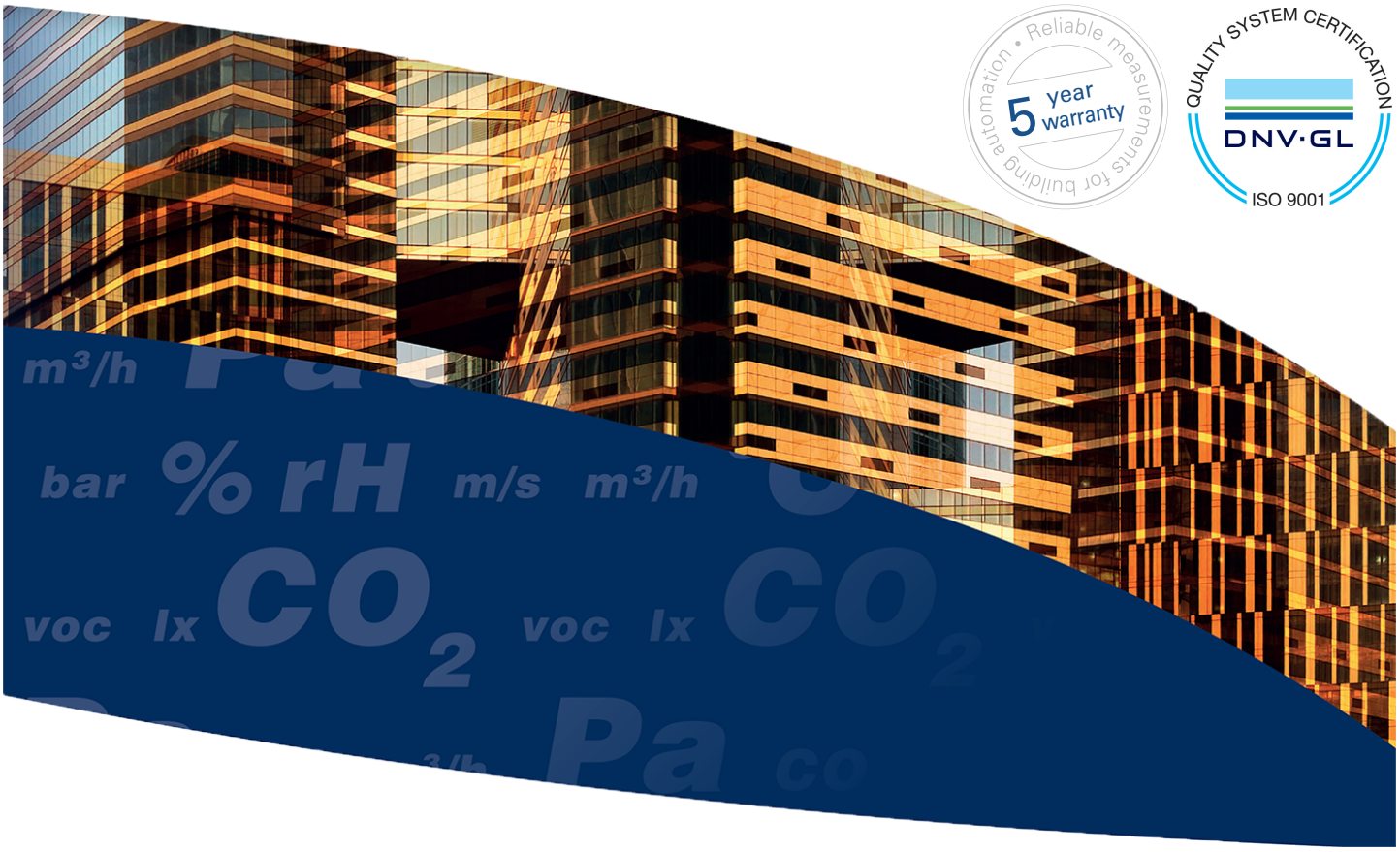


Produal Proxima® CU-LH - multifunctional control unit

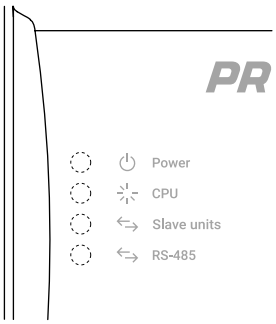
User Guide

PRODUAL
measure-be sure.

Contents

1 Functional description

1.1 Indicator lights



Power	The light is on when the supply voltage is connected.
CPU	The light indicates the *FUNC* button press.
Slave units	The light indicates the communication between the control unit and slave devices.
RS-485	The light indicates the communication in the RS-485 port.

1.2 Inputs

There are three inputs and all the inputs are multifunctional. This means that each input can be configured for different input signals and the controller will change its behaviour according to the selected configuration.

The available input types:

- 0...10 Vdc signal input.
- 0...10 Vdc temperature transmitter input.
- 0...10 Vdc humidity transmitter input.
- 0...10 Vdc CO_2 transmitter input.
- NTC 10 temperature sensor input.
- Resistance input. The input can be used for passive condensation sensor or a contact input, for example
- Potentiometer input.

1.2.1 Selectable input reaction time

The input reaction time is set to *Normal* by default. For example, the default setting is suitable resistance input but the setting should be changed for digital input. Otherwise the input reacts too slowly for a button press, for example.

Parameter	Holding register	Default	Range	Description
Filtering mode	*X35*	*Normal*	*Normal / Fast*	Input reaction time.

1.3 Outputs

There are four outputs and all the outputs are multifunctional. This means that each output can be configured for different output signals and functions.

The available output types:

- Voltage output (0...10 Vdc).
- 6-way valve output (0...10 Vdc).
- Fan output (0...10 Vdc).
- PWM output (24 Vac).
- 3-point actuator output (24 Vac).

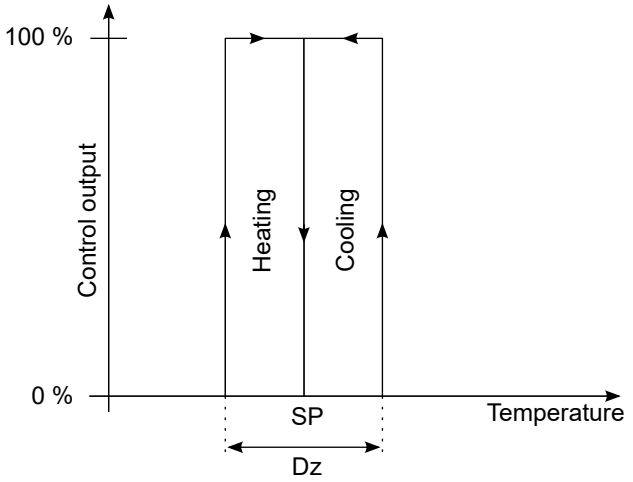
The controller has also two supply outputs (24 Vac, <6 A total) for external devices.

1.3.1 Thermostat function

Thermostat function can be selected separately for all outputs. The function works for heating and cooling control signal.

The output turns on when the control signal is 100 % and turns off when the control signal is 0 %. The thermostat function hysteresis is set by the controller's proportional band.

- When using the thermostat function in the heating side, the heating valve opens fully when the temperature falls below the dead zone (*DZ*) lower limit. The heating valve closes when the temperature reaches the setpoint (*SP*).
- When using the thermostat function in the cooling side, the cooling valve opens fully when the temperature rises over the dead zone higher limit. The cooling valve closes when the temperature reaches the setpoint.



Note the following parameters:

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 *Heating thermostat* or *Cooling thermostat*.

1.4 Operation modes

Control unit has three operation modes that can have their own control settings. The operation modes are called day, night and eco modes.

The operation modes can be controlled by the following functions:

- Using control unit's input information
- Using room unit's functions (Man in house button, occupancy detection)

- Bus communication

1.4.1 Resetting setpoint and fan speed when changing operation mode

The controller temperature setpoint can be reset when changing operation mode. The new setpoint source can be selected in the controller settings. If the reset function is activated, the fan speed also resets to a value defined with the parameter *Default fan speed after power failure*.

Parameter	Holding register	Default	Range	Description
Reset setpoint and fan speed when entering mode operating 1	*2X30*	*Disabled*	*Disabled / Input 1...3 / Room-Unit 1...2 / Active operation mode*	Source for setpoint when entering day mode. The fan speed is reset to the speed defined with the parameter *Default fan speed after power failure*.
Reset setpoint and fan speed when entering mode operating 2	*2X31*	*Disabled*	*Disabled / Input 1...3 / Room-Unit 1...2 / Active operation mode*	Source for setpoint when entering night mode. The fan speed is reset to the speed defined with the parameter *Default fan speed after power failure*.
Reset setpoint and fan speed when entering mode operating 3	*2X32*	*Disabled*	*Disabled / Input 1...3 / Room-Unit 1...2 / Active operation mode*	Source for setpoint when entering eco mode. The fan speed is reset to the speed defined with the parameter *Default fan speed after power failure*.
Default fan speed after power failure	*2X29*	*4-Step auto*	*Disabled / Fan speed 1...3 / 4-Step auto / EC auto / Room unit 1...2 / Room unit 1...2 EC auto*	Fan speed after power failure or operating mode change.

1.5 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 set temperature with the measured temperature and controls room heating 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. The controller set points can be set by using the control unit's input, by using a room unit or by setting the set point via bus communication.

1.5.1 Cascade control

The cascade control gives additional possibilities to control the room temperature with shunt valves, floor heating, exhaust and intake air, etc. Since such controllers often have different reaction and control properties than the normal room control, an extra control process is needed.

With an extra control process you get control of, for example, the supply line temperature or room temperature, which the normal room sensor cannot manage fast or accurate enough. Since the room sensor is usually placed in the middle of the room (or is integrated into a room unit) an additional sensor is needed. The additional sensor can be placed on the supply line tube, inside the floor or in the air exhaust duct etc.

The additional control process can be set to fit different applications. The preset settings can be used for floor heating etc. However, you may need to adjust the controller settings to get a stable control. Usually the secondary temperature, for example the floor or intake air, is adjusted to a temperature between the minimum and maximum temperatures set for the cascade controller.

Cascade control can be activated on one of the control unit outputs. To enable cascade control, one of the inputs need to be set for secondary temperature sensor.

1.5.2 Change-over function

In the change-over mode, the controller can switch between heating or cooling mode depending on the status of an input. Change-over function is suitable for 2-pipe control systems, where different water temperature are used according to the time of the year. For example, in wintertime the water is used for heating (water is hot) and in the summertime the water is used for cooling (water is cold).

An input can be selected to control change-over function under controller settings. Input can control the change-over function according to temperature value, contact switch or resistance input (digital on/off). The input can be also controlled directly from BMS system. The BMS system overrides the input value that switches the change-over state between cooling or heating.

Note the following parameters:

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 *Changeover*.
Changeover input source	*2X13*	*Off*	*Off / Input 1...3*	Input source for change-over function. If the parameter value is *Off*, the function state can be controlled from BMS.

1.6 Fan control

1.6.1 Fan starting boost

Some EC fan motors have difficulties to start with low voltages. The fan boost function rises the control voltage to a higher value when the fan starts.

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

Parameter	Holding register	Default	Range	Description
Fan boost time	*1X48*	*Off*	*Off, 1...10 s*	Fan starting boost timer.
Fan boost voltage	*1X49*	*0.000 V*	*0...10.000 V*	Fan starting boost voltage. The setting is available when the *Fan boost time* parameter value is not *Off*.

1.6.2 Fan speed limit in automatic mode

You can set the maximum speed for the fan, when the fan control is in automatic mode. The limitation can be activated by selecting the maximum speed with the parameter *Max fan step in auto mode* in the fan output settings. Even if the limit is set, the fan speed can be set to higher speed manually.

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

1.6.3 Fan speed changing delay

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

Parameter	Holding register	Default	Range	Description
Fan step delay	*1X37*	*0 s*	*0...3600 s*	Fan speed changing delay.

1.6.4 Fan speed after power failure or operating mode change

With the parameter *Default fan speed after power failure* you can set the fan speed that becomes effective after a power failure or operating mode change.

Parameter	Holding register	Default	Range	Description
Default fan speed after power failure	*2X29*	*4-Step auto*	*Disabled / Fan speed 1...3 / 4-Step auto / EC auto / Room unit 1...2 / Room unit 1...2 EC auto*	Fan speed after power failure or operating mode change.

1.6.5 Fan turning off delay

You can set the fan to be active during a certain time after the fan speed is controlled to stop. This gives time for the actuator to stop the heating/cooling, and also gives time for the fan to ventilate the excess heating/cooling. The fan output is set to the fan speed 1 value for the time set with the parameter *Fan turn off delay*.

Note the following parameters:

Parameter	Holding register	Default	Range	Description
Fan turn off delay	*1X51*	*Off*	*Off, 0...300 s*	Fan turning off delay.
Fan speed 1, volt output	*1X30*	*0*	*0...10,000 V*	Fan speed 1 voltage.

1.7 Room units

You can connect up to two room units (e.g. Produal Proxima® RU) to the control unit. By using two control units, you can control two rooms with one control unit. The room units are connected to the dedicated room unit connector.

1.7.1 External measurement value on room unit display

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

The available value types (measurement units) are the plain value without unit, temperature (°C) and CO_2 (ppm).

Note the following parameters:

Parameter	Holding register	Default	Range	Description
External display value type	*739 / 839*	*Disabled*	*Disabled / None / Temperature / CO2*	Type for the external measurement value in room unit's display. *Disabled* — Functionality disabled. *None* — No unit. *Temperature* — Temperature value. *CO2* — CO_2 value.
External display value source	*737 / 837*	*Internal sensor*	*Internal sensor / Input 1...3 / Value from Modbus register*	Source for the external measurement value in room unit's display. *Internal sensor* — Functionality disabled. *Input 1...3* — Value from input. *Value from Modbus register* — Value from the Modbus register *738 / 838*.
-	*738 / 838*	*0*	*-32768…32767*	External display value. The value is set to 0 after a power failure.

2 Commissioning

2.1 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.

The device can be mounted on the wall by screws or to a 35 mm DIN rail.

If a room unit, other external room temperature sensors or CO_2 sensors are connected, please follow the installation instructions for each device for accurate measurement values.

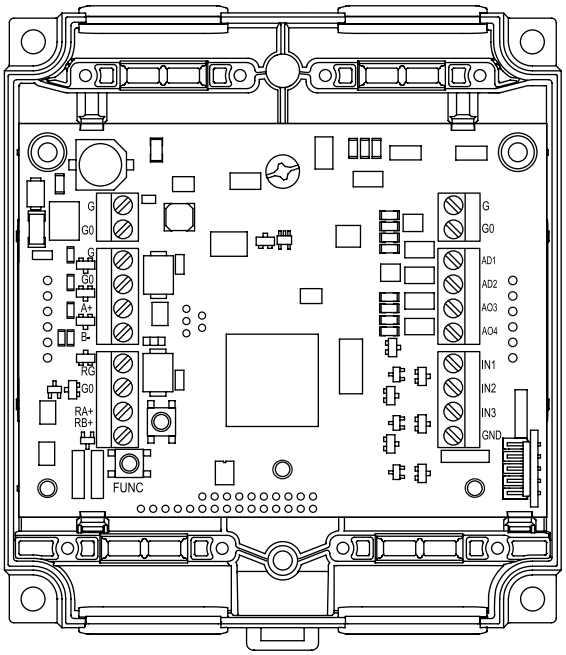
2.2 Wiring

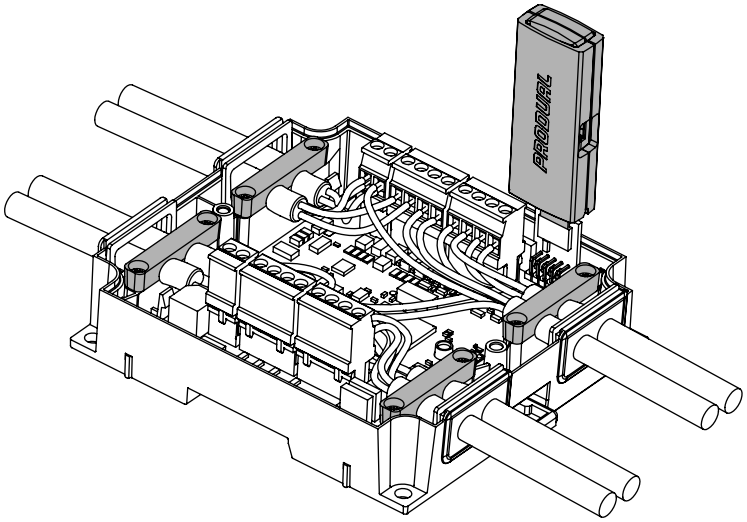
CAUTION **CAUTION:** Device wiring and commissioning can only be carried out by qualified professionals. Always make the wirings while the power is switched off.

The device terminals are grouped according to the functions to avoid any wiring mistakes. There are extra G and G0 terminals for connecting the separate supply voltage for other devices.

The terminals are designed for maximum of 2,5 mm^2 cable area. Please note that the cables for communication (RS-485) should be twisted pair (2x2 pairs). The cable length to the room units should not exceed 10 m.

NOTE **Note:** The supply voltage potential must be the same in the controller and in the connected 24 Vac actuators.





Connectors on the left side:

G	24 Vac/dc supply, < 2 VA NOTE **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+	RS-485 bus connection for Modbus RTU.
B-	

RG	24 Vac supply output for room unit, <0,25 A.
G0	0 V
RA+	RS-485 bus connection for room unit.
RB-	

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

2.3 Configuring control unit

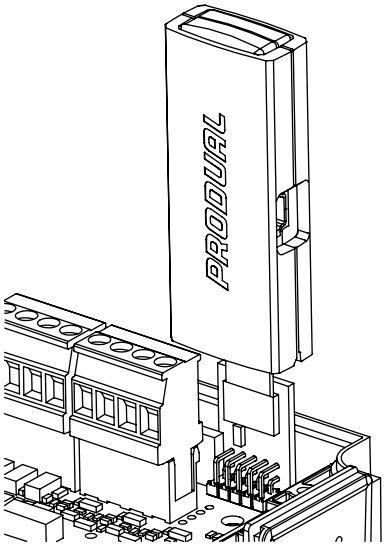
To configure the device, you first need to connect it to Produal MyTool® application. When the device is connected to application, you can make changes to the configuration.

NOTE **Note:** You need MyTool Connect for connecting Produal MyTool® to the device.

1. Connect the supply voltage to the control unit.

   NOTE **Note:** You can also power the device by connecting the mini USB cable to MyTool Connect.

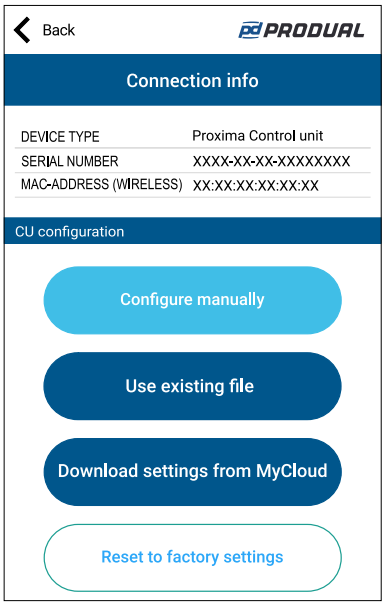
2. Open the device cover.
3. Insert the MyTool Connect to the connector.



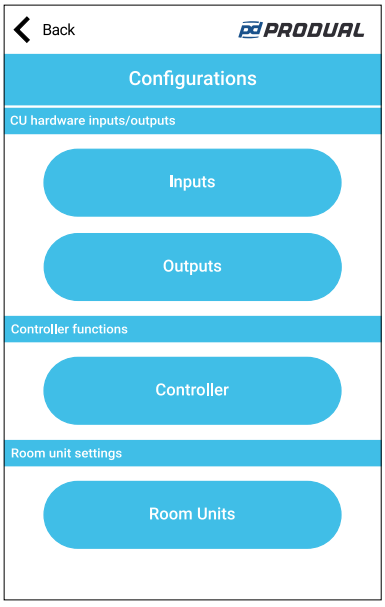
4. Start Produal MyTool®.

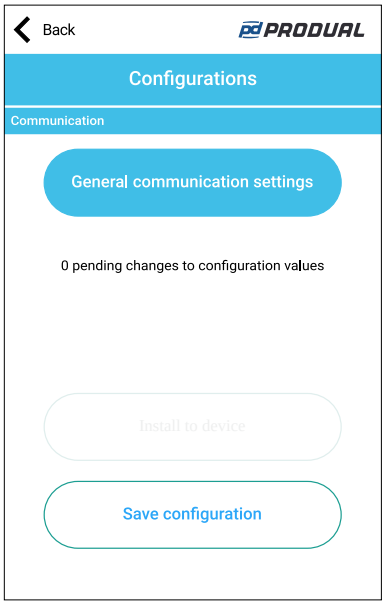
5. Press the *Bluetooth Devices* button.
   The device list shows the devices that have Bluetooth activated.
6. Select the device from the list.
7. Press the *Connect* button.

   The indicator light in MyTool Connect is illuminated continuously when Produal MyTool® is connected to the device.



8. Press the *Configure manually* button.





Configurations view has the following menus:

Inputs	Set up inputs.
Outputs	Set up outputs.
Controller	Set up controllers.
Room Units	Set up room units.
General communication settings	Set up communication parameters.

See more information about the settings from the following chapters.

9. Make the changes to configuration.
10. Press *Install to device* button to write the changes to the device.

11. Press the *Back* button.

12. Press the *Back* button again to disconnect from the device.

13. Select the disconnecting method.

- Select *Disconnect* to disconnect the device without deactivating the device Bluetooth.
- Select *Cancel* to cancel disconnecting.

2.3.1 Setting inputs

There are three inputs and all the inputs are multifunctional. This means that each input can be configured for different input signals and the controller will change its behaviour according to the selected configuration.

1. Press the *Inputs* button in the *Configurations* display.

2. Select the input you are going to set by pressing the number.

3. Select the input type.
The available types are:

Not used	The input is deactivated.
0...10 V Input	Input for 0...10 Vdc signal.
Temperature transmitter	Input for 0...10 Vdc temperature transmitter.
RH transmitter	Input for 0...10 Vdc humidity transmitter.
CO2 transmitter	Input for 0...10 Vdc CO_2 transmitter.
Temperature sensor NTC10K	Input for NTC 10K temperature sensor.
Resistance trigger	Input for resistance signal. The input can be used for passive condensation sensor, for example.
Potentiometer	Input for potentiometer.

4. Press the *Edit parameters* button to set up the input.

5. Make the settings.
See the following chapters for more details about the parameters.

6. Press the *Confirm changes* button to save the changes.

7. Press the *Confirm changes* button again to save the changes.

8. Press *Install to device* button to write the changes to the device.

2.3.1.1 Available settings for voltage control input

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.
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.
Contact-On level	*0,00...100.00 %*	*90.00 %*	Contact on level. Set the input value that is interpreted as contact ON on value. The function works as a "software contact". It can be used to override an output at a certain input voltage level.

Parameter name	Values	Default	Description
Contact-Off level	*0,00...100.00 %*	*10.00 %*	Contact off level. Set the input value that is interpreted as contact OFF on value. The function works as a "software contact". It can be used to release the output override at a certain input voltage level.
Contact hold-on time (s)	*0...59 s*	*0 s*	Contact hold on time (seconds). Set the seconds for the contact ON time. The time defines how long the contact stays on even if the *Contact-Off level* condition is fulfilled.
Contact hold-on time (m)	*0...59 min*	*0 min*	Contact hold on time (minutes). Set the minutes for the contact ON time.
Contact hold-on time (h)	*0...60 h*	*0 h*	Contact hold on time (hours). Set the hours for the contact ON time.
Contact hold-off time (s)	*0...59 s*	*0 s*	Contact hold off time (seconds). Set the seconds for the contact OFF time. The time defines how long the contact stays off even if the *Contact-On level* condition is fulfilled.
Contact hold-off time (m)	*0...59 min*	*0 min*	Contact hold off time (minutes). Set the minutes for the contact OFF time.
Contact hold-off time (h)	*0...60 h*	*0 h*	Contact hold off time (hours). Set the hours for the contact OFF time.
Efficient control range min	*0,00...100.00 %*	*0.00 %*	Effective control range minimum limit.
Efficient control range max	*0,00...100.00 %*	*100.00 %*	Effective control range maximum limit.
Voltage COV-limit	*0.001...5.000 V*	*0.100 V*	COV limit for voltage.
Filtering mode	*Normal / Fast*	*Normal*	Input reaction time.

2.3.1.2 Available settings for temperature transmitter input

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.
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, the 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, the 100 % input voltage (10 V, or scaled to *Voltage @ 100%* setting) from the transmitter should be interpreted +50 °C.
Temperature offset	*-100.0...100.0 °C*	*0.0 °C*	Input temperature offset. Set the offset for temperature input according to calibration.

Parameter name	Values	Default	Description
Contact-On level	*0.00...100.00 %*	*90.00 %*	Contact on level. Set the input value that is interpreted as contact ON on value. The function works as a "software contact". It can be used to override an output at a certain input voltage level.
Contact-Off level	*0.00...100.00 %*	*10.00 %*	Contact off level. Set the input value that is interpreted as contact OFF on value. The function works as a "software contact". It can be used to release the output override at a certain input voltage level.
Contact hold-on time (s)	*0...59 s*	*0 s*	Contact hold on time (seconds). Set the seconds for the contact ON time. The time defines how long the contact stays on even if the *Contact-Off level* condition is fulfilled.
Contact hold-on time (m)	*0...59 min*	*0 min*	Contact hold on time (minutes). Set the minutes for the contact ON time.
Contact hold-on time (h)	*0...60 h*	*0 h*	Contact hold on time (hours). Set the hours for the contact ON time.
Contact hold-off time (s)	*0...59 s*	*0 s*	Contact hold off time (seconds). Set the seconds for the contact OFF time. The time defines how long the contact stays off even if the *Contact-On level* condition is fulfilled.
Contact hold-off time (m)	*0...59 min*	*0 min*	Contact hold off time (minutes). Set the minutes for the contact OFF time.
Contact hold-off time (h)	*0...60 h*	*0 h*	Contact hold off time (hours). Set the hours for the contact OFF time.
Efficient control range min	*0.00...100.00 %*	*0.00 %*	Effective control range minimum limit.
Efficient control range max	*0.00...100.00 %*	*100.00 %*	Effective control range maximum limit.
Voltage COV-limit	*0.001...5.000 V*	*0.100 V*	COV limit for voltage.
Temperature COV-limit	*0.1...50.0 °C*	*0.5 °C*	COV limit for temperature.
Filtering mode	*Normal / Fast*	*Normal*	Input reaction time.

2.3.1.3 Available settings for humidity input

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.
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.
RH @ 0%	*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, the 0 % input voltage (0 V, or scaled to *Voltage @ 0%* setting) from the transmitter should be interpreted as 0 %rH

Parameter name	Values	Default	Description
RH @ 100%	*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, the 100 % input voltage (10 V, or scaled to *Voltage @ 100%* setting) from the transmitter should be interpreted 100 %rH.
RH offset	*-50.00...50.00 %rH*	*0.00 %rH*	Input humidity offset. Set the offset for humidity input according to calibration.
Contact-On level	*0.00...100.00 %*	*100.00 %*	Contact on level. Set the input value that is interpreted as contact ON on value. The function works as a "software contact". It can be used 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. The function works as a "software contact". It can be used to release the output override at a certain input voltage level.
Contact hold-on time (s)	*0...59 s*	*0 s*	Contact hold on time (seconds). Set the seconds for the contact ON time. The time defines how long the contact stays on even if the *Contact-Off level* condition is fulfilled.
Contact hold-on time (m)	*0...59 min*	*0 min*	Contact hold on time (minutes). Set the minutes for the contact ON time.
Contact hold-on time (h)	*0...60 h*	*0 h*	Contact hold on time (hours). Set the hours for the contact ON time.
Contact hold-off time (s)	*0...59 s*	*0 s*	Contact hold off time (seconds). Set the seconds for the contact OFF time. The time defines how long the contact stays off even if the *Contact-On level* condition is fulfilled.
Contact hold-off time (m)	*0...59 min*	*0 min*	Contact hold off time (minutes). Set the minutes for the contact OFF time.
Contact hold-off time (h)	*0...60 h*	*0 h*	Contact hold off time (hours). Set the hours for the contact OFF time.
Efficient control range min	*0.00...100.00 %*	*0.00 %*	Effective control range minimum limit.
Efficient control range max	*0.00...100.00 %*	*100.00 %*	Effective control range maximum limit.
Voltage COV-limit	*0.001...5.000 V*	*0.100 V*	COV limit for voltage.
Humidity COV-limit	*0.01...50.00 rh%*	*5.00 rh%*	COV limit for humidity.
Filtering mode	*Normal / Fast*	*Normal*	Input reaction time.

2.3.1.4 Available settings for CO_2 input

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.
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
CO2 @ 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, the 0 % input voltage (0 V, or scaled to *Voltage @ 0%* setting) from the transmitter should be interpreted as 0 ppm.
CO2 @ 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, the 100 % input voltage (10 V, or scaled to *Voltage @ 100%* setting) from the transmitter should be interpreted 2000 ppm.
CO2 offset	*-200...200 ppm*	*0 ppm*	Input CO_2 offset. Set the offset for CO_2 input according to calibration.
Contact-On level	*0.00...100.00 %*	*90.00 %*	Contact on level. Set the input value that is interpreted as contact ON on value. The function works as a "software contact". It can be used to override an output at a certain input voltage level.
Contact-Off level	*0.00...100.00 %*	*10.00 %*	Contact off level. Set the input value that is interpreted as contact OFF on value. The function works as a "software contact". It can be used to release the output override at a certain input voltage level.
Contact hold-on time (s)	*0...59 s*	*0 s*	Contact hold on time (seconds). Set the seconds for the contact ON time. The time defines how long the contact stays on even if the *Contact-Off level* condition is fulfilled.
Contact hold-on time (m)	*0...59 min*	*0 min*	Contact hold on time (minutes). Set the minutes for the contact ON time.
Contact hold-on time (h)	*0...60 h*	*0 h*	Contact hold on time (hours). Set the hours for the contact ON time.
Contact hold-off time (s)	*0...59 s*	*0 s*	Contact hold off time (seconds). Set the seconds for the contact OFF time. The time defines how long the contact stays off even if the *Contact-On level* condition is fulfilled.
Contact hold-off time (m)	*0...59 min*	*0 min*	Contact hold off time (minutes). Set the minutes for the contact OFF time.
Contact hold-off time (h)	*0...60 h*	*0 h*	Contact hold off time (hours). Set the hours for the contact OFF time.
Efficient control range min	*0.00...100.00 %*	*0.00 %*	Effective control range minimum limit.
Efficient control range max	*0.00...100.00 %*	*100.00 %*	Effective control range maximum limit.
Voltage COV-limit	*0.001...5.000 V*	*0.100 V*	COV limit for voltage.
CO2 COV-limit	*1...1000 ppm*	*50 ppm*	COV limit for CO_2.
Filtering mode	*Normal / Fast*	*Normal*	Input reaction time.

2.3.1.5 Available settings for temperature sensor input

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.
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 %.

Parameter name	Values	Default	Description
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 %.
Temperature offset	*-100.0...100.0 °C*	*0.0 °C*	Input temperature offset. Set the offset for temperature input according to calibration.
Contact-On level	*0.00...100.00 %*	*90.00 %*	Contact on level. Set the input value that is interpreted as contact ON on value. The function works as a "software contact". It can be used to override an output at a certain input voltage level.
Contact-Off level	*0.00...100.00 %*	*10.00 %*	Contact off level. Set the input value that is interpreted as contact OFF on value. The function works as a "software contact". It can be used to release the output override at a certain input voltage level.
Contact hold-on time (s)	*0...59 s*	*0 s*	Contact hold on time (seconds). Set the seconds for the contact ON time. The time defines how long the contact stays on even if the *Contact-Off level* condition is fulfilled.
Contact hold-on time (m)	*0...59 min*	*0 min*	Contact hold on time (minutes). Set the minutes for the contact ON time.
Contact hold-on time (h)	*0...60 h*	*0 h*	Contact hold on time (hours). Set the hours for the contact ON time.
Contact hold-off time (s)	*0...59 s*	*0 s*	Contact hold off time (seconds). Set the seconds for the contact OFF time. The time defines how long the contact stays off even if the *Contact-On level* condition is fulfilled.
Contact hold-off time (m)	*0...59 min*	*0 min*	Contact hold off time (minutes). Set the minutes for the contact OFF time.
Contact hold-off time (h)	*0...60 h*	*0 h*	Contact hold off time (hours). Set the hours for the contact OFF time.
Efficient control range min	*0.00...100.00 %*	*0.00 %*	Effective control range minimum limit.
Efficient control range max	*0.00...100.00 %*	*100.00 %*	Effective control range maximum limit.
Temperature COV-limit	*0.1...50.0 °C*	*0.5 °C*	COV limit for temperature.
Resistance (high limit) COV-limit	*10...150000 Ω*	*1000 Ω*	COV limit for resistance, high.
Filtering mode	*Normal / Fast*	*Normal*	Input reaction time.

2.3.1.6 Available settings for resistance input

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-On level	*0...300000 Ω*	*1000 Ω*	Contact on level. Set the input value that is interpreted as contact ON on value. The function works as a "software contact". It can be used to override an output at a certain input voltage level.

Parameter name	Values	Default	Description
Contact-Off level	*0...300000 Ω*	*500 Ω*	Contact off level. Set the input value that is interpreted as contact OFF on value. The function works as a "software contact". It can be used to release the output override at a certain input voltage level.
Contact hold-on time (s)	*0...59 s*	*0 s*	Contact hold on time (seconds). Set the seconds for the contact ON time. The time defines how long the contact stays on even if the *Contact-Off level* condition is fulfilled.
Contact hold-on time (m)	*0...59 min*	*0 min*	Contact hold on time (minutes). Set the minutes for the contact ON time.
Contact hold-on time (h)	*0...60 h*	*0 h*	Contact hold on time (hours). Set the hours for the contact ON time.
Contact hold-off time (s)	*0...59 s*	*0 s*	Contact hold off time (seconds). Set the seconds for the contact OFF time. The time defines how long the contact stays off even if the *Contact-On level* condition is fulfilled.
Contact hold-off time (m)	*0...59 min*	*0 min*	Contact hold off time (minutes). Set the minutes for the contact OFF time.
Contact hold-off time (h)	*0...60 h*	*0 h*	Contact hold off time (hours). Set the hours for the contact OFF time.
Efficient control range min	*0.00...100.00 %*	*0.00 %*	Effective control range minimum limit.
Efficient control range max	*0.00...100.00 %*	*100.00 %*	Effective control range maximum limit.
Resistance (high limit) COV-limit	*10...150000 Ω*	*1000 Ω*	COV limit for resistance, high.
Filtering mode	*Normal / Fast*	*Normal*	Input reaction time.

2.3.1.7 Available settings for potentiometer input

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.
Resistance (high range) min	*0...300000 Ω*	*0 Ω*	Minimum resistance for the potentiometer that is connected to the input.
Resistance (high range) max	*0...300000 Ω*	*10000 Ω*	Maximum resistance for the potentiometer that is connected to the input.
Resistance (high range) offset	*-100000...100000 Ω*	*0 Ω*	Input resistance offset. Set the offset for temperature input according to calibration.
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 sensor output is 100 %.
Efficient control range min	*0.00...100.00 %*	*0.00 %*	Effective control range minimum limit.
Efficient control range max	*0.00...100.00 %*	*100.00 %*	Effective control range maximum limit.

Parameter name	Values	Default	Description
Temperature COV-limit	*0.1...50.0 °C*	*0.5 °C*	COV limit for temperature.
Resistance (high limit) COV-limit	*10...150000 Ω*	*1000 Ω*	COV limit for resistance, high.
Filtering mode	*Normal / Fast*	*Normal*	Input reaction time.

2.3.2 Setting outputs

1. Press the *Outputs* button in the *Configurations* display.
2. Select the output you are going to set.
3. Select the *Output type*.
   The available types are:

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.

4. Press the *Edit parameters* button to set up the output.
5. Make the settings.
   See the following chapters for more details about the parameters.
6. Press the *Confirm changes* button to save the changes.
7. Press the *Confirm changes* button again to save the changes.
8. Press *Install to device* button to write the changes to the device.

2.3.2.1 Available settings for voltage output

Parameter name	Values	Default	Description
Control source	*BMS / Controller 1..2 / Cascade-controller / Input 1...3 / Room-Unit 1...2*	*Controller 1*	Output control source. Set the source for the output signal.
Output control type	*Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and cooling / Changeover / RH / CO2 / Maximum control*	*Heating*	Output control method. The setting is available when the *Control source* parameter value is *Controller 1*, *Controller 2* or *Cascade-controller*.
Room unit output type	*Temperature / RH / CO2*	*Temperature*	Room unit output type. The setting is available when the *Control source* parameter value is *Room-Unit 1* or *Room-Unit 2*.
Override input source	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Override source. If a "software contact"-function has been configured for an input, set the input that overrides the output at the set level of the input.

Parameter name	Values	Default	Description
Override input type	*PIR-Detection / "Man in House" button / Occupancy (PIR or MIH) / Contact*	*PIR-Detection*	Override input type. The setting is available when the *Override input source* parameter value is *Room-Unit 1* or *Room-Unit 2*.
Invert output signal	*Disabled / Enabled*	*Disabled*	Override inversion. Inverts the output signal, if an override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Override input value	*0.00...100.00 %*	*0.00 %*	Override value for override input source. Set the override value for the output, when a override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Off-value	*0.00...100.00 %*	*0.00 %*	Override off value for override source. Set the value for output when the override trigger from input is released. The setting is available when the *Control source* parameter value is *BMS*.
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.
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...2 / Auto*	*Not used*	Operating mode source.
Min output, operation mode 1	*0.00...100.00 %*	*0.00 %*	Voltage output range at day mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 2	*0.00...100.00 %*	*0.00 %*	Voltage output range at night mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 3	*0.00...100.00 %*	*0.00 %*	Voltage output range at eco mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 1	*0.00...100.00 %*	*100.00 %*	Voltage output range at day mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 2	*0.00...100.00 %*	*100.00 %*	Voltage output range at night mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 3	*0.00...100.00 %*	*100.00 %*	Voltage output range at eco mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Voltage @ 0%	*0...10.000 V*	*0.000 V*	Output voltage at 0 % control signal. Set the value for 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 voltage output when the control output is 100 %.
Jam-prevention interval	*Off / 1...7 days*	*Off*	Valve jam prevention function interval.
Voltage COV-limit	*0.001...5.000 V*	*0.100 V*	COV limit for voltage.

2.3.2.2 Available settings for 24 Vac PWM output

Parameter name	Values	Default	Description
Control source	*BMS / Controller 1..2 / Cascade-controller / Input 1...3 / Room-Unit 1...2*	*Controller 1*	Output control source. Set the source for the output signal.
Output control type	*Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and cooling / Changeover / RH / CO2 / Maximum control*	*Heating*	Output control method. The setting is available when the *Control source* parameter value is *Controller 1*, *Controller 2* or *Cascade-controller*.
Room unit output type	*Temperature / RH / CO2*	*Temperature*	Room unit output type. The setting is available when the *Control source* parameter value is *Room-Unit 1* or *Room-Unit 2*.
Override input source	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Override source. If a "software contact"-function has been configured for an input, set the input that overrides the output at the set level of the input.
Invert output signal	*Disabled / Enabled*	*Disabled*	Override inversion. Inverts the output signal, if an override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Override input value	*0.00...100.00 %*	*0.00 %*	Override value for override source. Set the override value for the output, when a override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Off-value	*0.00...100.00 %*	*0.00 %*	Override off value for override source. Set the value for output when the override trigger from input is released. The setting is available when the *Control source* parameter value is *BMS*.
Invert 24VAC control	*Disabled / Enabled*	*Disabled*	24 Vac output inversion.
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.
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...2 / Auto*	*Not used*	Operating mode source.
Min output, operation mode 1	*0.00...100.00 %*	*0.00 %*	Voltage output range at day mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 2	*0.00...100.00 %*	*0.00 %*	Voltage output range at night mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 3	*0.00...100.00 %*	*0.00 %*	Voltage output range at eco mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.

Parameter name	Values	Default	Description
Max output, operation mode 1	*0.00...100.00 %*	*100.00 %*	Voltage output range at day mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 2	*0.00...100.00 %*	*100.00 %*	Voltage output range at night mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 3	*0.00...100.00 %*	*100.00 %*	Voltage output range at eco mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
PWM-period	*0...1200 s*	*90 s*	PWM pulse width.
Jam-prevention interval	*Off / 1...7 days*	*Off*	Valve jam prevention function interval.

2.3.2.3 Available settings for 3-point actuator outputs

Parameter name	Values	Default	Description
Control source	*BMS / Controller 1..2 / Cascade-controller / Input 1...3 / Room-Unit 1...2*	*Controller 1*	Output control source. Set the source for the output signal.
Output control type	*Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and cooling / Changeover / RH / CO2 / Maximum control*	*Heating*	Output control method. The setting is available when the *Control source* parameter value is *Controller 1*, *Controller 2* or *Cascade-controller*.
Room unit output type	*Temperature / RH / CO2*	*Temperature*	Room unit output type. The setting is available when the *Control source* parameter value is *Room-Unit 1* or *Room-Unit 2*.
Link to secondary 3-point raise/lower output (output 1-4)		*Not set*	3-point actuator + output. The setting is available when the *Output type* parameter value is *24V AC 3-point lower*.
3-point raise/lower actuator operation time	*0...1200 s*	*720 s*	3-point actuator running time. The setting is available when the *Output type* parameter value is *24V AC 3-point raise*.
Override input source	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Override source. If a "software contact"-function has been configured for an input, set the input that overrides the output at the set level of the input.
Invert output signal	*Disabled / Enabled*	*Disabled*	Override inversion. Inverts the output signal, if an override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Override input value	*0.00...100.00 %*	*0.00 %*	Override value for override source. Set the override value for the output, when a override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Off-value	*0.00...100.00 %*	*0.00 %*	Override off value for override source. Set the value for output when the override trigger from input is released. The setting is available when the *Control source* parameter value is *BMS*.
Invert 24VAC control	*Disabled / Enabled*	*Disabled*	24 Vac output inversion.

Parameter name	Values	Default	Description
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.
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...2 / Auto*	*Not used*	Operating mode source.
Min output, operation mode 1	*0.00...100.00 %*	*0.00 %*	Voltage output range at day mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 2	*0.00...100.00 %*	*0.00 %*	Voltage output range at night mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 3	*0.00...100.00 %*	*0.00 %*	Voltage output range at eco mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 1	*0.00...100.00 %*	*100.00 %*	Voltage output range at day mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 2	*0.00...100.00 %*	*100.00 %*	Voltage output range at night mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 3	*0.00...100.00 %*	*100.00 %*	Voltage output range at eco mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Jam-prevention interval	*Off / 1...7 days*	*Off*	Valve jam prevention function interval.

2.3.2.4 Available settings for fan output

Parameter name	Values	Default	Description
Control source	*BMS / Controller 1..2 / Cascade-controller / Input 1...3 / Room-Unit 1...2*	*Controller 1*	Output control source. Set the source for the output signal.
Output control type	*Heating / Heating thermostat / Cooling / Cooling thermostat / Heating and cooling / Changeover / RH / CO2 / Maximum control*	*Heating*	Output control method. The setting is available when the *Control source* parameter value is *Controller 1*, *Controller 2* or *Cascade-controller*.
Room unit output type	*Temperature / RH / CO2*	*Temperature*	Room unit output type. The setting is available when the *Control source* parameter value is *Room-Unit 1* or *Room-Unit 2*.
Override input source	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Override source. If a "software contact"-function has been configured for an input, set the input that overrides the output at the set level of the input.

Parameter name	Values	Default	Description
Invert output signal	*Disabled / Enabled*	*Disabled*	Override inversion. Inverts the output signal, if an override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Override input value	*0.00...100.00 %*	*0.00 %*	Override value for override source. Set the override value for the output, when a override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Off-value	*0.00...100.00 %*	*0.00 %*	Fan off value. The setting is available when the *Control source* parameter value is *BMS*.
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.
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...2 / Auto*	*Not used*	Operating mode source.
Min output, operation mode 1	*0.00...100.00 %*	*0.00 %*	Voltage output range at day mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 2	*0.00...100.00 %*	*0.00 %*	Voltage output range at night mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 3	*0.00...100.00 %*	*0.00 %*	Voltage output range at eco mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 1	*0.00...100.00 %*	*100.00 %*	Voltage output range at day mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 2	*0.00...100.00 %*	*100.00 %*	Voltage output range at night mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 3	*0.00...100.00 %*	*100.00 %*	Voltage output range at eco mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Fan speed mode	*Force Step-0...3 / 4-Step auto / EC auto / Room unit 1..2*	*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.

Parameter name	Values	Default	Description
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 step delay	*0...3600 s*	*0 s*	Fan speed changing delay.
Voltage COV-limit	*0.001...5.000 V*	*0.100 V*	Voltage COV limit.
Fan boost time	*Off, 1...10 s*	*Off*	Fan starting boost timer.
Fan boost voltage	*0...10.000 V*	*0.000 V*	Fan starting boost voltage. The setting is available when the *Fan boost time* parameter value is not *Off*.
Max fan step in auto mode	*No limit / Speed 1...3*	*No limit*	Fan speed limit in automatic mode.
Fan turn off delay	*Off, 0...300 s*	*Off*	Fan turning off delay.

2.3.2.5 Available settings for 6-way valve output

Parameter name	Values	Default	Description
Control source	*BMS / Controller 1..2 / Cascade-controller / Input 1...3 / Room-Unit 1...2*	*Controller 1*	Output control source. Set the source for the output signal.
Override input source	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Override source. If a "software contact"-function has been configured for an input, set the input that overrides the output at the set level of the input.
Invert output signal	*Disabled / Enabled*	*Disabled*	Override inversion. Inverts the output signal, if an override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
Override input value	*0.00...100.00 %*	*0.00 %*	Override value for override source. Set the override value for the output, when a override is triggered by an input. The setting is available when the *Override input source* parameter value is not *Off*.
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.
Operating mode source	*Not used / Controller 1...2 / Auto*	*Not used*	Operating mode source.
Min output, operation mode 1	*0.00...100.00 %*	*0.00 %*	Voltage output range at day mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 2	*0.00...100.00 %*	*0.00 %*	Voltage output range at night mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Min output, operation mode 3	*0.00...100.00 %*	*0.00 %*	Voltage output range at eco mode, low limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.

Parameter name	Values	Default	Description
Max output, operation mode 1	*0.00...100.00 %*	*100.00 %*	Voltage output range at day mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 2	*0.00...100.00 %*	*100.00 %*	Voltage output range at night mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Max output, operation mode 3	*0.00...100.00 %*	*100.00 %*	Voltage output range at eco mode, high limit. The setting is available when the *Operating mode source* parameter value is not *Not used*.
Voltage COV-limit	*0.001...5.000 V*	*0.100 V*	COV limit for voltage.
6-way valve cooling, high limit	*0...10.000 V*	*0.000 V*	6-way valve cooling high limit voltage.
6-way valve cooling, low limit	*0...10.000 V*	*5.000 V*	6-way valve cooling low limit voltage.
6-way valve heating, low limit	*0...10.000 V*	*5.000 V*	6-way valve heating low limit voltage.
6-way valve heating, high limit	*0...10.000 V*	*10.000 V*	6-way valve heating high limit voltage.

2.3.3 Configuring controllers

You can configure the three built-in controllers in control unit. There are controllers 1, 2 and a cascade controller. The controller is handling the control logic based on the inputs and the controller settings, and it regulates the outputs accordingly.

Examples for using more than one controller:

- For a two-room system, you can configure controller 1 and 2 for each room.
- For a hotel room solution where floor heating is used, you can use controller 1 for the main room and use the cascade controller for the floor heating.

1. Press the *Controller* button in the *Configurations* display.
2. Select the controller you are going to set.
3. Select the *Controller type*.
   The available types are:

Not used	The controller is deactivated.
Heating	Controller regulates the heating.
Cooling	Controller regulates the cooling.
Heating and cooling	Controller regulates the heating and cooling.
Changeover	Controller regulates the heating and cooling according to the change-over function. Selection is not available for the cascade controller.

4. Press the *Edit parameters* button to set up the controller.
5. Make the settings.
   See the following chapters for more details about the parameters.
6. Press the *Confirm changes* button to save the changes.
7. Press the *Confirm changes* button again to save the changes.
8. Press *Install to device* button to write the changes to the device.

2.3.3.1 Available settings for controllers 1 and 2

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

Parameter name	Values	Default	Description
Temperature input (additional for average)	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Secondary temperature input for average calculation.
RH input (main)	*Off / Input 1...3 / Room-Unit 1...2*	*Room unit 1*	Main humidity input.
RH input (additional for average)	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Secondary humidity input for average calculation. The setting is available when the *RH input (main)* parameter value is not *Off*.
CO2 input (main)	*Off / Input 1...3 / Room-Unit 1...2*	*Room unit 1*	Main CO_2 input.
CO2 input (additional for average)	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Secondary CO_2 input for average calculation. The setting is available when the *CO2 input (main)* parameter value is not *Off*.
Setpoint source	*Active operation mode / Input 1...3 / Room-Unit 1...2*	*Room unit 1*	Source for set point.
Operation mode change method	*BMS Only / Room-Unit 1 setting / Room-Unit 2 setting / Select input source*	*Select input source*	Operation mode change method. Set the source that changes the operation mode.
Mode1/Mode2 input source	*Off / Input 1...3 / Room-Unit 1...2*	*Input 2*	Day/night mode source. Set the input that changes the operation mode between day mode and night mode. The setting is available when the *Operation mode change method* parameter value is *Select input source*.
Modex/Mode3 input source	*Off / Input 1...3 / Room-Unit 1...2*	*Room unit 1*	Eco mode activation source. Set the input that activates and deactivates the eco mode. The setting is available when the *Operation mode change method* parameter value is *Select input source*.
Room unit Mx/M3 input type	*PIR-Detection / "Man in house" button / Occupancy (PIR OR MIH)*	*Occupancy (PIR OR MIH)*	Room unit occupancy input method.
Changeover input source	*Off / Input 1...3*	*Off*	Input source for change-over function.
Operation mode 1 setpoint	*2.0...32.0 °C*	*22.0 °C*	Day mode set point
Operation mode 2 setpoint	*2.0...32.0 °C*	*22.0 °C*	Night mode set point
Operation mode 3 setpoint	*2.0...32.0 °C*	*22.0 °C*	Eco mode set point
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.
P-band, heating	*0...16.0 °C*	*1.5 °C*	Heating proportional band. Typically 1 °C is good for a normal room.
P-band, cooling	*0...16.0 °C*	*1.5 °C*	Cooling proportional band. Typically 1,0...1,5 °C is good for a normal room.

Parameter name	Values	Default	Description
I-time (Integral time)	*0...1200 s*	*160 s*	Controller integral time.
Max control influenced by heating	*Enabled / Disabled*	*Disabled*	Maximum power influenced by heating. If the *Output control type* parameter value is *Maximum control*, 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 the moment.
Max control influenced by cooling	*Enabled / Disabled*	*Disabled*	Maximum control influenced by cooling.
Max control influenced by RH	*Enabled / Disabled*	*Enabled*	Maximum control influenced by humidity.
Max control influenced by CO2	*Enabled / Disabled*	*Enabled*	Maximum control influenced by CO_2.
Default fan speed after power failure	*Disabled / Fan speed 1...3 / 4-Step auto / EC auto / Room unit 1...2 / Room unit 1...2 EC auto*	*Disabled*	Fan speed after power failure or operating mode change.
Reset setpoint and fan speed when entering operation mode 1	*Disabled / Input 1...3 / Room-Unit 1...2 / Active operation mode*	*Disabled*	Source for setpoint when entering day mode. The fan speed is reset to the speed defined with the parameter *Default fan speed after power failure*.
Reset setpoint and fan speed when entering operation mode 2	*Disabled / Input 1...3 / Room-Unit 1...2 / Active operation mode*	*Disabled*	Source for setpoint when entering night mode. The fan speed is reset to the speed defined with the parameter *Default fan speed after power failure*.
Reset setpoint and fan speed when entering operation mode 3	*Disabled / Input 1...3 / Room-Unit 1...2 / Active operation mode*	*Disabled*	Source for setpoint when entering eco mode. The fan speed is reset to the speed defined with the parameter *Default fan speed after power failure*.

2.3.3.2 Available settings for cascade controller

Parameter name	Values	Default	Description
Temperature input (main)	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Main temperature input.
Temperature input (additional for average)	*Off / Input 1...3 / Room-Unit 1...2*	*Off*	Secondary temperature input for average calculation.
Setpoint source	*Controller 1 / Controller 2*	*Controller 1*	Source for set point.
Setpoint source mode	*Heating / Cooling / Heating and Cooling*	*Heating*	Set point source mode.
Setpoint min	*2.0...32.0 °C*	*22.0 °C*	Set point range, minimum value.
Setpoint max	*2.0...32.0 °C*	*22.0 °C*	Set point range, maximum value.
Dead zone	*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 good for a normal room.

Parameter name	Values	Default	Description
P-band, cooling	*0...16.0 °C*	*2.0 °C*	Cooling proportional band. Typically 1,0...1,5 °C is good for a normal room.
I-time (Integral time)	*0...1200 s*	*160 s*	Controller integral time.

2.3.4 Configuring room units

You can configure the functions for up to two different room units. Two room unit solutions can be used to measure means value from two different temperature sources or if the control unit will control two different rooms with the two built in controllers in the control unit.

1. Press the *Room Units* button in the *Configurations* display.
2. Select the room unit you are going to set.
3. Set the room unit enabled.
4. Press the *Edit parameters* button to set up the room unit.
5. Make the settings.
   See the chapter Available settings for room units on page 29 for more details.
6. Press the *Confirm changes* button to save the changes.
7. Press the *Confirm changes* button again to save the changes.
8. Press *Install to device* button to write the changes to the device.

2.3.4.1 Available settings for room units

Parameter name	Values	Default	Description
Setpoint Center	*18...26 °C*	*21 °C*	Room unit set point centre. NOTE **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 set point range. Set how much the user can change the set point from the set point centre. For example, if set point range is set to 2 °C and set point centre is set at 21 °C, the user can change the set point ±2 °C (from 19 °C to 23 °C). NOTE **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 set point deviation step. Set how much the set point changes when pressing the set point buttons or turning the set point knob).
Contact mode	*Not Used / Temperature / RH / CO2*	*Not Used*	Room unit contact mode. Set 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 CO2 signal from the room unit turns on or off the contact function at some given level.
Temperature @ 0%	*-50.0...100.0 °C*	*0.0 °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 %.

Parameter name	Values	Default	Description
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 %.
CO2 @ 0%	*0...5000 ppm*	*700 ppm*	Room unit CO_2 at 0 %. Set the CO_2 value when the room unit sensor output is 0 %.
CO2 @ 100%	*0...5000 ppm*	*1200 ppm*	Room unit CO_2 at 100 %. Set the CO_2 value when the room unit sensor output is 100 %.
Contact-ON level	*0.00...100.00 %*	*0.00 %*	Room unit contact on level. Set the input signal level, when the input contact should change to 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, when the input contact should change to OFF. Select the signal with the *Contact mode* parameter.
Contact hold-on time (s)	*0...59 s*	*0 s*	Room unit contact hold on time (seconds). Set the seconds for the contact ON time. The time defines how long the contact stays on even if the *Contact-OFF level* condition is fulfilled.
Contact hold-on time (m)	*0...59 min*	*0 min*	Contact hold on time (minutes). Set the minutes for the contact ON time.
Contact hold-on time (h)	*0...60 h*	*0 h*	Contact hold on time (hours). Set the hours for the contact ON time.
Contact hold-off time (s)	*0...59 s*	*0 s*	Room unit contact hold off time (seconds). Set the seconds for the contact OFF time. The time defines how long the contact stays off even if the *Contact-ON level* condition is fulfilled.
Contact hold-off time (m)	*0...59 min*	*0 min*	Contact hold off time (minutes). Set the minutes for the contact OFF time.
Contact hold-off time (h)	*0...60 h*	*0 h*	Contact hold off time (hours). Set the hours for the contact OFF time.
PIR contact-on delay (s)	*0...59 s*	*0 s*	PIR contact on delay (seconds). Set the seconds of time delay after the PIR input switches the contact to ON. The PIR signal needs to be ON under the set time, before the contact switches to ON. For example, an ON signal from the room unit PIR detector must be ON for 30 seconds (movement in the room), before switching contact to ON.
PIR contact-on delay (m)	*0...59 min*	*0 min*	PIR contact on delay (minutes). Set the minutes of time delay after the PIR input switches the contact to ON.
PIR hold-on delay (s)	*0...59 s*	*0 s*	PIR contact hold on delay (seconds). Set the seconds for the time how long the PIR contact is ON after the latest movement detection.
PIR hold-on delay (m)	*0...59 min*	*0 min*	PIR contact hold on delay (minutes). Set the minutes for the time how long the PIR contact is ON after the latest movement detection.
PIR hold-on delay (h)	*0...60 h*	*0 h*	PIR contact hold on delay (hours). Set the hours for the time how long the PIR contact is ON after the latest movement detection.

Parameter name	Values	Default	Description
MIH hold-on delay (s)	*0...59 s*	*0 s*	Man in house button hold on time (seconds). Set the seconds for the duration of temporary day mode. This function can be used for example, in a conference room when user presses the man in house button. The system controls the room in day mode for a set time period. Then after the time period, the controller will automatically go back to night mode (energy saving mode), until the button is pressed again.
MIH hold-on delay (m)	*0...59 min*	*0 min*	Man in house button hold on time (minutes). Set the minutes for the duration of temporary day mode.
MIH hold-on delay (h)	*0...60 h*	*0 h*	Man in house button hold on time (hours). Set the hours for the duration of temporary day mode.
Temperature COV-limit	*0.01...50.0 °C*	*0.5 °C*	COV limit for temperature.
RH-COV-limit	*0.01...50.0 rh%*	*5.00 rh%*	COV limit for humidity.
CO2 COV-limit	*1...1000 ppm*	*50 ppm*	COV limit for CO_2.
External display value type	*Disabled / None / Temperature / CO2*	*Disabled*	Type for the external measurement value in room unit's display.
External display value source	*Internal sensor / Input 1...3 / Value from Modbus register*	*Internal sensor*	Source for the external measurement value in room unit's display. The setting is available if the parameter *External display value type* value is not *Disabled*. If the parameter value is *Value from Modbus register*, the displayed value is read from the register X38. Replace the X with the room unit number (7 = room unit 1 and 8 = room unit 2).

2.3.5 Configuring communication settings

1. Press the *General communication settings* button in the *Configurations* display.
2. Make the settings.
   See the chapter Available settings for communication on page 31 for more details.
3. Press the *Confirm changes* button to save the changes.
4. Press *Install to device* button to write the changes to the device.

2.3.5.1 Available settings for communication

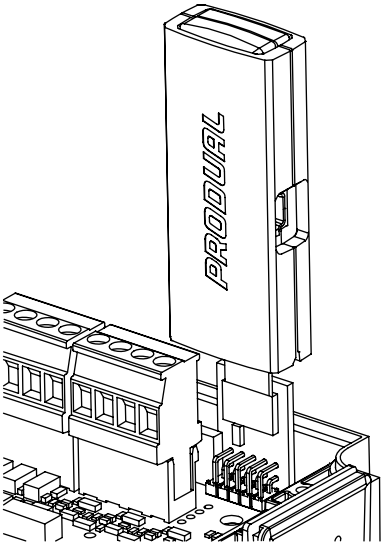
Parameter name	Values	Default	Description
Custom device name	0...32 characters	*Unnamed device*	Device name. Device name supports ASCII characters. The name is shown in the device connection view.
RS-485 Settings			
BMS RS-485 address	*1...247*	*1*	Modbus address (RS-485).
BMS RS-485 speed	*9600 / 14400 / 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).

Parameter name	Values	Default	Description
ROU RS-485 speed	*9600 / 19200 / 38400 / 57600 / 115200 bit/s*	*9600 bit/s*	ROU bus speed (RS-485).
ROU RS-485 parity	*None / Odd / Even*	*None*	ROU bus parity (RS-485).
ROU RS-485 stop-bits	*1 Stop-Bit / 2 Stop-Bits*	*1 Stop-Bit*	ROU bus stop bits (RS-485).
BMS Communication Settings NOTE **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 *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet network number	*1...65534*	*1*	BACnet network number. The network number must be unique inside the network. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet MAC address	*0...127*	*1*	BACnet MAC address. The address must be unique inside the network. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet MS/TP max masters	*1...127*	*127*	Maximum address of a master device. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
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. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet MS/TP baud rate	*9600 / 19200 / 38400 / 57600 / 76800 / 115200 bit/s*	*38400*	BACnet MSTP speed. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet MS/TP parity	*None / Odd / Even*	*None*	BACnet MSTP parity. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet MS/TP stop-bits	*1 Stop-Bit / 2 Stop-Bits*	*1 Stop-Bit*	BACnet MSTP stop bits. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet foreign device	*Enabled / Disabled*	*Disabled*	BACnet foreign device. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet/IP broadcast management device address	*xxx.xxx.xxx.xxx*	*0.0.0.0*	BACnet/IP broadcast management device address. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.
BACnet foreign device port	*0...65535*	*47808*	BACnet foreign device port. The setting is available when the *BMS communication mode* parameter value is *BACnet over RS-485*.

2.3.6 Updating the device firmware

The device firmware can be updated when the Produal MyTool® notifies about the update.

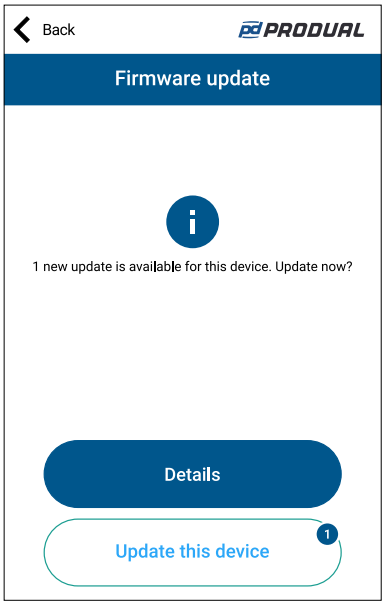
1. Open the device cover.
2. Insert the MyTool Connect to the connector.



3. Start Produal MyTool®.
4. Press the *Devices* button.
   The device list shows the devices that have Bluetooth activated.

   NOTE **Note:** The Bluetooth is enabled when the supply voltage is connected for the first time.
5. Select the device from the list.
6. Press the *Connect* button.

   The indicator light in MyTool Connect is illuminated continuously when Produal MyTool® is connected to the device.
7. Press the *Firmware update* button.



   You can see the update details by pressing the *Details* button.
8. Press the *Update this device* button to update the firmware.

   Important: The update starts immediately when you press the button. Do not interrupt the installation process.

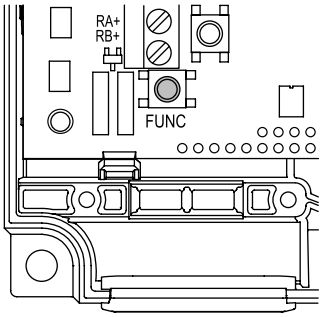
   Application downloads the new firmware and transfers it to the device. The device restarts to complete the firmware update.

9. Press the *OK* button on the confirmation view.
10. Press the *Back* to disconnect from the device.
11. Select the disconnecting method.
    - Select *Disconnect* to disconnect the device without deactivating the device Bluetooth.
    - Select *Cancel* to cancel disconnecting.

2.3.6.1 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.

3 Modbus

3.1 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*
Network size	up to 127 devices per segment
	* factory setting

3.2 Modbus function codes

The device supports the following Modbus function codes.

Decimal	Hexa-decimal	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

3.3 Modbus registers

3.3.1 Input registers (read)

3.3.1.1 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

3.3.1.2 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 %

Input register	Parameter description	Data type	Values	Range
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 %

3.3.1.3 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
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

Input register	Parameter description	Data type	Values	Range
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

3.3.1.4 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
1X00	Output power.	S16	0...10000	0...100,00 %
1X01	Output voltage.	S16	0...10000	0...10,000 V
1X02	Output current.	S16	0...20000	0...20,000 mA
1X03	Triac output status.	S16	0 - 1	0. Inactive 1. Active
1X04	Fan speed output value.	S16	0 - 1 - 2 - 3	0. Off 1. Speed 1 2. Speed 2 3. Speed 3
1X05	Fan speed percentage value.	S16	0...10000	0...100,00 %

3.3.1.5 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 %

Input register	Parameter description	Data type	Values	Range
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

3.3.1.6 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 %

3.3.1.7 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

3.3.2 Holding registers (read/write)

3.3.2.1 Holding registers for communication

NOTE **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 - 3 - 4 - 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

Holding register	Parameter description	Data type	Values	Range	Default
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 - 3 - 4 - 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
27	BMS communication mode.	U16	0 - 1 - 2	0. Modbus RTU / Modbus TCP 1. Modbus RTU / Modbus TCP / BACnet IP 2. BACnet MSTP / BACnet IP	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 - 3 - 4 - 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

Holding register	Parameter description	Data type	Values	Range	Default
35	Modbus TCP unit identifier.	U16	0...255	0...255	1

3.3.2.2 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 - 3 - 4 - 5 - 6 - 7 - 8	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	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
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

Holding register	Parameter description	Data type	Values	Range	Default
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

3.3.2.3 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 **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 **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...5000	0...5000 ppm	1200
X11	Room unit contact on level.	S16	0...10000	0...100,00 %	0

Holding register	Parameter description	Data type	Values	Range	Default
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	0
X14	Room unit contact hold on time (minutes).	S16	0...59	0...59 min	0
X15	Room unit contact hold on time (hours).	S16	0...60	0...60 h	0
X16	Room unit contact hold off time (seconds).	S16	0...59	0...59 s	0
X17	Room unit contact hold off time (minutes).	S16	0...59	0...59 min	0
X18	Room unit contact hold off time (hours).	S16	0...60	0...60 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	0
X22	PIR contact hold on delay (minutes).	S16	0...59	0...59 min	0
X23	PIR contact hold on delay (hours).	S16	0...60	0...60 h	0
X24	Man in house button hold on time (seconds).	S16	0...59	0...59 s	0
X25	Man in house button hold on time (minutes).	S16	0...59	0...59 min	0
X26	Man in house button hold on time (hours).	S16	0...60	0...60 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 - 3 - 4 - 5 - 6 - 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

3.3.2.4 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
1X00	Output type for the outputs 1 and 2.	S16	0 - 1 - 2 - 3 - 4 - 5 - 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
1X00	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
1X01	Output control source.	S16	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 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

Holding register	Parameter description	Data type	Values	Range	Default
1X02	Output control method.	S16	0 - 1 - 2 - 3 - 4 - 5 - 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
1X03	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
1X04	3-point actuator running time. Set this register only for the 3-point actuator + output.	S16	0...1200	0...1200 s	720
1X05	Not in use.	S16	-	-	0
1X06	Room unit output type.	S16	0 - 1 - 2	0. Temperature 1. Humidity 2. CO_2	0
1X07	Output override source.	S16	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 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

Holding register	Parameter description	Data type	Values	Range	Default
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
1X25	Output voltage at 100 %.	S16	0...10000	0...10,000 V	10000
1X26	Not in use.	S16	-	-	0
1X27	Not in use.	S16	-	-	0
1X28	Fan speed mode.	S16	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7	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	4
1X29	Fan off voltage.	S16	0...10000	0...10,000 V	0
1X30	Fan speed 1 voltage.	S16	0...10000	0...10,000 V	0
1X31	Fan speed 2 voltage.	S16	0...10000	0...10,000 V	0
1X32	Fan speed 3 voltage.	S16	0...10000	0...10,000 V	0
1X33	Fan off power.	S16	0...10000	0...100,00 %	0
1X34	Fan speed 1 power.	S16	0...10000	0...100,00 %	0
1X35	Fan speed 2 power.	S16	0...10000	0...100,00 %	0
1X36	Fan speed 3 power.	S16	0...10000	0...100,00 %	0
1X37	Fan speed changing delay.	S16	0...3600	0...3600 s	0
1X38	PWM pulse width.	S16	0...1200	0...1200 s	90

Holding register	Parameter description	Data type	Values	Range	Default
1X39	Valve jam prevention function interval.	S16	0 - 1 - 2 - 3 - 4 - 5 - 6 - 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
1X40	COV limit, voltage.	S16	1...5000	0,001...5,000 V	100
1X41	Not in use.	S16	-	-	500
1X42	6-way valve cooling low limit voltage.	S16	0...10000	0...10,000 V	0
1X43	6-way valve cooling high limit voltage.	S16	0...10000	0...10,000 V	5000
1X44	6-way valve heating low limit voltage.	S16	0...10000	0...10,000 V	5000
1X45	6-way valve heating high limit voltage.	S16	0...10000	0...10,000 V	10000
1X46	Not in use.	S16	-	-	0
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

3.3.2.5 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 - 3 - 4 - 5 - 6 - 7 - 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

Holding register	Parameter description	Data type	Values	Range	Default
2X02	Secondary temperature input for average calculation.	S16	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 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
2X03	Main humidity input.	S16	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 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 - 3 - 4 - 5 - 6 - 7 - 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 - 3 - 4 - 5 - 6 - 7 - 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 - 3 - 4 - 5 - 6 - 7 - 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
2X07	Source for set point.	S16	0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 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
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 - 3 - 4 - 5 - 6 - 7 - 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 - 3 - 4 - 5 - 6 - 7 - 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

Holding register	Parameter description	Data type	Values	Range	Default
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
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 - 3 - 4 - 5 - 6 - 7 - 8 - 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 - 3 - 4 - 5 - 6 - 7 - 8 - 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 - 3 - 4 - 5 - 6 - 7 - 8 - 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 - 3 - 4 - 5 - 6 - 7 - 8 - 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

3.3.2.6 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 - 3 - 4 - 5 - 6 - 7 - 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 - 3 - 4 - 5 - 6 - 7 - 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

3.3.2.7 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
9005	Not in use.	S16	-	-	-1
9006	Not in use.	S16	-	-	-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
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

3.3.2.8 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

4 BACnet

4.1 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*/19200/38400/57600/76800/115200 bit/s
Stop bits	1
Network size	up to 128 devices per segment
	* 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 control unit. The BTL certification validates that the product correctly implements the large and complex BACnet features. This eliminates the risk of BACnet implementation errors and interoperability problems.

4.2 Object descriptions

NOTE **Note:** Objects become visible based on the control unit configuration. All objects can't be visible at the same time.

4.2.1 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

4.2.2 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)*
Input 2 Voltage	0...10	0,001	*volts (5)*
Input 2 Temperature	-50...100	0,1	*degrees-celsius (62)*

Object name	Values	Resolution	Units
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)*

4.2.3 Analog value objects

Object name	Values	Resolution	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
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

Object name	Values	Reso-lution	Units	Default
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

4.2.4 Multi state 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

4.2.5 Multi state 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
Output 1 Fan Control	1 - 2 - 3 - 4 - 5 - 6 - 7 - 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 - 3 - 4 - 5 - 6 - 7 - 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

Object name	Values	State text	Default
Output 3 Fan Control	1 - 2 - 3 - 4 - 5 - 6 - 7 - 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 - 3 - 4 - 5 - 6 - 7 - 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
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