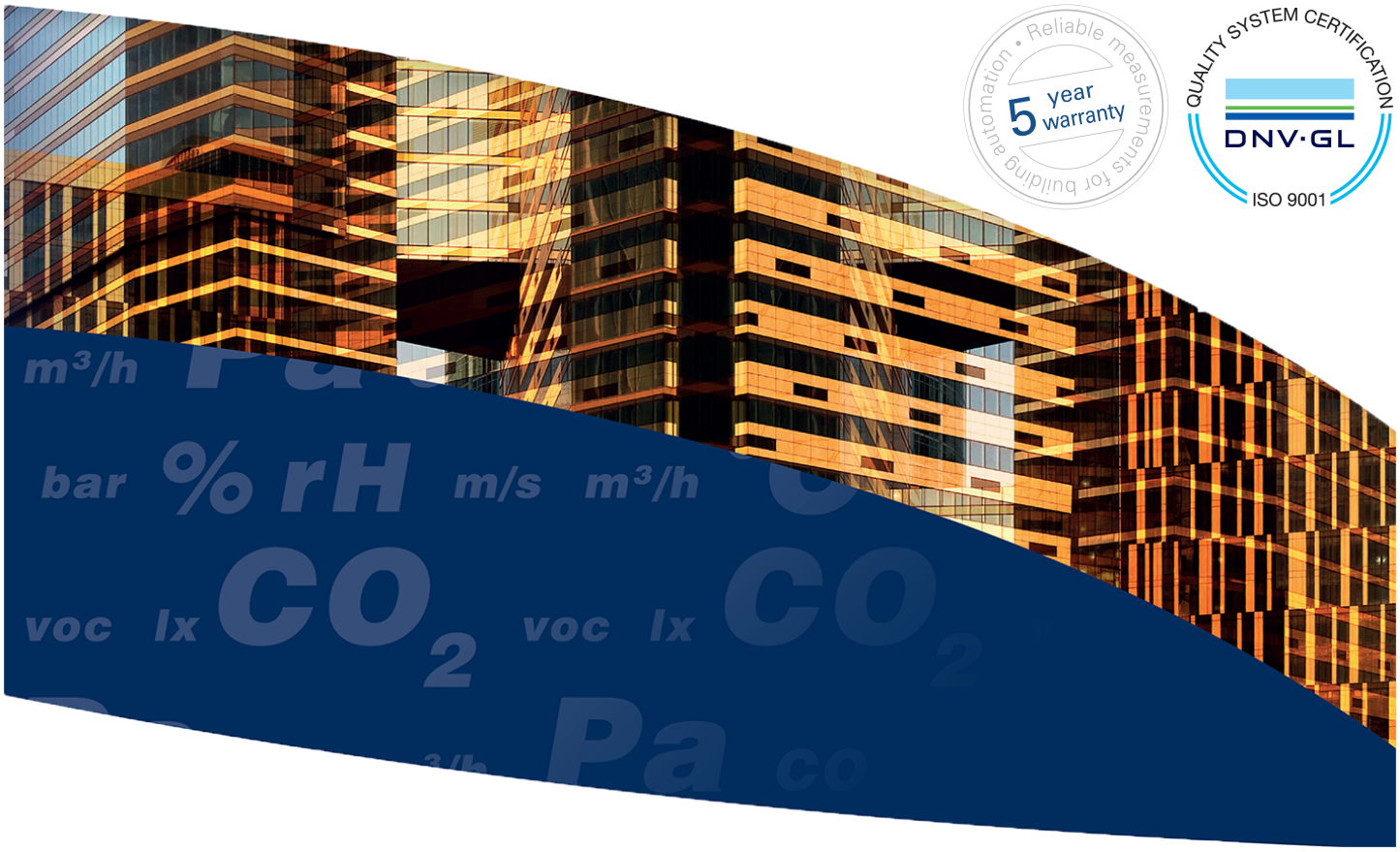
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USER GUIDE

# TRT

Produal

Distributed by AKRIBIS




# TRT - Touchscreen smart thermostat

User Guide

This user guide is for devices with the software version 5.01 or newer.

PRODUAL
measure-be sure.

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# 1 Safety precautions

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

Read this user guide carefully before commissioning, using or servicing this device. To avoid any kind of damage to people or property, follow the instructions carefully. Produal is not liable for any hazards or damages to people or property which are caused by ignoring the using or installation instructions.

To avoid electrical shock or damage to equipment, disconnect power before installing or servicing the product. Use only a proper wiring rated for the full operating voltage and maximum current in the system even in the event of a fault.

The product condition must be checked before installation. Do not drop the product or use excessive force during installation. Do not use the product if any damages are visible.

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

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

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

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

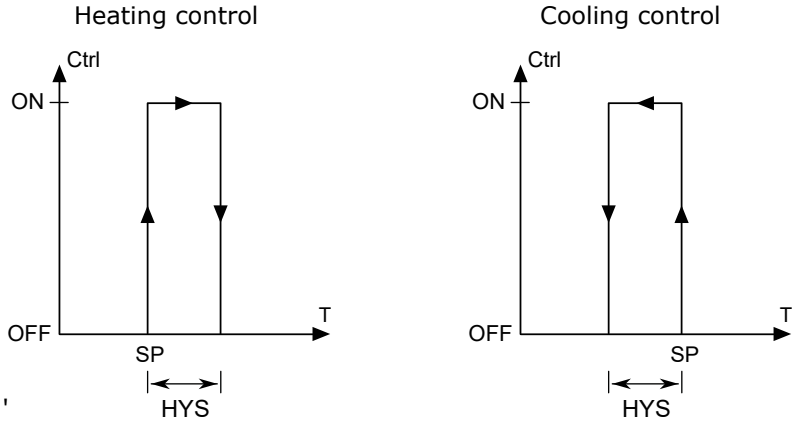
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# 2 Functional description

## 2.1 Control functions

### 2.1.1 Temperature control

The temperature is controlled by switching the relay as required. The control logic has hysteresis i.e. in the heating mode the temperature has to exceed the setpoint (*SP*) by the hysteresis (*HYS*) to switch the relay off. This prevents fast on/off cycling. In cooling mode, the function operates in reverse. The diagram below illustrates the temperature control operation.




The temperature setpoint can be adjusted by pressing temperature setpoint adjustment buttons or via the network.

- Comfort mode; temperature setpoint is adjusted by the user (or via the network) and viewed on the display. The user setpoint adjustment range can be limited (default range is ±3 °C).
- Eco mode; the setpoint is set to Eco mode setpoint. The user adjustment is disabled.
- Off mode; temperature setpoint is set to Off mode setpoint and the control changes to frost protection mode. The user setpoint adjustment is disabled.

### 2.1.2 High and low limit temperature control

The high and low limit temperature control can be used to protect floor surface or prevent condensation, for example.

If an external NTC 10 sensor is connected (to RI1 or RI2) and the temperature limit function is selected for the input, the device controls the temperature also according to set high and/or low limits.

**Note:** The setpoint on the display is not changed during the limitation. symbol indicates active limitation.

In heating control the function works as follows:

- If the external temperature exceeds the high limit setpoint, the relay switches off. The relay switches on after the temperature has dropped enough.
- If the external temperature drops below the low limit setpoint, the relay switches off. The relay switches off after the temperature has risen enough.
- The switching hysteresis is set in *Limit Hysteresis* parameter.

In cooling control the function works as follows:

- If the external temperature drops below the low limit setpoint, the relay switches off. The relay switches off after the temperature has risen enough.
- The switching hysteresis is set in *Limit Hysteresis* parameter.

**Note:** The function is disabled in off operation mode.

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### 2.1.3 Air conditioning and lighting control

The lighting ( ) and air conditioning ( ) buttons can be used to control the functions via communication network. The buttons and their current status is displayed on the front screen.

**Note:** These buttons only switch the corresponding network value to on or off. The device doesn't have any physical outputs to control air conditioning or lighting.

## 2.2 Operation modes

The device has seven operation modes that have their own control settings. The operation modes are called comfort, eco, holiday, boost, lock, hold and off modes.

The operation modes can be controlled by the following functions:

- Using device's display buttons
- Using a digital input (e.g. occupancy detection)
- Using bus communication

### 2.2.1 Comfort mode

The comfort mode is the base operating mode that allows user to control the device functions. In comfort mode, the temperature setpoint is adjusted by the user (or via the network) and viewed on the display. The user setpoint adjustment range can be limited (default range is ±3 °C).

### 2.2.2 Eco mode

The device can be switched to eco mode via network or via digital input (e.g. occupancy detection). Also, the device can be selected to change to eco mode, when the holiday mode activates.

In the eco mode, the device controls the temperature according to eco mode setpoint. The eco mode can be cancelled by pressing button in the main view. When the eco mode is cancelled, the device changes to comfort mode.

### 2.2.3 Holiday mode

The device can be switched to holiday mode via network, via digital input (e.g. occupancy detection) or via display button.

In the holiday mode, the device controls the temperature according to eco mode or off mode (the mode can be selected with *Holiday Mode* parameter).

The holiday mode can be activated via additional settings view by pressing button and setting the holiday duration. When the holiday mode is cancelled, the device changes to comfort mode.

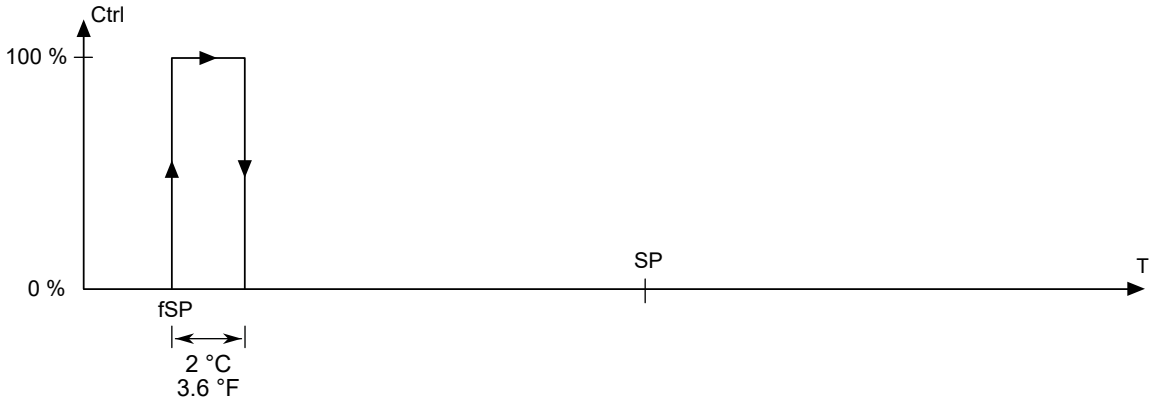
The available holiday mode duration is 0...31 days. After setting the duration, the thermostat immediately switches to selected mode. If the holiday mode duration is set to 0, the device switches to holiday mode until cancelled by pressing the selected operation mode button

### 2.2.4 Off mode

The device can be switched to off mode via network, via digital input (e.g. occupancy detection) or via display button. Also, the device can be selected to change to off mode, when the holiday mode activates.

In the off mode, the device controls the temperature according to off mode setpoint (*fSP*).

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If the temperature drops below the off mode setpoint, is displayed and the relay activates. When the temperature exceeds the off mode setpoint by 2 °C (3.6 °F), the device returns to off mode.

The off mode can be activated via additional settings view by pressing button. The off mode can be cancelled by pressing the button in the main view or in the additional settings view. When the off mode is cancelled, the device changes to comfort mode.

### 2.2.5 Lock mode

Lock mode locks the selected controls from the user. Lock mode can be activated by pressing button on the additional settings view.

The following options are available:

| Selection | Description |
|---|---|
| *Disabled* | Function is disabled. |
| *On/Off Only* | Off mode, lighting and blinds buttons available. |
| *Adjust Only* | Temperature setpoint buttons available. |
| *No Input* | All buttons unavailable. |

A lock mode protection code can be set via the maintenance view. If the lock code is not 0000 (factory setting), the code is required to activate and deactivate the lock mode.

The lock mode status doesn't change after power failure.

### 2.2.6 Hold mode

The device can be switched to hold mode via network, or via display button. The hold mode is available in P models.

In the hold mode, the device controls the temperature according to current operation mode ignoring the set time schedules.

The hold mode can be activated via additional settings view by pressing button and setting the hold duration. When the hold mode is cancelled, the device returns to normal operation.

The available hold mode duration is 0...48 hours. If the hold mode duration is set to 0, the device switches to hold mode until cancelled by pressing the hold mode button ( ). When the hold mode is active, the hold mode button shows on the display.

### 2.2.7 Boost mode

Boost mode activates the relay output manually for a period of time. The device can be switched to boost mode via network, via digital input (e.g. occupancy detection) or via display button ( ).

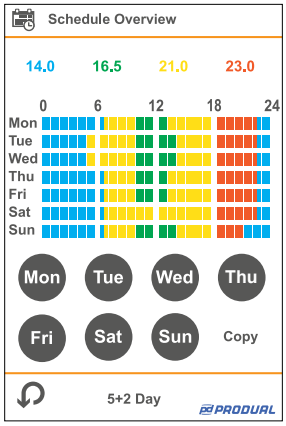
The boost time can be adjusted to 0...480 minutes. If the time is set to 0, the boost mode is deactivated. Boost mode can be cancelled by pressing button or over the network. The remaining boost time is viewed on the display.

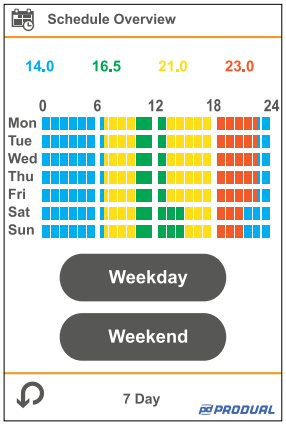
If Digital Input is set to operate boost function, the boost mode can't be cancelled through the display, and the boost is active until the input state changes.

## 2.3 Calendar functions

The -P models have up to five programmable switching times and up to four temperatures per day. The times and target temperatures can be set separately for all days, or to 5+2 day mode where the targets are set separately for weekdays and weekends.

*Schedule overview* display shows the current switching temperatures and switching times.




Times and temperatures can also be copied from one day to other day.

## 2.4 Inputs

### 2.4.1 Resistive inputs

RI1 and RI2 inputs can be used to connect NTC 10 sensor to device and the sensor information can be used for different control and display purposes. Inputs can also be used as potential free contact inputs.

**Note:** When the resistive inputs are used as digital inputs, the input state changing has approx. ten seconds delay. These inputs are not suitable for fast switching applications.

The following options are available:

| Selection | Description |
|---|---|
| *Disabled* | Input is disabled. |
| *Control* | The input is used for the main temperature control (NTC 10). This allows external temperature sensor to be used for the temperature control. The internal temperature sensor is disabled from the control. |
| *Min-Max* | The input is used for high and low temperature limit. When *Min-Max* is selected, the secondary information view starts to display the temperature (the measurement text is selectable). If both resistive inputs are set to *Min-Max*, RI1 takes precedence. |
| *Outside* | The input is used for outside temperature display. When the *Outside* is selected, secondary information view starts to display the temperature (the measurement text is selectable). If both resistive inputs are set to *Outside*, RI1 takes precedence. |
| *Network* | The input is available over the communication network as temperature measurement (NTC 10). |
| *IR Control* | Not in use. |
| *Close for ECO* | The input is used as a contact for activating the eco mode. The eco mode activates when the contact closes. |

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| Selection | Description |
|---|---|
| *Open for ECO* | The input is used as a contact for activating the eco mode. The eco mode activates when the contact opens. |
| *Close for OFF* | The input is used as a contact for activating the off mode. The off mode activates when the contact closes. |
| *Open for OFF* | The input is used as a contact for activating the off mode. The off mode activates when the contact opens. |
| *Network DI* | The input is available over the communication network as digital input. |

### 2.4.2 Digital inputs

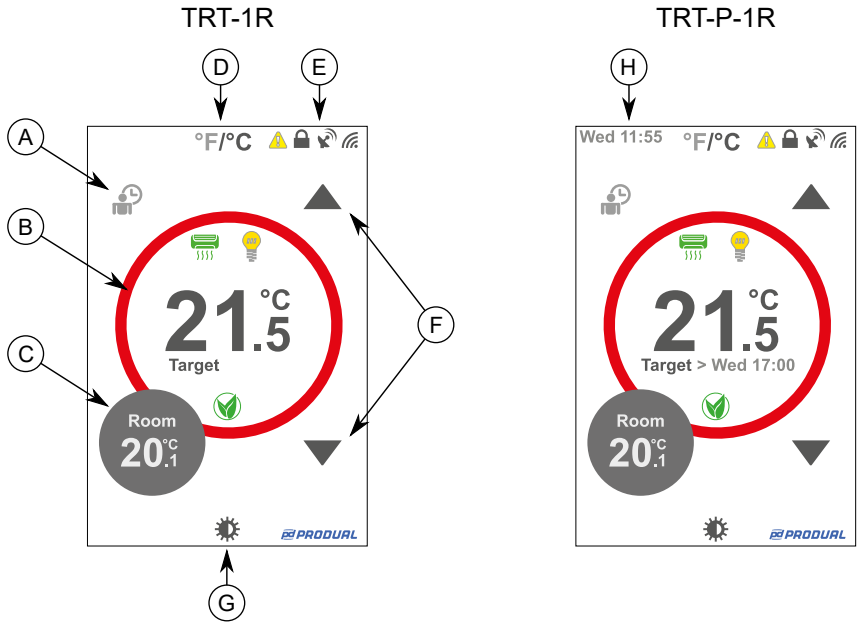
The potential free contact input can be configured for different functions. The switching delay from active to passive can be adjusted.

The following options are available:

| Selection | Description |
|---|---|
| *Disabled* | Input is disabled. |
| *Close for ECO* | The input is used for activating the eco mode. The eco mode activates when the contact closes. |
| *Open for ECO* | The input is used for activating the eco mode. The eco mode activates when the contact opens. |
| *Close for OFF* | The input is used for activating the off mode. The off mode activates when the contact closes. |
| *Open for OFF* | The input is used for activating the off mode. The off mode activates when the contact opens. |
| *Heating / Cooling* | The input is used for changing between heating and cooling in the change-over mode. The device works in the heating mode when the contact is open, and in the cooling mode when the contact is closed. |
| *Alarm* | When the contact closes, "DI Contact Alarm" alarm message is viewed on the display. |
| *Network* | The input is available over the communication network as digital input. |

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## 2.5 User interface




A. Boost mode button
B. Main information view
C. Secondary information view and action button
D. Temperature unit selection button
E. Status information
F. Temperature setpoint adjustment buttons
G. Backlight level selection button
H. Day and time

The user interface includes touch sensitive areas that can be used to change the device settings.

- Temperature setpoint adjustment buttons can be used to adjust the temperature setpoint.
- Backlight level selection button can be used to dim the display or turn it off.
- Main information screen has several touch areas that can be use adjust the settings, for example lighting.
- Temperature unit selection button can be used to change the temperature unit on the display.
- Secondary information view works also as a button that is used to access additional settings view.

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## 2.5.1 Main information view

TRT-1R



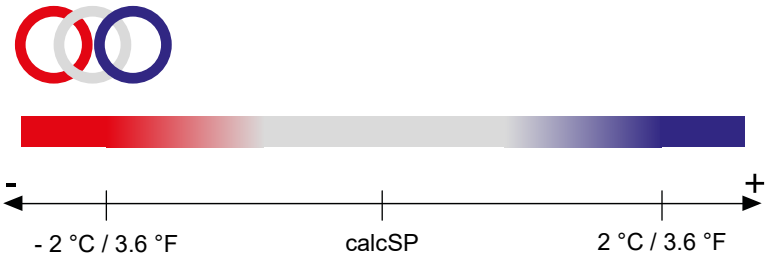

TRT-P-1R




| Symbol | Description |
|---|---|
|  | Energy ring. The energy ring colour illustrates how far the measured temperature is from the setpoint. |
|  | Air conditioning button. The button can be used to air conditioning (on/off). |
|  | Lighting button. The button can be used to control lighting (on/off) |
|  | Setpoint view. The next scheduled setpoint change is also displayed in -P models. |
|  | Eco mode button. Eco mode can be cancelled with the button. |
|  | Low and high temperature limit indicator. |

### 2.5.1.1 Energy ring colours

The colour of the energy ring indicates the heating/cooling demand. The energy ring is white, when the measured temperature is the same as the setpoint. The density of red/blue on the energy ring modulates based on how far from the setpoint (*calcSP*) the temperature is. When the difference is 2 °C / 3.6 °F the energy ring colour is at full density.




## 2.5.2 Secondary information view and action button

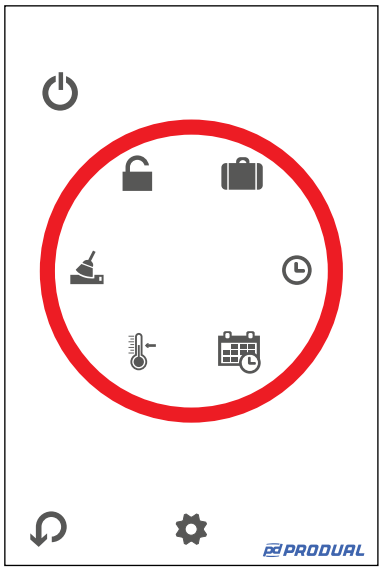
Secondary information view shows measurement information and holiday mode duration.




The secondary information view is also used as a button to access additional settings view. Entering the additional settings view can be protected by setting password in configuration mode (*Staff Code*). The password is 0000 by default, which means that the password is not required to access the additional settings view.

### 2.5.2.1 Additional settings view

The additional settings view can be accessed by pressing the secondary information view.




| Symbol | Description |
|---|---|
| | Cleaning mode button. The button is used to activate the cleaning mode. |
| | Locking button. The button is used to disable some of the display buttons. |
| | Holiday mode button. The button is used to activate the holiday mode. |
| | Time setting button. Only available in -P models. |
| | Calendar button. The button is used to access the calendar management view. Only available in -P models. |
| | Hold mode button. The button is used to activate the hold mode. Only available in -P models. |
| | Off mode button. The button is used to activate the off mode. |
| | Configuration mode button. The button is used to access configuration mode. |
| | Escape button. The button is used to exit the additional settings view. |

### 2.5.2.2 Cleaning mode

Cleaning mode can be activated via additional settings view by pressing button. The device enters to display cleaning mode, where all display presses are ignored for the set time (factory setting is 30 seconds) and countdown timer is displayed. This allows cleaning the touchscreen display.




## 2.5.3 Display backlight

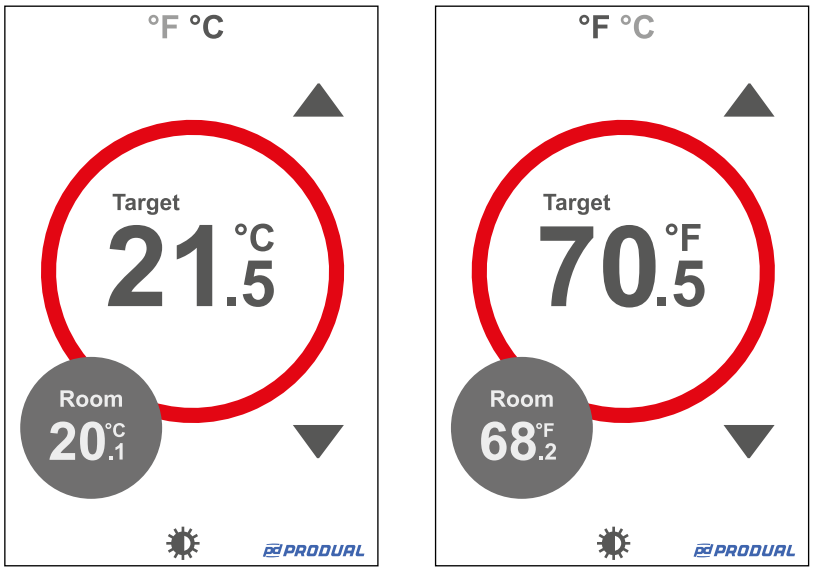
The display backlight has thee levels, normal, stand-by, and off. The backlight is in normal level when the display is touched. The display dims to the stand-by level after the display is not touched for 30 seconds. If the backlight stand-by level is set to 0, the screen backlight switches off.

The backlight level can also be controlled by pressing button. Pressing the button when the display backlight is in normal level, the backlight changes to stand-by level. Pressing the button when the backlight is in stand-by level, the backlight switches off.

The display backlight stand-by level can be adjusted through the configuration mode.

### 2.5.4 Temperature unit in display

If temperature unit selection button (°F °C) is enabled through the configuration mode, it is possible to change the temperature unit by pressing the button. This option is particularly useful in hospitality applications where the client base is expected to be international.

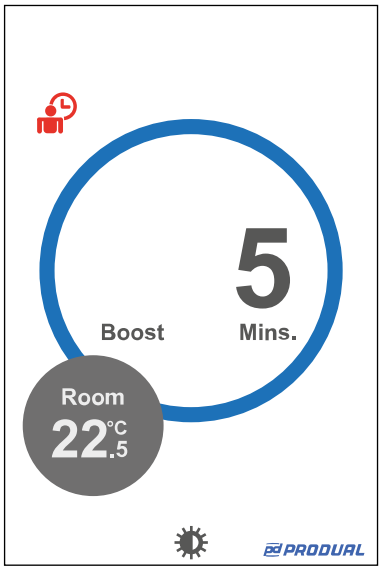



It is also possible to select temperature unit for the display at the commissioning through the configuration mode (*Native Units (Defaults)*).

**Important:** After changing the unit through the configuration mode, the controller reloads defaults for all settings. Select the native units when starting the commissioning.

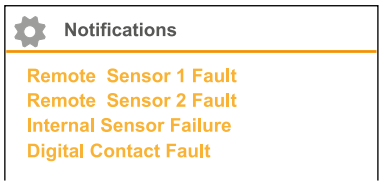
### 2.5.5 Boost mode view

When the boost mode is activated, the boost mode view shows the boosting information.



## 2.5.6 Sensor fault view

The device shows error information about the connected sensors. The sensor faults are indicated with ⚠ symbol. The error details can be viewed by pressing the secondary information view and then pressing ⚠ symbol.

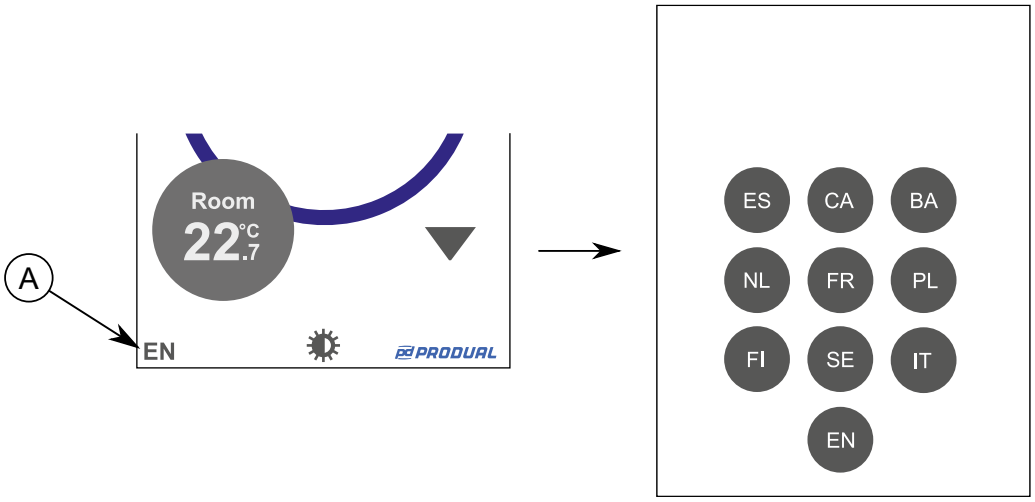



The typical alarms are listed in the following table.

| Alarm | Reason |
|---|---|
| *External sensor 1 fault* | The RI1 sensor resistance is out of range. |
| *External sensor 2 fault* | The RI2 sensor resistance is out of range. |
| *Internal sensor failure* | The internal sensor is defective. |
| *Digital contact fault* | Digital input is defective. |
| *Time Lost* | The real time clock has been reset. The real time clock is only in -P models. |

## 2.5.7 Display language

The user interface can be displayed in different languages. The language can be selected via configuration mode or by using language selection button that can be activated for the user.




A. Language selection button

The following languages are available.

| | |
|---|---|
| *ES* | Spanish |
| *CA* | Catalan |
| *BA* | Basque |
| *NL* | Dutch |
| *FR* | French |
| *IT* | Italian |
| *PL* | Polish |
| *EN* | English |
| *FI* | Finnish |
| *SE* | Swedish |

# 3 Commissioning

## 3.1 Mounting the product

**Warning:** Handle the product with care. Dropping the product may cause internal damage and unwanted functions in the connected system.

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

   **Warning:** Don't install this product near a life support apparatus.

   **Warning:** Don't install this product into a space containing flammable or explosive substances.

   **CAUTION:** Place the product outside the reach of children and animals.

   The device can be located in dry surroundings (IP20) with pollution degree 1 or 2. The device is mounted by using screws on the standard flush mounting box. The recommended installation height is 150...180 cm.

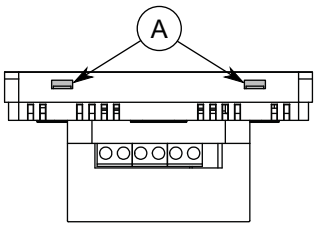
   The device location should be selected carefully. All the error factors that can affect to the measurements should be eliminated as well as possible. The following list defines the typical measurement error factors.

   - direct sun light
   - occupant proximity
   - air flow coming from windows or doors
   - air flow coming from ventilation nozzles
   - air flow coming from the flush mounting box
   - differential temperature caused by external wall

   **Important:** The product may only be installed in a location where the ambient conditions meet the operating condition requirements.

| Operating conditions | |
|---|---|
| Temperature | 0...50 °C (32...122 °F) |
| Humidity | 0...95 %rH (non-condensing) |

3. Remove the cover.
   a. Use a small flat head screwdriver to open the bottom locking clips.

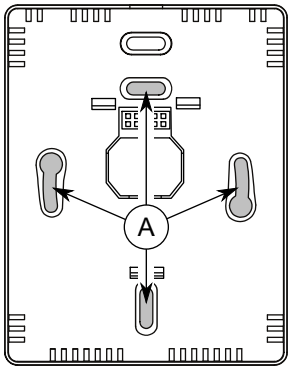



   A. Locking clips

   **Important:** Don't use excessive force when pushing the clips. The plastic cover is damaged easily.

   b. Carefully detach the cover from the bottom.
4. Make the wirings.

**5.** Mount the product on flush mounting box using the mounting points.

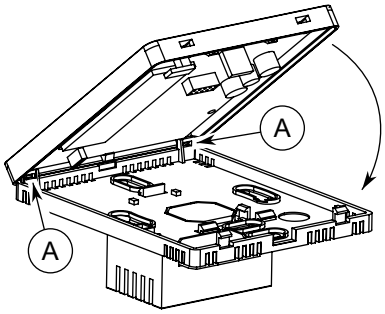



A. Mounting points

The maximum screw diameter is 4.3 mm.

**Important:** Don't use excessive force when tightening the mounting screws.

**6.** Carefully fit the cover.
Align the cover fixing clips with bottom part holes and close the cover.




A. Fixing clips and holes

## 3.2 Wiring

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

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

**Warning:** Fuse at load supply (normally 6 A, 10 A, 16 A) does not always limit the relay output load current to 7 A. The relay maximum load is 1750 VA (250 V x 7 A res.). Maximum inductive load is 2.2 A.

**CAUTION:** The product may only be connected to overvoltage category I or II electricity network according to IEC 60664-1. Use external overvoltage protection if the device is connected to the overvoltage category III electricity network.

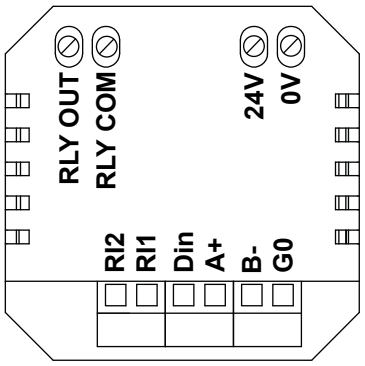
**CAUTION:** The used cables must have minimum of 230 Vac insulation for SELV wiring, if the mounting box includes also 230 Vac voltage wirings.

**CAUTION:** Use single stranded wires or use wire end sleeves if multi stranded wires are used.

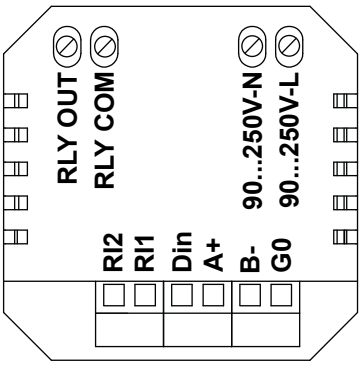
**CAUTION:** Don't connect fan motors in parallel. One product can control only one fan motor.

**CAUTION:** The relay connection wiring cross sections must be adapted to the overload protection conditions (max. 10 A). The wirings must always comply with local regulations.

-24 models




-230 models

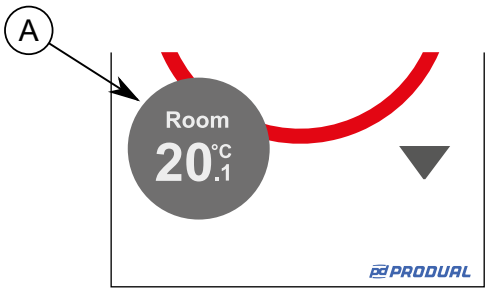



| | | |
|---|---|---|
| *RLY OUT* | Relay contact, 230 Vac / 30 Vdc, 7 A (res.) | |
| *RLY COM* | Relay contact, 230 Vac / 30 Vdc, 7 A (res.) | |
| *24V* | Supply, 24 Vac/dc | -24 models |
| *0V* | 0 V, common | |
| *90...250V-N* | Supply, 90...250 Vac/dc, neutral | -230 models |
| *90...250V-L* | Supply, 90...250 Vac/dc, live | |
| *RI2* | External temperature sensor input 2, NTC 10 (control, floor, outside, network only, digital input) | |
| *RI1* | External temperature sensor input 1, NTC 10 (control, floor, outside, network only, digital input) | |
| *Din* | Digital input, potential free contact (override, e.g. holiday) | |
| *A+* | Modbus RTU / BACnet MS/TP, RS-485 | |
| *B-* | | |
| *G0* | 0 V, common | |

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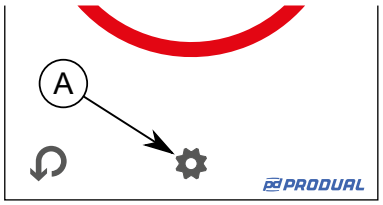
## 3.3 Configuring the device

1. Press the action button on the main view.

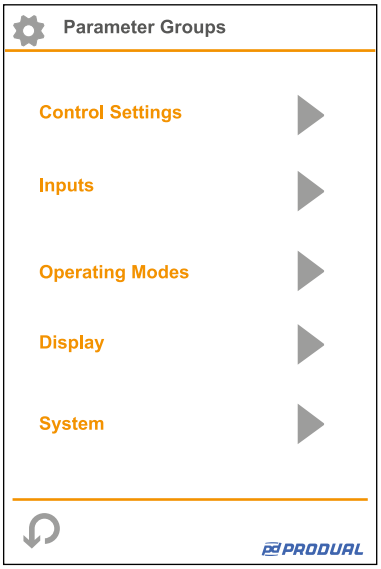



A. Action button

2. Press the configuration mode button.




3. Input the configuration mode password.
   The factory setting for the password is 6666.
4. Make the required settings.




   You can navigate in the menu by pressing ▶, ▼ and ▲ buttons. The values can be changed by pressing the value. See the following chapters for more information about the available settings.
5. Exit the configuration mode by pressing ↶ button.
6. Return to main view by pressing ↶ button.
   The device restarts before the main view is displayed.

### 3.3.1 Control settings menu

| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *Nominal SP* | *0.0...95.0* | *21.0* | Temperature control setpoint (°C/°F). |
| *ECO Heating Setpoint* | *0.0...95.0* | *16.0* | Heating control setpoint in eco mode (°C/°F). |

| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *ECO Cooling Setpoint* | *0.0...95.0* | *28.0* | Cooling control setpoint in eco mode (°C/°F). |
| *Frost Setpoint* | *0.0...95.0* | *8.0* | Off mode temperature setpoint (°C/°F). |
| *Min. Setpoint Adj.* | *0.0...95.0* | *14.0* | Temperature setpoint adjustment low limit (°C/°F). |
| *Max. Setpoint Adj.* | *0.0...95.0* | *30.0* | Temperature setpoint adjustment high limit (°C/°F). |
| *Hysteresis* | *0.0...20.0* | *1.0* | Temperature control hysteresis. |
| *Control Type* | *Heating / Cooling / Heating/Cooling* | *Heating* | Control type.<br>*Heating* – Heating control.<br>*Cooling* – Cooling control.<br>*Heating / Cooling* – Heating or cooling control (changeover function). |
| *Min. Limit* | *0.0...95.0* | *18.0* | Low limit control setpoint (°C/°F). |
| *Max. Limit* | *0.0...122.0* | *30.0* | High limit control setpoint (°C/°F). |
| *Limit Hysteresis* | *0.0...10.0* | *1.0* | Low/high limit control hysteresis. |
| *Setpoint Reset* | *Disabled / Enabled* | *Enabled* | Reset setpoint when changing from comfort operation mode to off mode.<br>*Disabled* – Setpoint is kept unchanged.<br>*Enabled* – Setpoint is reset to nominal value. |

## 3.3.2 Inputs menu

| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *RI1 Mode*<br>*RI2 Mode* | *Disabled / Control / Min-Max / Outside / Network / IR Control / Close for ECO / Open for ECO / Close for OFF / Open for OFF / Network DI* | *Disabled* | Resistive input usage.<br>*Disabled* – The input is not in use.<br>*Control* – Temperature measurement for control.<br>*Min-Max* – high and low limit temperature control measurement.<br>*Outside* – Outdoor temperature measurement.<br>*Network* – Measurement for communication network (NTC10).<br>*IR Control* – Not in use.<br>*Close for ECO* – Eco mode activates when the contact closes.<br>*Open for ECO* – Eco mode activates when the contact opens.<br>*Close for OFF* – Off mode activates when the contact closes.<br>*Open for OFF* – Off mode activates when the contact opens.<br>*Network DI* – Cooling is disabled when the contact is closed. |

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| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *Digital Input Mode* | *Close for ECO / Open for ECO / Close for OFF / Open for OFF / Heating/ Cooling / Alarm / Network / Disabled* | *Close for ECO* | Digital input usage.<br>*Close for ECO* — Eco mode activates when the contact closes.<br>*Open for ECO* — Eco mode activates when the contact opens.<br>*Close for OFF* — Off mode activates when the contact closes.<br>*Open for OFF* — Off mode activates when the contact opens.<br>*Heating / Cooling* — Changes between heating and cooling in changeover control.<br>*Alarm* — Alarm contact.<br>*Network* — Network value.<br>*Disabled* — The input is not in use. |
| *Digital Input Delay* | *0...7200* | *0* | Input delay when the contact changes from active to passive (seconds). |
| *Outside Temp. Source* | *Built-In Sensor / Network* | *Built-In Sensor* | Outdoor temperature source.<br>*Built-In Sensor* — The temperature is measured with external sensor that is connected to RI1 or RI2 input.<br>*Network* — The temperature is received via communication network. |
| *Internal Sensor Cal.* | *-10.0...10.0* | *0* | Internal temperature sensor tuning (°C/°F). |
| *RI1 Cal.* | *-10.0...10.0* | *0* | RI1 temperature sensor tuning (°C/°F). |
| *RI2 Cal.* | *-10.0...10.0* | *0* | RI2 temperature sensor tuning (°C/°F). |
| *Humidity Cal.* | *-10.0...10.0* | *0* | Humidity sensor tuning (%rH). |

### 3.3.3 Operating Modes menu

| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *Lock Mode* | *Disabled / On/ Off Only / Adjust Only / No Input* | *Disabled* | Lock mode.<br>*Disabled* — Function is disabled.<br>*On/Off Only* — Off mode, lighting and air conditioning buttons available.<br>*Adjust Only* — Temperature setpoint buttons available.<br>*No Input* — All buttons unavailable. |
| *Lock Code* | *0000...9999* | *0000* | Lock mode password (0000 = no password). |
| *Cleaning time* | *0...480* | *30* | Cleaning mode duration (seconds). |
| *Relay1 Mode* | *Control NC / Control NO* | *Control NC* | Relay operating direction.<br>*Control NC* — Normally closed.<br>*Control NO* — Normally open. |
| *Relay2 Mode* | *Control NC* | *Control NC* | Not in use. |
| *Boost Time* | *0...480* | *0* | Boost mode running time (minutes). If the value is 0, the boost mode is active until manually stopped. |

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| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *Holiday Mode* | *Off / ECO* | *Off* | The operation mode that activates when the holiday mode is activated. |

## 3.3.4 Display menu

| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *Brightness* | *0...20* | *5* | Display backlight brightness level. |
| *Enable Lights* | *Disabled / Enabled* | *Disabled* | Lights button visibility.<br>*Disabled* Button is not viewed.<br>*Enabled* Button is visible. |
| *Enable AC/IR* | *Disabled / Enabled* | *Disabled* | Air conditioning button visibility.<br>*Disabled* Button is not viewed.<br>*Enabled* Button is visible. |
| *Enable Holiday* | *Disabled / Enabled* | *Disabled* | Holiday mode button visibility.<br>*Disabled* Button is not viewed.<br>*Enabled* Button is visible. |
| *Humidity Display* | *Disabled / Enabled* | *Disabled* | Humidity measurement visibility. The selection is available only in -RH models.<br>*Disabled* Measurement is not viewed.<br>*Enabled* Measurement is visible on the secondary information view. |
| *Show Unit Swap* | *Disabled / Enabled* | *Disabled* | Measurement unit swap button visibility.<br>*Disabled* Button is not viewed.<br>*Enabled* Button is visible. |
| *Zone 1 Text* | *Disabled / Room / Floor / Outside / Zone 1...3 / Bathroom / Sauna / Bedroom / Kitchen / Cooler / Flow / Hot Water / Tank / Pool* | *Room* | Internal temperature sensor text.<br>See the texts in other languages from the chapter Display text translations. |
| *Zone 2 Text* | | *Floor* | RI1 temperature sensor text. |
| *Zone 3 Text* | | *Outside* | RI2 or network temperature sensor text. |
| *Show Off icon* | *Disabled / Enabled* | *Disabled* | Off button visibility on the main view.<br>*Disabled* Button is not viewed.<br>*Enabled* Button is visible. |

### 3.3.4.1 Display text translations

| English | Finnish | Swedish | French | Polish | Italian | Spanish | Catalan | Basque | Dutch |
|---|---|---|---|---|---|---|---|---|---|
| *Room* | *Huone* | *Rum* | *Pièce* | *Pokój* | *Stanza* | *Sala* | *Sala* | *Gela* | *Ruimte* |

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| English | Finnish | Swedish | French | Polish | Italian | Spanish | Catalan | Basque | Dutch |
|---|---|---|---|---|---|---|---|---|---|
| *Floor* | *Lattia* | *Golv* | *Plancher* | *Podłoga* | *Pavimento* | *Suelo* | *Terre* | *Lurzoruan* | *Vloer* |
| *Outside* | *Ulko* | *Utomhus* | *Ext* | *Zewnątrz* | *Esterno* | *Exterior* | *Exterior* | *Kanpo* | *Buiten* |
| *Zone 1* | *Vyöhyke1* | *Zon 1* | *Zone 1* | *Strefa 1* | *Zona 1* | *Zona 1* | *Zona 1* | *1. Gunea* | *Zone 1* |
| *Zone 2* | *Vyöhyke2* | *Zon 2* | *Zone 2* | *Strefa 2* | *Zona 2* | *Zona 2* | *Zona 2* | *2. Gunea* | *Zone 2* |
| *Zone 3* | *Vyöhyke3* | *Zon 3* | *Zone 3* | *Strefa 3* | *Zona 3* | *Zona 3* | *Zona 3* | *3. Gunea* | *Zone 3* |
| *Bathroom* | *Pesuh.* | *Badrum* | *SdB* | *Łazienka* | *Bagno* | *Baño* | *Bany* | *Bainugela* | *Badkamer* |
| *Sauna* | *Sauna* | *Bastu* | *Sauna* | *Sauna* | *Sauna* | *Sauna* | *Sauna* | *Sauna* | *Sauna* |
| *Bedroom* | *Makuuh* | *Sovrum* | *Chambre* | *Sypialnia* | *St. Letto* | *Habit.* | *Habit.* | *Logela* | *Slaapk.* |
| *Kitchen* | *Keittiö* | *Kök* | *Cuisine* | *Kuchnia* | *Cucina* | *Cocina* | *Cuina* | *Sukaldea* | *Keuken* |
| *Cooler* | *Jääkaappi* | *Kylare* | *Clim* | *Chłodnica* | *Cond.* | *Chiller* | *Chiller* | *Hotzgailua* | *Koeling* |
| *Flow* | *Virtaus* | *Flöde* | *Débit* | *Przepływ* | *Flusso* | *Caudal* | *Cabal* | *Ur-emarial* | *Flow* |
| *Hot water* | *Käyttövesi* | *Vatten* | *Eau Ch.* | *Woda* | *Acq. Calda* | *A. Cal.* | *A. Cal.* | *Ur beroa* | *w. Water* |
| *Tank* | *Tankki* | *Tank* | *Réservoir* | *Zasobnik* | *Serbatoio* | *Depósito* | *Dipòsit* | *Ur tanga* | *Boiler* |
| *Pool* | *Allas* | *Bassäng* | *Piscine* | *Basen* | *Piscina* | *Piscina* | *Piscina* | *Igerilegua* | *Zwembad* |

### 3.3.5 System menu

| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *Address* | *0..247* (MOD models) / *0...127* (BAC models) | *1* | Communication bus address. |
| *Baud Rate* | *9600 / 19200 / 38400 / 57600 / 76800* | *9600* | Communication bus speed. |
| *Parity* | *None / Odd / Even* | *None* | Communication bus parity. |
| *Stop Bits* | *1 Stop Bit / 2 Stop Bit* | *1 Stop Bit* | Number of stop bits. |
| *Device ID* | *0...4194303* | *Auto* | Device ID (*Auto* = 651001). The setting is available only in BAC models. |
| *Service Pin* | *Disabled / Enabled* | *Disabled* | BACnet service pin.<br>*Disabled* — Function is disabled.<br>*Enabled* — The device sends BACnet I-AM message. |
| *Maintenance Code* | *0000...9999* | *6666* | Configuration mode password (0000 = no password). |
| *Staff Code* | *0000...9999* | *0000* | Additional settings view password (0000 = no password). |

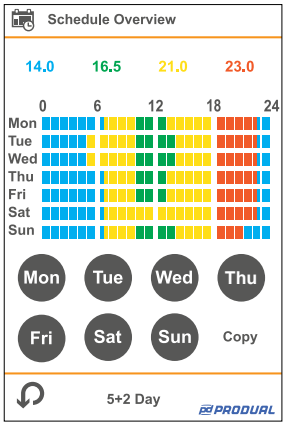
| Menu item | Available values | Factory setting | Description |
|---|---|---|---|
| *Language* | *ES / CA / BA / FR / IT / PL / EN / FI / SE / NL* | *EN* | Display language.<br>*ES* Spanish<br>*CA* Catalan<br>*BA* Basque<br>*FR* French<br>*IT* Italian<br>*PL* Polish<br>*EN* English<br>*FI* Finnish<br>*SE* Swedish<br>*NL* Dutch |
| *Show Language Swap* | *Disabled / Enabled* | *Disabled* | Language selection button visibility. |
| *Screen Refresh Rate* | *Fast / Medium / Slow* | *Fast* | Display refresh rate. |
| *Native Units (Defaults)* | *Celsius / Fahrenheit* | *C* | Default temperature unit (Celsius / Fahrenheit).<br>**Important:** After changing the unit through the configuration mode, the controller reloads defaults for all settings. Select the native units when starting the commissioning. |
| *Reload Default* | *Off / On* | *Off* | Reload factory settings.<br>**Important:** The factory defaults are loaded immediately when pressing the menu item. |
| *Version* | *x.xx BACnet / x.xx Modbus* | - | Firmware version. |

## 3.4 Using the calendar functions

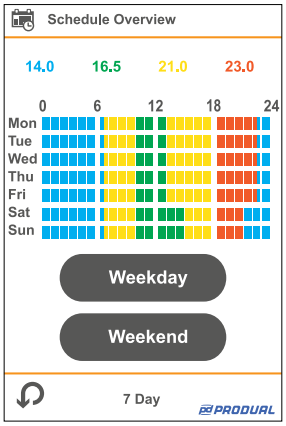
1. Press the secondary information view to access additional settings view.
2. Press button.

**3.** Select the calendar mode by pressing the mode text.
There are two calendar modes available, *7 Day* and *5+2 Day*.

*7 Day* mode

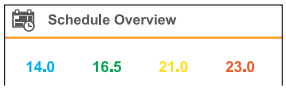



*5+2 Day* mode



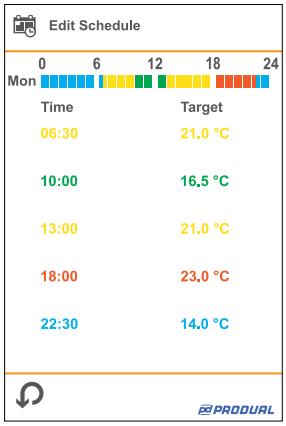

**Note:** Switching from *7 Day* mode to *5+2 Day* mode will set the values to weekday/ weekend group settings if the values are changed. When changing back to seven day mode, the settings must be reset for each day.

**4.** Set the target temperatures.
Press the target temperature value to change it.




**5.** Press the day or weekday/weekend button.

**6.** Set the switching times and temperatures.




a. Press the time value to set the switching time.
b. Press the temperature value to select target temperature.

**7.** Press ↩ button to return to main calendar view.

**Note:** You can copy the settings from one day to other by using *Copy* button.

**8.** Press ↩ button to return to additional settings view.

**9.** Press ↩ button to exit from additional settings view.

# 4 Modbus

## 4.1 Modbus properties

The Modbus communication is available only in MOD models.

| | |
|---|---|
| Protocol | RS-485 Modbus RTU |
| Bus speed | 9600*/19200/38400/56000/76800 bit/s |
| Data bits | 8 |
| Parity | none*/odd/even |
| Stop bits | 1* / 2 |
| Modbus ID | 1* |
| Unit load | 1/2 UL |
| | * factory setting |

## 4.2 Modbus function codes

The device supports the following Modbus function codes.

| Decimal | Hexa-decimal | Function |
|---|---|---|
| 1 | 0x01 | Read Coils |
| 3 | 0x03 | Read Holding Registers |
| 4 | 0x04 | Read Input Registers |
| 5 | 0x05 | Write Single Coil |
| 6 | 0x06 | Write Single Register |
| 16 | 0x10 | Write Multiple Registers |

## 4.3 Modbus registers

### 4.3.1 Coils

| Regis-ter | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *100* | Off mode override. | Bit | *0 - 1* | 0. Off<br>1. On | *0* |
| *101* | Eco mode override. | Bit | *0 - 1* | 0. Off<br>1. On | *0* |
| *102* | Heating/cooling mode selection (change-over function). | Bit | *0 - 1* | 0. Heating<br>1. Cooling | *0* |
| *103* | Hold mode status. | Bit | *0 - 1* | 0. Off<br>1. On | *0* |

Legacy registers for backward compatibility:

| Regis-ter | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *3* | Relay output, read-only (relay mode = control).<br>Relay output override (relay mode = network). | Bit | *0 - 1* | 0. Off<br>1. On | *0* |

## 4.3.2 Discrete inputs

| Register | Parameter description | Data type | Values | Range |
|---|---|---|---|---|
| *100* | Digital input 1 status (DI1) | Bit | *0 - 1* | 0. Off<br>1. On |
| *101* | Relay output status | Bit | *0 - 1* | 0. Off<br>1. On |
| *102* | Holiday mode status | Bit | *0 - 1* | 0. Off<br>1. On |
| *103* | Lighting symbol status | Bit | *0 - 1* | 0. Off<br>1. On |
| *104* | Air conditioning symbols status | Bit | *0 - 1* | 0. Off<br>1. On |
| *105* | Cleaning mode status | Bit | *0 - 1* | 0. Off<br>1. On |
| *106* | Screen locking status | Bit | *0 - 1* | 0. Off<br>1. On |
| *107* | Boost status | Bit | *0 - 1* | 0. Off<br>1. On |
| *108* | Eco mode status | Bit | *0 - 1* | 0. Off<br>1. On |
| *109* | Frost mode status | Bit | *0 - 1* | 0. Off<br>1. On |
| *110* | Hold mode status | Bit | *0 - 1* | 0. Off<br>1. On |
| *111* | Digital input 2 status (RI1) | Bit | *0 - 1* | 0. Off<br>1. On |
| *112* | Digital input 3 status (RI2) | Bit | *0 - 1* | 0. Off<br>1. On |

## 4.3.3 Input registers

| Register | Parameter description | Data type | Values | Range |
|---|---|---|---|---|
| *100* | Temperature measurement. | S16 | *-400...3020* | -40.0...302.0 °C/°F |
| *101* | External temperature measurement, resistive input 1. | S16 | *-400...3020* | -40.0...302.0 °C/°F |
| *102* | External temperature measurement, resistive input 2. | S16 | *-400...3020* | -40.0...302.0 °C/°F |
| *103* | Current calculated setpoint. | S16 | *-400...3020* | -40.0...302.0 °C/°F |

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| Register | Parameter description | Data type | Values | Range |
|---|---|---|---|---|
| *104* | Current function mode. | U16 | *0 - 1 - 2 - 3* | 0. Comfort<br>1. Eco<br>2. Off<br>3. Boost |
| *105* | Relative humidity measurement. | U16 | *0...1000* | 0.0...100.0 %rH |
| *106* | Alarm status. | U16 | *0...256* | 7-bit binary value. Bits are designated as follows:<br>0. Internal sensor<br>1. RI1 input<br>2. RI2 input<br>3. Humidity sensor<br>4. DI1 input<br>5. Not in use<br>6. Time lost<br>The alarm value is the binary value + 1. |
| *107* | Discrete input registers. | U16 | *0...65535* | Bit 0 = DI1, Bit 1 = relay... |
| *108* | Next scheduled switching time. | U16 | *0...2400* | 0...2400 |
| *109* | Next scheduled switching day. | U16 | *0 - 1 - 2 … - 6* | 0. Monday<br>1. Tuesday<br>2. Wednesday<br>3. Thursday<br>4. Friday<br>5. Saturday<br>6. Sunday |
| *110* | Next scheduled switching setpoint. | U16 | *0...950* | 0.0...95.0 °C/°F |
| *111* | Comfort mode user setpoint. | U16 | *-400...3020* | -40.0...302.0 °C/°F |
| *112* | Room control temperature. | U16 | *-400...3020* | -40.0...302.0 °C/°F |
| *113* | Floor control temperature. | U16 | *-400...3020* | -40.0...302.0 °C/°F |
| *114* | Outdoor temperature for display. | U16 | *-400...3020* | -40.0...302.0 °C/°F |
| *200* | Firmware version. | U16 | - | - |

Legacy registers for backward compatibility:

| Register | Parameter description | Data type | Values | Range |
|---|---|---|---|---|
| *0* | Temperature measurement. | S16 | *-400...3020* | -40.0...302.0 °C/°F |
| *1* | External temperature measurement, resistive input 2. | S16 | *-400...3020* | -40.0...302.0 °C/°F |

### 4.3.4 Holding registers

| Register | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *100* | Nominal temperature setpoint. | U16 | *0...950* | 0.0...95.0 °C/°F | *200* |
| *101* | Eco mode heating setpoint. | U16 | *0...950* | 0.0...95.0 °C/°F | *160* |
| *102* | Eco mode cooling setpoint. | U16 | *0...950* | 0.0...95.0 °C/°F | *280* |
| *103* | Frost guard function setpoint. | U16 | *0...950* | 0.0...95.0 °C/°F | *80* |

| Regis-ter | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *104* | Minimum setpoint. | U16 | *0...950* | 0.0...95.0 °C/°F | *140* |
| *105* | Maximum setpoint. | U16 | *0...950* | 0.0...95.0 °C/°F | *300* |
| *106* | Temperature control hysteresis. | U16 | *0...200* | 0.0...20.0 °C/°F | *10* |
| *107* | RI1 input mode. | U16 | *0 - 1 - 2 … - 10* | 0. Disabled<br>1. Room (NTC 10 control)<br>2. Floor (NTC 10 high/low limit)<br>3. Outdoor temperature (NTC 10)<br>4. Network NTC 10<br>5. Not in use.<br>6. Close for Eco mode (digital input)<br>7. Open for Eco mode (digital input)<br>8. Close for Off mode (digital input)<br>9. Open for Off mode (digital input)<br>10. Network digital input | *0* |
| *108* | RI2 input mode. | U16 | *0 - 1 - 2 … - 10* | | *0* |
| *109* | Control type. | U16 | *0 - 1 - 2* | 0. Heating<br>1. Cooling<br>2. Heating/cooling (changeover) | *0* |
| *110* | Minimum temperature limit. | U16 | *0...950* | 0.0...95.0 °C/°F | *180* |
| *111* | Maximum temperature limit. | U16 | *0...1220* | 0.0...122.0 °C/°F | *300* |
| *112* | Min/max temperature limit hysteresis. | U16 | *0...100* | 0.0...10.0 °C/°F | *10* |
| *113* | Digital input mode. | U16 | *0 - 1 - 2 ... - 7* | 0. Disabled<br>1. Close for Eco mode<br>2. Open for Eco mode<br>3. Close for Off mode<br>4. Open for Off mode<br>5. Heating / cooling change-over<br>6. Alarm contact<br>7. Network DI | *1* |
| *114* | Digital input delay. | U16 | *0...28800* | 0...28800 s | *0* |
| *115* | Enable lighting button. | U16 | *0 - 1* | 0. Disabled<br>1. Enabled | *0* |
| *116* | Enable air conditioning button. | U16 | *0 - 1* | 0. Disabled<br>1. Enabled | *0* |

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| Regis-ter | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *117* | Not in use. | U16 | - | - | - |
| *118* | Lock mode. | U16 | *0 - 1 - 2 - 3* | 0. Disabled<br>1. Off mode, lighting air conditioning buttons available.<br>2. Temperature setpoint buttons available.<br>3. All buttons unavailable | *0* |
| *119* | Swap temperature unit button. | U16 | *0 - 1* | 0. Disabled<br>1. Enabled | *0* |
| *120* | Internal temperature measurement tuning. | S16 | *-100...100* | -10.0...10.0 °C/°F | *0* |
| *121* | RI1 input tuning. | S16 | *-100...100* | -10.0...10.0 °C/°F | *0* |
| *122* | RI2 input tuning. | S16 | *-100...100* | -10.0...10.0 °C/°F | *0* |
| *123* | Humidity measurement tuning. | S16 | *-100...100* | -10.0...10.0 %rH | *0* |
| *124* | Humidity display. | U16 | *0 - 1* | 0. Disabled<br>1. Enabled | *1* |
| *125* | Cleaning mode duration. | U16 | *0…480* | 0...480 min | *0* |
| *126* | Boost mode duration. | U16 | *0...480* | 0 = disabled,<br>1...480 min | *0* |
| *127* | Display backlight level. | U16 | *0...20* | 0...20 | *5* |
| *128* | Relay operating direction. | U16 | *0 - 1* | 0. Normally open<br>1. Normally closed | *0* |
| *129* | Lock mode password. | U16 | *0...9999* | 0000...9999 | *0000* |
| *130* | Configuration mode password. | U16 | *0...9999* | 0000...9999 | *6666* |
| *131* | Override air conditioning. | U16 | *0 - 1 - 2* | 0. None<br>1. Override on<br>2. Override off | *0* |
| *132* | Override lighting. | U16 | *0 - 1 - 2* | 0. None<br>1. Override on<br>2. Override off | *0* |
| *133* | Override lock mode. | U16 | *0 - 1 - 2* | 0. None<br>1. Lock mode on<br>2. Lock mode off | *0* |
| *134* | Holiday mode button. | U16 | *0 - 1* | 0. Disabled<br>1. Enabled | *1* |
| *135* | Holiday mode target. | U16 | *0 - 1* | 0. Off mode<br>1. Eco mode | *0* |
| *136* | Relay output override. | U16 | *0 - 1 - 2* | 0. None<br>1. Override relay on<br>2. Override relay off | *0* |
| *137* | Staff mode password. | U16 | *0...9999* | 0000...9999 | *0000* |

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| Register | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *138* | Language. | U16 | *0 - 1 - 2 ... - 9* | 0. English<br>1. Finnish<br>2. Swedish<br>3. Italian<br>4. Dutch<br>5. French<br>6. Polish<br>7. Spanish<br>8. Catalan<br>9. Basque | *0* |
| *139* | Zone 1 room sensor text on the display. | U16 | *1 - 2 ... - 15* | 1. *Room*<br>2. *Floor*<br>3. *Outside*<br>4. *Zone 1*<br>5. *Zone 2*<br>6. *Zone 3*<br>7. *Bathroom*<br>8. *Sauna*<br>9. *Bedroom*<br>10.*Kitchen*<br>11.*Cooler*<br>12.*Flow*<br>13.*Hot water*<br>14.*Tank*<br>15.*Pool* | *1* |
| *140* | Zone 2 floor sensor text on the display. | U16 | *0 - 1 - 2 ... - 15* | 0. Disabled<br>1. *Room*<br>2. *Floor*<br>3. *Outside*<br>4. *Zone 1*<br>5. *Zone 2*<br>6. *Zone 3*<br>7. *Bathroom*<br>8. *Sauna*<br>9. *Bedroom*<br>10.*Kitchen*<br>11.*Cooler*<br>12.*Flow*<br>13.*Hot water*<br>14.*Tank*<br>15.*Pool* | *2* |
| *141* | Zone 3 outdoor sensor text on the display. | U16 | *0 - 1 - 2 ... - 15* | | *3* |
| *142* | Outdoor temperature source. | U16 | *0 - 1* | 0. Connected sensor<br>1. Network sensor | *0* |
| *143* | Outdoor temperature network value.<br>If the outdoor temperature source is set to 1, and a valid (within range) value is set to this register, the display shows outdoor temperature in the small action circle. | S16 | *-580...1220* | -58.0...122.0 °C/°F | *0* |
| *144* | Current hour. | U16 | *0...23* | 0...23 | - |
| *145* | Current minute. | U16 | *0...59* | 0...59 | - |

| Regis-ter | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *146* | Current day. | U16 | *1...31* | 1...31 | - |
| *147* | Current month | U16 | *1...12* | 1...12 | - |
| *148* | Current year. | U16 | *2015...2099* | 2015...2099 | - |
| *149* | Current hour update register. | U16 | *0...23* | 0...23 | - |
| *150* | Current minute update register. | U16 | *0...59* | 0...59 | - |
| *151* | Current day update register. | U16 | *1...31* | 1...31 | - |
| *152* | Current month update register. | U16 | *1...12* | 1...12 | - |
| *153* | Current year update register. | U16 | *2015...2099* | 2015...2099 | - |
| *154* | Update time and date. | U16 | *0 - 1* | 0. No action<br>1. Update | *0* |
| *155* | Target setpoint 1 | U16 | *0...950* | 0.0...95.0 °C/°F | *160* |
| *156* | Target setpoint 2 | U16 | *0...950* | 0.0...95.0 °C/°F | *180* |
| *157* | Target setpoint 3 | U16 | *0...950* | 0.0...95.0 °C/°F | *200* |
| *158* | Target setpoint 4 | U16 | *0...950* | 0.0...95.0 °C/°F | *220* |
| *162* | Reset setpoint when changing from comfort operation mode to off mode. | U16 | *0 - 1* | 0. Enabled<br>1. Disabled | *0* |
| *163* | Enable off button. | U16 | *0 - 1* | 0. Disabled<br>1. Enabled | *0* |
| *164* | Operation mode override. | U16 | *0 - 1* | 0. Comfort mode<br>1. Eco mode<br>2. Off mode<br>3. Boost mode (read only) | - |
| *200* | Monday / weekday switching time 1 | U16 | *0...2400* | 0...2400 | *0600* |
| *201* | Monday / weekday switching time 2 | U16 | *0...2400* | 0...2400 | *1000* |
| *202* | Monday / weekday switching time 3 | U16 | *0...2400* | 0...2400 | *1300* |
| *203* | Monday / weekday switching time 4 | U16 | *0...2400* | 0...2400 | *1700* |
| *204* | Monday / weekday switching time 5 | U16 | *0...2400* | 0...2400 | *2200* |
| *205* | Monday / weekday switching time 1 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *206* | Monday / weekday switching time 2 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *207* | Monday / weekday switching time 3 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *208* | Monday / weekday switching time 4 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *209* | Monday / weekday switching time 5 target | U16 | *0 - 1 - 2 - 3 - 4* | | *1* |
| *210* | Tuesday / weekend switching time 1 | U16 | *0...2400* | 0...2400 | *0600* |

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| Regis-ter | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *211* | Tuesday / weekend switching time 2 | U16 | *0...2400* | 0...2400 | *1000* |
| *212* | Tuesday / weekend switching time 3 | U16 | *0...2400* | 0...2400 | *1300* |
| *213* | Tuesday / weekend switching time 4 | U16 | *0...2400* | 0...2400 | *1700* |
| *214* | Tuesday / weekend switching time 5 | U16 | *0...2400* | 0...2400 | *2200* |
| *215* | Tuesday / weekend switching time 1 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *216* | Tuesday / weekend switching time 2 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *217* | Tuesday / weekend switching time 3 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *218* | Tuesday / weekend switching time 4 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *219* | Tuesday / weekend switching time 5 target | U16 | *0 - 1 - 2 - 3 - 4* | | *1* |
| *220* | Wednesday switching time 1 | U16 | *0...2400* | 0...2400 | *0600* |
| *221* | Wednesday switching time 2 | U16 | *0...2400* | 0...2400 | *1000* |
| *222* | Wednesday switching time 3 | U16 | *0...2400* | 0...2400 | *1300* |
| *223* | Wednesday switching time 4 | U16 | *0...2400* | 0...2400 | *1700* |
| *224* | Wednesday switching time 5 | U16 | *0...2400* | 0...2400 | *2200* |
| *225* | Wednesday switching time 1 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *226* | Wednesday switching time 2 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *227* | Wednesday switching time 3 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *228* | Wednesday switching time 4 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *229* | Wednesday switching time 5 target | U16 | *0 - 1 - 2 - 3 - 4* | | *1* |
| *230* | Thursday switching time 1 | U16 | *0...2400* | 0...2400 | *0600* |
| *231* | Thursday switching time 2 | U16 | *0...2400* | 0...2400 | *1000* |
| *232* | Thursday switching time 3 | U16 | *0...2400* | 0...2400 | *1300* |
| *233* | Thursday switching time 4 | U16 | *0...2400* | 0...2400 | *1700* |
| *234* | Thursday switching time 5 | U16 | *0...2400* | 0...2400 | *2200* |
| *235* | Thursday switching time 1 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *236* | Thursday switching time 2 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *237* | Thursday switching time 3 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *238* | Thursday switching time 4 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *239* | Thursday switching time 5 target | U16 | *0 - 1 - 2 - 3 - 4* | | *1* |
| *240* | Friday switching time 1 | U16 | *0...2400* | 0...2400 | *0600* |
| *241* | Friday switching time 2 | U16 | *0...2400* | 0...2400 | *1000* |
| *242* | Friday switching time 3 | U16 | *0...2400* | 0...2400 | *1300* |
| *243* | Friday switching time 4 | U16 | *0...2400* | 0...2400 | *1700* |
| *244* | Friday switching time 5 | U16 | *0...2400* | 0...2400 | *2200* |
| *245* | Friday switching time 1 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *246* | Friday switching time 2 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |

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| Regis-ter | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *247* | Friday switching time 3 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *248* | Friday switching time 4 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *249* | Friday switching time 5 target | U16 | *0 - 1 - 2 - 3 - 4* | | *1* |
| *250* | Saturday switching time 1 | U16 | *0...2400* | 0...2400 | *0600* |
| *251* | Saturday switching time 2 | U16 | *0...2400* | 0...2400 | *1000* |
| *252* | Saturday switching time 3 | U16 | *0...2400* | 0...2400 | *1300* |
| *253* | Saturday switching time 4 | U16 | *0...2400* | 0...2400 | *1700* |
| *254* | Saturday switching time 5 | U16 | *0...2400* | 0...2400 | *2200* |
| *255* | Saturday switching time 1 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *256* | Saturday switching time 2 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *257* | Saturday switching time 3 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *258* | Saturday switching time 4 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *259* | Saturday switching time 5 target | U16 | *0 - 1 - 2 - 3 - 4* | | *1* |
| *260* | Sunday switching time 1 | U16 | *0...2400* | 0...2400 | *0600* |
| *261* | Sunday switching time 2 | U16 | *0...2400* | 0...2400 | *1000* |
| *262* | Sunday switching time 3 | U16 | *0...2400* | 0...2400 | *1300* |
| *263* | Sunday switching time 4 | U16 | *0...2400* | 0...2400 | *1700* |
| *264* | Sunday switching time 5 | U16 | *0...2400* | 0...2400 | *2200* |
| *265* | Sunday switching time 1 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *266* | Sunday switching time 2 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *267* | Sunday switching time 3 target | U16 | *0 - 1 - 2 - 3 - 4* | | *2* |
| *268* | Sunday switching time 4 target | U16 | *0 - 1 - 2 - 3 - 4* | | *3* |
| *269* | Sunday switching time 5 target | U16 | *0...2400* | 0...2400 | *1000* |
| *300* | Bus address. | U16 | *0...247* | 0...247 | *1* |
| *301* | Bus speed. | U16 | *0 - 1 - 2 - 3 - 4* | 0. 9600 bits/s<br>1. 19200 bits/s<br>2. 38400 bits/s<br>3. 57600 bits/s<br>4. 76800 bits/s | *0* |
| *302* | Bus parity. | U16 | *0 - 1 - 2* | 0. None<br>1. Odd<br>2. Even | *0* |
| *303* | Stop bits. | U16 | *0 - 1* | 0. 1 stop bit<br>1. 2 stop bits | *0* |
| *304* | Display refresh rate. | U16 | *0 - 1 - 2* | 0. Fast<br>1. Medium<br>2. Slow | *0* |
| *308* | Show language changing button on display. | U16 | *0 - 1* | 0. Disabled<br>1. Enabled | *0* |
| *400* | Reset device. | U16 | *0 - 1* | 0. N/A<br>1. Reset device | *0* |
| *401* | Non volatile memory update. | U16 | *0 - 1* | 0. N/A<br>1. Update memory | *0* |

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| Register | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *403* | Reset to factory defaults. | U16 | *0 - 1* | 0. N/A<br>1. Reset to defaults | *0* |

Legacy registers for backward compatibility:

| Register | Parameter description | Data type | Values | Range | Default |
|---|---|---|---|---|---|
| *1* | Device operation mode. Register can be used to switch to eco mode. Reset locally. | U16 | *0 - 1* | 0. Day mode<br>1. Eco mode (night) | *0* |
| *2* | Nominal temperature setpoint. | U16 | *0...95* | 0...95 °C/°F | *20* |
| *14* | Minimum setpoint. | U16 | *0...95* | 0...95 °C/°F | *14* |
| *15* | Maximum setpoint. | U16 | *0...95* | 0...95 °C/°F | *30* |
| *16* | Temperature control hysteresis. | U16 | *0...20* | 0...20 °C/°F | *1* |
| *18* | Frost guard function setpoint. | U16 | *0...95* | 0...95 °C/°F | *8* |
| *19* | Bus address. | U16 | *0...247* | 0...247 | *1* |

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# 5 BACnet

## 5.1 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 bit/s |
| Stop bits | 1 |
| Unit load | 1/2 UL |
| | * factory setting |

## 5.2 Analog input objects

| Object name | Values | Resolution | Units |
|---|---|---|---|
| *Room* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Outside* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Floor* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Setpoint* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Humidity* | *0...100* | *0.1* | *percent-relative-humidity (29)* |
| *RI_1* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *RI_2* | *-40...302* | *0.1* | *degrees-celsius (62)* |

## 5.3 Analog value objects

| Object name | Values | Resolution | Units |
|---|---|---|---|
| *Target Setpoint1* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Target Setpoint2* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Target Setpoint3* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Target Setpoint4* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *ECO Heating Setpoint* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *ECO Cooling Setpoint* | *-40...302* | *0.1* | *degrees-celsius (62)* |
| *Frost Setpoint* | *0...95* | *0.1* | *degrees-celsius (62)* |
| *Min. Limit* | *0...95* | *0.1* | *degrees-celsius (62)* |
| *Max. Limit* | *0...95* | *0.1* | *degrees-celsius (62)* |
| *Brightness* | *0...20* | *1.0* | *no-units (95)* |
| *Hysteresis* | *0...20* | *0.1* | *degrees-celsius (62)* |
| *Network Temp.* | *-58...122* | *0.1* | *degrees-celsius (62)* |
| *Nominal Setpoint* | *0...95* | *0.1* | *degrees-celsius (62)* |

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## 5.4 Binary input objects

| Object name | Values | Inactive/Active_Text | Default |
|---|---|---|---|
| *DI_1* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Cleaning* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Boost Status* | *0 - 1* | 0. Off<br>1. On | *0* |
| *DI2* | *0 - 1* | 0. Off<br>1. On | *0* |
| *DI3* | *0 - 1* | 0. Off<br>1. On | *0* |

## 5.5 Binary output objects

| Object name | Values | Inactive/Active_Text | Default |
|---|---|---|---|
| *Relay_1* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Off Status* | *0 - 1* | 0. Off<br>1. On | *0* |
| *ECO Status* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Lights* | *0 - 1* | 0. Off<br>1. On | *0* |
| *A/C* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Lock* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Change-Over* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Nonvol Update* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Hold* | *0 - 1* | 0. Off<br>1. On | *0* |
| *Relay_2* | *0 - 1* | 0. Off<br>1. On | *0* |

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## 5.6 Multi state input objects

| Object name | Values | State text | Default |
|---|---|---|---|
| *Device Mode* | *1 - 2 - 3 - 4* | 1. Comfort mode<br>2. Eco mode<br>3. Off mode<br>4. Boost mode | *1* |
| *Alarm* | *1...256* | 7-bit binary value. Bits are designated as follows:<br>0. Internal sensor<br>1. RI1 input<br>2. RI2 input<br>3. Humidity sensor<br>4. DI1 input<br>5. Not in use<br>6. Time lost<br>The alarm value is the binary value + 1. | *1* |

## 5.7 Proprietary objects

### 5.7.1 App. Config object

Required object properties:

| Property name | Properties | Value |
|---|---|---|
| Object identifier | Read | proprietary-128 |
| Object name | Read / write | App. Config |
| Object type | Read | proprietary-128 |

Optional properties: none

| Property ID | Values | Default | Description |
|---|---|---|---|
| *30106* | *1...256* | *1* | 7-bit binary value (read-only). Bits are designated as follows:<br>0. Internal sensor<br>1. RI1 input<br>2. RI2 input<br>3. Humidity sensor<br>4. DI1 input<br>5. Not in use<br>6. Time lost<br>The alarm value is the binary value + 1. |
| *40101* | *0.0...95.0* | *16.0* | Eco mode heating setpoint (°C/°F). |
| *40102* | *0.0...95.0* | *28.0* | Eco mode cooling setpoint (°C/°F). |
| *40103* | *0.0...95.0* | *8.0* | Off mode setpoint (°C/°F). |
| *40104* | *0.0...95.0* | *14.0* | Minimum setpoint (°C/°F). |
| *40105* | *0.0...95.0* | *30.0* | Maximum setpoint (°C/°F). |
| *40106* | *0.0...20.0* | *1.0* | Hysteresis (°C/°F). |

| Property ID | Values | Default | Description |
|---|---|---|---|
| *40107* | *0 - 1 - 2 … - 10* | *0* | RI1 input mode.<br>0. Disabled<br>1. Room (NTC 10, control)<br>2. Floor (NTC 10, high/low limit)<br>3. Outdoor (NTC 10)<br>4. Network NTC 10<br>5. Not in use<br>6. Close for Eco mode (digital input)<br>7. Open for Eco mode (digital input)<br>8. Close for Off mode (digital input)<br>9. Open for Off mode (digital input)<br>10.Network digital input |
| *40108* | *0 - 1 - 2 … - 10* | *0* | RI2 input mode.<br>0. Disabled<br>1. Room (NTC 10, control)<br>2. Floor (NTC 10, high/low limit)<br>3. Outdoor (NTC 10)<br>4. Network NTC 10<br>5. Not in use<br>6. Close for Eco mode (digital input)<br>7. Open for Eco mode (digital input)<br>8. Close for Off mode (digital input)<br>9. Open for Off mode (digital input)<br>10.Network digital input |
| *40109* | *0 - 1 - 2* | *0* | Control type.<br>0. Heating<br>1. Cooling<br>2. Heating/cooling (changeover) |
| *40110* | *0.0...95.0* | *18.0* | Minimum limit setpoint (°C/°F). |
| *40111* | *0.0...95.0* | *30.0* | Maximum limit setpoint (°C/°F). |
| *40112* | *0.0...10.0* | *1.0* | Min/max temperature limit hysteresis (°C/°F). |
| *40113* | *0 - 1 - 2 … - 7* | *1* | Digital input mode.<br>0. Disabled<br>1. Close for Eco mode<br>2. Open for Eco mode<br>3. Close for Off mode<br>4. Open for Off mode<br>5. Heating / cooling change-over<br>6. Alarm contact<br>7. Network DI |
| *40114* | *0...7200* | *0* | Digital input delay (seconds). |
| *40115* | *0 - 1* | *0* | Enable lighting button.<br>0. Disabled<br>1. Enabled |
| *40116* | *0 - 1* | *0* | Enable air conditioning button.<br>0. Disabled<br>1. Enabled |

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| Property ID | Values | Default | Description |
|---|---|---|---|
| *40118* | *0 - 1 - 2 - 3* | *0* | Lock mode.<br>0. Disabled<br>1. Off mode, lighting air conditioning buttons available.<br>2. Temperature setpoint buttons available.<br>3. All buttons unavailable |
| *40119* | *0 - 1* | *0* | Swap temperature unit button.<br>0. Disabled<br>1. Enabled |
| *40120* | *-10.0...10.0* | *0.0* | Internal temperature measurement tuning (°C/°F). |
| *40121* | *-10.0...10.0* | *0.0* | RI1 input tuning (°C/°F). |
| *40122* | *-10.0...10.0* | *0.0* | RI2 input tuning (°C/°F). |
| *40123* | *-10.0...10.0* | *0.0* | Humidity measurement tuning (%rH). |
| *40124* | *0 - 1* | *0* | Humidity display.<br>0. Disabled<br>1. Enabled |
| *40125* | *0...480* | *0* | Cleaning mode duration (seconds). |
| *40126* | *0...480* | *0* | Boost mode duration (minutes). 0 = disabled, 1...480 min |
| *40127* | *0...20* | *5* | Display backlight level. |
| *40128* | *0 - 1* | *0* | Relay operating direction.<br>0. Normally open<br>1. Normally closed |
| *40129* | *0000...9999* | *0000* | Lock mode password. |
| *40130* | *0000...9999* | *6666* | Configuration mode password. |
| *40134* | *0 - 1* | *1* | Holiday mode button.<br>0. Disabled<br>1. Enabled |
| *40135* | *0 - 1* | *0* | Holiday mode target.<br>0. Off mode<br>1. Eco mode |
| *40137* | *0000...9999* | *0000* | Staff mode password. |
| *40138* | *0 - 1 - 2 … - 9* | *0* | Language.<br>0. English<br>1. Finnish<br>2. Swedish<br>3. Italian<br>4. Dutch<br>5. French<br>6. Polish<br>7. Spanish<br>8. Catalan<br>9. Basque |

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| Property ID | Values | Default | Description |
|---|---|---|---|
| *40139* | *1 - 2 - 3 … - 15* | *1* | Zone 1 room sensor text on the display.<br>1. *Room*<br>2. *Floor*<br>3. *Outside*<br>4. *Zone 1*<br>5. *Zone 2*<br>6. *Zone 3*<br>7. *Bathroom*<br>8. *Sauna*<br>9. *Bedroom*<br>10.*Kitchen*<br>11.*Cooler*<br>12.*Flow*<br>13.*Hot water*<br>14.*Tank*<br>15.*Pool* |
| *40140* | *0 - 1 - 2 … - 15* | *2* | Zone 2 floor sensor text on the display.<br>0. Disabled<br>1. *Room*<br>2. *Floor*<br>3. *Outside*<br>4. *Zone 1*<br>5. *Zone 2*<br>6. *Zone 3*<br>7. *Bathroom*<br>8. *Sauna*<br>9. *Bedroom*<br>10.*Kitchen*<br>11.*Cooler*<br>12.*Flow*<br>13.*Hot water*<br>14.*Tank*<br>15.*pool* |
| *40141* | *0 - 1 - 2 … - 15* | *3* | Zone 3 outdoor sensor text on the display.<br>0. Disabled<br>1. *Room*<br>2. *Floor*<br>3. *Outside*<br>4. *Zone 1*<br>5. *Zone 2*<br>6. *Zone 3*<br>7. *Bathroom*<br>8. *Sauna*<br>9. *Bedroom*<br>10.*Kitchen*<br>11.*Cooler*<br>12.*Flow*<br>13.*Hot water*<br>14.*Tank*<br>15.*pool* |
| *40160* | *-* | *0* | Not in use. |

| Property ID | Values | Default | Description |
|---|---|---|---|
| *40162* | *0 - 1* | *0* | Reset setpoint when changing from comfort operation mode to off mode.<br>0. Enabled<br>1. Disabled |
| *40163* | *0 - 1* | *0* | Off mode button.<br>0. Disabled<br>1. Enabled |
| *40300* | *0...127* | *1* | Bus address. |
| *40301* | *0 - 1 - 2 - 3 - 4* | *0* | Bus speed.<br>0. 9600 bits/s<br>1. 19200 bits/s<br>2. 38400 bits/s<br>3. 57600 bits/s<br>4. 76800 bits/s |
| *40302* | *0 - 1 - 2* | *0* | Bus parity.<br>0. None<br>1. Odd<br>2. Even |
| *40303* | *0 - 1* | *0* | Stop bits.<br>0. 1 stop bit<br>1. 2 stop bits |
| *40304* | *0 - 1 - 2* | *0* | Display refresh rate.<br>0. Fast<br>1. Medium<br>2. Slow |
| *40308* | *0 - 1* | *0* | Show language changing button on display.<br>0. Disabled<br>1. Enabled |
| *40400* | *0 - 1* | *0* | Reset device.<br>0. N/A<br>1. Reset device |
| *40401* | *0 - 1* | *0* | Non volatile memory update.<br>0. N/A<br>1. Update memory |
| *40403* | *0 - 1* | *0* | Reset to factory defaults.<br>0. N/A<br>1. Reset to defaults |

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# 6 Disposal

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

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

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

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