akribis

USER GUIDE

RU

Produal

Distributed by AKRIBIS



PRODUAL

PART OF BEMSIQ GROUP

RU room unit

USER GUIDE

This user guide is for room unit software version 2.1.6.13 or newer.

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 User interface....6
4.1 Setpoint knob....6
4.2 Occupancy button....6
4.3 Fan button....7
4.4 Display....8
4.4.1 Setpoint adjustment view....9
4.4.2 Fan speed view....10

5 Commissioning....11
5.1 Mounting the product....11
5.2 Wiring....12
5.3 Changing the room unit Modbus address....13

6 Maintenance....14
6.1 CO_2 measurement calibration....14

7 Modbus....15
7.1 Modbus properties....15
7.2 Modbus function codes....15
7.3 Modbus registers....15
7.3.1 Input registers....15
7.3.2 Holding registers....16

AKRIBIS · www.akribis.info · contacto@akribis.info

1 Introduction

RU is a simple room unit designed to be used with the CU and CU-LH control units or as a stand-alone Modbus RTU slave device. The basic version has a built-in temperature sensor and a setpoint knob.

The setpoint knob has an endless rotation function. The indicator lights around the knob indicate the current temperature setpoint. Building management system can reset the setpoint via bus.

The following options are available:

- CO_2 measurement (-CO2 models)
- Relative humidity measurement (-RH models)
- One or two buttons (/)
- Display with backlight adjustment (-D models)

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

The RU room units are intended for setting the temperature setpoint and measuring temperature, humidity (-RH models) and CO_2 (-CO2 models) in room environment. These room units can also be equipped with one or two buttons for setting occupancy status and fan speed.

This device is intended to be connected to building automation systems in the HVAC/R industry.

AKRIBIS · www.akribis.info · contacto@akribis.info

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. 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 . Refer to national and local authorities to ensure that the installation is functional and safe.

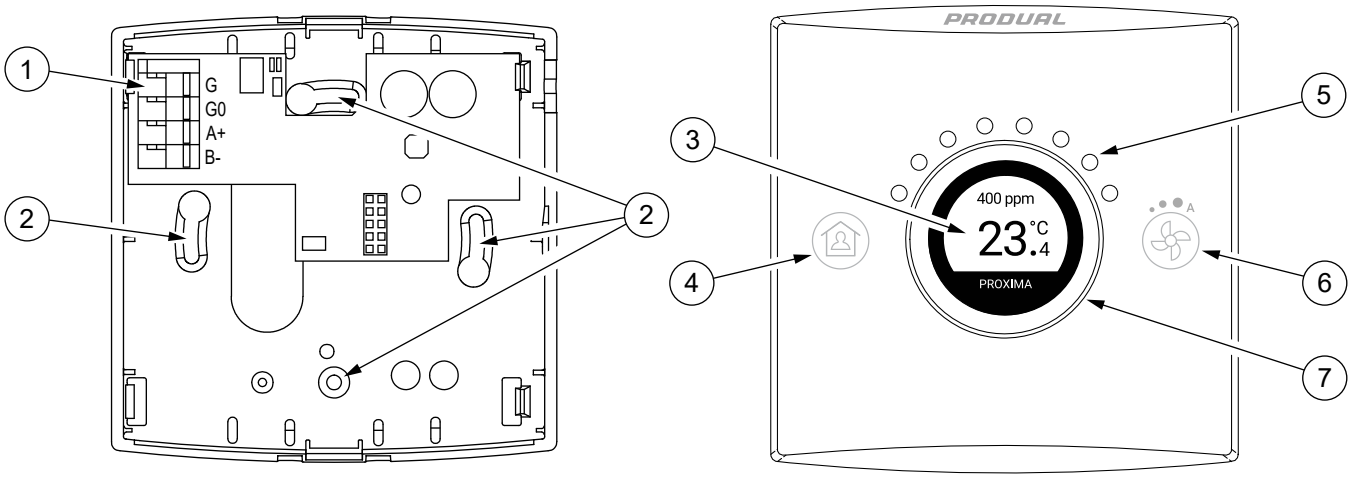
The product should only be used in professionally designed applications. Unauthorised modifications are not allowed. The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals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

AKRIBIS · www.akribis.info · contacto@akribis.info

3 Main components



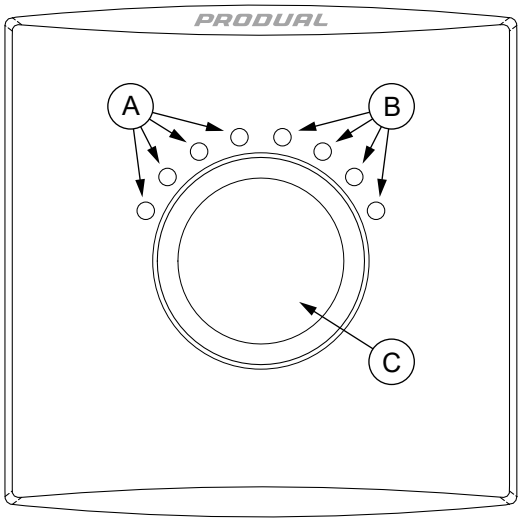
1	Terminal block	2	Mounting point
3	Display (-D models)	4	Occupancy button (M and FM models)
5	Indicator lights	6	Fan button (F and FM models)
7	Setpoint knob		

AKRIBIS · www.akribis.info · contacto@akribis.info

4 User interface

4.1 Setpoint knob

With the setpoint knob, you can set the temperature setpoint for a control unit or other controlling device.

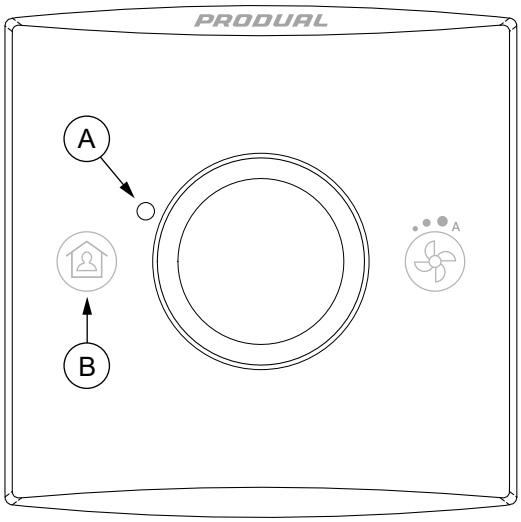


A. Blue indicator lights
B. Orange indicator lights
C. Setpoint knob

Indicator lights indicate how far the user setpoint is from the setpoint centre (Modbus holding register 1). When the user setpoint is the same as the setpoint centre value, one blue and one orange indicator light are on. When you turn the setpoint knob away from the setpoint centre, the corresponding lights come on. When all blue or orange lights are on, the user setpoint is at the user setpoint range limit (Modbus holding register 2). All indicator lights have three states (off, dimmed, bright).

4.2 Occupancy button

The 1M and 2FM models have the occupancy button. You can use this button to temporarily switch the controller to day mode or indicate occupancy, for example.



A. Indicator light for occupancy button
B. Occupancy button

When you tap the occupancy button, the value in Modbus holding register 19 changes to 1. The left-most blue indicator light indicates when the button is tapped.

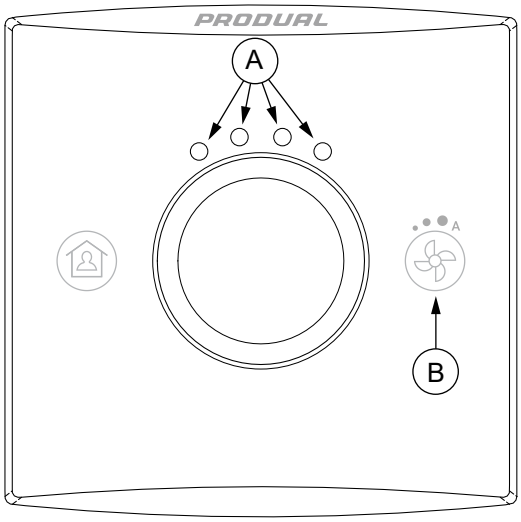
You can set the left-most indicator light to indicate the occupancy timer status. You can control the indicator light using CU and CU-LH control unit or by using Modbus communication.

When you configure the settings, use the following holding registers.

Holding register	Parameter description	Data type	Values	Range	Default
12	Occupancy timer. The timer activates when the user taps the occupancy button or when the occupancy sensor detects movement.	U16	*0 - 1 - 2 - ... - 6*	0. 5 min 1. 15 min 2. 30 min 3. 60 min 4. 90 min 5. 120 min 6. Off / filtering	*6*
19	Occupancy button interaction status. This register is reset after a successful reading operation.	U16	*0 - 1*	0. Button not pressed 1. Button pressed	*0*
23	Occupancy button status.	U16	*0 - 1*	0. Enabled 1. Disabled	*1*
28	Occupancy button function.	U16	*0 - 1*	0. Delay 1. On/off	*0*
29	Occupancy button status and timer override.	U16	*0 - 1*	0. Off 1. On	*0*
30	Automatic day mode after PIR detection, occupancy button press or timer end.	U16	*0 - 1*	0. Off 1. On	*1*
31	Night / save mode. The selected mode activates when the timer ends.	U16	*0 - 1*	0. Night 1. Save	*0*
45	User interaction mode.	U16	*0 - 1*	0. Only occupancy button active 1. Normal operation	*1*
46	Occupancy button status feedback.	U16	*0 - 1*	0. Disabled 1. Enabled	*0*

4.3 Fan button

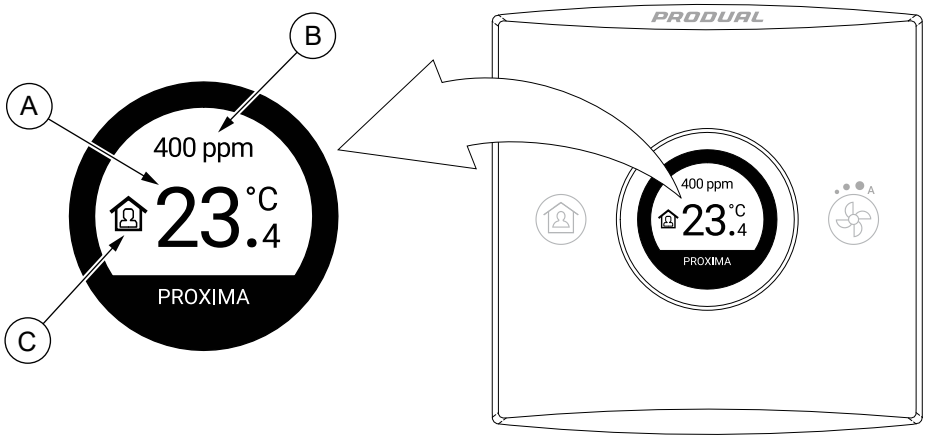
The 1F and 2FM models have the fan button. You can set the fan speed by tapping the fan button. The fan speed is indicated with green indicator lights and shown on the display (-D models).



A. Indicator lights for fan speed
B. Fan button

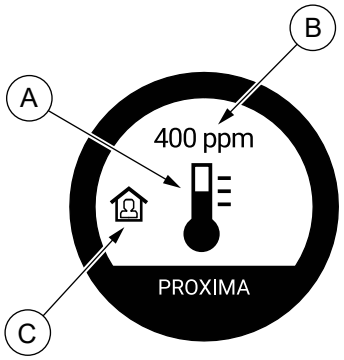
Fan speed	Number of indicator lights on
Fan off	0
Speed 1	1
Speed 2	2
Speed 3	3
Automatic	4

4.4 Display



A. Main information view
B. Secondary information view
C. Function symbol

If the setpoint view is enabled (register 25), the view is displayed as follows.



A. Setpoint view symbol
B. Secondary information view
C. Function symbol

The available views are listed in the following table.

Main information view	23.4 °C	Measured temperature.
		Setpoint view symbol.
Secondary information view	⌄21.0	Setpoint. You can use the arrows to indicate cooling or heating need. These arrows are controlled via Modbus registers 32 (cooling) and 33 (heating).
	⌄+1.0	Deviation from the setpoint. You can use the arrows to indicate cooling or heating need. These arrows are controlled via Modbus registers 32 (cooling) and 33 (heating).
	400 ppm	CO_2 value.
	34 %RH	Humidity value.
Function symbol		The area is empty when day mode is active.
		Occupancy symbol. This symbol in visible when the temporary day mode activates.
		Night mode symbol. This symbol in visible when the night mode is active.
		Eco mode symbol. This symbol in visible when the eco mode is active.

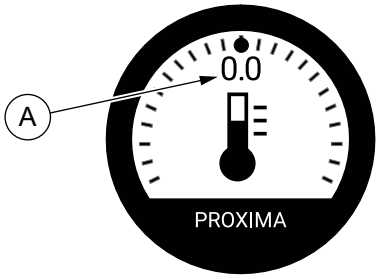
4.4.1 Setpoint adjustment view

When you turn the setpoint knob, the setpoint adjustment view is shown on the display.



A. Setpoint
B. Measured temperature

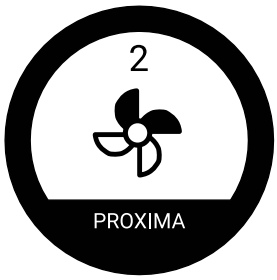
If you enable the setpoint deviation view (Modbus holding register 25), the view is shown as follows.



A. Deviation from setpoint

4.4.2 Fan speed view

When you tap the fan button, the fan speed view is shown on the display.



The first tap shows the current fan speed and the second tap changes the speed.

AKRIBIS · www.akribis.info · contacto@akribis.info

5 Commissioning

5.1 Mounting the product

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 (IP20) with pollution degree 1 or 2. The recommended mounting height is 150...180 cm.

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

   - direct sunlight
   - occupant proximity
   - 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

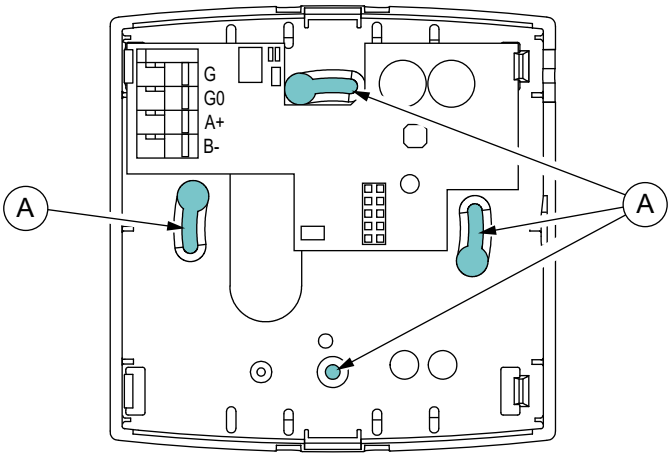
   Important: Only install this device in a location where the ambient conditions meet the operating condition requirements.

   Operating conditions

Temperature	0...50 °C
Humidity	0...85 %rH (non-condensing)

3. Remove the cover.

4. Mount the product using the mounting points.



A. Mounting points

The maximum screw diameter is 3 mm.

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

5. Do the wirings.
   See chapter Wiring on page 12 for instructions.
6. Close the cover carefully.

5.2 Wiring

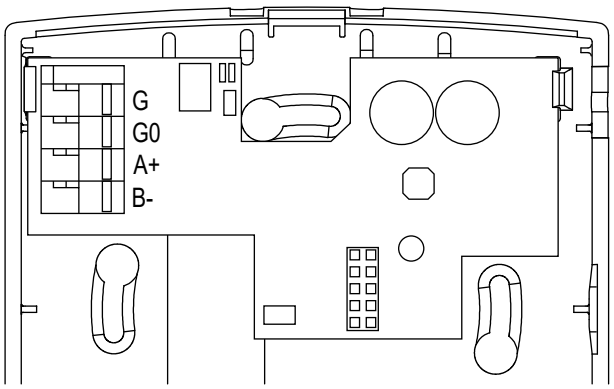
WARNING: Only connect wires and commission the device if you are qualified for electrical work and familiar with building automation products. Risk of electric shock and damage to the device.

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

WARNING: Connect this device to SELV (separated extra low voltage) electricity network only. This device is appliance class III product according to IEC 60664-1.

CAUTION: Connect the device only to overvoltage category I, II or III electricity network according to IEC 60664-1.

The wiring terminals are designed for maximum of 1.5 mm^2 wires. Use a twisted pair cable (2x2 pairs) for communication (RS-485). The maximum cable length for the room unit is 10 m.



G	24 Vac/dc, < 1 VA (< 2 VA in -CO2 models)
G0	0 V
A+	Modbus RTU (RS-485)
B-	

5.3 Changing the room unit Modbus address

The room unit Modbus address is 1 as the factory setting. You can change the address via Modbus or by turning the room unit setpoint knob within 10 seconds after the power is turned on. Only addresses 1 and 2 are available when changing the address by turning the knob.

1. Turn on the room unit power.

   All indicator lights are on for 2 seconds to indicate that the lights are working.

   After the 2 seconds, the room unit shows the current address by flashing the left-most indicator lights. The address is the same as the number of flashing indicator lights.

2. Turn the knob anytime within the 10-second time frame to change the address.

   Address 1: Turn the knob three steps counter-clockwise and then three steps clockwise.

   Address 2: Turn the knob three steps clockwise and then three steps counter-clockwise.

   If the address was changed successfully, the indicator lights flash to show the current address.

AKRIBIS · www.akribis.info · contacto@akribis.info

6 Maintenance

6.1 CO_2 measurement calibration

The device uses automatic CO_2 measurement calibration function (ABC algorithm). This function eliminates the long-term drift. You can use the automatic calibration function if the CO_2 concentration drops at least two times within a week to the level of approximately 400 ppm. Therefore, the automatic calibration is effective in spaces that are not continuously occupied.

You can deactivate the automatic calibration function in continuously occupied spaces via Modbus.

If the automatic calibration function is not in use, the device should be calibrated every 6-12 months. The recommended calibration interval is 5 years even if the automatic calibration is in use.

AKRIBIS · www.akribis.info · contacto@akribis.info

7 Modbus

7.1 Modbus properties

Protocol	RS-485 Modbus RTU
Bus speed	9600*/14400/19200/38400/57600/115200 bit/s
Data bits	8
Parity	none*/odd/even
Stop bits	1* / 2
Modbus ID	1*
Unit load	1/4 UL
	* factory setting

Important: This device writes the Modbus register values to non-volatile memory unless otherwise specified in this document. The non-volatile memory durability is 100000 write cycles.

7.2 Modbus function codes

This device supports the following Modbus function codes.

Decimal	Hexadec-imal	Function
1	0x01	Read Coils
2	0x02	Read Discrete Inputs
3	0x03	Read Holding Registers
4	0x04	Read Input Registers
5	0x05	Write Single Coil
6	0x06	Write Single Register
15	0x0F	Write Multiple Coils
16	0x10	Write Multiple Registers

7.3 Modbus registers

7.3.1 Input registers

7.3.1.1 Input registers for device status

Register	Parameter description	Data type	Values	Range
0	Measured temperature value.	S16	*0...600*	0.0...60.0 °C
1	Temperature setpoint.	S16	*20...420*	2.0...42.0 °C
2	User fan speed.	S16	*0 - 1 - 2 - 3 - 4*	0. Off 1. Speed 1 2. Speed 2 3. Speed 3 4. Automatic

AKRIBIS · www.akribis.info · contacto@akribis.info

Register	Parameter description	Data type	Values	Range
3	Current operation mode.	S16	*0 - 1 - 2 - 3*	0. Off 1. Day 2. Night 3. Eco
4	Measured CO_2 value.	S16	*0...2000*	0...2000 ppm
5	Measured humidity value (one decimal).	S16	*0...1000*	0...100.0 %rH
6	Remaining time in the PIR or occupancy off delay.	S16	*0...600*	0...600 min
7	Movement detection status. The register value resets to 0 after reading.	S16	*0 - 1*	0. Movement not detected 1. Movement detected
8	Occupancy button status.	S16	*0 - 1*	0. Inactive 1. Delay is active
9	Measured humidity value (two decimals).	S16	*0...10000*	0...100.00 %rH
10	Fan status.	S16	*0 - 1*	0. Manual mode 1. Automatic mode
11	Restarting status.	S16	*0 - 1*	0. Room unit has restarted but control unit has not detected the restart 1. Room unit has restarted and control unit has detected the restart

7.3.1.2 Input registers for device information

Input register	Parameter description	Data type	Values	Range
9917	Primary software ID1.	U16	*0...65535*	0...65535
9918	Primary software ID2.	U16	*0...65535*	0...65535
9919	Primary software version 1.	U16	*0...65535*	0...65535
9920	Primary software version 2.	U16	*0...65535*	0...65535

7.3.2 Holding registers

7.3.2.1 Holding registers for device settings

Register	Parameter description	Data type	Values	Range	Default
0	Setpoint from Modbus. The value overdrives the user set value when writing.	U16	*20...420*	2.0...42.0 °C	*210*
1	Setpoint centre.	U16	*18...26*	18...26 °C	*21*

Register	Parameter description	Data type	Values	Range	Default
2	Setpoint range.	U16	*0...16*	0...16 °C	*2*
3	Setpoint deviation step.	U16	*1...5*	0.1...0.5 °C	*5*
4	User fan speed overdrive. The value overrides the user set value when writing.	U16	*0 - 1 - 2 - 3 - 4*	0. Off 1. Speed 1 2. Speed 2 3. Speed 3 4. Automatic	*4*
5	Current fan speed.	U16	*0 - 1 - 2 - 3*	0. Off 1. Speed 1 2. Speed 2 3. Speed 3	*0*
6	Current operation mode. The value overrides the user set value when writing.	U16	*0 - 1 - 2 - 3*	0. Off 1. Day 2. Night 3. Eco	*0*
7	External temperature measurement value.	U16	*0...500*	0.0...50.0 °C	*230*
8	External CO_2 measurement value.	U16	*0...2000*	0...2000 ppm	*400*
9	Screen saver delay.	U16	*0 - 1 - 2 - ... - 6*	0. 15 s 1. 30 s 2. 1 min 3. 2 min 4. 5 min 5. 10 min 6. 30 min	*0*
10	Screen brightness when screen saver is active.	U16	*0...100*	0...100 %	*10*
11	Screen brightness.	U16	*0...100*	0...100 %	*70*
12	Occupancy timer. The timer activates when the user taps the occupancy button or when the occupancy sensor detects movement.	U16	*0 - 1 - 2 - ... - 6*	0. 5 min 1. 15 min 2. 30 min 3. 60 min 4. 90 min 5. 120 min 6. Off / filtering	*6*
13	Temperature measurement offset.	U16	*-30...30*	-3.0...3.0 °C	*0*
14	CO_2 measurement offset.	U16	*-100...100*	-100...100 ppm	*0*
15	Temperature display offset.	U16	*-30...30*	-3.0...3.0 °C	*0*
16	CO_2 display offset.	U16	*-100...100*	-100...100 ppm	*0*
17	Timer value.	U16	*0...65535*	0...65535 min	*0*
18	PIR detection status. The register is reset after successful reading operation.	U16	*0 - 1*	0. No detection 1. Detection	*0*

AKRIBIS · www.akribis.info · contacto@akribis.info

Register	Parameter description	Data type	Values	Range	Default
19	Occupancy button interaction status. This register is reset after a successful reading operation.	U16	*0 - 1*	0. Button not pressed 1. Button pressed	*0*
20	External temperature shown on display. If the measured value is not available or the register 7 value is 0, the field on the display is empty.	U16	*0 - 1*	0. Measured value is shown. 1. Value from the register 7 is shown.	*0*
21	External CO_2 shown on display. If the measured value is not available or the register 8 value is 0, the field on the display is left empty.	U16	*0 - 1*	0. Measured value is shown. 1. Value from the register 8 is shown.	*0*
22	Fan button status.	U16	*0 - 1*	0. Disabled 1. Enabled	*1*
23	Occupancy button status.	U16	*0 - 1*	0. Disabled 1. Enabled	*1*
24	CO_2 / humidity value visibility.	U16	*0 - 1 - 2 - 3*	0. Not visible 1. Humidity and CO_2 2. Humidity 3. CO_2	*1*
25	Show setpoint on display.	U16	*0 - 1*	0. Measured temperature 1. Setpoint	*0*
26	Temperature unit.	U16	*0 - 1*	0. Celsius 1. Fahrenheit	*0*
27	Fan type.	U16	*0 - 1*	0. EC fan 1. 3-speed fan	*0*
28	Occupancy button function.	U16	*0 - 1*	0. Delay 1. On/off	*0*
29	Occupancy button status and timer override.	U16	*0 - 1*	0. Off 1. On	*0*
30	Automatic day mode after PIR detection, occupancy button press or timer end.	U16	*0 - 1*	0. Off 1. On	*1*
31	Night / save mode. The selected mode activates when the timer ends.	U16	*0 - 1*	0. Night 1. Save	*0*
32	Cooling symbol visibility.	U16	*0 - 1*	0. Not visible 1. Visible	*0*
33	Heating symbol visibility.	U16	*0 - 1*	0. Not visible 1. Visible	*0*
34	BMS slave address (RS-485).	U16	*0...247*	0...247	*1*

AKRIBIS · www.akribis.info · contacto@akribis.info

Register	Parameter description	Data type	Values	Range	Default
35	BMS bus speed (RS-485).	U16	*0 - 1 - 2 - ... - 5*	0. 9600 bps 1. 14400 bps 2. 19200 bps 3. 38400 bps 4. 57600 bps 5. 115200 bps	*0*
36	BMS bus parity (RS-485).	U16	*0 - 1 - 2*	0. None 1. Odd 2. Even	*0*
37	BMS bus stop bits (RS-485).	U16	*0 - 1*	0. 1 stop bit 1. 2 stop bits	*0*
38	RS-485 mode.	U16	*1*	1. Modbus	*1*
39	Fan button mode.	U16	*1 - 2*	1. 0 - 1 - 2 - 3 - Auto 2. 0 - toggle speed - Auto	*1*
40	Fan toggle speed.	U16	*1 - 2 - 3*	1. Speed 1 2. Speed 2 3. Speed 3	*1*
41	Automatic calibration function (ABC algorithm) status.	U16	*0 - 1*	0. ABC off 1. ABC on	*1*
42	Humidity measurement offset.	S16	*-500...500*	-50.0...50.0 %rH	*0*
43	Humidity display offset.	S16	*-500...500*	-50.0...50.0 %rH	*0*
44	Display status.	U16	*0 - 1*	0. Display on 1. Display off	*0*
45	User interaction mode.	U16	*0 - 1*	0. Only occupancy button active 1. Normal operation	*1*
46	Occupancy button feedback status.	U16	*0 - 1*	0. Disabled 1. Enabled	*0*
47	Restarting status.	U16	*0 - 1*	0. Room unit has restarted but control unit has not detected the restart 1. Room unit has restarted and control unit has detected the restart	*0*

AKRIBIS · www.akribis.info · contacto@akribis.info

7.3.2.2 Holding registers for device naming

Holding register	Parameter description	Data type	Values	Range	Default
9900	Characters 1 and 2 of the device name.	U16	*0...65535*	[0...255], [0...255]	*21870*
9901	Characters 3 and 4 of the device name.	U16	*0...65535*	[0...255], [0...255]	*28257*
9902	Characters 5 and 6 of the device name.	U16	*0...65535*	[0...255], [0...255]	*28005*
9903	Characters 7 and 8 of the device name.	U16	*0...65535*	[0...255], [0...255]	*25632*
9904	Characters 9 and 10 of the device name.	U16	*0...65535*	[0...255], [0...255]	*25701*
9905	Characters 11 and 12 of the device name.	U16	*0...65535*	[0...255], [0...255]	*30313*
9906	Characters 13 and 14 of the device name.	U16	*0...65535*	[0...255], [0...255]	*25445*
9907	Characters 15 and 16 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9908	Characters 17 and 18 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9909	Characters 19 and 20 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9910	Characters 21 and 22 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9911	Characters 23 and 24 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9912	Characters 25 and 26 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9913	Characters 27 and 28 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9914	Characters 29 and 30 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*
9915	Characters 31 and 32 of the device name.	U16	*0...65535*	[0...255], [0...255]	*0*

AKRIBIS · www.akribis.info · contacto@akribis.info