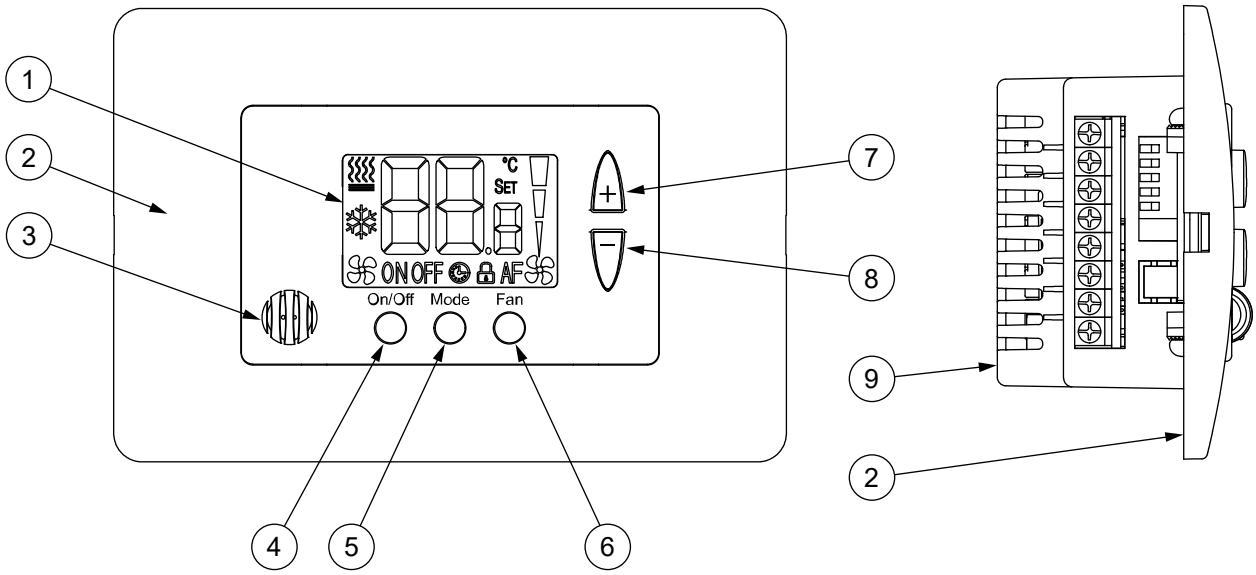
The product should only be used in professionally designed applications. Unauthorised modifications are not allowed. The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or property.

In this document, there are different warnings and notes. The warning and note types are defined in the following table.

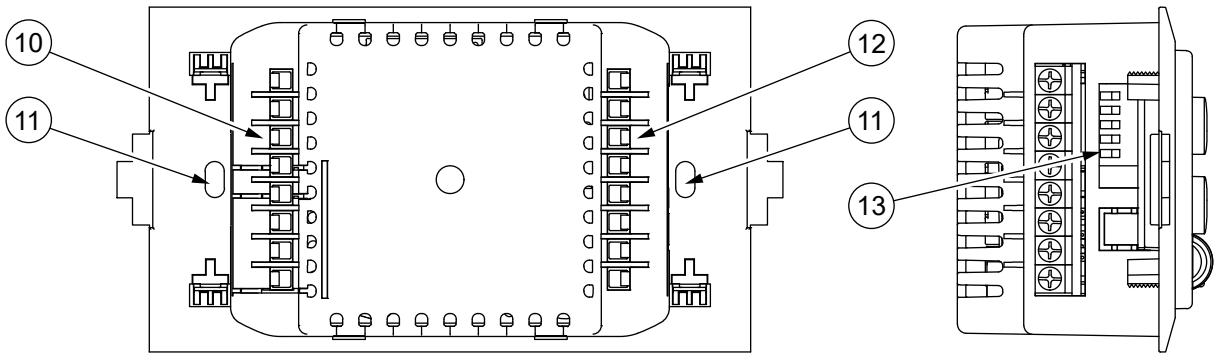
Sign	Description
WARNING:	The warning symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION:	The caution symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
Important:	The important symbol indicates a potentially hazardous situation which, if not avoided, could result in damage to the device or property.
Note:	The note symbol indicates a useful tip or a recommended way to complete a task. These notes also provide information that is useful but not critical to the user.

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3 Main components



1	Display	2	Cover plate
3	Temperature sensor	4	On/off button *(On/Off)*
5	Mode button *(Mode)*	6	Fan button *(Fan)*
7	Temperature setpoint button *(+)*	8	Temperature setpoint button *(–)*
9	Housing		



10	Terminal block, 230 Vac	11	Mounting point
12	Terminal block, extra-low voltage	13	DIP switches

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4 Functional description

This chapter introduces the main functions of the device.

4.1 Voltage output

This room thermostat has one voltage output (0...10 Vdc). You can use it to control an EC fan.

You can configure the EC fan settings through the device menu or via Modbus communication. If you configure the settings via bus, you can use the following holding registers.

Holding register	Parameter description	Data type	Values	Range	Default
27	Automatic fan speed	S16	*0 - 1*	0. Disabled 1. Enabled	*1*
41	Fan proportional band, 3-speed fan / EC fan	S16	*1...10*	*1...10 °C*	*3*
42	Fan, low speed	S16	*0...30*	*0...30 %*	*20*
43	Fan, medium speed	S16	*30...60*	*30...60 %*	*50*
44	Fan, high speed	S16	*60...100*	*60...100 %*	*90*
45	EC fan, low limit, automatic fan speed	S16	*0...100*	*0...100 %*	*0*
46	EC fan, high limit, automatic fan speed	S16	*0...100*	*0...100 %*	*100*

4.2 Relay outputs

This room thermostat has a total of six relay outputs. It supplies power to the external devices through its relay outputs. You can connect the following external devices to the relay outputs: a 3-speed fan, fan coil valve actuators, and a condensate pump or an electric heater.

The room thermostat has three relay outputs (230 Vac, 3 A) for controlling the speed of a 3-speed fan. Low, medium and high speed each have a separate relay output. You can configure the fan speed levels in the device settings or via Modbus communication.

The room thermostat has two relay outputs (230 Vac, 0.5 A) for controlling valves in a 2- or 4-pipe fan coil system. In a 4-pipe system, one relay output controls the heating valve and the other relay output controls the cooling valve. A 2-pipe system has only one valve, so the two relay outputs are connected with a jump wire and one of them controls the valve.

The room thermostat has one relay output (230 Vac, 0.5 A) for controlling a condensate pump or an electric heater.

You can configure the settings for the relay outputs with the DIP switches. You can configure the fan proportional band and fan speed settings through the device menu or via Modbus communication. If you configure the settings via bus, you can use the following holding registers.

Holding register	Parameter description	Data type	Values	Range	Default
27	Automatic fan speed	S16	*0 - 1*	0. Disabled 1. Enabled	*1*
41	Fan proportional band, 3-speed fan / EC fan	S16	*1...10*	*1...10 °C*	*3*

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Holding register	Parameter description	Data type	Values	Range	Default
42	Fan, low speed	S16	*0...30*	*0...30 %*	*20*
43	Fan, medium speed	S16	*30...60*	*30...60 %*	*50*
44	Fan, high speed	S16	*60...100*	*60...100 %*	*90*

4.3 Inputs

This room thermostat has one resistive input and one dual-mode input (resistive/digital). You can connect an external *NTC 50* temperature sensor to the *T1* resistive input, for example, to measure return air temperature.

Only use external *NTC 50* temperature sensors with the following resistance characteristics.

°C	kΩ
7.2	115.8
10.0	100.9
12.8	88.1
15.6	77.1
18.3	67.7

°C	kΩ
21.1	59.6
23.9	52.5
26.7	46.4
29.4	41.2
32.2	36.6

The *IN1* dual-mode input allows you to connect a strap-on *NTC 50* temperature sensor to the thermostat for heating/cooling changeover in a 2-pipe system. Alternatively, you can connect an occupancy sensor to the dual-mode input to start and stop the thermostat according to occupancy status. Another option is to connect a remote ON/OFF switch to the dual-mode input for switching the thermostat on and off.

If you connect an occupancy sensor to the dual-mode input, the thermostat starts operating when the occupancy sensor detects movement and stops operating when occupants leave the room. You can also configure a 1...99-minute delay for stopping the thermostat. For example, if the delay is 10 minutes and the room thermostat is in heating mode, it stops heating 10 minutes after occupants leave the room. You can set a delay for a remote switch, too.

You can select normally closed *(NC)* or normally open *(NO)* as the contact function for an external occupancy sensor or a remote switch.

You can configure the input settings through the device menu or via Modbus communication. If you configure the settings via bus, you can use the following holding registers.

Holding register	Parameter description	Data type	Values	Range	Default
36	Input *T1* function	S16	*0 - 1*	0. Not in use 1. External *NTC 50* sensor	*0*
37	Input *IN1* function	S16	*0 - 1 - 3*	0. Not in use 1. External changeover sensor 3. Occupancy sensor or ON/OFF switch	*0*
38	Input *IN1*, contact function	S16	*0 - 1*	0. Normally closed *(NC)* 1. Normally open *(NO)*	*1*

Holding register	Parameter description	Data type	Values	Range	Default
39	Input *IN1*, thermostat stopping delay	S16	*0...99*	*0...99 min, 0 = 1 s*	*0*
40	Input *IN1*, thermostat operating logic when occupancy sensor is connected	S16	*0 - 1*	0. Relays are off when the room is unoccupied. Thermostat stays on. Relays switch on when occupied again. 1. Relays and thermostat are off when the room is unoccupied. Thermostat stays off when the room is occupied again.	*0*
48	Occupancy detection mode	S16	*0 - 1 - 2*	0. Occupancy sensor 1. Always occupied 2. Always unoccupied	*0*

4.4 Operation modes

This room thermostat has four operation modes. The active operation mode is indicated on the left side of the display with an icon. Operation modes available to the user depend on the device settings.

Icon	Operation mode
❄	Cooling mode. The cooling icon flashes when the cooling mode is active.
♨	Heating mode. The heating icon flashes when the heating mode is active.
♨ ❄	Automatic operation mode. The heating icon flashes when the heating mode is active. The cooling icon flashes when the cooling mode is active. If the automatic operation mode is disabled in the settings, it is not available to the user.
	Fan only mode. The fan icon flashes when the fan is on. This icon is also shown on the display when automatic fan speed is enabled.

The automatic operation mode controls cooling and heating. If you enable the Cooling and Fan option (parameter *P85* or holding register *14*), the heating mode and the automatic operation mode are not available in the user interface.

In a 2-pipe fan coil system, if an electric heater is connected to relay output *16*, heating and cooling operate as follows:

Operation mode	Relay output	Stage
Cooling mode	*14* fan coil valve	1st stage cooling
Heating mode	*14* fan coil valve	1st stage heating

Operation mode	Relay output	Stage
Automatic operation mode	*14* fan coil valve	1st stage cooling
	16 electric heater	1st stage heating

In a 2-pipe fan coil system, you can attach a strap-on *NTC 50* temperature sensor to the water supply pipe of the fan coil unit and connect it to the *IN1* dual-mode input of the room thermostat. The strap-on sensor functions as a changeover sensor. The changeover sensor measures if the water in the supply pipe is hot or cold, allowing the thermostat to shift between heating and cooling modes automatically in the automatic operation mode. If the supply pipe temperature is above 30 °C, the water in the pipe is hot and the thermostat activates the heating mode. If the supply pipe temperature is below 20 °C, the water in the pipe is cold and the thermostat activates the cooling mode. The thermostat stays in the activated mode as long as the supply pipe temperature is between 20 °C and 30 °C.

If an electric heater is connected to relay output *16* and a changeover sensor is connected to the *IN1* dual-mode input, heating and cooling operate as follows:

Selected operation mode	Relay output	Stage
Cooling mode	*14* fan coil valve	1st stage cooling
Heating mode, *IN1 > 30 °C*	*14* fan coil valve	1st stage heating
Heating mode, *IN1 < 20 °C*	*14* fan coil valve	1st stage cooling
	16 electric heater	1st stage heating
Automatic operation mode	*14* fan coil valve	1st stage cooling if *IN1 < 20 °C*
	16 electric heater	1st stage heating if *IN1 > 30 °C*

If you configure the settings via bus, you can use the following holding registers.

Holding register	Parameter description	Data type	Values	Range	Default
14	Cooling and Fan only	S16	*0 - 1*	0. Off 1. On	*0*
26	Automatic operation mode (heating and cooling)	S16	*0 - 1*	0. Disabled 1. Enabled	*1*
30	Operation mode	S16	*0 - 1 - 2 - 3*	0. Fan only 1. Cooling 2. Heating 3. Automatic	*1*

4.5 Timer

This room thermostat has a built-in timer. The user can set the timer for 1 to 10 hours from the user interface. The timer automatically switches the room thermostat off after the set period. If the room thermostat is on and the timer is set, a clock icon at the bottom of the display indicates that the timer is active.

In case of a power failure, the timer resets and does not switch the room thermostat off. The clock icon flashes until the user presses the *On/Off* button to switch the thermostat off, and then on again.

5 Commissioning

5.1 Mounting

WARNING: Always commission the device in a de-energised electricity network. Risk of electric shock.

WARNING: Handle the product with care. Dropping the product can damage it internally and cause unwanted functions in the connected system.

1. Check that the product is not damaged during transportation.
2. Select the mounting position.

   WARNING: Do not install this product near a life support equipment. This device may cause harmful interference to nearby life support equipment.

   WARNING: Do not install this product into environment containing flammable or explosive substances.

   CAUTION: Place the device outside the reach of children and animals.

   Mount the device in dry surroundings (IP30) with pollution degree 1 or 2. The recommended mounting height is 150 cm from the floor.

   Select the mounting position carefully. If possible, eliminate all the error factors that can affect the measurements. Typical measurement error factors include:

   - direct sunlight
   - airflow coming from windows or doors
   - airflow coming from ventilation nozzles
   - airflow coming from the flush mounting box
   - differential temperature caused by an external wall
   - warm air from heaters, televisions and other electrical equipment

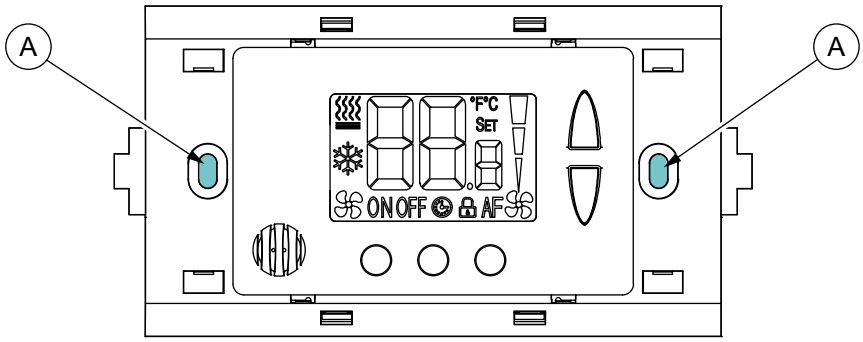
   Important: Only install this device in a location where the ambient conditions meet the operating condition requirements.

Operating conditions	
Ambient temperature	0...50 °C
Ambient humidity	0...80 %rH (non-condensing)

3. Set the DIP switches in correct positions for your application.
   See chapter DIP switch settings on page 11 for instructions.
4. Connect the wires.
   See chapter Wiring on page 12 for instructions.

5. Mount the device on a 503 flush mounting box using the mounting points.

   Two mounting screws are included in the product package.



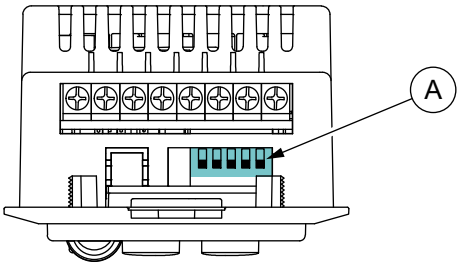
   A. Mounting point

6. Attach the cover plate to the device by pushing it towards the wall until it clicks into place.

5.2 DIP switch settings

WARNING: Always commission the device in a de-energised electricity network. Risk of electric shock.

Set the DIP switches into correct positions according to your application before you connect the wires. See the table below for the DIP switch settings.



A. DIP switches

DIP	 1 *ON*	 1 *OFF*	**Default**
1	Modbus communication line terminated with the built-in 120 Ω termination resistor. Set the *DIP 1* dip switch to *ON* position in the last unit of the communication line.	Modbus communication line not terminated with the built-in termination resistor.	 *OFF*
2	2-pipe fan coil unit control	4-pipe fan coil unit control	 *OFF*
3	EC fan control (0...10 V)	3-speed fan control (230 V)	 *OFF*

DIP	 1 ON	 1 OFF	Default
4	Fan runs on-demand for cooling or heating (select this in no-valve configuration)	Fan on-demand / fan continuous (selectable)	 OFF
5	Electric heater control	Condensate pump control	 OFF

5.3 Wiring

WARNING: Only connect wires and commission the device if you are qualified for electrical work and familiar with building automation products. Risk of electric shock and damage to the device.

WARNING: Always commission the device in a de-energised electricity network. Risk of electric shock.

WARNING: Protect the external power sources and power wiring with a fuse or circuit breaker. The maximum rating for the external circuit breaker is 6 A.

CAUTION: Connect the device only to overvoltage category I, II or III electricity network according to EN 60730-1.

CAUTION: Use single-stranded wires if possible. If you use multi-stranded wires, always install wire end sleeves to the wires to prevent short circuits and ensure secure attachment.

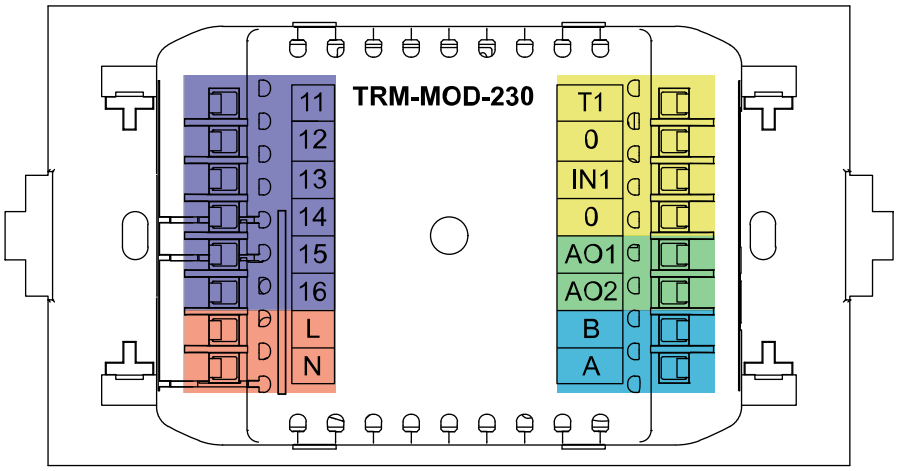
Important: This product cannot detect an abnormal condition of output port. External supervising (automated/human) can be necessary depending on the application where this product is used.

Important: For CE and UKCA compliance, use correctly grounded, shielded cable.

1. Make sure that the DIP switches are in correct positions.
   See chapter DIP switch settings on page 11 for instructions.

2. The wiring terminals are located on the rear of the device.

CAUTION: Do not open the device cover. There are no DIP switches, buttons or serviceable parts inside the housing.



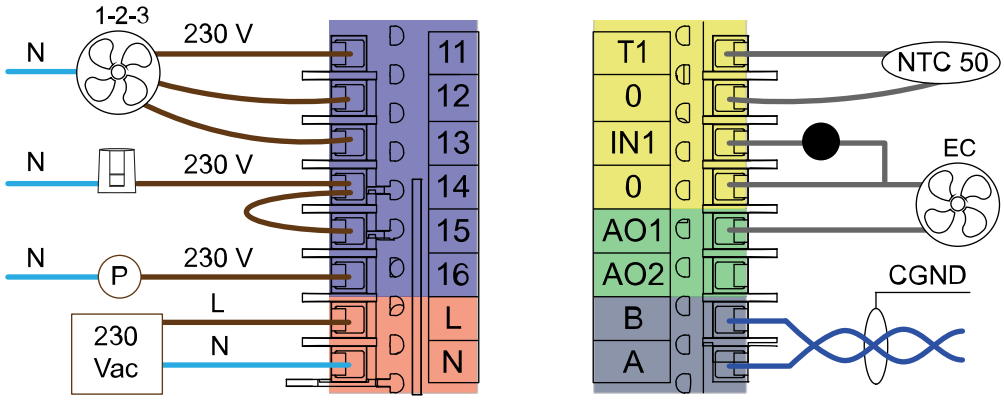
3. Connect the wires according to the wiring diagram.

   Separate wiring diagrams are provided for 2-pipe and 4-pipe fan coil applications.

Important: Do not use excessive force when you tighten the wiring terminal screws.

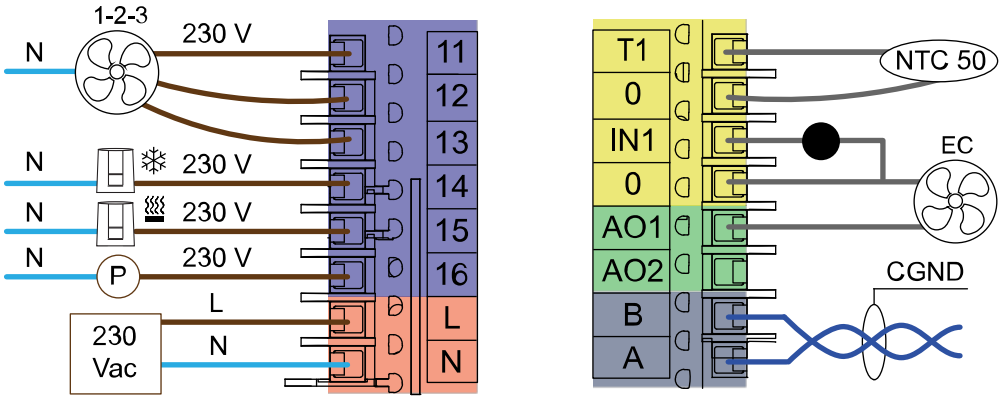
4. If you connect external sensors to the room thermostat, see chapter Connecting external sensors on page 15 for instructions.

5. If you have a 2-pipe system, connect the wires as follows:



11	3-speed fan	Fan, high speed. Relay output 230 Vac, 3 A.
12		Fan, medium speed. Relay output 230 Vac, 3 A.
13		Fan, low speed. Relay output 230 Vac, 3 A.
14	2-pipe system	Valve control. Relay output 230 Vac, 0.5 A.
15		Connect relay outputs 15 and 14 with a jump wire. The same valve is used for heating or cooling depending on the operation mode.
16	Condensate pump or electric heater. Relay output 230 Vac, 0.5 A.	
L	Power supply	230 Vac, 50 Hz
N		0 V
T1	Resistive input	External *NTC 50* temperature sensor
0		0 V
IN1	Dual-mode input	External *NTC 50* temperature sensor, ON/OFF switch or occupancy sensor
0		0 V
AO1	Analogue output, fan 0...10 V	
AO2	Not in use	
B	Modbus RTU, RS-485 Set *DIP 1* to *ON* in the last unit of the communication line.	
A		

6. If you have a 4-pipe system, connect the wires as follows:



11	3-speed fan	Fan, high speed. Relay output 230 Vac, 3 A.
12		Fan, medium speed. Relay output 230 Vac, 3 A.
13		Fan, low speed. Relay output 230 Vac, 3 A.
14	4-pipe system	Cooling valve. Relay output 230 Vac, 0.5 A.
15		Heating valve. Relay output 230 Vac, 0.5 A.
16	Condensate pump or electric heater. Relay output 230 Vac, 0.5 A.	
L	Power supply	230 Vac, 50 Hz
N		0 V
T1	Resistive input	External *NTC 50* temperature sensor
0		0 V
IN1	Dual-mode input	External *NTC 50* temperature sensor, ON/OFF switch or occupancy sensor
0		0 V
AO1	Analogue output, fan 0...10 V	
AO2	Not in use	
B	Modbus RTU, RS-485	
A	Set *DIP 1* to *ON* in the last unit of the communication line.	

7. Install the device on a flush mounting box and attach the cover plate before you connect the supply voltage to the device.

5.4 Connecting external sensors

The room thermostat has one resistive input (*T1*) and one dual-mode input (*IN1*). You can connect an external *NTC 50* temperature sensor to *T1* resistive input, for example, to measure return air temperature. The *IN1* dual-mode input allows you to connect an external *NTC 50* temperature sensor to the thermostat for heating/cooling changeover in a 2-pipe system. Alternatively, you can connect an occupancy sensor to the dual-mode input to start and stop the thermostat according to occupancy status. Another option is to connect a remote switch to the dual-mode input for switching the thermostat on and off.

5.4.1 Connecting an external temperature sensor

1. Disconnect the device supply voltage.

2. Connect the external *NTC 50* temperature sensor to the *T1* resistive input.
   See chapter Wiring on page 12 for wiring instructions.
3. Mount the room thermostat on the flush mounting box.
4. Attach the cover plate to the device.
5. Connect the supply voltage.
6. Open the device settings.
   See chapter Configuring settings using the device menu on page 17 for instructions.
7. Set parameter *P08* value to *1* in the settings.
8. Exit the settings.
9. Monitor the temperature readings. If necessary, adjust temperature measurement offset in the device settings (parameter *P01*).

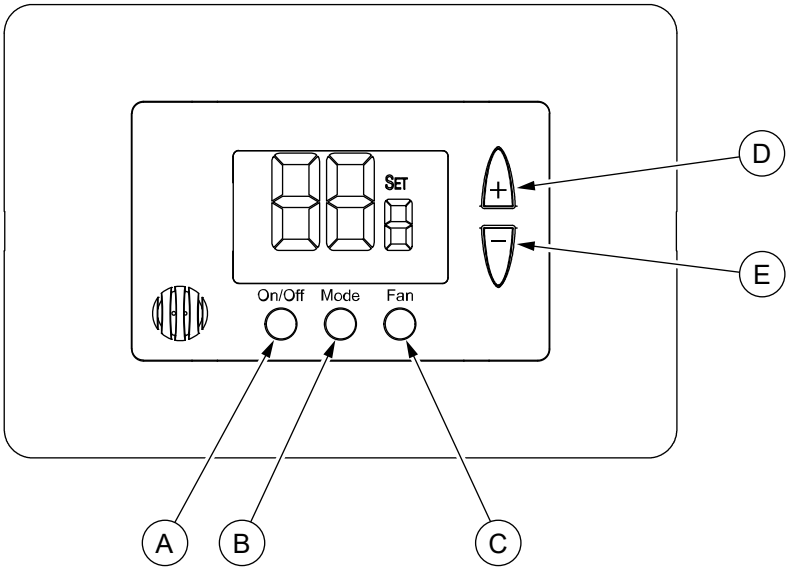
5.4.2 Connecting a changeover sensor

You can use a strap-on *NTC 50* temperature sensor as a heating/cooling changeover sensor in a 2-pipe system.

1. Attach the changeover sensor to the supply pipe of the fan coil unit.
2. Disconnect the room thermostat supply voltage.
3. Connect the changeover sensor to the *IN1* dual-mode input.
   See chapter Wiring on page 12 for instructions.
4. Set *DIP 2* dip switch to *ON* position.
   See chapter DIP switch settings on page 11 for instructions.
5. Mount the room thermostat on the flush mounting box and attach the cover plate.
6. Connect the supply voltage.
7. Open the device settings.
   See chapter Configuring settings using the device menu on page 17 for instructions.
8. Set parameter *P09* value to *1* in the settings.
   In the automatic operation mode, the room thermostat shifts between heating and cooling modes automatically depending on the temperature reading of the changeover sensor.
9. Exit the settings.

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5.5 Configuring settings using the device menu



A. Exit settings (*On/Off* button)
B. Open settings / select a parameter (*Mode* button)
C. Return to parameter list (*Fan* button)
D. Scroll up / change parameter value (+)
E. Scroll down / change parameter value (–)

Important: Make sure that all wires are connected according to the instructions before you turn on the power.

1. Mount the device on a flush mounting box according to instructions in chapter Mounting on page 10 before you configure the settings.
2. Connect the supply voltage to the device.
3. Press the button repeatedly until the setpoint is *10 °C*.
4. Press and hold the *Mode* button for 7 seconds to open the settings.
   Text *SET* and the first item on the parameter list are shown on the display.
5. Use the and buttons to scroll the parameter list.
6. Press the *Mode* button to select a parameter.
7. Use the or button to change the value of the selected parameter.
8. Press the *Fan* button to return to the parameter list.
9. Press the *On/Off* button to exit the settings.

   Note: If you do not press any buttons for 30 seconds, the device returns to normal operation.
10. Adjust the temperature setpoint to correct temperature.
    The setpoint is *10 °C* after you exit the settings.

5.5.1 General settings

General settings include parameters for device buttons, display and factory reset.

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Parameter	Values	Default	Description
P04	*0 - 1*	*0*	Select if the user can adjust the fan speed by pressing the *Fan* button or if the button is disabled. 0. Enable the button 1. Disable the button The user can enable all buttons by pressing and holding the *Mode* button.
P05	*0 - 1*	*0*	Select if the user can change the operation mode by pressing the *Mode* button or if the button is disabled. 0. Enable the button 1. Disable the button The user can enable all buttons by pressing and holding the *Mode* button.
P06	*0 - 1*	*0*	Select if the user can start and stop the thermostat by pressing the *On/Off* button or if the button is disabled. 0. Enable the button 1. Disable the button The user can enable all buttons by pressing and holding the *Mode* button.
P29	*0 - 1*	*0*	Enable or disable the display backlight. 0. Enable backlight 1. Disable backlight
P30	*0 - 1*	*0*	Enable or disable the button press sounds. 0. Enable button sounds 1. Disable button sounds
P98	*0 - 1*	*0*	Select if only setpoint or setpoint and room temperature are shown on the display. 0. Setpoint and room temperature 1. Setpoint
P99	*0 - 1*	*0*	Select *1* to reset the device to factory settings. The parameter value changes back to the default setting automatically.

5.5.2 Control settings

Control settings include parameters for temperature measurement tuning, temperature setpoint, and operation modes.

Parameter	Values	Default	Description
P01	*±6 °C*	*0 °C*	Temperature measurement tuning (offset). Set the offset to correct the temperature reading.
P02	*10...30 °C*	*10 °C*	Temperature setpoint low limit.
P03	*10...30 °C*	*30 °C*	Temperature setpoint high limit.

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Parameter	Values	Default	Description
P14	*0 - 1*	*1*	Enable or disable the automatic operation mode. If you enable the automatic mode, select the modes it controls in the *P85* parameter. 0. Disable automatic operation mode 1. Enable automatic operation mode
P85	*0 - 1*	*0*	Select the available operation modes. These operation modes are available to the user and the automatic operation mode. 0. Cooling, Heating and Fan 1. Cooling and Fan

5.5.3 Input settings

See the table below for the *T1* resistive input and the *IN1* dual-mode input settings.

If you connect an occupancy sensor to the *IN1* dual-mode input, configure the following settings:

1. Set the *P09* parameter to *3*, Occupancy sensor or ON/OFF switch.
2. Set the *P10* parameter to Normally closed or Normally open depending on how your occupancy sensor operates when it detects movement.
3. Set the delay for stopping heating or cooling after the occupants leave the room in the *P11* parameter.
4. Set the *P15* parameter to *0* to stop heating or cooling when the room is unoccupied and to start heating or cooling when the room is occupied again.

With these settings, the room thermostat starts operating when the occupancy sensor detects movement and stops operating when the occupants leave the room. Text *ON* is shown on the display even when the thermostat has stopped heating or cooling. If you configure the delay for stopping the thermostat in the *P11* parameter to 10 minutes and the room thermostat is in heating mode, it stops heating 10 minutes after the occupants leave the room. If the delay is *0*, heating stops 1 second after the occupants leave the room. Note that the thermostat's operation time after the occupants leave the room also depends on the occupancy sensor's contact hold time.

Parameter	Values	Default	Description
P08	*0 - 1*	*0*	Resistive input *T1* setting. Select *1* if an external *NTC 50* temperature sensor is connected to the input. 0. Internal sensor 1. External sensor
P09	*0 - 1 - 3*	*0*	Dual-mode input *IN1* settings. 0. Input *IN1* not in use 1. Changeover sensor (2-pipe system only) 3. Occupancy sensor or ON/OFF switch If you select changeover sensor, set *DIP 2* dip switch to *ON* position in the room thermostat. If you use an occupancy sensor, select the contact function in the *P10* parameter. Also configure the *P11* and *P15* parameters. If you use a remote ON/OFF switch, configure parameters *P10* and *P11*.

Parameter	Values	Default	Description
P10	*0 - 1*	*1*	Dual-mode input *IN1* settings for an occupancy sensor or a remote ON/OFF switch. Select the contact function. 0. Normally closed *(NC)* 1. Normally open *(NO)*
P11	*0...99 min*	*0*	Dual-mode input *IN1* settings for the occupancy sensor or a remote ON/OFF switch. Select how long the room thermostat operates before it stops after occupants leave the room or set the remote ON/OFF switch to OFF. Set this parameter to *0* to select a 1-second delay.
P15	*0 - 1*	*0*	Dual-mode input *IN1* settings for the occupancy sensor. This parameter defines how the room thermostat operates when the room is occupied or unoccupied. 0. Relays are off when the room is unoccupied. Relays switch on when the room is occupied again. Thermostat status does not change *(ON)*. 1. Relays are off when room is unoccupied. Thermostat status changes to *OFF*. Thermostat stays off when room is occupied again.
P83	-	-	If an *NTC 50* changeover sensor is connected to the *IN1* input, this parameter shows changeover sensor's measurement value. This parameter is read-only.

5.5.4 Fan settings

Configure the following settings for the 3-speed fan and the EC fan. Select the fan type with the *DIP 3* dip switch.

Parameter	Values	Default	Description
P65	*1...10 °C*	*3 °C*	Fan proportional band for 3-speed fan and EC fan. Sets the temperature range during which the fan speed increases to maximum speed. For example, if this parameter value is *3 °C* and the temperature setpoint is *21 °C*, the fan runs at maximum speed when room temperature is ≥*24 °C*.
P67	*0...30 %*	*20 %*	Low speed value for 3-speed fan and EC fan.
P68	*30...60 %*	*50 %*	Medium speed value for 3-speed fan and EC fan.
P69	*60...100 %*	*90 %*	High speed value for 3-speed fan and EC fan.
P76	*0...100 %*	*0 %*	Low limit for EC fan speed when automatic fan speed is enabled.
P77	*0...100 %*	*100 %*	High limit for EC fan speed when automatic fan speed is enabled.

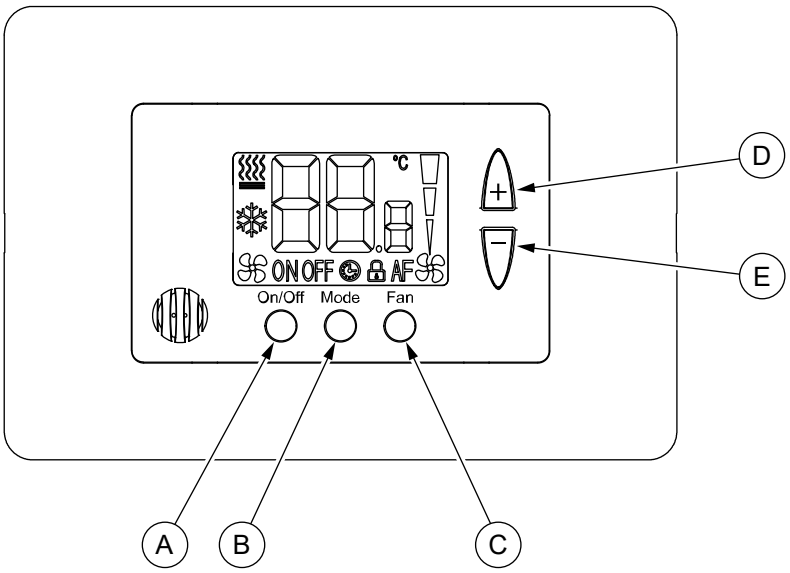
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<table>
<tr><th>Parameter</th><th>Values</th><th>Default</th><th>Description</th></tr>
<tr><td>P91</td><td>0 - 1 - 2 - 3</td><td>1</td><td>Fan configuration when the DIP 4 dip switch is set to OFF position.
<table>
<tr><td>Value</td><td>Fan on-demand</td><td>Fan continuous</td></tr>
<tr><td>0</td><td>N/A</td><td>Cooling and heating</td></tr>
<tr><td>1</td><td>Heating</td><td>Cooling</td></tr>
<tr><td>2</td><td>Cooling</td><td>Heating</td></tr>
<tr><td>3</td><td>Cooling and heating</td><td>N/A</td></tr>
</table></td></tr>
<tr><td>P92</td><td>0 - 1</td><td>1</td><td>Automatic fan speed. If you enable this parameter, fan speed increases and decreases automatically according to fan proportional band. Also set the DIP 4 dip switch to ON position.
0. Disabled
1. Enabled</td></tr>
</table>

5.5.5 Communication settings

Parameter	Values	Default	Description
P97	*1...99*	*1*	Select the Modbus address for the device.

6 Operating instructions



A. Start and stop the thermostat: *On/Off* button
B. Select the operation mode: *Mode* button
C. Adjust the fan speed: *Fan* button
D. Increase room temperature: (+)
E. Decrease room temperature: (−)

6.1 Starting and stopping operation

1. Press the *On/Off* button to start the device.
   Text *ON* is shown at the bottom of the display. The thermostat starts heating or cooling according to the selected operation mode and temperature setpoint.
2. Press the *On/Off* button again to stop the device.
   Text *OFF* is shown at the bottom of the display. The thermostat stops heating or cooling.

6.2 Adjusting the temperature setpoint

1. Press the (+) or (−) button.
   The setpoint flashes.
2. Press the (+) or (−) button again to adjust the setpoint.

6.3 Selecting the operation mode

The operation mode icon on the left side of the display shows which operation mode is selected. Operation modes available to the user depend on the device settings. All operation modes and their icons are listed below.

Icon	Operation mode
❄	Cooling mode. The cooling icon flashes when the cooling mode is active.

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Icon	Operation mode
	Heating mode. The heating icon flashes when the heating mode is active.
	Automatic operation mode. The heating icon flashes when the heating mode is active. The cooling icon flashes when the cooling mode is active.
	Automatic fan speed mode. The fan icon flashes when the fan is on. The icon is also shown on the display when automatic fan speed is enabled.

1. Press the *Mode* button to select the operation mode.
2. Press the *Mode* button again and again until you see the icon for the operation mode you want to select.

6.4 Adjusting the fan speed

The fan icon on the right side of the display shows the selected fan speed. Fan speeds available to the user depend on the device settings. All fan speeds and their icons are listed below.

Icon	Fan speed
	Low speed
	Medium speed
	High speed
	Automatic fan speed. Letters *AF* and the current fan speed are shown on the display. If the fan stops, only letters *AF* are shown on the display.

1. Press the *Fan* button to adjust the fan speed.
   You can see the selected fan speed on the right side of the display.
2. Press the *Fan* button again to increase or decrease the fan speed, or to select automatic fan speed.

6.5 Setting the timer

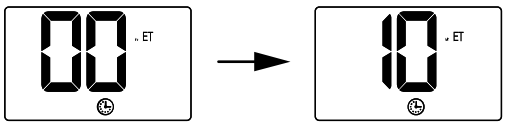
The timer automatically switches the thermostat off after selected number of hours.

Note: After a power failure, the timer resets to *00*. The clock icon flashes until you switch the thermostat off and on by pressing the *On/Off* button.

1. Press and hold the *On/Off* button for 5 seconds.
   The display shows the hours (*00*).

2. Set the timer using the + and − buttons.

   The timer range is 0...10 hours. One button press increases or decreases the timer value by one hour.



3. Press the *Mode* button or wait 30 seconds to return to normal operation mode.
   A clock icon is shown at the bottom of the display when the room thermostat is on.
4. If you want to cancel the timer, set the hours to *00* again.

6.6 Locking and unlocking the buttons

You can lock and unlock the following room thermostat buttons: *Mode*, *Fan*, + and −.

1. Make sure that the setpoint is more than 10 °C.
2. Press and hold the *Mode* button for 15 seconds to lock the thermostat buttons.
   A lock symbol is shown on the display if you press a locked button.
3. To unlock the buttons, press and hold the *Mode* button for 15 seconds again.

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7 Modbus

The device is equipped with Modbus RTU communication via **RS-485** connection.

7.1 Modbus properties

Protocol	RS-485 Modbus RTU
Bus speed	9600 bit/s
Data bits	8
Parity	no parity
Stop bits	1
Modbus ID	*1
Unit load	1/8 UL
	* factory setting

7.2 Modbus function codes

This device supports the following Modbus function codes.

Decimal	Hexadec-imal	Function
3	0x03	Read Holding Registers
6	0x06	Write Single Register
16	0x10	Write Multiple Registers
43	0x2B	Read Device Identification

7.3 Device identification objects

Object ID	Object	Data type	Value	Category
0	*VendorName*	*ASCII*	*Meitav Tec Ltd*	*01 Basic device identification*
1	*ProductCode*	*ASCII*	*22422601*	*01 Basic device identification*
2	*MajorMinorRevision*	*ASCII*	*V0.1.1*	*01 Basic device identification*
3	*VendorUrl*	*ASCII*	*www.meitavtec.com*	*02 Regular device identification*

7.4 Holding registers

Registers marked with an asterisk (*) are read-only registers.

Register	Parameter description	Data type	Values	Range	Default
*0**	Temperature measurement, internal temperature sensor	S16	*-20...99*	*-20...99 °C*	

Register	Parameter description	Data type	Values	Range	Default
*1**	Temperature measurement, external changeover sensor	S16	*-40...89*	*-40...89 °C*	
*2**	Not in use	S16			
*3**	Not in use	S16			
*4**	Not in use	S16			
*5**	Analogue output 1 *(AO1)*, EC fan speed	S16	*0...100*	*0...100 %*	
*6**	DIP switch status	S16	*0...15*	*0...15*	*0*
*7**	Dual-mode input *IN1* contact status	S16	*0 - 1*	0. Closed 1. Open	*0*
*8**	Relay output 13 status, 3-speed fan low speed	S16	*0 - 1*	0. Off 1. On	
*9**	Relay output 12 status, 3-speed fan medium speed	S16	*0 - 1*	0. Off 1. On	
*10**	Relay output 11 status, 3-speed fan high speed	S16	*0 - 1*	0. Off 1. On	
*11**	Relay output 14 status, cooling valve	S16	*0 - 1*	0. Off 1. On	
*12**	Relay output 15 status, heating valve	S16	*0 - 1*	0. Off 1. On	
*13**	Relay output 16 status, condensate pump or electric heater	S16	*0 - 1*	0. Off 1. On	
14	Cooling and Fan only	S16	*0 - 1*	0. Off 1. On	*0*
15	Automatic fan speed	S16	*0 - 1 - 2 - 3*	0. Disabled 1. In heating mode 2. In cooling mode 3. Always	*1*
*16**	Current operation mode	S16	*0 - 1 - 2 - 4*	0. Fan only 1. Cooling 2. Heating 4. Thermostat is off.	
*17**	Current fan speed, 3-speed fan / EC fan	S16	*0 - 1 - 2 - 3*	0. Off/automatic 1. Low 2. Medium 3. High	
*18**	Current temperature setpoint	S16	*10...30*	*10...30 °C*	*22*
19	Room thermostat status	S16	*0 - 1*	0. Off 1. On	*0*
20	Reset to factory settings	S16	*0 - 1*	0. Off 1. Reset	*0*

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Register	Parameter description	Data type	Values	Range	Default
21	The *Mode* button status	S16	*0 - 1*	0. Unlocked 1. Locked	*0*
22	The *On/Off* button status	S16	*0 - 1*	0. Unlocked 1. Locked	*0*
23	The *Fan* button status	S16	*0 - 1*	0. Unlocked 1. Locked	*0*
24	Setpoint button status (+ and –)	S16	*0 - 1*	0. Unlocked 1. Locked	*0*
25	Show only setpoint on the display	S16	*0 - 1*	0. Off 1. On	*0*
26	Automatic operation mode (heating and cooling)	S16	*0 - 1*	0. Disabled 1. Enabled	*1*
27	Automatic fan speed	S16	*0 - 1*	0. Disabled 1. Enabled	*1*
28	Button press sounds	S16	*0 - 1*	0. On 1. Off	*0*
29	Display backlight	S16	*0 - 1*	0. On 1. Off	*0*
30	Operation mode	S16	*0 - 1 - 2 - 3*	0. Fan only 1. Cooling 2. Heating 3. Automatic	*1*
31	Fan speed	S16	*0 - 1 - 2 - 3*	0. Automatic 1. Low 2. Medium 3. High	*1*
32	Temperature setpoint	S16	*10...30*	*10...30 °C*	*22*
33	Temperature setpoint low limit	S16	*10...30*	*10...30 °C*	*10*
34	Temperature setpoint high limit	S16	*10...30*	*10...30 °C*	*30*
35	Temperature measurement tuning	S16	*-6...6*	*-6...6 °C*	*0 °C*
36	Input *T1* function	S16	*0 - 1*	0. Not in use 1. External *NTC 50* sensor	*0*
37	Input *IN1* function	S16	*0 - 1 - 3*	0. Not in use 1. External changeover sensor 3. Occupancy sensor or ON/OFF switch	*0*

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Register	Parameter description	Data type	Values	Range	Default
38	Input *IN1*, contact function	S16	*0 - 1*	0. Normally closed *(NC)* 1. Normally open *(NO)*	*1*
39	Input *IN1*, thermostat stopping delay	S16	*0...99*	*0...99 min, 0 = 1 s*	*0*
40	Input *IN1*, thermostat operating logic when occupancy sensor is connected	S16	*0 - 1*	0. Relays are off when the room is unoccupied. Thermostat stays on. Relays switch on when occupied again. 1. Relays and thermostat are off when the room is unoccupied. Thermostat stays off when the room is occupied again.	*0*
41	Fan proportional band, 3-speed fan / EC fan	S16	*1...10*	*1...10 °C*	*3*
42	Fan, low speed	S16	*0...30*	*0...30 %*	*20*
43	Fan, medium speed	S16	*30...60*	*30...60 %*	*50*
44	Fan, high speed	S16	*60...100*	*60...100 %*	*90*
45	EC fan, low limit, automatic fan speed	S16	*0...100*	*0...100 %*	*0*
46	EC fan, high limit, automatic fan speed	S16	*0...100*	*0...100 %*	*100*
47	Modbus address	S16	*1...99*	*1...99*	*1*
48	Occupancy detection mode	S16	*0 - 1 - 2*	0. Occupancy sensor 1. Always occupied 2. Always unoccupied	*0*
*49**	Input *IN1*, occupancy status	S16	*0 - 1*	0. Occupied 1. Unoccupied	*0*

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8 Disposal

This device is considered as electrical and electronic equipment for disposal in terms of the applicable European Directive. At the end of life, the product must enter the recycling system at an appropriate collection point.

- The device must be disposed through channels provided for this purpose.
- The disposal must be completed according to the local and currently applicable laws and regulations.

Generally all metals can be recycled as material. Plastics and cardboard packaging material can be used in energy recovery. Printed circuit boards need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code. Contact your local Produal distributor for further information on environmental aspects and recycling instructions for professional recyclers.



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