

CU-LH multifunctional control unit

USER GUIDE

This user guide is for control unit
software version 1.6.16.1 or newer.

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1 Introduction

The Produal Proxima® CU-LH control unit is designed for advanced room and zone control applications that demand more functionality than traditional controllers can provide. With this control unit you can control, for example, heating, cooling and ventilation using a wide range of actuators.

The control unit has two separate controllers and a cascade controller for controlling up to two zones with one control unit. With multiple inputs and outputs, you can use several different devices for measurement and control.

You can connect up to two room units to one control unit for controlling up to two rooms with the same unit. The control unit supports the following devices as room units:

- Produal Proxima® RU
- RT-CO2-MOD
- RTX-CO2-MOD and RTX-RH-MOD
- TRI
- ROU-S

The control unit supports the following communication protocols: Modbus RTU and BACnet MS/TP.

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 Produal Proxima® CU-LH control unit is intended to be used for controlling heating, cooling and ventilation in up to two rooms or zones. This control unit can be mounted in the empty space above a false ceiling, if the local installation regulations permit middle roof installation.

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.

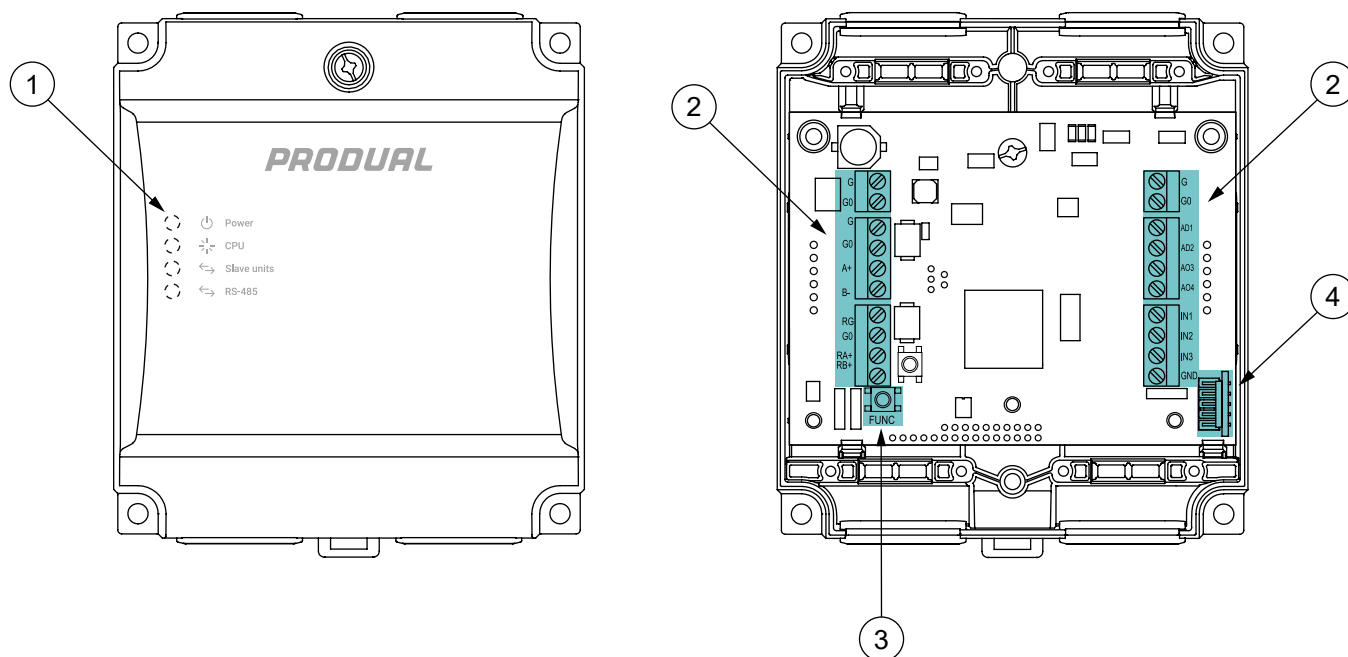
After installation, the product will be part of a system whose specifications and performance characteristics are not designed or controlled by Produal. Refer to national and local authorities to ensure that the installation is functional and safe.

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.

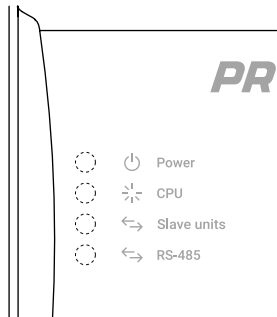
3 Main components



1	Indicator lights	2	Terminal block
3	button	4	MyTool Connect dongle connector

4 Functional description

4.1 Indicator lights



Power	The indicator light is ON when the supply voltage is connected.
CPU	The indicator light is ON while the <i>FUNC</i> button is pressed down during firmware reset.
Slave units	The light indicates that the control unit communicates with the room units connected to the control unit.
RS-485	The light indicates communication in the RS-485 port.

4.2 Operation modes

The control unit has three operation modes. These operation modes are called day mode (mode 1), night mode (mode 2) and eco mode (mode 3). Each operation mode can have separate settings for setpoint, setpoint source and dead zone.

You can control the operation modes using:

- information the control unit receives through its inputs
- the room unit's functions (man-in-house button, occupancy detection)
- bus communication

4.2.1 Changing temperature setpoint source and resetting fan speed when the operation mode changes

The controller has a function that changes the temperature setpoint source when a room unit shifts between operation modes. You can select the setpoint source for the function in the controller settings. The function also resets the fan speed to the default fan speed defined in the *Default fan speed after power failure* parameter.

In the MyProdual application, you can configure the following settings in *Configuration > Component setup > Controllers*.

MyProdual parameter	Holding register	Default	Range	Description
Reset setpoint and fan speed when entering operation mode 1	2X30	Disabled	Disabled / Input 1...3 / Room-Unit 1 / Room-Unit 2 Active operation mode	Source for setpoint when entering day mode. The control unit resets the fan speed to the speed defined in the <i>Default fan speed after power failure</i> parameter.

MyProdual parameter	Holding register	Default	Range	Description
Reset setpoint and fan speed when entering operation mode 2	2X31	Disabled	Disabled / Input 1...3 / Room-Unit 1 / Room-Unit 2 / Active operation mode	Source for setpoint when entering night mode. The control unit resets the fan speed to the speed defined in the <i>Default fan speed after power failure</i> parameter.
Reset setpoint and fan speed when entering operation mode 3	2X32	Disabled	Disabled / Input 1...3 / Room-Unit 1 / Room-Unit 2 / Active operation mode	Source for setpoint when entering eco mode. The control unit resets the fan speed to the speed defined in the <i>Default fan speed after power failure</i> parameter.
Default fan speed after power failure	2X29	4-Step auto	Disabled / Fan speed 1 / Fan speed 2 / Fan speed 3 / 4-Step auto / EC auto / Room-Unit 1 / Room-Unit 2 / EC auto	Fan speed after power failure or operation mode shift.

4.3 Inputs

The control unit has three inputs and all the inputs are multifunctional. You can configure each multifunctional input for a different input signal and the controller will change its behaviour according to the selected configuration.

The following input types are available:

- Voltage input (0...10 Vdc)
- Temperature transmitter input (0...10 Vdc)
- Humidity transmitter input (0...10 Vdc)
- CO₂ transmitter input (0...10 Vdc)
- NTC 10K temperature sensor input
- Resistance input for continuous resistance measurement or for a contact. For example, you can use this input for a condensation switch (e.g. KA 10).
- Potentiometer input
- Occupancy sensor input

4.3.1 Selectable input reaction time

The input reaction time is set to *Normal* by default. If the input type is resistance input, you can use the default setting. If the input type is digital input, change this setting to *Fast*. Otherwise the input reacts too slowly, for example, to a button press or a signal from an occupancy sensor.

In the MyProdual application, you can select the input reaction time in *Configuration > Component setup > Inputs > 1/2/... > Input responsiveness > Filtering Mode*.

MyProdual parameter	Holding register	Default	Range	Description
Filtering Mode	X35	Normal	Normal / Fast	Input responsiveness. The <i>Fast</i> mode reduces filtering, and the control unit reacts faster to changes in the input signal.

4.3.2 Contact timers

The control unit has a timer function for software contacts. You can define delays for turning the contact on and off in the input settings.

In the MyProdual application, you can configure the contact timer settings in *Configuration > Component setup > Inputs > 1/2/... > Contact settings*.

MyProdual parameter	Holding register	Default	Range	Description
Contact hold on time	X18...X20	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	The contact stays on for the duration defined in this parameter. The contact stays on even if the control unit receives a contact OFF signal during this time.
Contact hold off time	X21...X23	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	The contact stays off for the duration defined in this parameter. The contact stays off even if the control unit receives a contact ON signal during this time.
Contact turn on delay	X36...X38	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	This is the time the control unit waits before it turns on the contact after it receives a contact ON signal.
Contact turn off delay	X39...X41	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	This is the time the control unit waits before it turns off the contact after it receives a contact OFF signal.

4.3.3 Contact timers for external PIR sensors

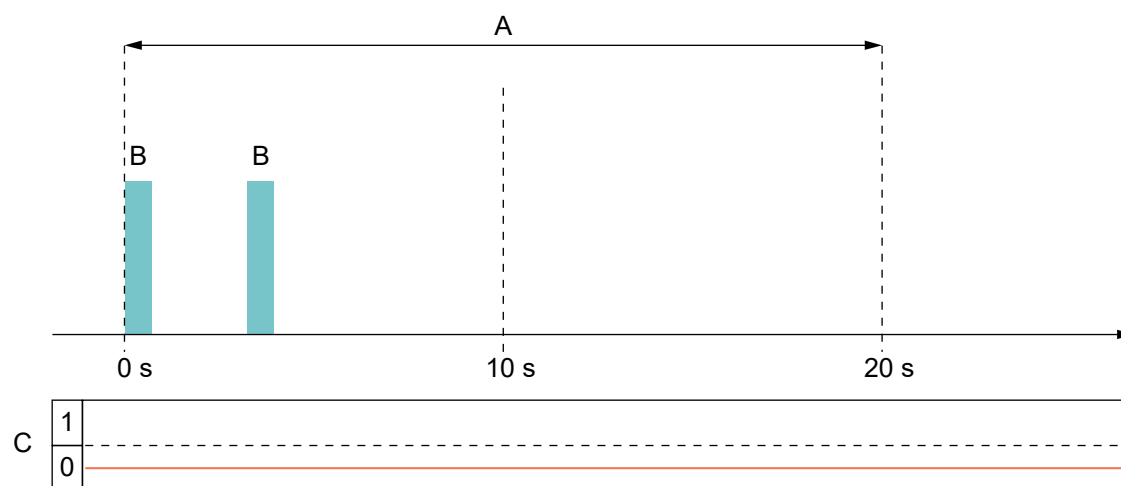
You can set contact timers to prevent unnecessary shifts between operation modes. For example, if the room is unoccupied and the eco mode is active, you can set a timer to prevent day mode activation when someone enters the room temporarily. Similarly, you can prevent eco mode activation when everyone has left for lunch, for example. The day mode stays active during this short unoccupied time.

You can connect an external PIR sensor to a control unit input for occupancy detection if you select *PIR* as the input type. The external PIR sensor must provide contact input signal to the control unit. The control unit supports both normally open (NO) and normally closed (NC) sensor types. You can adjust the contact resistance threshold in the input settings according to sensor type.

If you connect an external PIR sensor to an input, set the input reaction time to *Fast* in the input settings. See section [Selectable input reaction time](#) on page 8 for more information.

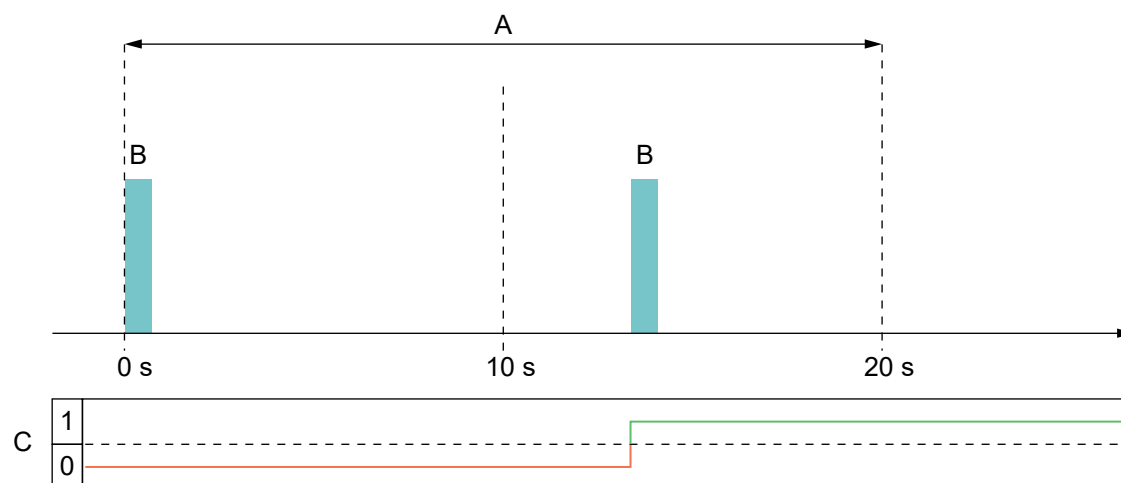
The contact timer function for the external PIR sensor allows you to define delays for turning a contact on and off. The PIR contact timers operate on the basis of a detection window that tracks software contact events. The detection window duration is two times the delay defined in the *Contact turn on delay* parameter. A new detection window starts when the PIR sensor detects movement after the previous detection window has ended.

For example, in the following figures the delay defined in the *Contact turn on delay* parameter is 10 seconds, and the detection window is 20 seconds. If the PIR sensor detects movement twice within the first 10 seconds but then nothing for the next 10 seconds, the contact stays off.



- A. Detection window
- B. PIR sensor event
- C. Contact status (0 = OFF, 1= ON)

If the PIR sensor detects movement at the beginning of the detection window and again during the second half of the detection window, the second PIR sensor event turns on the contact.



- A. Detection window
- B. PIR sensor event
- C. Contact status (0 = OFF, 1= ON)

You can also set a delay for turning the contact off, for example, to prevent operation mode shift from day mode to eco mode when everyone has left the room for a short period of time during office hours. For example, if you set the delay in the *Contact turn off delay* parameter to 30 minutes, the operation mode changes after 1 hour if the external PIR sensor does not detect movement again during that time.

In the MyProdual application, you can configure the contact timer settings in *Configuration > Component setup > Inputs > 1/2/... > Contact settings*.

MyProdual parameter	Holding register	Default	Range	Description
Contact-On Level	X16	1000 Ω	0...300000 Ω	Contact resistance threshold for turning the contact on. Set this parameter above the <i>Contact off level</i> if the sensor type is normally closed.

MyProdual parameter	Holding register	Default	Range	Description
Contact-Off Level	X17	500 Ω	0...300000 Ω	Contact resistance threshold for turning the contact off. Set this parameter below the <i>Contact on level</i> if the sensor type is normally closed.
Contact hold on time	X18...X20	0 h 0 min 0 s	0 h 0 min 0 s...60 h 59 min 59 s	The contact stays on for the duration defined in this parameter. The contact stays on even if the control unit receives a contact OFF signal during this time.
Contact hold off time	X21...X23	0 h 0 min 0 s	0 h 0 min 0 s...60 h 59 min 59 s	The contact stays off for the duration defined in this parameter. The contact stays off even if the control unit receives a contact ON signal during this time.
Contact turn on delay	X36...X38	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	This is the duration the control unit waits after the external PIR sensor detects movement. After this delay, the control unit waits the same duration for the next PIR sensor event. If the PIR sensor detects movement again during this time, the control unit turns on the contact.
Contact turn off delay	X39...X41	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	This is the duration the control unit waits after the last PIR sensor event. After this delay, the control unit waits the same duration for the next PIR sensor event. If the PIR sensor does not detect movement again during this time, the control unit turns off the contact.
Filtering Mode	X35	Normal	Normal / Fast	Input response time. Select <i>Fast</i> mode for the PIR input.
Control Source	1X01	Controller 1	BMS / Controller 1...2 / Cascade-Controller / Room-Unit 1 / Input 1...3 / Room-Unit 1 / Room-Unit 2	Select the input as the <i>Control Source</i> in the output settings to connect the input to an output.

4.4 Outputs

The control unit has four outputs and all the outputs are multifunctional. You can configure each multifunctional output for different output signals and functions.

The following output types are available:

- Voltage output (0...10 Vdc).
- 6-way valve output (0...10 Vdc).
- Fan output (0...10 Vdc).
- PWM output (24 Vac). Only in outputs 1 and 2.
- 3-point actuator output (24 Vac). Only in outputs 1 and 2.

The controller also has two supply outputs (24 Vac, <6 A total) for external devices.

4.4.1 Thermostat function

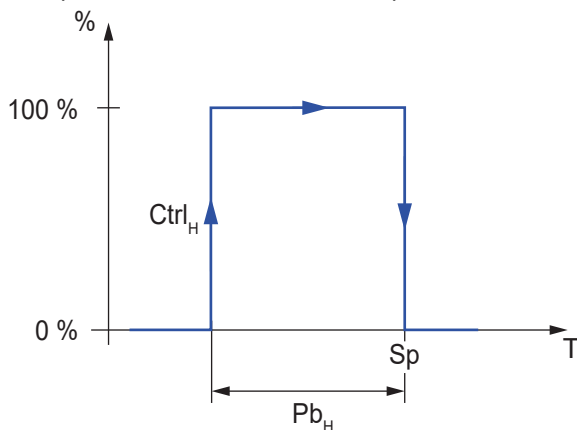
You can set the thermostat function separately for each output. This function works for heating and cooling control signals.

The control unit sends a 100 % output signal when the control signal is 100 %. When the control signal is 0 %, the control unit sends a 0 % output signal. For example, if you use a 24 V PWM output to control a thermal actuator, the control unit sends a 24 V signal when the control signal is 100 %, and a 0 V signal when the control signal is 0 %.

The proportional band set in the controller settings defines the hysteresis for the thermostat function.

The thermostat function operates in heating and cooling mode as follows:

- When the thermostat function operates in the heating mode, the heating valve opens fully when the temperature falls below the lower limit of the proportional band. The heating valve closes when the temperature reaches the setpoint.

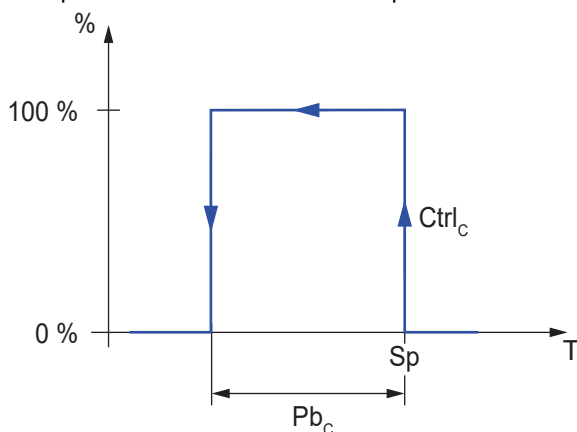


Ctrl_H Control signal for heating

Sp Setpoint

Pb_H Proportional band for heating

- When the thermostat function operates in the cooling mode, the cooling valve opens fully when the temperature rises over the higher limit of the proportional band. The cooling valve closes when the temperature reaches the setpoint.



Ctrl_C Control signal for cooling

Sp Setpoint

Pb_C Proportional band for cooling

Note the following parameters:

MyProdual parameter	Holding register	Default	Range	Description
Output control type	1X02	Heating	Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and Cooling / Changeover / RH / CO2 / Maximum control	Output control method. Set the parameter value to <i>Heating thermostat</i> or <i>Cooling thermostat</i> . Output settings.
P-band, Heating	2X20	1.5 °C	0.0...16.0 °C	Control range for heating. Set the proportional band for heating in this parameter. This value defines the lower and the higher limit of the proportional band. It also defines the hysteresis for the thermostat function. Controller settings.
P-band, Cooling	2x21	1.5 °C	0.0...16.0 °C	Control range for cooling. Set the proportional band for cooling in this parameter. This value defines the lower and the higher limit of the proportional band. It also defines the hysteresis for the thermostat function. Controller settings.

4.5 Control functions

The control unit controls the temperature in a room using a fan coil unit, heating radiators and/or chilled beams. The control unit compares the temperature setpoint with the measured temperature and controls room heating and/or cooling via its outputs.

The control unit has two separate controllers that can have different control settings. With these two controllers, the control unit can control two rooms or zones simultaneously.

You can configure the setpoint, integration time and proportional band for the controllers. Proportional band is the range of values within which the control output signal goes between 0 % and 100 % in proportion to the measured input value.

You can set the controller's temperature setpoint by:

- a device connected to an input on the control unit
- a room unit connected to the control unit as a slave unit
- the BMS via bus communication
- a fixed setpoint (active operation mode controls the setpoint).

4.5.1 Temperature control

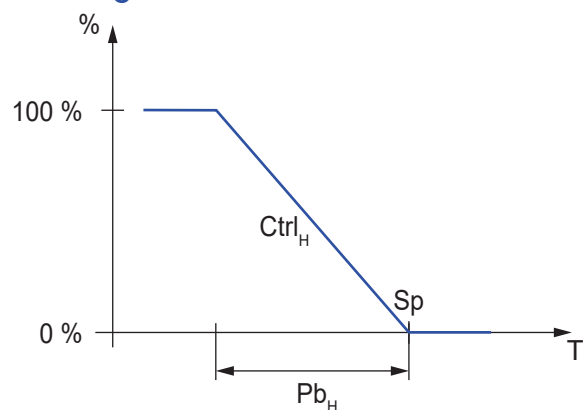
Temperature control can have one or two stages (heating or cooling / heating and cooling). The control unit can also automatically change over from heating to cooling by using a digital input, temperature measurement or network value.

There are various control configurations available:

- One stage heating control
- One stage cooling control
- One stage heating and one stage cooling control
- One stage changeover heating and cooling control

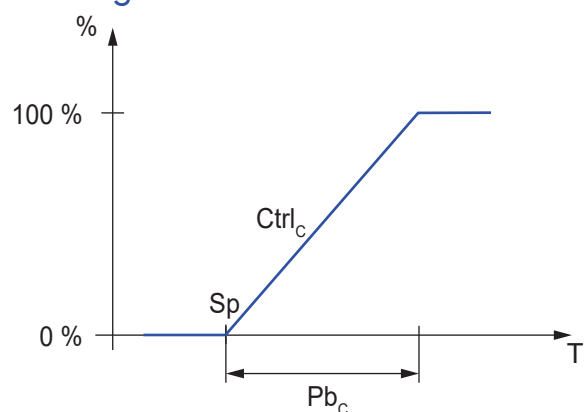
The controller modulates the heating and cooling signals according to the setpoint (Sp) and the measured temperature. The control can be P or PI control.

Heating control



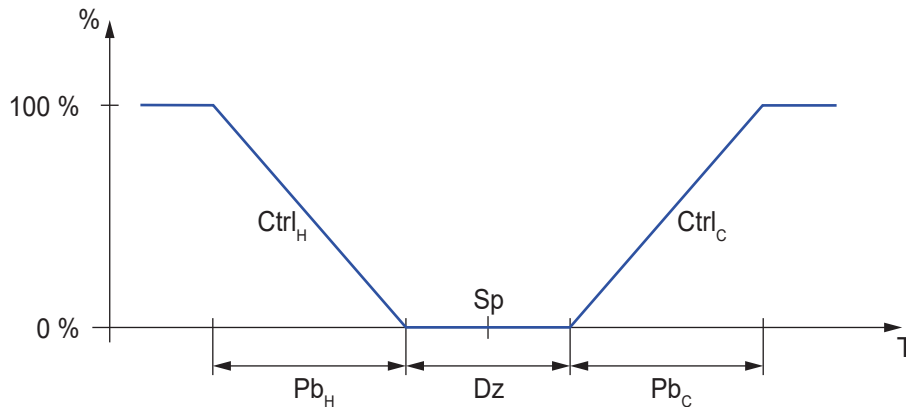
%	Control signal level
$Ctrl_H$	Control signal for heating
Sp	Setpoint
Pb_H	Proportional band for heating control
T	Temperature

Cooling control



%	Control signal level
$Ctrl_C$	Control signal for cooling
Sp	Setpoint
Pb_C	Proportional band for cooling control
T	Temperature

Heating and cooling control



%	Control signal level
Ctrl_H	Control signal for heating
Ctrl_C	Control signal for cooling
Sp	Setpoint
Pb_H	Proportional band for heating control
Pb_C	Proportional band for cooling control
Dz	Dead zone
T	Temperature

There is a dead zone between the heating and cooling stages. In the dead zone, the cooling and heating control signals are at 0 %. If you use PI control, temperature must remain in the dead zone for a prolonged period before the heating and cooling signals are controlled to 0 %. The controller has a function that prevents cooling and heating control from operating simultaneously.

You can set control output direction to direct or reversed. The reversed control output changes the actuator running direction to opposite direction (e.g. valve drives from 100 % to 0 %). You can configure the output direction individually for each control output.

4.5.2 Cascade control

In addition to the two controllers described above, the control unit also has a cascade controller that broadens the possibilities to control the room temperature. Cascade control provides an additional control process to control devices that require different reaction times and control properties than the normal room control. With the cascade controller, the control unit can control the room temperature using, for example, shunt valves, floor heating, exhaust air, or intake air.

You can use cascade control, for example, to control the water temperature of a floor heating supply line. Cascade control requires an additional temperature sensor because normal room sensors are not fast or accurate enough for this purpose. In addition, the placement of normal room sensors is not optimal for cascade control, as they are usually installed in the middle of the room or integrated into a room unit. When you use an additional temperature sensor, you can mount it, for example, on the floor heating supply pipe, inside the floor, or in the ventilation exhaust duct.

You can adjust the cascade controller settings to the requirements of different applications. The preset settings are suitable for floor heating. However, you may need to adjust the controller settings to get stable control results. It is common practice to set the floor temperature, intake air temperature or other secondary temperature setpoint to a value between the minimum and maximum temperatures defined for the cascade controller.

You can activate the cascade controller on one of the control unit outputs. Connect the additional temperature sensor to an input and configure the input settings. Then configure the cascade controller settings and output settings.

In the MyProdual application, you can configure the cascade controller settings in *Configuration > Component setup > Controllers > Cascade*.

MyProdual parameter	Holding register	Default	Range	Description
Temperature Input (additional for average)	2302	Off	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Secondary temperature input for average calculation. Select the input the external temperature sensor is connected to.
Setpoint Source	2304	Controller 1	Controller 1 / Controller 2	Select the source for the setpoint.
Setpoint Source Mode	2305	Heating	Heating / Cooling / Heating and Cooling	Select the setpoint source mode.
Setpoint Min	2306	22.0 °C	2.0...32.0 °C	Define the minimum temperature for the setpoint range.
Setpoint Max	2307	22.0 °C	2.0...32.0 °C	Define the maximum temperature for the setpoint range.
Control Source	1X01	Controller 1	BMS / Controller 1 / Cascade-Controller / Input 1...3 / Room-Unit 1 / Room-Unit 2	Select Cascade-Controller as the control source in output settings.

4.5.3 Separate integral times for heating and cooling control

As a default, both heating and cooling controllers use the same integral time. You can also set separate integral times for heating and cooling control.

In the MyProdual application, you can configure these settings in *Configuration > Component setup > Controllers > Controller 1 / Controller 2 / Cascade > PI controller*.

MyProdual parameter	Holding register	Default	Range	Description
I-time (integral time)	2122 / 2222 / 2311	720 s	0...1200 s	Controller integral time. If the <i>Separate I-time for cooling</i> parameter value is <i>Off</i> , the integral time is common for both heating and cooling. If the parameter value is not <i>Off</i> , this value is the integral time for heating.
Separate I-time for cooling	2132 / 2232 / 2312	Off	Off, 0...1200 s	Enable this parameter to use a separate integral time for cooling.

4.5.4 Changeover function

In the changeover mode, the controller can switch an output between the heating mode and the cooling mode according to the status of an input. You can use the changeover function for 2-pipe control systems, where the water temperature changes according to seasons. For example, in winter, the water is used for heating (water is hot), and in summer, the water is used for cooling (water is cold).

You can select the input that controls the changeover function in the controller settings. The input can control the changeover function according to temperature, contact switch or resistance input (digital on/off). The BMS system can also control the input directly and override the input value that switches the changeover state between cooling or heating.

Note the following parameters:

MyProdual parameter	Holding register	Default	Range	Description
Output control type	1X02	Heating	Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and Cooling / Changeover / RH / CO2 / Maximum control	Output control method. Set the parameter value to <i>Changeover</i> . Output settings.
Changeover Input Source	2X13	Off	Off /Input 1...3	Input source for the changeover function. If the parameter value is <i>Off</i> , the function state can be controlled from BMS. Controller settings.
-	2x34	0 / 1	0. Heating 1. Cooling	State of the changeover function. The BMS can control the function if the value in the <i>Changeover Input Source</i> parameter is <i>Off</i> .

4.5.5 Fan control

Select *Fan* in the *Output Type* parameter in the output settings to access the fan settings in the MyProdual application.

4.5.5.1 Fan starting boost

Some EC fan motors have difficulties to start with low voltages. The fan boost function increases the control voltage to a higher value when the fan starts. You can enable the fan boost function in the output settings.

When this function is active, the fan output is set to a fixed value (parameter *Fan boost voltage*) for the defined time (parameter *Fan boost time*), while the fan speed is controlled from stop position to speed 1. The fan output returns to speed 1 voltage after the timer runs out.

MyProdual parameter	Holding register	Default	Range	Description
Fan boost time	1X48	Off	Off, 1...10 s	Fan starting boost timer. Select the boost duration in this parameter to enable the timer.
Fan boost voltage	1X49	0.000 V	0...10.000 V	Fan starting boost voltage. This setting is available when the <i>Fan boost time</i> parameter value is not <i>Off</i> .

4.5.5.2 Fan speed limit in automatic mode

You can set the maximum speed for the fan when the fan control is in automatic mode. You can enable this limitation by selecting the maximum speed in the *Max fan step in auto mode* parameter in the output settings. Even if the limit is set, the user can increase the fan speed manually.

MyProdual parameter	Holding register	Default	Range	Description
Max fan step in auto mode	1X50	No limit	No limit / Fan speed 1...3	Fan speed limit in automatic mode.

4.5.5.3 Fan speed changing delay

With the fan speed changing delay (parameter *Fan speed step delay*), you can prevent the fan going directly from off position to full speed, for example. The delay is used in all step changes. You can set this parameter in the output settings.

MyProdual parameter	Holding register	Default	Range	Description
<i>Fan speed step delay</i>	1X37	0 s	0...3600 s	Fan speed changing delay.

4.5.5.4 Fan speed after power failure or operation mode shift

You can select the fan speed that becomes effective after a power failure or an operation mode shift in the *Default fan speed after power failure* parameter in the controller settings.

MyProdual parameter	Holding register	Default	Range	Description
<i>Default fan speed after power failure</i>	2X29	4-Step auto	Disabled / Fan speed 1...3 / 4-Step auto / EC auto / Room-Unit 1 / Room-Unit 2 / Room-Unit 1 EC auto / Room-Unit 2 EC auto	Fan speed after a power failure or operation mode shift.

4.5.5.5 Fan turning off delay

You can configure the fan to operate for a certain time after the fan speed is controlled to stop. This gives the actuator time to stop heating or cooling, and it also gives the fan time to ventilate the remaining hot or cold air. The fan turning off delay prevents problems caused by condensation. If the fan stops immediately, moisture can condensate to the fan element.

The control unit sets the fan output to fan speed 1 for the time defined in the *Fan turn off delay* parameter. You can define the fan speed voltage for step 1 and the fan turn off delay in the output settings.

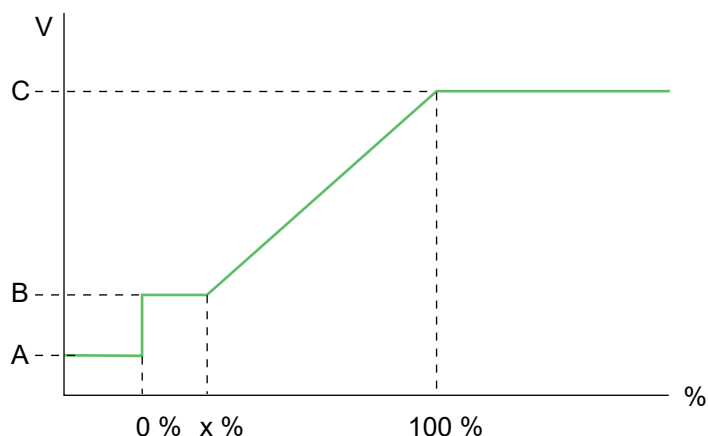
Note the following parameters:

MyProdual parameter	Holding register	Default	Range	Description
<i>Fan turn off delay</i>	1X51	Off	Off, 0...300 s	Delay for turning the fan off.
<i>Fan speed 1, Volt output</i>	1X30	0	0...10.000 V	Voltage for fan speed 1.

4.5.5.6 Fan ON minimum voltage

Some EC fan motors have difficulties to start with low voltages. You can define the minimum starting voltage for the fan. When the control unit starts the fan, it sends the output signal immediately at the minimum voltage configured for the *Fan on voltage minimum* parameter in the output settings.

The figure below shows the operating principle of the minimum starting voltage function. In the beginning, the fan speed is 0 and the fan power is at 0 %. Then the control unit sends the output signal at the fan ON minimum voltage, and the fan starts at speed 1. The control unit continues to send the output signal at the fan ON minimum voltage until it is time to increase the fan speed.



- A. Fan speed 0
B. Fan ON minimum voltage
C. Fan speed 3

MyProdual parameter	Holding register	Default	Range	Description
Fan on voltage minimum	1x52	0	0...10.000 V	Minimum voltage to start the fan. This setting is available in the MyProdual application, if you selected <i>EC auto</i> , <i>Room-Unit 1 EC</i> or <i>Room-Unit 2 EC</i> in the <i>Fan speed mode</i> parameter in the output settings.

4.6 Room units

You can connect up to two room units to the control unit. If you use two room units, you can control two rooms with one control unit. The control unit has dedicated slave unit connectors for connecting the room units. Configure room unit 1 to use Modbus address 1 and room unit 2 to use Modbus address 2 in the device menu of the room unit before you connect them to the slave unit connectors.

The control unit's slave unit connectors support the following Produal devices:

- Produal Proxima® RU room units
- ROU-S room units
- TRI touchscreen room interfaces
- RT-CO2-MOD room CO₂ transmitters
- RTX-CO2-MOD room CO₂ transmitters
- RTX-RH-MOD room humidity transmitters

The control unit communicates with the room units using the internal Modbus bus between the control unit and the room unit. Therefore, the room units connected to the slave unit connectors must use the Modbus RTU protocol to communicate with the control unit. Many BACnet devices also have a Modbus mode. If you plan to connect BACnet devices to the slave unit connectors, always make sure that they support Modbus communication.

The communication sequence varies depending on the room unit. The control unit initialises the room unit by reading the device type and firmware version from the room unit. If the room unit is ROU-S or TRI, the control unit proceeds to read the input registers. After reading the necessary registers, the control unit starts to poll the input values at regular intervals. If the control unit loses the connection with the room unit, it resets all information it has read from the room unit and starts to initialise the room unit again. The control unit loses the connection if it cannot read the room unit input values for 30 seconds or if the identity of the room unit changes.

If an RT-CO₂ or RTX transmitter is connected to the control unit, the control unit reads all input registers. Then the control unit writes the control values to the Modbus holding registers of the transmitter. The control unit reads and writes the registers every second.

RT-CO₂ and RTX series transmitters as room units

The control unit supports the following measurements for the RT-CO₂ and RTX series transmitters: temperature, humidity and carbon dioxide. It also supports occupancy detection (PIR).

RT-CO₂ and RTX transmitter settings cannot be configured through the control unit. Configure their settings first using the MyProdual smartphone application. Configure the bus as the control source for the transmitter features which the control unit controls. Then select some other control source than bus for the remaining transmitter features.

Other compatible transmitters and sensors

The dedicated slave unit connectors only support the devices listed above. However, you can connect output signals from other sensors and transmitters to the control unit inputs.

You can connect the following Produal devices to the control unit inputs:

- HDH room CO₂ transmitters
- TEHR NTC 10-P room temperature sensor
- TEHR LL-P room temperature transmitter
- TEHR LU-P room temperature transmitter
- TEHR LU-PU room temperature transmitter

If the room temperature sensor or transmitter has a passive potentiometer, configure the minimum resistance and the maximum resistance of the control unit input to match the resistance range of the passive potentiometer.

4.6.1 External measurement value on room unit display

An external measurement value can be shown on room unit's display. This function is available for RU room units.

The available value types (measurement units) are the plain value without unit, temperature (°C) and CO₂ (ppm).

Note the following parameters:

MyProdual parameter	Holding register	Default	Range	Description
External Display Value Type	739 / 839	Disabled	Disabled / None / Temperature / CO ₂	External measurement shown on the room unit's display.
				Disabled Functionality disabled.
				None No unit.
				Temperature Temperature value.
				CO ₂ CO ₂ value.

MyProdual parameter	Holding register	Default	Range	Description
External Display Value Source	737 / 837	Internal sensor	Internal sensor / Input 1...3 / Value from Modbus register	Source of the external measurement shown on the room unit's display.
				Internal sensor Functionality is disabled. Room unit's internal measurement is shown on the display.
				Input 1...3 The control unit reads the value from the selected input.
				Value from Modbus register The control unit reads the value from the Modbus register 738 / 838.
-	738 / 838	0	-32768...32767	External display value.  Note: The control unit sets this value to 0 after a power failure.

4.6.2 Occupancy sensor timers for room units

The control unit has a contact timer function for room units that have a PIR sensor for detecting room occupancy. The contact timer function allows you to define delays for turning a contact on and off. The contact timers operate on the basis of a detection window that tracks PIR sensor events. The room unit contact timers operate in the same way as the external PIR sensors. See [Contact timers for external PIR sensors](#) on page 9 for more information about their operating principle.

You can set contact timers to prevent unnecessary shifts between operation modes. For example, if the room is unoccupied and the eco mode is active, you can set a timer to prevent day mode activation when someone enters the room temporarily. Similarly, you can prevent eco mode activation when everyone has left for lunch, for example. The day mode stays active during this short unoccupied time.

You can define delays for turning the contact on and off in the room unit settings of the control unit. In the MyProdual application, you can find the PIR settings in *Component setup > Room units > 1/2 > PIR settings*.

MyProdual parameter	Holding register	Default	Range	Description
PIR contact-on delay	X19...X20	0 min 0 s	min 0 s...59 min 59 s	This is the time the controller waits before it turns on the contact after it reads a PIR sensor event from the room unit. The room unit saves a PIR sensor event to the holding register when the PIR sensor detects movement. If the PIR sensor detects movement after this delay, the controller turns the contact on.
PIR hold-on delay	X21...X23	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	This setting defines how long the contact stays on if the PIR sensor does not detect movement again.
PIR turn-off delay	X40...X42	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	This is the time the controller waits before it turns off the contact after movement stops.
PIR hold-off delay	X43...X45	0 h 0 min 0 s	0 h 0 min 0 s...18 h 12 min 15 s	This delay defines how long the contact stays off after the control unit turns it off. The contact stays off even if the PIR sensor detects movement during this time.

5 Commissioning

5.1 Mounting the device

The device is designed for hidden installation, e.g. above a false ceiling.

It's recommended to use cable ties or equivalent to have some strain relief and to tidy up the installation. If proper strain relief is needed for the cables, use the CA-SR strain relief set.

This device is suitable for hidden installation, for example, above a false ceiling.

Use cable ties or equivalent to have some strain relief and to tidy up the installation. If it is necessary to add strain relief for the cables, use the CA-SR strain relief set.

Mount the device to a 35 mm DIN rail or on the wall with screws.

If you connect a room unit, external room temperature sensors or CO₂ sensors to this control unit, follow the installation instructions for each device to get accurate measurement results.

5.2 Wiring



WARNING: Device wiring and commissioning can only be carried out by qualified professionals. Always make the device wirings in de-energised electricity network.



WARNING: External power sources and power wiring must be protected with a fuse or circuit breaker. Rating depends on the overall system load, but the maximum rating for the external circuit breaker is 16 A (limited by internal structure of the product).



WARNING: This product is appliance class III product according to IEC 60664-1. The product may only be connected to SELV (separated extra low voltage) electricity network.



CAUTION: The product may only be connected to overvoltage category I, II or III electricity network according to IEC 60664-1.



CAUTION: Ensure that all covers are closed before you connect the supply voltage to the product. Do not remove the covers when the supply voltage is connected.



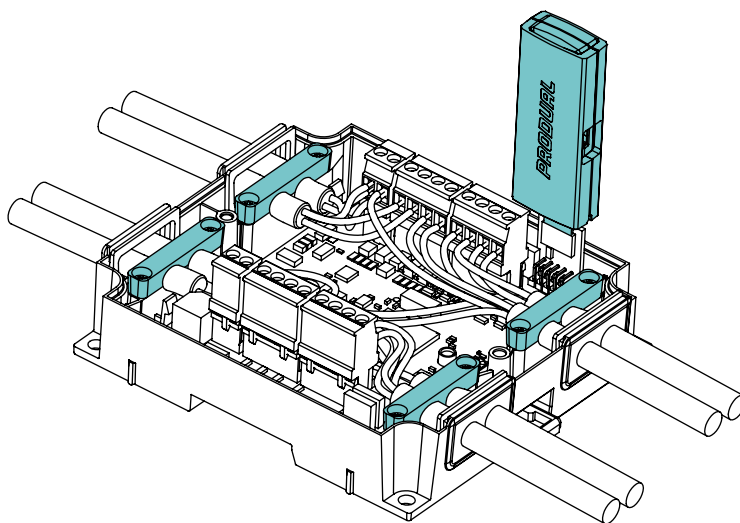
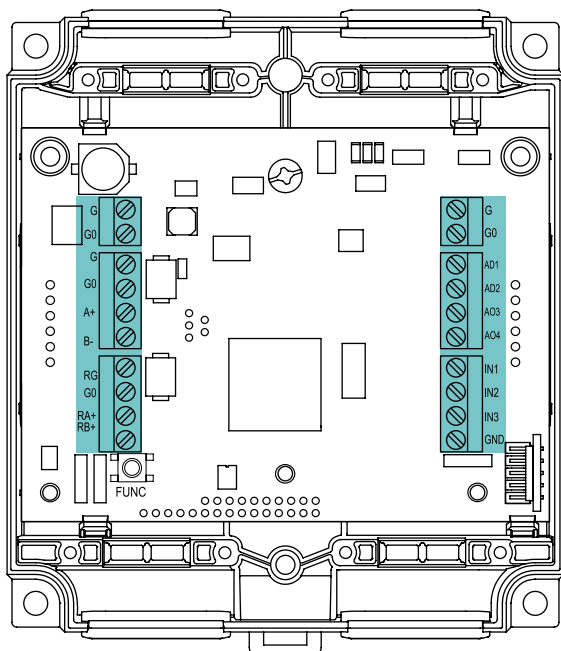
Important: This product has no capability to detect an abnormal condition of input or output ports. External supervising (automated/human) may be needed depending on the application where this product is used.

The device terminals are grouped according to their functions to avoid any wiring mistakes. You can get supply voltage for other devices by connecting them to the additional supply voltage connectors.

Use maximum of 2.5 mm² wires for wiring. Use twisted pair cables (2x2 pairs) for communication (RS-485). Connect room units to the control unit with cables that are less than 10 m in length.



Note: The supply voltage potential must be the same in this device and in the connected 24 Vac actuators.



Connectors on the left side:

G	24 Vac/dc supply, < 2 VA ! Note: Only the DC functions work when using DC supply voltage. To get full functionality, use AC supply.
G0	0 V
G	24 Vac supply output, <6 A (total load for all supply outputs)
G0	0 V
A+ B-	RS-485 bus connection for Modbus RTU or BACnet MS/TP.
RG	24 Vac supply output for room unit, <0.25 A.
G0	0 V
RA+ RB-	RS-485 bus connection for room unit.

Connectors on the right side:

G	24 Vac supply output, <6 A (total load for all supply outputs)
G0	0 V
AD1	Output 1. 24 Vac (switched to 0 V, 1 A) / 0...10 Vdc (-0.5...+2 mA) output.
AD2	Output 2. 24 Vac (switched to 0 V, 1 A) / 0...10 Vdc (-0.5...+2 mA) output.
AO3	Output 3. 0...10 Vdc (-0.5...+2 mA) output.
AO4	Output 4. 0...10 Vdc (-0.5...+2 mA) output.
IN1	Input 1. NTC10 / 0...10 Vdc / Resistive / Contact
IN2	Input 2. NTC10 / 0...10 Vdc / Resistive / Contact
IN3	Input 3. NTC10 / 0...10 Vdc / Resistive / Contact

GND	0 V
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5.3 Configuring control unit settings

To configure the device, you first need to connect it to MyProdual application. When the device is connected to the application, you can make changes to the configuration.



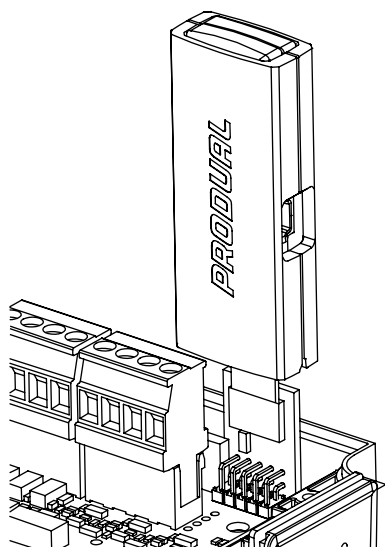
Note: You need the MyTool Connect dongle for connecting the MyProdual application to the device.

1. Connect the supply voltage to the control unit.



Note: You can also power the device by connecting a USB cable to the MyTool Connect dongle.

2. Open the device cover.
3. Insert the MyTool Connect to the connector.



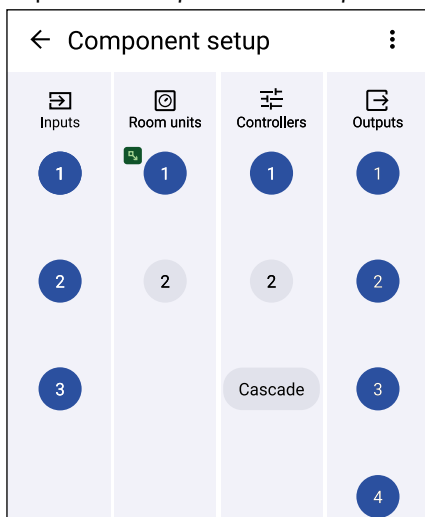
The indicator light on the MyTool Connect dongle flashes when the Bluetooth is ready for connecting.

4. Start the MyProdual application.
5. Tap the *Quick access* button.
6. Tap the *Bluetooth connection* button.
The device list shows the devices that have Bluetooth activated.
7. Tap a device on the list to connect.

The indicator light on the MyTool Connect dongle is illuminated continuously when the MyProdual application is connected to the device.

8. Tap the *Configuration* button.

9. Tap the *Component setup* button.

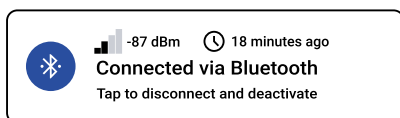


The *Component setup* page is divided into sections:

<i>Inputs</i>	Configure input settings.
<i>Room units</i>	Configure room unit settings.
<i>Controllers</i>	Configure controller settings.
<i>Outputs</i>	Configure output settings.

See the following chapters for more information about the settings.

10. Make the changes to the configuration.
11. Tap the *Confirm* button at the top of each settings page to save the settings to the application.
12. Go back to the *Configuration* page.
13. Tap the *General communication settings* button to configure the communication settings.
14. Tap the *Install to device* button at the bottom of the *Configuration* page to write the changes to the device.
15. Tap the ← button.
16. Tap the connection info button to disconnect the device.



17. Select the disconnecting method.
 - Select *Disconnect but keep Bluetooth active* to disconnect the device without deactivating the device Bluetooth.
 - Select *Cancel* to cancel disconnecting.
18. Remove the MyTool Connect dongle.

5.3.1 Setting inputs

The control unit has three inputs and all the inputs are multifunctional. You can configure each multifunctional input for a different input signal and the controller will change its behaviour according to the selected configuration.

1. Tap the *Component setup* button on the *Configuration* page to open the *Component setup* page.

2. Tap a number button in the *Inputs* column to select the input you are going to configure.
3. Tap the *Input Type* field to select the input type.
4. Select the input type and tap the *Ok* button.

The following input types are available:

<i>Not Used</i>	The input is deactivated.
<i>0...10V Input</i>	Input for 0...10 Vdc signal.
<i>Temperature Transmitter</i>	Input for 0...10 Vdc temperature transmitter.
<i>RH Transmitter</i>	Input for 0...10 Vdc humidity transmitter.
<i>CO2 Transmitter</i>	Input for 0...10 Vdc CO ₂ transmitter.
<i>Temperature Sensor NTC10K</i>	Input for NTC 10K temperature sensor.
<i>Resistance Trigger</i>	Input for resistance signal. For example, you can connect a condensation switch (e.g. KA 10) to this input.
<i>Potentiometer</i>	Input for potentiometer.
<i>PIR</i>	Input for occupancy sensor signal. You can connect an external PIR sensor to this input. The control unit supports normally open (NO) and normally closed (NC) sensor types.

5. Configure the settings for the input.
See the following chapters for more information about the settings.
6. Tap the *Confirm* button at the top of the page to save the changes to the application.
7. Tap the *Apply these settings to device* button at the bottom of the *Component setup* page to write the changes to the device.

5.3.1.1 Available settings for voltage control input

Parameter name	Values	Default	Description
<i>Measurement scale</i>			
<i>Voltage @ 0%</i>	0...10.000 V	0.000 V	Input voltage at 0 %. Set the value for voltage input when the transmitter output is 0 %. For example, 1 V to the input should be read as 0 % input.
<i>Voltage @ 100%</i>	0...10.000 V	10.000 V	Input voltage at 100 %. Set the value for voltage input when the transmitter output is 100 %. For example, 8 V to the input should be read as 100 % input.
<i>Override settings</i>			
<i>Override Enabled</i>	<i>Enabled / Disabled</i>	<i>Disabled</i>	Input override status. Enable to write a value to the input.
<i>Override Value</i>	0.00...100.00 %	0.00 %	Input override value. Set the value to be written to the input.
<i>Contact settings</i>			
<i>Contact-On Level</i>	0.00...100.00 %	100.00 %	Contact on level. Set the input value that is interpreted as contact ON on value. You can use this software contact function to override an output at a certain input voltage level.
<i>Contact-Off Level</i>	0.00...100.00 %	0.00 %	Contact off level. Set the input value that is interpreted as contact OFF on value. You can use this software contact function to release the output override at a certain input voltage level.

Parameter name	Values	Default	Description
Contact hold-on time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold on time. Set the hours, minutes and seconds for the contact ON time. This time defines how long the contact stays on even if the contact off level condition is fulfilled.
Contact hold-off time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold off time. Set the hours, minutes and seconds for the contact OFF time. This time defines how long the contact stays off even if the contact on level condition is fulfilled.
Contact turn-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned on after the contact on level condition is fulfilled.
Contact turn-off delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned off after the contact off level condition is fulfilled.
Effective power			
Efficient Control Range Min	0.00...100.00 %	0.00 %	The minimum limit for the effective control range.
Efficient Control Range Max	0.00...100.00 %	100.00 %	The maximum limit for the effective control range.
Input responsiveness			
Filtering Mode	Normal / Fast	Normal	Input reaction time.
BACnet COV settings			
Voltage COV-limit	0.001...5.000 V	0.100 V	Change of Value limit for voltage.

5.3.1.2 Available settings for temperature transmitter input

Parameter name	Values	Default	Description
Measurement scale			
Voltage @ 0%	0...10.000 V	0.000 V	Input voltage at 0 %. Set the value for voltage input when the transmitter output is 0 %. For example, 1 V to the input should be read as 0 % input.
Voltage @ 100%	0...10.000 V	10.000 V	Input voltage at 100 %. Set the value for voltage input when the transmitter output is 100 %. For example, 8 V to the input should be read as 100 % input.
Temperature @ 0%	-50.0...100.0 °C	-50.0 °C	Input temperature at 0 %. Set the value for temperature input when the transmitter output is 0 %. For example, 0 % input voltage (0 V, or scaled to Voltage @ 0% setting) from the transmitter should be interpreted as 0 °C.
Temperature @ 100%	-50.0...100.0 °C	100.0 °C	Input temperature at 100 %. Set the value for temperature input when the transmitter output is 100 %. For example, 100 % input voltage (10 V, or scaled to Voltage @ 100% setting) from the transmitter should be interpreted as +50 °C.
Measurement correction			
Temperature Offset	-100.0...100.0 °C	0.0 °C	Input temperature offset. Set the offset for temperature input according to calibration.
Override settings			

Parameter name	Values	Default	Description
Override Enabled	Enabled / Disabled	Disabled	Input override status. Enable to write a value to the input.
Override Value	0.00...100.00 %	0.00 %	Input override value. Set the value to be written to the input.
Contact settings			
Contact-On Level	0.00...100.00 %	100.00 %	Contact on level. Set the input value that is interpreted as contact ON on value. You can use this software contact function to override an output at a certain input voltage level.
Contact-Off Level	0.00...100.00 %	0.00 %	Contact off level. Set the input value that is interpreted as contact OFF on value. You can use this software contact function to release the output override at a certain input voltage level.
Contact hold-on time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold on time. Set the hours, minutes and seconds for the contact ON time. This time defines how long the contact stays on even if the contact off level condition is fulfilled.
Contact hold-off time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold off time. Set the hours, minutes and seconds for the contact OFF time. This time defines how long the contact stays off even if the contact on level condition is fulfilled.
Contact turn-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned on after the contact on level condition is fulfilled.
Contact turn-off delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned off after the contact off level condition is fulfilled.
Effective power			
Efficient Control Range Min	0.00...100.00 %	0.00 %	The minimum limit for the effective control range.
Efficient Control Range Max	0.00...100.00 %	100.00 %	The maximum limit for the effective control range.
Input responsiveness			
Filtering Mode	Normal / Fast	Normal	Input reaction time.
BACnet COV settings			
Voltage COV-limit	0.001...5.000 V	0.100 V	Change of Value limit for voltage.

5.3.1.3 Available settings for humidity transmitter input

Parameter name	Values	Default	Description
Measurement scale			
Voltage @ 0%	0...10.000 V	0.000 V	Input voltage at 0 %. Set the value for voltage input when the transmitter output is 0 %. For example, 1 V to the input should be read as 0 % input.
Voltage @ 100%	0...10.000 V	10.000 V	Input voltage at 100 %. Set the value for voltage input when the transmitter output is 100 %. For example, 8 V to the input should be read as 100 % input.

Parameter name	Values	Default	Description
<i>RH@ 0%</i>	0.00...100.00 %rH	0.00 %rH	Input humidity at 0 %. Set the value for humidity input when the transmitter output is 0 %. For example, 0 % input voltage (0 V, or scaled to <i>Voltage @ 0%</i> setting) from the transmitter should be interpreted as 0 %rH.
<i>RH @ 100%</i>	0.00...100.00 %rH	100.00 %rH	Input humidity at 100 %. Set the value for humidity input when the transmitter output is 100 %. For example, 100 % input voltage (10 V, or scaled to <i>Voltage @ 100%</i> setting) from the transmitter should be interpreted 100 %rH.
<i>Measurement correction</i>			
<i>RH Offset</i>	-50.00...50.00 %rH	0.00 %rH	Input humidity offset. Set the offset for humidity input according to calibration.
<i>Override settings</i>			
<i>Override Enabled</i>	<i>Enabled / Disabled</i>	<i>Disabled</i>	Input override status. Enable to write a value to the input.
<i>Override Value</i>	0.00...100.00 %	0.00 %	Input override value. Set the value to be written to the input.
<i>Contact settings</i>			
<i>Contact-On Level</i>	0.00...100.00 %	100.00 %	Contact on level. Set the input value that is interpreted as contact ON on value. You can use this software contact function to override an output at a certain input voltage level.
<i>Contact-Off Level</i>	0.00...100.00 %	0.00 %	Contact off level. Set the input value that is interpreted as contact OFF on value. You can use this software contact function to release the output override at a certain input voltage level.
<i>Contact hold-on time</i>	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold on time. Set the hours, minutes and seconds for the contact ON time. This time defines how long the contact stays on even if the contact off level condition is fulfilled.
<i>Contact hold-off time</i>	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold off time. Set the hours, minutes and seconds for the contact OFF time. This time defines how long the contact stays off even if the contact on level condition is fulfilled.
<i>Contact turn-on delay</i>	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned on after the contact on level condition is fulfilled.
<i>Contact turn-off delay</i>	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned off after the contact off level condition is fulfilled.
<i>Effective power</i>			
<i>Efficient Control Range Min</i>	0.00...100.00 %	0.00 %	The minimum limit for the effective control range.
<i>Efficient Control Range Max</i>	0.00...100.00 %	100.00 %	The maximum limit for the effective control range.
<i>Input responsiveness</i>			
<i>Filtering Mode</i>	<i>Normal / Fast</i>	<i>Normal</i>	Input reaction time.
<i>BACnet COV settings</i>			
<i>Voltage COV-limit</i>	0.001...5.000 V	0.100 V	Change of Value limit for voltage.

5.3.1.4 Available settings for CO₂ transmitter input

Parameter name	Values	Default	Description
Measurement scale			
Voltage @ 0%	0...10.000 V	0.000 V	Input voltage at 0 %. Set the value for voltage input when the transmitter output is 0 %. For example, 1 V to the input should be read as 0 % input.
Voltage @ 100%	0...10.000 V	10.000 V	Input voltage at 100 %. Set the value for voltage input when the transmitter output is 100 %. For example, 8 V to the input should be read as 100 % input.
CO ₂ @ 0%	0...10000 ppm	0 ppm	Input CO ₂ at 0 %. Set the value for CO ₂ input when the transmitter output is 0 %. For example, 0 % input voltage (0 V, or scaled to <i>Voltage @ 0%</i> setting) from the transmitter should be interpreted as 0 ppm.
CO ₂ @ 100%	0...10000 ppm	2000 ppm	Input CO ₂ at 100 %. Set the value for CO ₂ input when the transmitter output is 100 %. For example, 100 % input voltage (10 V, or scaled to <i>Voltage @ 100%</i> setting) from the transmitter should be interpreted as 2000 ppm.
Measurement correction			
CO ₂ Offset	-200...200 ppm	0 ppm	Input CO ₂ offset. Set the offset for CO ₂ input according to calibration.
Override settings			
Override Enabled	Enabled / Disabled	Disabled	Input override status. Enable to write a value to the input.
Override Value	0.00...100.00 %	0.00 %	Input override value. Set the value to be written to the input.
Contact settings			
Contact-On Level	0.00...100.00 %	100.00 %	Contact on level. Set the input value that is interpreted as contact ON on value. You can use this software contact function to override an output at a certain input voltage level.
Contact-Off Level	0.00...100.00 %	0.00 %	Contact off level. Set the input value that is interpreted as contact OFF on value. You can use this software contact function to release the output override at a certain input voltage level.
Contact hold-on time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold on time. Set the hours, minutes and seconds for the contact ON time. This time defines how long the contact stays on even if the contact off level condition is fulfilled.
Contact hold-off time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold off time. Set the hours, minutes and seconds for the contact OFF time. This time defines how long the contact stays off even if the contact on level condition is fulfilled.
Contact turn-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned on after the contact on level condition is fulfilled.
Contact turn-off delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned off after the contact off level condition is fulfilled.
Effective power			

Parameter name	Values	Default	Description
Efficient Control Range Min	0.00...100.00 %	0.00 %	The minimum limit for the effective control range.
Efficient Control Range Max	0.00...100.00 %	100.00 %	The maximum limit for the effective control range.
Input responsiveness			
Filtering Mode	Normal / Fast	Normal	Input reaction time.
BACnet COV settings			
Voltage COV-limit	0.001...5.000 V	0.100 V	Change of Value limit for voltage.

5.3.1.5 Available settings for temperature sensor input

Parameter name	Values	Default	Description
Measurement scale			
Temperature @ 0%	-50.0...100.0 °C	-50.0 °C	Input temperature at 0 %. Set the value for temperature input when the sensor output is 0 %.
Temperature @ 100%	-50.0...100.0 °C	100.0 °C	Input temperature at 100 %. Set the value for temperature input when the sensor output is 100 %.
Measurement correction			
Temperature Offset	-100.0...100.0 °C	0.0 °C	Input temperature offset. Set the offset for temperature input according to calibration.
Override settings			
Override Enabled	Enabled / Disabled	Disabled	Input override status. Enable to write a value to the input.
Override Value	0.00...100.00 %	0.00 %	Input override value. Set the value to be written to the input.
Contact settings			
Contact-On Level	0.00...100.00 %	100.00 %	Contact on level. Set the input value that is interpreted as contact ON on value. You can use this software contact function to override an output at a certain input voltage level.
Contact-Off Level	0.00...100.00 %	0.00 %	Contact off level. Set the input value that is interpreted as contact OFF on value. You can use this software contact function to release the output override at a certain input voltage level.
Contact hold-on time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold on time. Set the hours, minutes and seconds for the contact ON time. This time defines how long the contact stays on even if the contact off level condition is fulfilled.
Contact hold-off time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold off time. Set the hours, minutes and seconds for the contact OFF time. This time defines how long the contact stays off even if the contact on level condition is fulfilled.
Contact turn-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned on after the contact on level condition is fulfilled.
Contact turn-off delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned off after the contact off level condition is fulfilled.
Effective power			

Parameter name	Values	Default	Description
Efficient Control Range Min	0.00...100.00 %	0.00 %	The minimum limit for the effective control range.
Efficient Control Range Max	0.00...100.00 %	100.00 %	The maximum limit for the effective control range.
Input responsiveness			
Filtering Mode	Normal / Fast	Normal	Input reaction time.

5.3.1.6 Available settings for resistance trigger input

Parameter name	Values	Default	Description
Override settings			
Override Enabled	Enabled / Disabled	Disabled	Input override status. Enable to write a value to the input.
Override Value	0.00...100.00 %	0.00 %	Input override value. Set the value to be written to the input.
Contact settings			
Contact-On Level	0...300000 Ω	1000 Ω	Contact on level. Set the input value that is interpreted as contact ON on value. You can use this software contact function to override an output at a certain input resistance level.
Contact-Off Level	0...300000 Ω	500 Ω	Contact off level. Set the input value that is interpreted as contact OFF on value. You can use this software contact function to release the output override at a certain input resistance level.
Contact hold-on time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold on time. Set the hours, minutes and seconds for the contact ON time. This time defines how long the contact stays on even if the contact off level condition is fulfilled.
Contact hold-off time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Contact hold off time. Set the hours, minutes and seconds for the contact OFF time. This time defines how long the contact stays off even if the contact on level condition is fulfilled.
Contact turn-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned on after the contact on level condition is fulfilled.
Contact turn-off delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	The delay before the contact is turned off after the contact off level condition is fulfilled.
Effective power			
Efficient Control Range Min	0.00...100.00 %	0.00 %	The minimum limit for the effective control range.
Efficient Control Range Max	0.00...100.00 %	100.00 %	The maximum limit for the effective control range.
Input responsiveness			
Filtering Mode	Normal / Fast	Normal	Input reaction time.

5.3.1.7 Available settings for potentiometer input

Parameter name	Values	Default	Description
Measurement scale			

Parameter name	Values	Default	Description
Temperature @ 0%	-50.0...100.0 °C	-50.0 °C	Potentiometer temperature value at 0 %. Set the value for temperature when the potentiometer output is 0 %.
Temperature @ 100%	-50.0...100.0 °C	100.0 °C	Potentiometer temperature value at 100 %. Set the value for temperature input when the potentiometer output is 100 %.
Resistance (High range) min	0...300000 Ω	0 Ω	The minimum resistance for the potentiometer that is connected to the input.
Resistance (High range) max	0...300000 Ω	10000 Ω	The maximum resistance for the potentiometer that is connected to the input.
Measurement correction			
Resistance (High range) offset	-100000...100000 Ω	0 Ω	Input resistance offset. Set the offset for the input according to calibration.
Override settings			
Override Enabled	Enabled / Disabled	Disabled	Input override status. Enable to write a value to the input.
Override Value	0.00...100.00 %	0.00 %	Input override value. Set the value to be written to the input.
Effective power			
Efficient Control Range Min	0.00...100.00 %	0.00 %	The minimum limit for the effective control range.
Efficient Control Range Max	0.00...100.00 %	100.00 %	The maximum limit for the effective control range.
Input responsiveness			
Filtering Mode	Normal / Fast	Normal	Input reaction time.

5.3.2 Setting outputs

The control unit has four outputs and all the outputs are multifunctional.

1. Tap the *Component setup* button on the *Configuration* page to open the *Component setup* page.
2. Tap a number button in the *Outputs* column to select the output you are going to configure.
3. Tap the *Output Type* field to select the output type.
4. Select the output type and tap the *Ok* button.

The following output types are available:

Not Used	The output is deactivated.
Voltage	Voltage output.
6-Way Valve	6-way valve output.
Fan	Fan output.
24V AC PWM	24 Vac output. Only available for outputs 1 and 2.
24V AC 3-point raise	3-point actuator + output. Only available for outputs 1 and 2.
24V AC 3-point lower	3-point actuator - output. Only available for outputs 1 and 2.

5. Configure the settings for the output.

See the following chapters for more information about the settings.

6. Tap the *Confirm* button at the top of the page to save the changes to the application.
7. Tap the *Apply these settings to device* button at the bottom of the *Component setup* page to write the changes to the device.

5.3.2.1 Available settings for voltage output

Parameter name	Values	Default	Description
Output settings			
Control Source	BMS /Controller 1 / Controller 2 / Cascade-Controller / Input 1...3 / Room-Unit 1 /	Controller 1	Output control source. Select the source for the output signal.
Output control type	Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and Cooling / Changeover / RH / CO2 / Maximum control	Maximum control	Output control method. This setting is available when the <i>Control Source</i> parameter value is <i>Controller 1</i> , <i>Controller 2</i> or <i>Cascade-Controller</i> .
Room Unit Output Type	Temperature / RH / CO2	Temperature	Room unit output type. This setting is available when the <i>Control Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Jam-Prevention Interval	Off / 1 Day...7 Days	Off	Jam prevention interval. The jam prevention function forces the actuator output open for a short time to prevent the valve from jamming. For example, if the jam prevention interval is 3 Days, the control unit forces the actuator open once every 3 days.
Forcing settings			
Forcing Input Source	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Forcing input source. If you configured the software contact function for an input, select the input that overrides the output at the set input level.
Forcing Input Type	PIR-Detection / "Man in House" -Button / Occupancy (PIR or MIH) / Contact	PIR-Detection	Forcing input type. This setting is available when the <i>Forcing Input Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Force invert output signal	Disabled / Enabled	Disabled	Forcing inversion. Inverts the output signal, if an input triggers the forcing function. This setting is available when the <i>Forcing Input Source</i> parameter value is not <i>Off</i> .
Force-Value	0.00...100.00 %	0.00 %	Forcing ON value for the forcing input source. Set the percentage for the calculated effect value. If an input triggers the forcing function, the control unit overrides the output with this value.
Override settings			
Output override	Disabled / Enabled	Disabled	Output override status. Enable to write a value to the output.
Output override value	0.00...100.00 %	0.00 %	Output override value. Set the value to be written to the output.

Parameter name	Values	Default	Description
Scaling settings			
Efficient Control Range Min	0.00...100.00 %	0.00 %	Effective control range of output, minimum limit.
Efficient Control Range Max	0.00...100.00 %	100.00 %	Effective control range of output, maximum limit.
Operating Mode Source	Not Used / Controller 1 / Controller 2 / Auto	Not Used	Operation mode source. Select the source that triggers the operation mode shift.
Min output, operation mode 1	0.00...100.00 %	0.00 %	Output range at day mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 2	0.00...100.00 %	0.00 %	Output range at night mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 3	0.00...100.00 %	0.00 %	Output range at eco mode, low limit. The setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 1	0.00...100.00 %	100.00 %	Output range at day mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 2	0.00...100.00 %	100.00 %	Output range at night mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 3	0.00...100.00 %	100.00 %	Output range at eco mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Voltage @ 0%	0...10.000 V	0.000 V	Output voltage at 0 % control signal. Set the value for the voltage output when the control output is 0 %.
Voltage @ 100%	0...10.000 V	10.000 V	Output voltage at 100 % control signal. Set the value for the voltage output when the control output is 100 %.
BACnet settings			
Voltage COV-limit	0.001...5.000 V	0.100 V	Change of Value limit for voltage.

5.3.2.2 Available settings for 24 Vac PWM output

Parameter name	Values	Default	Description
Output settings			
Control Source	BMS /Controller 1 / Controller 2 / Cascade-Controller / Input 1...3 / Room-Unit 1 /	Controller 1	Output control source. Select the source for the output signal.

Parameter name	Values	Default	Description
Output control type	Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and Cooling / Changeover / RH / CO2 / Maximum control	Maximum control	Output control method. This setting is available when the <i>Control Source</i> parameter value is <i>Controller 1</i> , <i>Controller 2</i> or <i>Cascade-Controller</i> .
Room Unit Output Type	Temperature / RH / CO2	Temperature	Room unit output type. This setting is available when the <i>Control Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Invert 24VAC Control	Disabled / Enabled	Disabled	24 VAC control inversion. Inverts the output signal if an input triggers an override.
PWM-Period	0...1200 s	0 s	The pulse width modulation period.
Jam-Prevention Interval	Off / 1 Day...7 Days	Off	Jam prevention interval. The jam prevention function forces the actuator output open for a short time to prevent the valve from jamming. For example, if the jam prevention interval is 3 Days, the control unit forces the actuator open once every 3 days.
Forcing settings			
Forcing Input Source	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Forcing input source. If you configured the software contact function for an input, select the input that overrides the output at the set input level.
Forcing Input Type	PIR-Detection / "Man in House" -Button / Occupancy (PIR or MIH) / Contact	PIR-Detection	Forcing input type. This setting is available when the <i>Forcing Input Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Force invert output signal	Disabled / Enabled	Disabled	Forcing inversion. Inverts the output signal, if an input triggers the forcing function. This setting is available when the <i>Forcing Input Source</i> parameter value is not <i>Off</i> .
Force-Value	0.00...100.00 %	0.00 %	Forcing ON value for the forcing input source. Set the percentage for the calculated effect value. If an input triggers the forcing function, the control unit overrides the output with this value.
Override settings			
Output override	Disabled / Enabled	Disabled	Output override status. Enable to write a value to the output.
Output override value	0.00...100.00 %	0.00 %	Output override value. Set the value to be written to the output.
Scaling settings			
Efficient Control Range Min	0.00...100.00 %	0.00 %	Effective control range of output, minimum limit.
Efficient Control Range Max	0.00...100.00 %	100.00 %	Effective control range of output, maximum limit.

Parameter name	Values	Default	Description
Operating Mode Source	Not Used / Controller 1 / Controller 2 / Auto	Not Used	Operation mode source. Select the source that triggers the operation mode shift.
Min output, operation mode 1	0.00...100.00 %	0.00 %	Output range at day mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 2	0.00...100.00 %	0.00 %	Output range at night mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 3	0.00...100.00 %	0.00 %	Output range at eco mode, low limit. The setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 1	0.00...100.00 %	100.00 %	Output range at day mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 2	0.00...100.00 %	100.00 %	Output range at night mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 3	0.00...100.00 %	100.00 %	Output range at eco mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .

5.3.2.3 Available settings for 3-point actuator outputs

Parameter name	Values	Default	Description
Output settings			
Control Source	BMS /Controller 1 / Controller 2 / Cascade-Controller / Input 1...3 / Room-Unit 1 /	Controller 1	Output control source. Select the source for the output signal.
Output control type	Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and Cooling / Changeover / RH / CO2 / Maximum control	Maximum control	Output control method. This setting is available when the <i>Control Source</i> parameter value is <i>Controller 1</i> , <i>Controller 2</i> or <i>Cascade-Controller</i> .
Link to secondary 3-point raise/lower output (output 1-4)	Not set / Output 1...2	Not set	3-point actuator + output. This setting is available when the <i>Output Type</i> parameter value is <i>24V AC 3-point lower</i> .
3-point raise/lower actuator operation time	0...1200 s	720 s	3-point actuator running time. This setting is available when the <i>Output Type</i> parameter value is <i>24V AC 3-point raise</i> .
Room Unit Output Type	Temperature / RH / CO2	Temperature	Room unit output type. This setting is available when the <i>Control Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Invert 24VAC Control	Disabled / Enabled	Disabled	24 VAC control inversion. Inverts the output signal if an input triggers an override.

Parameter name	Values	Default	Description
Jam-Prevention Interval	Off / 1 Day...7 Days	Off	Jam prevention interval. The jam prevention function forces the actuator output open for a short time to prevent the valve from jamming. For example, if the jam prevention interval is 3 Days, the control unit forces the actuator open once every 3 days.
Forcing settings			
Forcing Input Source	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Forcing input source. If you configured the software contact function for an input, select the input that overrides the output at the set input level.
Forcing Input Type	PIR-Detection / "Man in House" -Button / Occupancy (PIR or MIH) / Contact	PIR-Detection	Forcing input type. This setting is available when the <i>Forcing Input Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Force invert output signal	Disabled / Enabled	Disabled	Forcing inversion. Inverts the output signal, if an input triggers the forcing function. This setting is available when the <i>Forcing Input Source</i> parameter value is not <i>Off</i> .
Force-Value	0.00...100.00 %	0.00 %	Forcing ON value for the forcing input source. Set the percentage for the calculated effect value. If an input triggers the forcing function, the control unit overrides the output with this value.
Override settings			
Output override	Disabled / Enabled	Disabled	Output override status. Enable to write a value to the output.
Output override value	0.00...100.00 %	0.00 %	Output override value. Set the value to be written to the output.
Scaling settings			
Efficient Control Range Min	0.00...100.00 %	0.00 %	Effective control range of output, minimum limit.
Efficient Control Range Max	0.00...100.00 %	100.00 %	Effective control range of output, maximum limit.
Operating Mode Source	Not Used / Controller 1 / Controller 2 / Auto	Not Used	Operation mode source. Select the source that triggers the operation mode shift.
Min output, operation mode 1	0.00...100.00 %	0.00 %	Output range at day mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 2	0.00...100.00 %	0.00 %	Output range at night mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 3	0.00...100.00 %	0.00 %	Output range at eco mode, low limit. The setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 1	0.00...100.00 %	100.00 %	Output range at day mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .

Parameter name	Values	Default	Description
Max output, operation mode 2	0.00...100.00 %	100.00 %	Output range at night mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 3	0.00...100.00 %	100.00 %	Output range at eco mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .

5.3.2.4 Available settings for fan output

Parameter name	Values	Default	Description
Output settings			
Control Source	BMS /Controller 1 / Controller 2 / Cascade-Controller / Input 1...3 / Room-Unit 1 /	Controller 1	Output control source. Select the source for the output signal.
Output control type	Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and Cooling / Changeover / RH / CO2 / Maximum control	Maximum control	Output control method. This setting is available when the <i>Control Source</i> parameter value is <i>Controller 1</i> , <i>Controller 2</i> or <i>Cascade-Controller</i> .
Room Unit Output Type	Temperature / RH / CO2	Temperature	Room unit output type. This setting is available when the <i>Control Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Forcing settings			
Forcing Input Source	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Forcing input source. If you configured the software contact function for an input, select the input that overrides the output at the set input level.
Forcing Input Type	PIR-Detection / "Man in House" -Button / Occupancy (PIR or MIH) / Contact	PIR-Detection	Forcing input type. This setting is available when the <i>Forcing Input Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Force invert output signal	Disabled / Enabled	Disabled	Forcing inversion. Inverts the output signal, if an input triggers the forcing function. This setting is available when the <i>Forcing Input Source</i> parameter value is not <i>Off</i> .
Force-Value	0.00...100.00 %	0.00 %	Forcing ON value for the forcing input source. Set the percentage for the calculated effect value. If an input triggers the forcing function, the control unit overrides the output with this value.
Override settings			
Output override	Disabled / Enabled	Disabled	Output override status. Enable to write a value to the output.
Output override value	0.00...100.00 %	0.00 %	Output override value. Set the value to be written to the output.
Scaling settings			

Parameter name	Values	Default	Description
Efficient Control Range Min	0.00...100.00 %	0.00 %	Effective control range of output, minimum limit.
Efficient Control Range Max	0.00...100.00 %	100.00 %	Effective control range of output, maximum limit.
Operating Mode Source	Not Used / Controller 1 / Controller 2 / Auto	Not Used	Operation mode source. Select the source that triggers the operation mode shift.
Min output, operation mode 1	0.00...100.00 %	0.00 %	Output range at day mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 2	0.00...100.00 %	0.00 %	Output range at night mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 3	0.00...100.00 %	0.00 %	Output range at eco mode, low limit. The setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 1	0.00...100.00 %	100.00 %	Output range at day mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 2	0.00...100.00 %	100.00 %	Output range at night mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 3	0.00...100.00 %	100.00 %	Output range at eco mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Fan settings			
Fan speed mode	Force step 0-3 / 4-Step auto / EC auto / Room-Unit 1 / Room-Unit 2 / Room-Unit 1 EC / Room-Unit 2 EC	4-Step auto	Fan speed mode.
Fan speed 0, Volt output	0...10.000 V	0.000 V	Fan off voltage.
Fan speed 1, Volt output	0...10.000 V	0.000 V	Fan speed 1 voltage.
Fan speed 2, Volt output	0...10.000 V	0.000 V	Fan speed 2 voltage.
Fan speed 3, Volt output	0...10.000 V	0.000 V	Fan speed 3 voltage.
Fan speed 0, activate @ effect	0.00...100.00 %	0.00 %	Fan off power level on the proportional band.
Fan speed 1, activate @ effect	0.00...100.00 %	33.33 %	Fan speed 1 power level on the proportional band.
Fan speed 2, activate @ effect	0.00...100.00 %	66.66 %	Fan speed 2 power level on the proportional band.
Fan speed 3, activate @ effect	0.00...100.00 %	100.00 %	Fan speed 3 power level on the proportional band.
Fan speed step delay	0...3600 s	0 s	Fan speed changing delay.

Parameter name	Values	Default	Description
Fan boost time	Off, 1...10 s	Off	Fan starting boost timer. Select the boost duration in this parameter to enable the timer.
Fan boost voltage	0...10.000 V	0.000 V	Fan starting boost voltage. This setting is available when the <i>Fan boost time</i> parameter value is not Off.
Max fan step in auto mode	No limit / Fan speed 1 / Fan speed 2 / Fan speed 3	No limit	Fan speed limit in automatic mode.
Fan turn off delay	Off, 1...300 s	Off	Fan turning off delay.
BACnet settings			
Voltage COV-limit	0.001...5.000 V	0.100 V	Change of Value limit for voltage.

5.3.2.5 Available settings for 6-way valve output

Parameter name	Values	Default	Description
Output settings			
Control Source	BMS /Controller 1 / Controller 2 / Cascade-Controller / Input 1...3 / Room-Unit 1 /	Controller 1	Output control source. Select the source for the output signal.
Output control type	Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and Cooling / Changeover / RH / CO2 / Maximum control	Maximum control	Output control method. This setting is available when the <i>Control Source</i> parameter value is <i>Controller 1</i> , <i>Controller 2</i> or <i>Cascade-Controller</i> .
Room Unit Output Type	Temperature / RH / CO2	Temperature	Room unit output type. This setting is available when the <i>Control Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Step 0 voltage, 6-way valve	0.000...10.000 V	0.000 V	Voltage for 6-way valve's step 0.
Step 1 voltage, 6-way valve	0.000...10.000 V	5.000 V	Voltage for 6-way valve's step 1.
Step 2 voltage, 6-way valve	0.000...10.000 V	5.000 V	Voltage for 6-way valve's step 2.
Step 3 voltage, 6-way valve	0.000...10.000 V	10.000 V	Voltage for 6-way valve's step 3.
Forcing settings			
Forcing Input Source	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Forcing input source. If you configured the software contact function for an input, select the input that overrides the output at the set input level.

Parameter name	Values	Default	Description
Forcing Input Type	PIR-Detection / "Man in House" -Button / Occupancy (PIR or MIH) / Contact	PIR-Detection	Forcing input type. This setting is available when the <i>Forcing Input Source</i> parameter value is <i>Room-Unit 1</i> or <i>Room-Unit 2</i> .
Force invert output signal	Disabled / Enabled	Disabled	Forcing inversion. Inverts the output signal, if an input triggers the forcing function. This setting is available when the <i>Forcing Input Source</i> parameter value is not <i>Off</i> .
Force-Value	0.00...100.00 %	0.00 %	Forcing ON value for the forcing input source. Set the percentage for the calculated effect value. If an input triggers the forcing function, the control unit overrides the output with this value.
Override settings			
Output override	Disabled / Enabled	Disabled	Output override status. Enable to write a value to the output.
Output override value	0.00...100.00 %	0.00 %	Output override value. Set the value to be written to the output.
Scaling settings			
Operating Mode Source	Not Used / Controller 1 / Controller 2 / Auto	Not Used	Operation mode source. Select the source that triggers the operation mode shift.
Min output, operation mode 1	0.00...100.00 %	0.00 %	Output range at day mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 2	0.00...100.00 %	0.00 %	Output range at night mode, low limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Min output, operation mode 3	0.00...100.00 %	0.00 %	Output range at eco mode, low limit. The setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 1	0.00...100.00 %	100.00 %	Output range at day mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 2	0.00...100.00 %	100.00 %	Output range at night mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
Max output, operation mode 3	0.00...100.00 %	100.00 %	Output range at eco mode, high limit. This setting is available when the <i>Operating Mode Source</i> parameter value is not <i>Not Used</i> .
BACnet settings			
Voltage COV-limit	0.001...5.000 V	0.100 V	Change of Value limit for voltage.

5.3.3 Configuring controllers

Controllers manage the control logic based on the input signals and the controller settings, and regulate the outputs accordingly. You can configure the setting for the three built-in controllers in the control unit: controller 1, controller 2, and cascade controller.

Examples for using more than one controller:

- In a two-room system, you can configure settings for controllers 1 and 2, and use one controller for each room.
- In a hotel room where floor heating is used, you can use controller 1 for the main room and the cascade controller for floor heating in the bathroom.
 1. Tap the *Component setup* button on the *Configuration* page to open the *Component setup* page.
 2. Tap a number button in the *Controllers* column to select controller 1 or 2, or tap *Cascade* to select the cascade controller.
 3. Select the *Controller Type* and tap the *Ok* button.
The following controller types are available:

<i>Not Used</i>	The controller is deactivated.
<i>Heating</i>	Controller regulates the heating.
<i>Cooling</i>	Controller regulates the cooling.
<i>Heating and Cooling</i>	Controller regulates the heating and cooling.
 4. Configure the settings for the controller.
See the following chapters for more information about the settings.
 5. Tap the *Confirm* button at the top of the page to save the changes to the application.
 6. Tap the *Apply these settings to device* button at the bottom of the *Component setup* page to write the changes to the device.

5.3.3.1 Available settings for controllers 1 and 2

Parameter name	Values	Default	Description
<i>Measurement source</i>			
<i>Temperature Input (main)</i>	<i>Off / Input 1...3 / Room-Unit 1 / Room-Unit 2</i>	<i>Room-Unit 1</i>	Main temperature input.
<i>Temperature Input (additional for average)</i>	<i>Off / Input 1...3 / Room-Unit 1 / Room-Unit 2</i>	<i>Off</i>	Secondary temperature input for average calculation. You can use the additional input to calculate the average temperature from the main input measurement data and the secondary input measurement data.
<i>RH Input (main)</i>	<i>Off / Input 1...3 / Room-Unit 1 / Room-Unit 2</i>	<i>Room-Unit 1</i>	Main humidity input.
<i>RH Input (additional for average)</i>	<i>Off / Input 1...3 / Room-Unit 1 / Room-Unit 2</i>	<i>Off</i>	Secondary humidity input for average calculation. This setting is available when the <i>RH Input (main)</i> parameter value is not <i>Off</i> .
<i>CO2 Input (main)</i>	<i>Off / Input 1...3 / Room-Unit 1 / Room-Unit 2</i>	<i>Room-Unit 1</i>	Main CO ₂ input.
<i>CO2 Input (additional for average)</i>	<i>Off / Input 1...3 / Room-Unit 1 / Room-Unit 2</i>	<i>Off</i>	Secondary CO ₂ input for average calculation. This setting is available when the <i>CO2 Input (main)</i> parameter value is not <i>Off</i> .
<i>Setpoint Source</i>			
<i>Setpoint Source</i>	<i>Active operation mode / Input 1...3 / Room-Unit 1 / Room-Unit 2</i>	<i>Room-Unit 1</i>	Source for setpoint.

Parameter name	Values	Default	Description
Operation mode selection			
Operation Mode Change Method	BMS Only / Room-Unit 1 Setting / Room-Unit 2 Setting / Select input source	Select input source	The method for shifting between operation modes. Select the source for controlling the shift between operation modes.
Mode1/Mode2 Input Source	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Input 2	Input source for the day/night mode. Select the input that triggers the operation mode shift between day mode and night mode. This setting is available when the Operation Mode Change Method parameter value is Select input source.
Room Unit M1/M2 Input Type	PIR-Detection / "Man in House" -Button / Occupancy (PIR OR MIH)	PIR-Detection	Room unit occupancy input method. Set the input type for selecting operation modes 1 and 2 from the room unit. This setting is available when the Mode1/Mode2 Input Source parameter value is Room-Unit 1 or Room-Unit 2.
ModeX/Mode3 Input Source	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Input source for eco mode activation. Select the input that activates and deactivates the eco mode. This setting is available when the Operation Mode Change Method parameter value is Select input source.
Room Unit MX/M3 Input Type	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	PIR-Detection	Room unit occupancy input method. Set the input type for selecting operation mode 3 from the room unit. This setting is available when the ModeX/ Mode3 Input Source parameter value is Room-Unit 1 or Room-Unit 2.
Changeover Input Source	Off / Input 1...3	Off	Input source for the changeover function.
Operation mode 1-2-3 parameters			
Operation Mode 1 Setpoint	2.0...32.0 °C	22.0 °C	Day mode setpoint.
Operation Mode 2 Setpoint	2.0...32.0 °C	22.0 °C	Night mode setpoint.
Operation Mode 3 Setpoint	2.0...32.0 °C	22.0 °C	Eco mode setpoint.
Operation Mode 1 Dead Zone	0.0...30.0 °C	1.0 °C	Day mode dead zone.
Operation Mode 2 Dead Zone	0.0...30.0 °C	3.0 °C	Night mode dead zone.
Operation Mode 3 Dead Zone	0.0...30.0 °C	8.0 °C	Eco mode dead zone.
Reset setpoint and fan speed when entering operation mode 1	Disabled / Input 1...3 / Room-Unit 1 / Room-Unit 2 /	Disabled	Source for setpoint when entering day mode. The control unit resets the fan speed to the speed defined in the Default fan speed after power failure parameter.
Reset setpoint and fan speed when entering operation mode 2	Disabled / Input 1...3 / Room-Unit 1 / Room-Unit 2 /	Disabled	Source for setpoint when entering night mode. The control unit resets the fan speed to the speed defined in the Default fan speed after power failure parameter.

Parameter name	Values	Default	Description
Reset setpoint and fan speed when entering operation mode 3	Disabled / Input 1...3 / Room-Unit 1 / Room-Unit 2 /	Disabled	Source for setpoint when entering eco mode. The control unit resets the fan speed to the speed defined in the <i>Default fan speed after power failure</i> parameter.
PI-controller			
P-band, Heating	0...16.0 °C	1.5 °C	Proportional band for heating. 1 °C is usually a good setting for a normal room.
P-band, Cooling	0...16.0 °C	1.5 °C	Proportional band for cooling. Usually, a value between 1.0 °C and 1.5 °C is a good setting for a normal room.
I-time (integral time)	0...1200 s	160 s	Controller integral time. If the <i>Separate I-time for cooling</i> parameter value is <i>Off</i> , the integral time defined in this parameter is common for both heating and cooling. If the parameter value is not <i>Off</i> , this value is the integral time for heating only.
Separate I-time for cooling	Off, 1...1200 s	Off	Separate integral time for cooling.
Maximum control			
Max control Influenced By Heating	Enabled / Disabled	Disabled	Maximum power influenced by heating. If the <i>Output control type</i> parameter value is <i>Maximum control</i> , select the signals that should control the output. The controller selects the highest values between the selected signals. For example, if cooling is highest, it will control the output according to the cooling effect. The controller always controls the output according to the signal that is highest at that moment.
Max control Influenced By Cooling	Enabled / Disabled	Disabled	Maximum control influenced by cooling.
Max control Influenced By RH	Enabled / Disabled	Disabled	Maximum control influenced by humidity.
Max control Influenced By CO ₂	Enabled / Disabled	Disabled	Maximum control influenced by CO ₂ .
Fan speed			
Default fan speed after power failure	Disabled / Fan speed 1...3 / 4-Step auto / EC auto / Room-Unit 1 / Room-Unit 2 / Room-Unit 1 EC auto / Room-Unit 2 EC auto	Disabled	Fan speed after power failure or operation mode change.

5.3.3.2 Available settings for cascade controller

Parameter name	Values	Default	Description
Measurement source			
Temperature Input (main)	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Main temperature input.

Parameter name	Values	Default	Description
Temperature Input (additional for average)	Off / Input 1...3 / Room-Unit 1 / Room-Unit 2	Off	Secondary temperature input for average calculation.
Changeover Input Source	Off / Input 1...3	Off	Input source for the changeover function.
Setpoint Source			
Setpoint Source	Controller 1 / Controller 2	Controller 1	Source for the setpoint.
Setpoint Source Mode	Heating / Cooling / Heating and Cooling	Heating	Setpoint source mode.
Setpoint Min	2.0...32.0 °C	22.0 °C	Setpoint range, minimum value.
Setpoint Max	2.0...32.0 °C	22.0 °C	Setpoint range, maximum value.
PI-controller			
Deadzone	0.0...30.0 °C	1.0 °C	Dead zone.
P-band, Heating	0...16.0 °C	2.0 °C	Heating proportional band. Typically 1 °C is a good setting for a normal room.
P-band, Cooling	0...16.0 °C	2.0 °C	Cooling proportional band. Typically 1.0...1.5 °C is a good setting for a normal room.
I-time (integral time)	0...1200 s	160 s	Controller integral time. If the <i>Separate I-time for cooling</i> parameter value is <i>Off</i> , the integral time is common for both heating and cooling. If the parameter value is not <i>Off</i> , this value is the integral time for heating.
Separate I-time for cooling	Off, 1...1200 s	Off	Separate integral time for cooling.

5.3.4 Configuring room units

You can configure functions for up to two different room units. You can use two room units to

- measure temperature from two different sources to calculate the average temperature
- control two rooms with the two built-in controllers of the control unit.

RT-CO2 and RTX transmitter settings cannot be configured through the control unit. Configure their settings first using the MyProdual smartphone application. Configure the bus as the control source for the transmitter features which the control unit controls. Then select some other control source than bus for the remaining transmitter features.

To enable the room unit in the control unit settings, do the following:

1. Open the room unit's Modbus settings.
 - a. Make sure that the Modbus address is 1 for room unit 1 and 2 for room unit 2.
 - b. Make sure that the room unit has the same bus speed, parity, and stop bits as the *ROU* fields in the *RS-485 Settings* in the *General communication settings* of the control unit.
2. Connect the MyProdual application to the control unit. See chapter [Configuring control unit settings](#) on page 24 for instructions.
3. Tap the *Component setup* button on the *Configuration* page to open the *Component setup* page.
4. Tap a number button in the *Room units* column to select the room unit you are going to configure.

5. If the room unit is disabled, tap the *Room unit* field and select *Enabled* to enable the room unit.
6. Configure the settings for the room unit.
See the following chapter for more information about the settings.
7. Tap the *Confirm* button at the top of the page to save the changes to the application.
8. Tap the *Apply these settings to device* button at the bottom of the *Component setup* page to write the changes to the device.

5.3.4.1 Available settings for room units

Parameter name	Values	Default	Description
Operation mode settings			
Default Operation Mode	Mode 1 / Mode 2 / Mode 3	Mode 1	The default operation mode for the room unit.
Operation Mode Source	BMS / Controller 1 / Controller 2	BMS	The operation mode source controls when the room unit shifts between operation modes.
Setpoint settings			
Setpoint Center	18...26 °C	21 °C	Room unit setpoint centre.  Note: To be able to use 0.5 °C steps, the room unit must support the feature. See the input register X20 for the supported features.
Setpoint Limit	1...16 °C	3 °C	Room unit setpoint range. Set how much the user can change the setpoint from the setpoint centre. For example, if the setpoint range is set to 2 °C and the setpoint centre is set at 21 °C, the user can change the setpoint ±2 °C (from 19 °C to 23 °C).  Note: To be able to use 0.5 °C steps, the room unit must support the feature. See the input register X20 for the supported features.
Setpoint Step	0.1...0.5 °C	0.5 °C	Room unit setpoint deviation step. Set how much the setpoint changes when the user presses the setpoint buttons or turns the setpoint knob.
Temperature settings			
Temperature @ 0%	-50.0...100.0 °C	-50.0 °C	Room unit temperature at 0 %. Set the temperature value when the room unit sensor output is 0 %.
Temperature @ 100%	-50.0...100.0 °C	50.0 °C	Room unit temperature at 100 %. Set the temperature value when the room unit sensor output is 100 %.
%RH settings			
RH @ 0%	0.00...100.00 %rh	65.00 %rh	Room unit humidity at 0 %. Set the humidity value when the room unit sensor output is 0 %.
RH @ 100%	0.00...100.00 %rh	80.00 %rh	Room unit humidity at 100 %. Set the humidity value when the room unit sensor output is 100 %.
CO ₂ settings			
CO ₂ @ 0%	0...10000 ppm	700 ppm	Room unit CO ₂ at 0 %. Set the CO ₂ value when the room unit sensor output is 0 %.

Parameter name	Values	Default	Description
CO ₂ @ 100%	0...10000 ppm	1200 ppm	Room unit CO ₂ at 100 %. Set the CO ₂ value when the room unit sensor output is 100 %.
Contact settings			
Contact Mode	Not Used / Temperature / RH / CO ₂	Not Used	Room unit contact mode. Select a mode to use input signal from the room unit as a contact input. The input switches on or off depending on the signal level. For example, the CO ₂ signal from the room unit switches the contact function on or off at a defined level.
Contact-On Level	0.00...100.00 %	0.00 %	Room unit contact on level. Set the input signal level for switching the input contact ON. Select the signal with the Contact Mode parameter.
Contact-Off Level	0.00...100.00 %	0.00 %	Room unit contact off level. Set the input signal level for switching the input contact OFF. Select the signal with the Contact Mode parameter.
Contact hold-on time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Room unit contact hold on time. Set the hours, minutes and seconds for the contact ON time. This time defines how long the contact stays on even if the Contact-Off Level condition is fulfilled.
Contact hold-off time	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Room unit contact hold off time. Set the hours, minutes and seconds for the contact OFF time. This time defines how long the contact stays off even if the Contact-Off Level condition is fulfilled.
PIR settings			
PIR contact-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	PIR contact on delay. Set the hours, minutes and seconds for the delay after which the ON-signal from the PIR input switches the contact ON. The PIR signal must be ON for the duration defined in this parameter before the control unit switches the contact ON. For example, if you set this parameter to 30 seconds, an ON-signal from the room unit's PIR sensor must be ON for 30 seconds (movement in the room), before the control unit switches the contact on.
PIR hold-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	PIR contact hold on delay. This delay defines how long the PIR contact stays ON after the PIR sensor detects movement.
PIR turn-off delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	PIR contact turn off delay. This delay defines how long the control unit waits before it switches the PIR contact OFF.
PIR hold-off delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	PIR hold-off delay. The contact stays off for the duration defined in this parameter. The contact stays off even if the room unit's PIR sensor detects movement during this delay.
MIH settings			

Parameter name	Values	Default	Description
MIH hold-on delay	0 h 0 min 0 s...18 h 12 min 15 s	0 h 0 min 0 s	Man-in-house button hold-on time. Set the duration for temporary day mode. For example, you can save energy in a conference room with this function. When the users come to the conference room, they press the man-in-house button on the room unit. The control unit shifts to day mode for a time period defined in this parameter. After the time period passes, the control unit will automatically shift to night mode (energy saving mode) until someone presses the button again.
Display settings			
External Display Value Type	Disabled / None / Temperature / CO2	Disabled	Type of the external measurement value shown on the room unit's display.
External Display Value Source	Internal sensor / Input 1...3 / Value from Modbus register	Internal sensor	Source of the external measurement value shown on the room unit's display. This setting is available if the parameter <i>External Display Value Type</i> value is not <i>Disabled</i> . If the parameter value is <i>Value from Modbus register</i> , the control unit reads the value shown on the display from register X38. Replace the X with the room unit number (7 = room unit 1, 8 = room unit 2).

5.3.5 Configuring communication settings

1. Tap the *General communication settings* button on the *Configuration* page to open the *Edit settings* page.
2. Tap a parameter on the list to change its value.
See the following chapter for more information about the settings.
3. Tap the *Confirm* button at the top of the page to save the changes to the application.
4. Tap the *Apply these settings to device* button at the bottom of the *Component setup* page to write the changes to the device.

5.3.5.1 Available settings for communication

Parameter name	Values	Default	Description
RS-485 Settings			
BMS RS-485 address	1...247	1	Modbus address (RS-485).
BMS RS-485 speed	9600 / 14400 / 19200 / 38400 / 57600 / 115200 bit/s	9600 bit/s	Modbus speed (RS-485).
BMS RS-485 parity	None / Odd / Even	None	Modbus parity (RS-485).
BMS RS-485 stop-bits	1 Stop-Bit / 2 Stop-Bits	1 Stop-Bit	Modbus stop bits (RS-485).
ROU RS-485 speed	9600 / 19200 / 38400 / 57600 / 115200 bit/s	9600 bit/s	Room unit bus speed (RS-485).

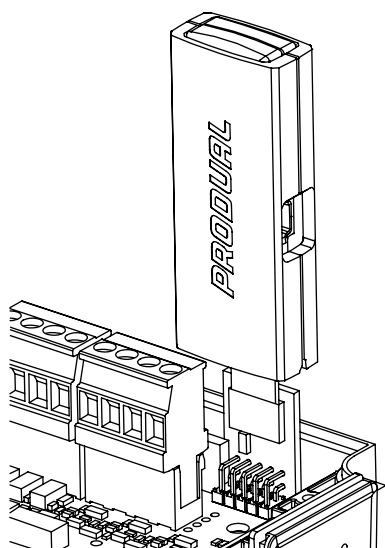
Parameter name	Values	Default	Description
ROU RS-485 parity	None / Odd / Even	None	Room unit bus parity (RS-485).
ROU RS-485 stop-bits	1 Stop-Bit / 2 Stop-Bits	1 Stop-Bit	Room unit bus stop bits (RS-485).
BMS Communication Settings			
 Note: BMS Communication Settings section is available only in BAC models.			
BMS communication mode	Modbus over RS-485 / BACnet over RS-485	BACnet over RS-485	Communication mode.
			Modbus over RS-485 Modbus RTU
			BACnet over RS-485 BACnet MSTP
BACnet device instance	0...4194303	1000	BACnet device instance identifier. The setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet network number	1...65534	1	BACnet network number. The network number must be unique inside the network. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet MAC address	0...127	1	BACnet MAC address. The address must be unique inside the network. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet MS/TP max masters	1...127	127	Maximum address of a master device. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet MS/TP max info frames	1...255	20	Maximum number of information frames that a node can send before it has to pass the token. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet MS/TP baud rate	9600 / 19200 / 38400 / 57600 / 76800 / 115200 bit/s	38400	BACnet MSTP speed. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet MS/TP parity	None / Odd / Even	None	BACnet MSTP parity. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet MS/TP stop-bits	1 Stop-Bit / 2 Stop-Bits	1 Stop-Bit	BACnet MSTP stop bits. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet foreign device	Enabled / Disabled	Disabled	BACnet foreign device. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .
BACnet/IP broadcast management device address	xxx.xxx.xxx.xxx	0.0.0.0	BACnet/IP broadcast management device address. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .

Parameter name	Values	Default	Description
BACnet foreign device port	0...65535	47808	BACnet foreign device port. This setting is available when the <i>BMS communication mode</i> parameter value is <i>BACnet over RS-485</i> .

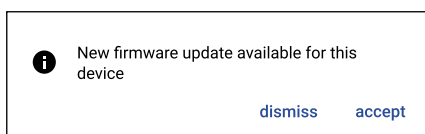
5.3.6 Updating device firmware

You can update the device firmware when the MyProdual application notifies you about the update.

1. Open the device cover.
2. Insert the MyTool Connect dongle to the connector.



3. Start the MyProdual application.
4. Connect the device to the MyProdual application.
See chapter [Configuring control unit settings](#) on page 24 for instructions on connecting the device.
5. Tap the **Accept** button on the update notification.



6. Review the update details and tap the **Install** button to start the update.
7. Wait for the firmware installation process to complete.



Important: Keep the mobile phone near the device to keep Bluetooth active. If the connection is lost, the firmware update process cannot complete.

8. Tap the **Ok** button in the firmware update completion dialog.
9. Tap the **Close** button.
10. Tap the connection info button to disconnect the device.

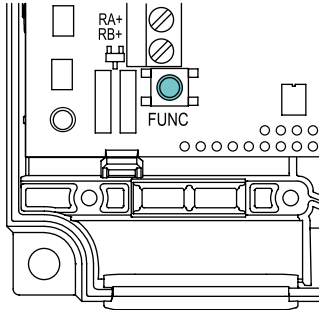


11. Remove the MyTool Connect dongle.

5.3.6.1 Resetting to factory firmware

If the firmware update fails, the device can be reset to factory firmware.

1. Disconnect the power supply.
2. Open the device cover.
3. Press and hold the *FUNC* button.



4. Reconnect the power supply.
5. Wait for 30 seconds and release the button.

The factory firmware is now reset to the device.

6 Modbus

6.1 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

6.2 Modbus function codes

The device supports the following Modbus function codes.

Decimal	Hexadecimal	Function
3	0x03	Read Holding Registers
4	0x04	Read Input Registers
6	0x06	Write Single Register
16	0x10	Write Multiple Registers
23	0x17	Read/Write Multiple Registers

6.3 Modbus registers

6.3.1 Input registers (read)

6.3.1.1 Input registers for device status

Input register	Parameter description	Data type	Values	Range
0	Error register.	U16	bits 0...3	0. Low voltage 1. RU1 communication 2. RU2 communication 3. Software version mismatch

6.3.1.2 Input registers for inputs

Table reading instruction: The register numbers include an X in the middle. Replace the X with the input number you are reading.

Input register	Parameter description	Data type	Values	Range
X00	Input power.	S16	0...10000	0...100.00 %
X01	Input voltage.	S16	0...10000	0...10000 mV
X02	Resistance input value, high range	S16	0...30000	0...300000 Ω
X03	Resistance input value, low range	S16	0...20000	0...2000.0 Ω
X04	Temperature input value.	S16	-500...1000	-50.0...100.0 °C
X05	Humidity input value.	S16	0...10000	0...100.00 %rH
X06	CO ₂ input value.	S16	0...10000	0...10000 ppm
X07	Contact input status.	S16	0 - 1	0. Inactive 1. Active
X08	Effective input power.	S16	0...10000	0...100.00 %

6.3.1.3 Input registers for room units

Table reading instruction: The register numbers include an X in the middle. Replace the X with the room unit number (7 = room unit 1 and 8 = room unit 2) you are adjusting.

Input register	Parameter description	Data type	Values	Range
X00	Room unit temperature value.	S16	-500...500	-50.0...50.0 °C
X01	Room unit humidity value.	S16	0...10000	0...100.00 %
X02	Room unit CO ₂ value.	S16	0...5000	0...5000 ppm
X03	Room unit set point value.	S16	20...420	2.0...42.0 °C
X04	Room unit operation mode.	S16	0 - 1 - 2 - 3	0. Not selected 1. Day 2. Night 3. Eco
X05	Room unit fan speed.	S16	0 - 1 - 2 - 3 - 4	0. Off 1. Speed 1 2. Speed 2 3. Speed 3 4. Automatic
X06	Room unit PIR status.	S16	0 - 1	0. Inactive 1. Active
X07	Room unit man in house button status.	S16	0 - 1	0. Inactive 1. Active
X08	Room unit temperature power.	S16	0...10000	0...100.00 %
X09	Room unit humidity power.	S16	0...10000	0...100.00 %
X10	Room unit CO ₂ power.	S16	0...10000	0...100.00 %
X11	Room unit contact status.	S16	0 - 1	0. Inactive 1. Active
X12	Number of room unit communication errors.	U16	0...65535	0...65535

Input register	Parameter description	Data type	Values	Range
X13	Room unit feature reading status.	U16	0 - 1 - 2	0. Features not read 1. Feature read failed 2. Feature read successful
X14	Number of room unit feature registers.	U16	0...65535	0...65535
X15	Number of room unit input registers.	U16	0...125	0...125
X16	Number of room unit feature bits.	U16	0...65535	0...65535
X17	Room unit feature bits.	U16	bits 0...6	0. Humidity 1. CO ₂ 2. PIR 3. Left button 4. Right button 5. Encoder 6. Display
X18	Room unit left button function.	U16	0 - 1 - 2 - 3	0. Invalid function 1. User defined function 2. Man in house 3. Fan speed
X19	Room unit right button function.	U16	0 - 1 - 2 - 3	0. Invalid function 1. User defined function 2. Man in house 3. Fan speed
X20	Room unit extra software feature support.	U16	0 - 1	0. No features supported 1. 0.5 °C steps supported in setpoint centre

6.3.1.4 Input registers for outputs

Table reading instruction: The register numbers include an X in the middle. Replace the X with the output number you are adjusting.

Input register	Parameter description	Data type	Values	Range
IX00	Output power.	S16	0...10000	0...100.00 %
IX01	Output voltage.	S16	0...10000	0...10.000 V
IX02	Output current.	S16	0...20000	0...20.000 mA
IX03	Triac output status.	S16	0 - 1	0. Inactive 1. Active
IX04	Fan speed output value.	S16	0 - 1 - 2 - 3	0. Off 1. Speed 1 2. Speed 2 3. Speed 3

Input register	Parameter description	Data type	Values	Range
1X05	Fan speed percentage value.	S16	0...10000	0...10.000 %

6.3.1.5 Input registers for controllers 1 and 2

Table reading instruction: The register numbers include an X in the middle. Replace the X with the controller number (1 or 2) you are adjusting.

Input register	Parameter description	Data type	Values	Range
2X00	Controller heating output.	S16	0...10000	0...100.00 %
2X01	Controller cooling output.	S16	0...10000	0...100.00 %
2X02	Controller humidity output.	S16	0...10000	0...100.00 %
2X03	Controller CO ₂ output.	S16	0...10000	0...100.00 %
2X04	Controller maximum selection output.	S16	0...10000	0...100.00 %
2X05	Controller 3P+ output status.	S16	0 - 1	0. Inactive 1. Active
2X06	Controller 3P- output status.	S16	0 - 1	0. Inactive 1. Active

6.3.1.6 Input registers for cascade controller

Input register	Parameter description	Data type	Values	Range
2300	Controller set point.	S16	20...320	2.0...32.0 °C
2301	Controller heating output.	S16	0...10000	0...100.00 %
2302	Controller cooling output.	S16	0...10000	0...100.00 %

6.3.1.7 Input registers for device information

Input register	Parameter description	Data type	Values	Range
9900	Device type 1.	U16	0...65535	0...65535
9901	Device type 2.	U16	0...65535	0...65535
9902	Serial number 1.	U16	0...65535	0...65535
9903	Serial number 2.	U16	0...65535	0...65535
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

6.3.2 Holding registers (read/write)

6.3.2.1 Holding registers for communication



Note: The control unit must be restarted to complete the communication settings change. The registers that are marked with *, doesn't require restarting.

Holding register	Parameter description	Data type	Values	Range	Default
12	Modbus address (RS-485).	U16	0...255	0...255	1
13	Modbus 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
14	Modbus parity (RS-485).	U16	0 - 1 - 2	0. None 1. Odd 2. Even	0
15	Modbus stop bits (RS-485).	U16	0 - 1	0. 1 stop bit 1. 2 stop bits	0
16	Not used.	U16	-	-	1
17	Room unit 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
18	Room unit bus parity (RS-485).	U16	0 - 1 - 2	0. None 1. Odd 2. Even	0
19	Room unit bus stop bits (RS-485).	U16	0 - 1	0. 1 stop bit 1. 2 stop bits	0
21	BACnet device instance identifier, first two digits.	U16	0...63	0...63	0
22	BACnet device instance identifier, last five digits.	U16	0...65535	0...65535	10000
23	BACnet network number.	U16	1...65534	1...65534	1
24	BACnet MAC address.	U16	0...127	0...127	1
25	Maximum BACnet address of a master device.	U16	1...127	1...127	127
26	Maximum number of BACnet information frames that a node can send before it has to pass the token.	U16	1...255	1...255	20

Holding register	Parameter description	Data type	Values	Range	Default
27	BMS communication mode.	U16	0 - 1	0. Modbus RTU 1. BACnet MS/TP and Modbus RTU (only available in-BAC models)	0
28	Not in use.	U16	-	-	0
29	Not in use.	U16	-	-	0
30	Not in use.	U16	-	-	0
31	Not in use.	U16	-	-	47808
32	BACnet MSTP bus speed.	U16	0 - 1 - 2 - ... - 5	0. 9600 bps 1. 19200 bps 2. 38400 bps 3. 57600 bps 4. 76800 bps 5. 115200 bps	2
33	BACnet MSTP parity.	U16	0 - 1 - 2	0. None 1. Odd 2. Even	0
34	BACnet MSTP stop bits.	U16	0 - 1	0. 1 stop bit 1. 2 stop bits	0

6.3.2.2 Holding registers for inputs

Table reading instruction: The register numbers include an X in the middle. Replace the X with the input number you are adjusting.

Holding register	Parameter description	Data type	Values	Range	Default
X00	Input type.	S16	0 - 1 - 2 - ... - 9	0. Not used 1. Direct control 2. Temperature signal 3. Humidity signal 4. CO ₂ signal 5. NTC 10 6. N/A 7. Resistive / Digital input 8. Potentiometer 9. PIR	5
X01	Input overdrive status.	S16	0 - 1	0. Disabled 1. Enabled	0
X02	Input overdrive value.	S16	0...10000	0...100.00 %	0
X03	Input voltage @ 0 %.	S16	0...10000	0...10.000 V	0
X04	Input voltage @ 100 %.	S16	0...10000	0...10.000 V	10000
X05	Input temperature at 0 %.	S16	-500...1000	-50.0...100.0 °C	-500

Holding register	Parameter description	Data type	Values	Range	Default
X06	Input temperature at 100 %.	S16	-500...1000	-50.0...100.0 °C	1000
X07	Input temperature offset.	S16	-1000...1000	-100.0...100.0 °C	0
X08	Input humidity at 0 %.	S16	0...10000	0...100.00 %rH	0
X09	Input humidity at 100 %.	S16	0...10000	0...100.00 %rH	10000
X10	Input humidity offset.	S16	-5000...5000	-50.00...50.00 %rH	0
X11	Input CO ₂ at 0 %.	S16	0...10000	0...10000 ppm	0
X12	Input CO ₂ at 100 %.	S16	0...10000	0...10000 ppm	2000
X13	Input CO ₂ offset	S16	-200...200	-200...200 ppm	0
X14	Contact on level.	S16	0...10000	0...100.00 %	9000
X15	Contact off level.	S16	0...10000	0...100.00 %	100
X16	Contact on level.	S16	0...30000	0...300000 Ω	100
X17	Contact off level.	S16	0...30000	0...300000 Ω	50
X18	Contact hold on time (seconds).	S16	0...59	0...59 s	0
X19	Contact hold on time (minutes).	S16	0...59	0...59 min	0
X20	Contact hold on time (hours).	S16	0...60	0...60 h	0
X21	Contact hold off time (seconds).	S16	0...59	0...59 s	0
X22	Contact hold off time (minutes).	S16	0...59	0...59 min	0
X23	Contact hold off time (hours).	S16	0...60	0...60 h	0
X24	Efficient control range min	S16	0...10000	0...100.00 %	0
X25	Efficient control range max	S16	0...10000	0...100.00 %	10000
X26	COV limit for voltage.	S16	1...5000	0.001...5.000 V	100
X27	COV limit for temperature.	S16	1...500	0.1...50.0 °C	5
X28	COV limit for humidity.	S16	1...5000	0.01...50.00 %	500
X29	COV limit for CO ₂ .	S16	1...1000	0...1000 ppm	50
X30	COV limit for resistance, high.	U16	1...15000	10...150000 Ω	50
X31	COV limit for resistance, low.	S16	1...1000	0.1...100.0 Ω	100
X32	Resistance high, minimum.	U16	0...30000	0...300000 Ω	0
X33	Resistance high, maximum.	U16	0...30000	0...300000 Ω	1000
X34	Resistance high, offset.	S16	-10000...10000	-100000...100000 Ω	0
X35	Input reaction time.	S16	0 - 1	0. Normal 1. Fast	0
X36	Input contact turn on delay (seconds).	U16	0...59	0...59 s ¹⁾	0
X37	Input contact turn on delay (minutes).	U16	0...59	0...59 min ¹⁾	0
X38	Input contact turn on delay (hours).	U16	0...18	0...18 h	0
X39	Input contact turn off delay (seconds).	U16	0...59	0...59 s ¹⁾	0

Holding register	Parameter description	Data type	Values	Range	Default
X40	Input contact turn off delay (minutes).	U16	0...59	0...59 min ¹⁾	0
X41	Input contact turn off delay (hours).	U16	0...18	0...18 h	0

¹⁾ Maximum timer value is 18 hours, 12 minutes and 15 seconds.

6.3.2.3 Holding registers for room units

Table reading instruction: The register numbers include an X in the middle. Replace the X with the room unit number (7 = room unit 1 and 8 = room unit 2) you are adjusting.

Holding register	Parameter description	Data type	Values	Range	Default
X00	Enable room unit.	S16	0 - 1	0. Disabled 1. Enabled	1
X01	Room unit set point centre.  Note: To be able to use 0.5 °C steps, the room unit must support the feature. See the input register X20 for the supported features.	S16	18...26 / 32786...32793	18...26 °C / 18.5...25.5 °C	21
X02	Room unit set point range.  Note: To be able to use 0.5 °C steps, the room unit must support the feature. See the input register X20 for the supported features.	S16	1...16 / 32769...32783	1...16 °C / 1.5...15.5 °C	3
X03	Room unit set point deviation step.	S16	1...5	0.1...0.5 °C	5
X04	Room unit contact mode.	S16	0 - 1 - 2 - 3	0. Not in use 1. Temperature 2. Humidity 3. CO ₂	0
X05	Room unit temperature at 0 %.	S16	-500...1000	-50.0...100.0 °C	0
X06	Room unit temperature at 100 %.	S16	-500...1000	-50.0...100.0 °C	500
X07	Room unit humidity at 0 %.	S16	0...10000	0...100.00 %rH	6500
X08	Room unit humidity at 100 %.	S16	0...10000	0...100.00 %rH	8000
X09	Room unit CO ₂ at 0 %.	S16	0...5000	0...5000 ppm	700
X10	Room unit CO ₂ at 100 %.	S16	0...10000	0...10000 ppm	1200
X11	Room unit contact on level.	S16	0...10000	0...100.00 %	0
X12	Room unit contact off level.	S16	0...10000	0...100.00 %	0
X13	Room unit contact hold on time (seconds).	S16	0...59	0...59 s ¹⁾	0

Holding register	Parameter description	Data type	Values	Range	Default
X14	Room unit contact hold on time (minutes).	S16	0...59	0...59 min ¹⁾	0
X15	Room unit contact hold on time (hours).	S16	0...18	0...18 h	0
X16	Room unit contact hold off time (seconds).	S16	0...59	0...59 s ¹⁾	0
X17	Room unit contact hold off time (minutes).	S16	0...59	0...59 min ¹⁾	0
X18	Room unit contact hold off time (hours).	S16	0...18	0...18 h	0
X19	PIR contact on delay (seconds).	S16	0...59	0...59 s	0
X20	PIR contact on delay (minutes).	S16	0...59	0...59 min	0
X21	PIR contact hold on delay (seconds).	S16	0...59	0...59 s ¹⁾	0
X22	PIR contact hold on delay (minutes).	S16	0...59	0...59 min ¹⁾	0
X23	PIR contact hold on delay (hours).	S16	0...18	0...18 h	0
X24	Man in house button hold on time (seconds).	S16	0...59	0...59 s ¹⁾	0
X25	Man in house button hold on time (minutes).	S16	0...59	0...59 min ¹⁾	0
X26	Man in house button hold on time (hours).	S16	0...18	0...18 h	0
X27	Room unit set point	S16	20...420	20...420	-
X28	Room unit operation mode.	S16	0 - 1 - 2 - 3	0. Not selected 1. Day 2. Night 3. Eco	-
X29	Room unit fan speed.	S16	0 - 1 - 2 - 3 - 4	0. Off 1. Speed 1 2. Speed 2 3. Speed 3 4. Automatic	-
X30	PIR status.	S16	0 - 1	0. Inactive 1. Active	-
X31	Man in house status.	S16	0 - 1	0. Inactive 1. Active	-
X32	COV limit for temperature.	S16	1...500	0.1...50.0 °C	5
X33	COV limit for humidity.	S16	1...5000	0.01...50.00 %	500
X34	COV limit for CO ₂ .	S16	1...1000	0...1000 ppm	50
X35	Default operation mode.	S16	0 - 1 - 2	0. Day 1. Night 2. Eco	0

Holding register	Parameter description	Data type	Values	Range	Default
X36	Operation mode source.	S16	0 - 1 - 2	0. BMS 1. Controller 1 2. Controller 2	0
X37	Source for the external measurement value in room unit's display.	S16	0 - 1 - 2 - ... - 7	0. Value from room unit's own register 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Register X38 value	0
X38	External display value. The value is used if the register X37 value is 7. The value is set to 0 after a power failure.	S16	-32768...32767	-32768...32767	0
X39	Type for the external measurement value in room unit's display.	S16	-1 - 0 - 1 - 3	-1 = Functionality disabled 0. No unit 1. Temperature 2. N/A 3. CO ₂	-1
X40	Room unit PIR turn off delay (seconds).	U16	0...59	0...59 s ¹⁾	0
X41	Room unit PIR turn off delay (minutes).	U16	0...59	0...59 min ¹⁾	0
X42	Room unit PIR turn off delay (hours).	U16	0...18	0...18 h	0
X43	Room unit PIR hold off delay (seconds).	U16	0...59	0...59 s ¹⁾	0
X44	Room unit PIR hold off delay (minutes).	U16	0...59	0...59 min ¹⁾	0
X45	Room unit PIR hold off delay (hours).	U16	0...18	0...18 h	0

¹⁾ Maximum timer value is 18 hours, 12 minutes and 15 seconds.

6.3.2.4 Holding registers for outputs

Table reading instruction: The register numbers include an X in the middle. Replace the X with the output number you are adjusting.

Holding register	Parameter description	Data type	Values	Range	Default
IX00	Output type for the outputs 1 and 2.	S16	0 - 1 - 2 - ... - 6	0. Not in use 1. Analogue voltage 2. 6-way valve 3. Fan 4. 24 Vac 5. 3-point actuator + 6. 3-point actuator -	4
IX00	Output type for the outputs 3 and 4.	S16	0 - 1 - 2 - 3	0. Not in use 1. Analogue voltage 2. 6-way valve 3. Fan	0
IX01	Output control source.	S16	0 - 1 - 2 - ... - 11	0. BMS 1. Controller 1 2. Controller 2 3. Cascade controller 4. Input 1 5. Input 2 6. Input 3 7. N/A 8. N/A 9. N/A 10. Room unit 1 11. Room unit 2	0
IX02	Output control method.	S16	0 - 1 - 2 - ... - 6	0. Heating 1. Cooling 2. Change-over 3. Humidity 4. CO ₂ 5. Maximum selection 6. Heating and cooling 7. Heating thermostat 8. Cooling thermostat 9. Heating and cooling thermostat	0
IX03	3-point actuator + output. Set this register only for the 3-point actuator - output.	S16	0 - 1 - 2	0. Not set 1. Output 1 2. Output 2	0
IX04	3-point actuator running time. Set this register only for the 3-point actuator + output.	S16	0...1200	0...1200 s	720
IX05	Not in use.	S16	-	-	0
IX06	Room unit output type.	S16	0 - 1 - 2	0. Temperature 1. Humidity 2. CO ₂	0

Holding register	Parameter description	Data type	Values	Range	Default
1X07	Output override source.	S16	0 - 1 - 2 - ... - 8	0. Off 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	0
1X08	Room unit override type.	S16	0 - 1 - 2 - 3	0. PIR detection 1. Man in house button 2. Occupancy detection 3. Contact	0
1X09	Override inversion.	S16	0 - 1	0. Disabled 1. Enabled	0
1X10	Override value for override source.	S16	0...10000	0...100.00 %	0
1X11	Fan off value.	S16	0...10000	0...100.00 %	0
1X12	24 Vac output inversion.	S16	0 - 1	0. Disabled 1. Enabled	0
1X13	Enable direct output override.	S16	0 - 1	0. Override disabled 1. Override enabled	0
1X14	Direct override value.	S16	0...10000	0...100.00 %	0
1X15	Effective control range of output, minimum limit.	S16	0...10000	0...100.00 %	0
1X16	Effective control range of output, maximum limit.	S16	0...10000	0...100.00 %	10000
1X17	Operating mode source.	S16	0 - 1 - 2 - 3	0. Not in use 1. Controller 1 2. Controller 2 3. Automatic	0
1X18	Voltage output range at day mode, low limit.	S16	0...10000	0...100.00 %	0
1X19	Voltage output range at night mode, low limit.	S16	0...10000	0...100.00 %	0
1X20	Voltage output range at eco mode, low limit.	S16	0...10000	0...100.00 %	0
1X21	Voltage output range at day mode, high limit.	S16	0...10000	0...100.00 %	0
1X22	Voltage output range at night mode, high limit.	S16	0...10000	0...100.00 %	0
1X23	Voltage output range at eco mode, high limit.	S16	0...10000	0...100.00 %	0
1X24	Output voltage at 0 %.	S16	0...10000	0...10.000 V	0

Holding register	Parameter description	Data type	Values	Range	Default
IX25	Output voltage at 100 %.	S16	0...10000	0...10.000 V	10000
IX26	Not in use.	S16	-	-	0
IX27	Not in use.	S16	-	-	0
IX28	Fan speed mode.	S16	0 - 1 - 2 - ... - 9	0. Off 1. Speed 1 2. Speed 2 3. Speed 3 4. Automatic 5. Automatic EC 6. Room unit 1, 3-speed 7. Room unit 2, 3-speed 8. Room unit 1, EC 9. Room unit 2, EC	4
IX29	Fan off voltage.	S16	0...10000	0...10.000 V	0
IX30	Fan speed 1 voltage.	S16	0...10000	0...10.000 V	0
IX31	Fan speed 2 voltage.	S16	0...10000	0...10.000 V	0
IX32	Fan speed 3 voltage.	S16	0...10000	0...10.000 V	0
IX33	Fan off power.	S16	0...10000	0...10.000 V	0
IX34	Fan speed 1 power.	S16	0...10000	0...100.00 %	0
IX35	Fan speed 2 power.	S16	0...10000	0...100.00 %	0
IX36	Fan speed 3 power.	S16	0...10000	0...100.00 %	0
IX37	Fan speed changing delay.	S16	0...3600	0...3600 s	0
IX38	PWM pulse width.	S16	0...1200	0...1200 s	90
IX39	Valve jam prevention function interval.	S16	0 - 1 - 2 - ... - 7	0. Function off 1. 1 day 2. 2 days 3. 3 days 4. 4 days 5. 5 days 6. 6 days 7. 7 days	0
IX40	COV limit, voltage.	S16	1...5000	0.001...5.000 V	100
IX41	Not in use.	S16	-	-	500
IX42	6-way valve cooling low limit voltage.	S16	0...10000	0...10.000 V	0
IX43	6-way valve cooling high limit voltage.	S16	0...10000	0...10.000 V	5000
IX44	6-way valve heating low limit voltage.	S16	0...10000	0...10.000 V	5000
IX45	6-way valve heating high limit voltage.	S16	0...10000	0...10.000 V	10000
IX46	Not in use.	S16	-	-	0

Holding register	Parameter description	Data type	Values	Range	Default
1X47	Not in use.	S16	-	-	0
1X48	Fan starting boost timer.	S16	0...10	0 = off, 1...10 s	0
1X49	Fan starting boost voltage.	S16	0...10000	0...10.000 V	0
1X50	Fan speed limit in automatic mode.	S16	0 - 1 - 2 - 3	0. No limit 1. Speed 1 2. Speed 2 3. Speed 3	0
1X51	Fan turning off delay.	S16	0...300	0...300 s	0
1X52	Fan ON minimum voltage.	S16	0...10000	0...10.000 V	0

6.3.2.5 Holding registers for controllers 1 and 2

Table reading instruction: The register numbers include an X in the middle. Replace the X with the controller number (1 or 2) you are adjusting.

Holding register	Parameter description	Data type	Values	Range	Default
2X00	Controller type.	S16	0 - 1 - 2 - 3	0. Not in use 1. Heating 2. Cooling 3. Heating and cooling	3
2X01	Main temperature input.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	7
2X02	Secondary temperature input for average calculation.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	0

Holding register	Parameter description	Data type	Values	Range	Default
2X03	Main humidity input.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	7
2X04	Secondary humidity input for average calculation.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	0
2X05	Main CO ₂ input.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	7
2X06	Secondary CO ₂ input.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	0
2X07	Source for set point.	S16	0 - 1 - 2 - ... - 8	0. Active mode 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	7

Holding register	Parameter description	Data type	Values	Range	Default
2X08	Operation mode change method.	S16	0 - 1 - 2 - 3	0. BMS only 1. Room unit 1 setting 2. Room unit 2 setting 3. Separate bits	3
2X09	Day/night mode source.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	2
2X10	Room unit day/night mode input type.	S16	0 - 1 - 2	0. PIR detection 1. Man in house button 2. Occupancy	0
2X11	Eco mode activation source.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	7
2X12	Room unit eco mode input type.	S16	0 - 1 - 2	0. PIR detection 1. Man in house button 2. Occupancy (PIR detection or Man in house button)	2
2X13	Changeover input.	S16		0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A	0
2X14	Day mode set point.	S16	20...320	2.0...32.0 °C	220
2X15	Night mode set point.	S16	20...320	2.0...32.0 °C	220
2X16	Eco mode set point.	S16	20...320	2.0...32.0 °C	220
2X17	Day mode dead zone.	S16	0...300	0...30.0 °C	10
2X18	Night mode dead zone.	S16	0...300	0...30.0 °C	30
2X19	Eco mode dead zone.	S16	0...300	0...30.0 °C	80
2X20	Heating proportional band.	S16	0...160	0...16.0 °C	15
2X21	Cooling proportional band.	S16	0...160	0...16.0 °C	15

Holding register	Parameter description	Data type	Values	Range	Default
2X22	Controller integral time.	S16	0...1200	0...1200 s	160
2X23	Maximum power influenced by heating.	S16	0 - 1	0. Disabled 1. Enabled	0
2X24	Maximum power influenced by cooling.	S16	0 - 1	0. Disabled 1. Enabled	0
2X25	Maximum control influenced by humidity.	S16	0 - 1	0. Disabled 1. Enabled	1
2X26	Maximum control influenced by CO ₂ .	S16	0 - 1	0. Disabled 1. Enabled	1
2X27	Current controller set point.	S16	20...320	2.0...32.0 °C	-
2X28	Active operation mode.	S16	0 - 1 - 2	0. Day mode 1. Night mode 2. Eco mode	-
2X29	Fan speed after power failure or operating mode change.	S16	0 - 1 - 2 - ... - 9	0. Functionality disabled 1. Speed 1 2. Speed 2 3. Speed 3 4. Automatic 5. Automatic EC 6. Room unit 1, 3-speed 7. Room unit 2, 3-speed 8. Room unit 1, EC 9. Room unit 2, EC	0
2X30	Source for setpoint when entering day mode. The fan speed is reset to the speed defined with the register 2X29.	S16	0 - 1 - 2 - ... - 9	0. Functionality disabled 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2 9. Active operation mode	0

Holding register	Parameter description	Data type	Values	Range	Default
2X31	Source for setpoint when entering night mode. The fan speed is reset to the speed defined with the register 2X29.	S16	0 - 1 - 2 - ... - 9	0. Functionality disabled 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2 9. Active operation mode	0
2X32	Source for setpoint when entering eco mode. The fan speed is reset to the speed defined with the register 2X29.	S16	0 - 1 - 2 - ... - 9	0. Functionality disabled 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2 9. Active operation mode	0
2X33	Not in use.	S16	-	-	0
2X34	Change-over function state.	S16	0 - 1	0. Heating 1. Cooling	0

6.3.2.6 Holding registers for cascade controller

Holding register	Parameter description	Data type	Values	Range	Default
2300	Controller type.	S16	0 - 1 - 2 - 3	0. Not in use 1. Heating 2. Cooling 3. Heating and cooling	0
2301	Main temperature input.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	0

Holding register	Parameter description	Data type	Values	Range	Default
2302	Secondary temperature input for average calculation.	S16	0 - 1 - 2 - ... - 8	0. Not in use 1. Input 1 2. Input 2 3. Input 3 4. N/A 5. N/A 6. N/A 7. Room unit 1 8. Room unit 2	0
2303	Not in use.	S16	-	-	0
2304	Source for set point.	S16	0 - 1	0. Controller 1 1. Controller 2	0
2305	Set point source mode.	S16	0 - 1 - 2	0. Heating 1. Cooling 2. Heating and cooling	0
2306	Set point range, minimum value.	S16	20...320	2.0...32.0 °C	220
2307	Set point range, maximum value.	S16	20...320	2.0...32.0 °C	220
2308	Dead zone.	S16	0...300	0...30.0 °C	10
2309	Heating proportional band.	S16	0...160	0...16.0 °C	20
2310	Cooling proportional band.	S16	0...160	0...16.0 °C	20
2311	Controller integral time.	S16	0...1200	0...1200 s	160
2312	Not in use.	S16	-	-	0
2313	Change-over function state.	S16	0 - 1	0. Heating 1. Cooling	0

6.3.2.7 Holding registers for temporary overdrive control

Holding register	Parameter description	Data type	Values	Range	Default
9000	Temporary overdrive timer.	U16	0...65535	0...65535 min	0
9001	Temporary overdrive, input 1.	S16	-1...1000	-1 = disabled, 0...100.00 %	-1
9002	Temporary overdrive, input 2.	S16	-1...1000	-1 = disabled, 0...100.00 %	-1
9003	Temporary overdrive, input 3.	S16	-1...1000	-1 = disabled, 0...100.00 %	-1
9004	Not in use.	S16	-	-1	-1
9005	Not in use.	S16	-	-1	-1
9006	Not in use.	S16	-	-1	-1
9007	Temporary overdrive, output 1.	S16	-1...1000	-1 = disabled, 0...100.00 %	-1
9008	Temporary overdrive, output 2.	S16	-1...1000	-1 = disabled, 0...100.00 %	-1

Holding register	Parameter description	Data type	Values	Range	Default
9009	Temporary overdrive, output 3.	S16	-1...1000	-1 = disabled, 0...100.00 %	-1
9010	Temporary overdrive, output 4.	S16	-1...1000	-1 = disabled, 0...100.00 %	-1

6.3.2.8 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

7 BACnet

7.1 BACnet properties

The BACnet communication is available only in -BAC models.

Protocol	BACnet MS/TP
Device profile	BACnet Application specific controller (B-ASC)
Bus speed	9600*/14400/19200/38400/57600/115200 bit/s
Stop bits	1
Unit load	1/4 UL
	* factory setting



BACnet is a registered trademark of ASHRAE. ASHRAE does not endorse, approve or test products for compliance with ASHRAE standards. Compliance of listed products to the requirements of ASHRAE Standard 135 is the responsibility of BACnet International. BTL is a registered trademark of BACnet International.

BACnet International has issued the BTL Certificate to this device. The BTL certification validates that the product correctly implements the extensive and complex BACnet features. This eliminates the risk of BACnet implementation errors and interoperability problems.

7.2 Object descriptions



Note: Objects become visible based on the device configuration. All objects cannot be visible at the same time.

7.2.1 Binary value objects

Object name	Values	Inactive/Active_Text	Default
Input 1 Contact	0 - 1	0. Off 1. On	0
Input 2 Contact	0 - 1	0. Off 1. On	0
Input 3 Contact	0 - 1	0. Off 1. On	0

7.2.2 Analog input objects

Object name	Values	Resolu- tion	Units
Input 1 Voltage	0...10	0.001	volts (5)
Input 1 Temperature	-50...100	0.1	degrees-celsius (62)
Input 1 Rh	0...100	0.01	percent-relative-humidity (29)
Input 1 CO2	0...10000	1.0	parts-per-million (96)
Input 1 Resistance	0...300000	30	ohms (4)
Input 1 Power	0...100	0.01	percent (98)

Object name	Values	Resolu- tion	Units
Input 2 Voltage	0...10	0.001	volts (5)
Input 2 Temperature	-50...100	0.1	degrees-celsius (62)
Input 2 Rh	0...100	0.01	percent-relative-humidity (29)
Input 2 CO2	0...10000	1.0	parts-per-million (96)
Input 2 Resistance	0...300000	30	ohms (4)
Input 2 Power	0...100	0.01	percent (98)
Input 3 Voltage	0...10	0.001	volts (5)
Input 3 Temperature	-50...100	0.1	degrees-celsius (62)
Input 3 Rh	0...100	0.01	percent-relative-humidity (29)
Input 3 CO2	0...10000	1.0	parts-per-million (96)
Input 3 Resistance	0...300000	30	ohms (4)
Input 3 Power	0...100	0.01	percent (98)
RU 1 Temperature	-50...100	0.1	degrees-celsius (62)
RU 1 RH	0...100	0.01	percent-relative-humidity (29)
RU 1 CO2	0...10000	1.0	parts-per-million (96)
RU 1 Power (Temp)	0...100	0.01	percent (98)
RU 1 Power (RH)	0...100	0.01	percent (98)
RU 1 Power (CO2)	0...100	0.01	percent (98)
RU 2 Temperature	-50...100	0.1	degrees-celsius (62)
RU 2 RH	0...100	1.0	percent-relative-humidity (29)
RU 2 CO2	0...10000	0.01	parts-per-million (96)
RU 2 Power (Temp)	0...100	0.01	percent (98)
RU 2 Power (RH)	0...100	0.01	percent (98)
RU 2 Power (CO2)	0...100	0.01	percent (98)

7.2.3 Analog value objects

Object name	Values	Resolu- tion	Units	Default
RU 1 Current Setpoint Value	2...42	0.1	degrees-celsius (62)	21.0
RU 2 Current Setpoint Value	2...42	0.1	degrees-celsius (62)	21.0
Controller 1 Current Setpoint Value	2...32	0.1	degrees-celsius (62)	22.0
Controller 2 Current Setpoint Value	2...32	0.1	degrees-celsius (62)	22.0
Output 1 Voltage	0...10	0.001	volts (5)	0
Output 1 6-way Valve	0...10	0.001	volts (5)	0
Output 1 Fan	0...10	0.001	volts (5)	0
Output 1 Power	0...100	0.01	percent (98)	0
Output 2 Voltage	0...10	0.001	volts (5)	0
Output 2 6-way Valve	0...10	0.001	volts (5)	0

Object name	Values	Resolution	Units	Default
Output 2 Fan	0...10	0.001	volts (5)	0
Output 2 Power	0...100	0.01	percent (98)	0
Output 3 Voltage	0...10	0.001	volts (5)	0
Output 3 6-way Valve	0...10	0.001	volts (5)	0
Output 3 Fan	0...10	0.001	volts (5)	0
Output 3 Power	0...100	0.01	percent (98)	0
Output 4 Voltage	0...10	0.001	volts (5)	0
Output 4 6-way Valve	0...10	0.001	volts (5)	0
Output 4 Fan	0...10	0.001	volts (5)	0
Output 4 Power	0...100	0.01	percent (98)	0

7.2.4 Multistate input objects

Object name	Values	State text	Default
RU 1 Fan Speed	1 - 2 - 3 - 4 - 5	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3 5. Fan Speed Auto	1
RU 2 Fan Speed	1 - 2 - 3 - 4 - 5	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3 5. Fan Speed Auto	1

7.2.5 Multistate value objects

Object name	Values	State text	Default
RU 1 Operating Mode	1 - 2 - 3 - 4	1. Mode 0 2. Mode 1 3. Mode 2 4. Mode 3	1
RU 2 Operating Mode	1 - 2 - 3 - 4	1. Mode 0 2. Mode 1 3. Mode 2 4. Mode 3	1

Object name	Values	State text	Default
Output 1 Fan Control	1 - 2 - ... - 8	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3 5. Fan Speed AUTO 6. Fan Speed AUTO EC 7. Fan Speed AUTO RU1 8. Fan Speed AUTO RU2	1
Output 2 Fan Control	1 - 2 - ... - 8	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3 5. Fan Speed AUTO 6. Fan Speed AUTO EC 7. Fan Speed AUTO RU1 8. Fan Speed AUTO RU2	1
Output 3 Fan Control	1 - 2 - ... - 8	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3 5. Fan Speed AUTO 6. Fan Speed AUTO EC 7. Fan Speed AUTO RU1 8. Fan Speed AUTO RU2	1
Output 4 Fan Control	1 - 2 - ... - 8	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3 5. Fan Speed AUTO 6. Fan Speed AUTO EC 7. Fan Speed AUTO RU1 8. Fan Speed AUTO RU2	1
Controller 1 Active Mode	1 - 2 - 3	1. Mode 0 2. Mode 1 3. Mode 2	1
Controller 2 Active Mode	1 - 2 - 3	1. Mode 0 2. Mode 1 3. Mode 2	1
Output 1 Fan Step	1 - 2 - 3 - 4	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3	1
Output 2 Fan Step	1 - 2 - 3 - 4	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3	1

Object name	Values	State text	Default
Output 3 Fan Step	1 - 2 - 3 - 4	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3	1
Output 4 Fan Step	1 - 2 - 3 - 4	1. Fan Speed 0 2. Fan Speed 1 3. Fan Speed 2 4. Fan Speed 3	1

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.

