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USER GUIDE

TRC-P

Produal

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TRC-P - Touchscreen room controller

User Guide

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

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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.

1.1 Intended use

TRC room controllers are intended to control temperature, humidity, CO_2 and air flow in room environment, for example.

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

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2 Functional description

2.1 Control functions

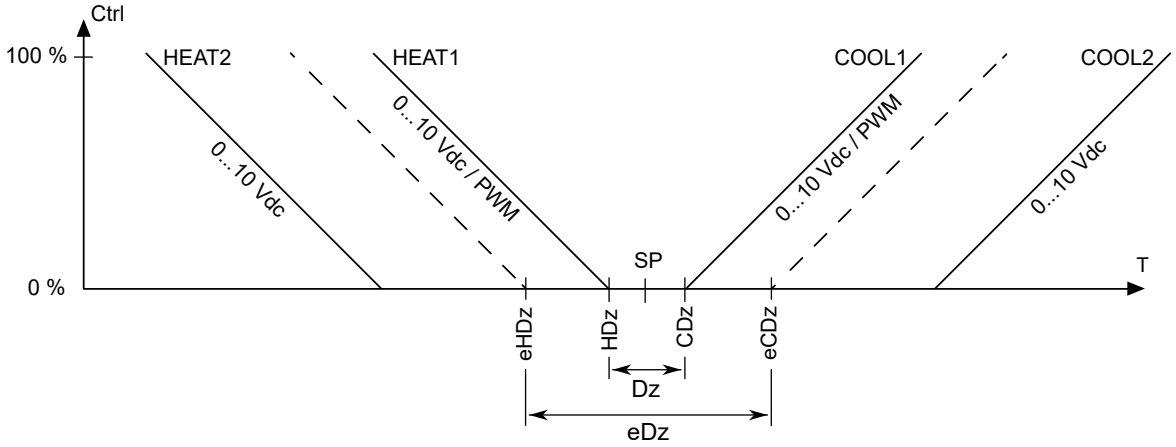
2.1.1 Temperature control

The temperature control can have up to two heating stages and cooling stages (as a default, one heating stage and one cooling stage), and can also automatically change-over from heating to cooling by using digital input, temperature measurement or network value.

There are various control configurations available:

- One or two stage heating control
- One or two stage cooling control
- One or two stage heating and one or two stage cooling control (up to three outputs)
- One stage change-over heating and cooling control

The controller modulates the heating and cooling demand outputs according to the setpoint (*SP*) and the measured temperature. The control can be P or PI control.



Between the first heating and cooling stages is a dead zone. In the dead zone, the cooling and heating control signals are 0 %. If the PI control is used, the temperature must remain in the dead zone for a prolonged period before the heating and cooling signals are controlled to 0 %. The controller has a function that prevents cooling and heating control to be on simultaneously.

The dead zone has individual settings (*HDz* and *CDz*) for heating and cooling, that allows asymmetrical setting. For example, in some applications it is important that the cooling starts to respond to temperature changes faster than heating.

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

The setpoint and dead zone change according to the operating modes as follows:

- 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 nominal setpoint remains unchanged. The user adjustment is disabled and the Eco mode dead zone settings are used.
- Off mode; temperature setpoint is set to Off mode setpoint and the control changes to thermostatic mode. The user setpoint adjustment is disabled.

The control outputs can be set to direct or reverse. The reversed control output changes the actuator running direction (e.g. valve drives from 100 % to 0 %). The output direction can be configured individually for each control stage.

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2.1.2 Auxiliary heating control

The controllers have an auxiliary heating temperature control. The auxiliary control provides additional PI control function for applications where second control loop is required, for example second temperature control for bathrooms. The auxiliary control is activated by selecting *Aux control* for RI1 or RI2 input and *Aux. loop* for one output.

The auxiliary heating temperature control setpoint can be adjusted through the configuration mode and via Modbus.

2.1.3 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).

The change-over function uses the heating stages 1 and 2, and cooling stages 1 and 2.

An input (DI1/RI1/RI2) can be selected to control change-over function under controller settings. Input can control the change-over function according to temperature value or a contact switch. The input can be also controlled directly from BMS system in models with communication bus.

If RI1 or RI2 is selected to be used with change-over, the controller switches to heating when the temperature exceeds 25 °C and to cooling when the temperature drops below 20 °C. These temperature limits are adjustable.

2.1.4 High and low limit temperature control

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. The limit function is enabled by setting the *Limit Ratio* parameter (default value is 0.0 = disabled).

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

In high limit control, if the external temperature exceeds the high limit setpoint, the main control setpoint is reduced by the amount set in *Limit Ratio* parameter. For example, if the value is 2.0, for every degree that the external temperature exceeds the high limit setpoint, the main control setpoint is lowered by 2.0 degrees.

The low limit control works in reverse. If the external temperature drops below the low limit setpoint, the main control setpoint is increased by the amount set in *Limit Ratio* parameter for every degree that the external temperature is below the low limit setpoint.

The setpoint is adjusted by using the following formula: Setpoint adjustment = (limit setpoint - measured temperature) * *Limit Ratio*

Note: The function is disabled in off operation mode.

2.1.5 Fan speed control

Fan speed control adjusts the fan speed based on the ventilation demand. The fan speed can be configured to follow different control outputs. The following options are available:

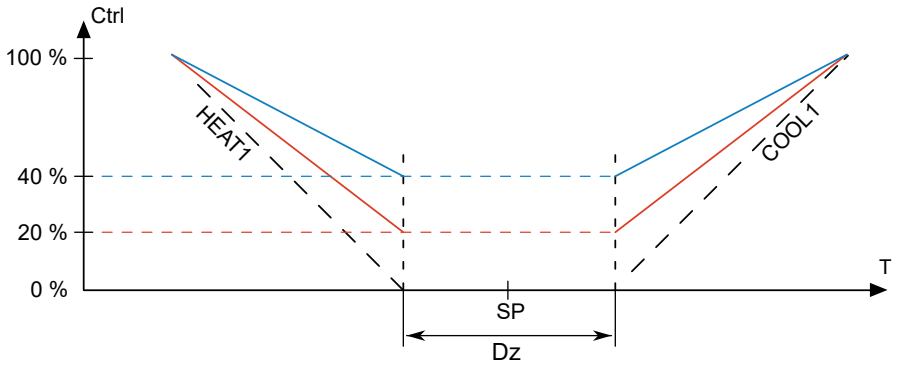
- Heating and cooling stage 1 (factory setting)
- Heating stage 1
- Cooling stage 1
- Heating and cooling stage 2
- Heating stage 2
- Cooling stage 2
- CO_2 control
- Humidity control
- De-humidity control
- Maximum of cooling stage 1 and CO_2 control

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- Maximum of heating stage 1, cooling stage 1 and humidity control

When using factory settings, the fan speed control follows the heating and cooling stage 1. For example if the heating stage 1 output is 55 %, and the minimum fan level is set to 0 %, the fan speed output is 55 %.

Minimum fan level setting is used to set the minimum fan speed during the operation in comfort mode. The fan output is scaled between the minimum fan level and maximum level (100 %). The fan speed is 0 % in the dead zone unless fan off delay is set to 0 (factory setting, the fan speed is kept at minimum level in the dead zone). See the following diagram for example.



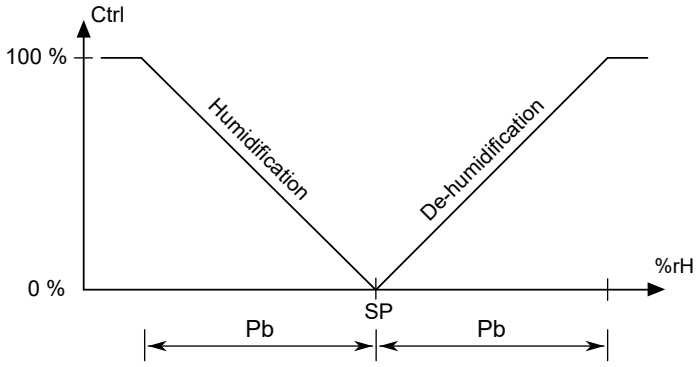
The fan off delay defines how long the fan runs in the dead zone. For example, by setting the fan off delay to 30 seconds, the fan switches off after the heating and cooling demand has been in the dead zone for 30 seconds.

The fan maximum speed can be set in output settings by using output scaling. Y1 is the factory setting for the fan control output.

The fan is off in off mode unless the temperature drops below the off mode temperature. Fan speed is controlled to 33 % if the temperature is below the off mode temperature setting.

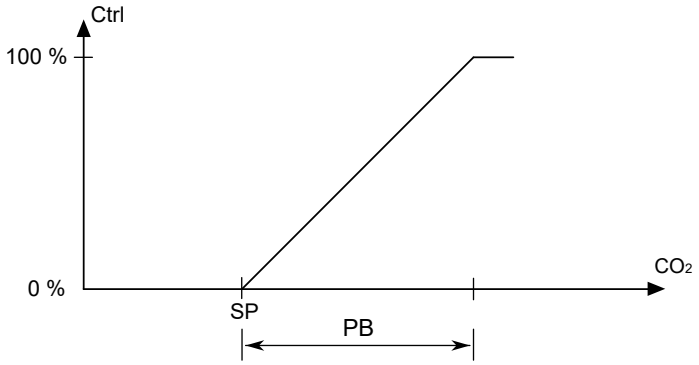
2.1.6 Humidity control

The humidity measurement and control is available in -RH models. The humidity control can be used in demand based control applications to increase the fresh air supply, for example when the humidity level is high. The controller can control both de-humidification and humidification and the control signals can be directed to any of the analogue outputs (Y1, Y2, or Y3). The direction of the outputs can also be reversed.



2.1.7 CO_2 control

The CO_2 measurement and control is available in -CO2 models. The CO_2 control can be used in demand based control applications to increase the fresh air supply, for example when the CO_2 level is high. The control signal can be directed to any of the analogue outputs (Y1, Y2, or Y3), or it can be used in maximum demand control (*MAX VAV*, *MAX FAN* options). The direction of the outputs can also be reversed.



The CO_2 control output (*Ctrl*) corresponds to the CO_2 setpoint (*SP*) and the CO_2 proportional band (*Pb*). If the output is configured to be direct, When the CO_2 level rises above the setpoint, the output starts to rise to 100 %. The proportional band defines how fast the control output rises 100 %. The CO_2 control supports both P and PI control.

In the eco and off modes the CO_2 control output is set to 0 %.

2.1.8 Maximum selection control

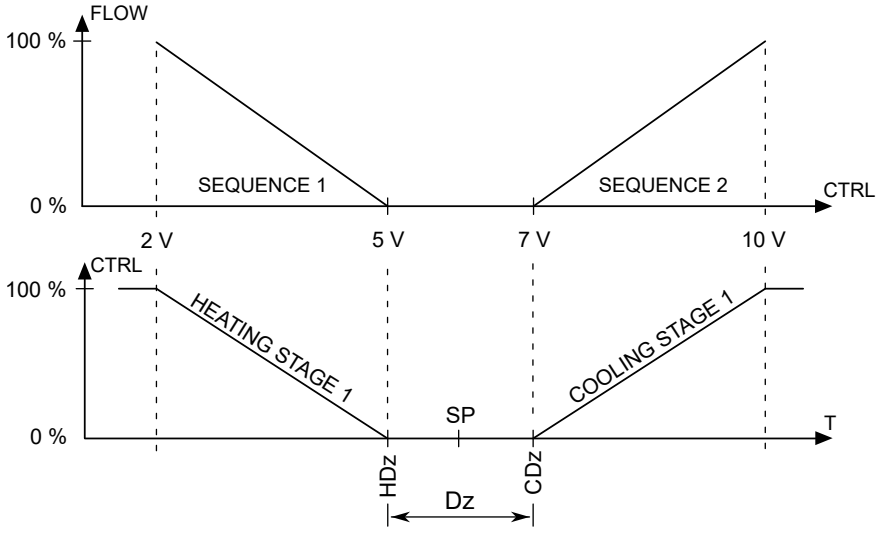
All analogue outputs can be configured to be controlled according to maximum value of the selected control values. There are two selections available for the maximum selection control, *Max. VAV* and *Max. Fan*.

With *Max. VAV* selection, the corresponding output takes the maximum of the CO_2 and cooling control. This is typically used in demand based ventilation (VAV) to control fresh air supply when there is either demand for more fresh air, or demand for cooling.

With *Max. Fan* selection, the corresponding output takes the maximum of CO_2 and fan speed control. This can used to boost fans speed at high CO_2 level and when the fan speed temperature control demand has increased.

2.1.9 6-way valve control

The controller can be configured to control Belimo's 6-way valve via an analogue output (Y1/Y2/Y3). The 6-way valve is controlled according to the heating stage 1 and cooling stage 1. The control can also be reversed. See the following diagram for more information about the control.



Note: The analogue output scaling and valve jam prevention function are not available for 6-way valve control output.

2.2 Operation modes

The device has five operation modes that have their own control settings. The operation modes are called comfort, eco, boost, lock 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

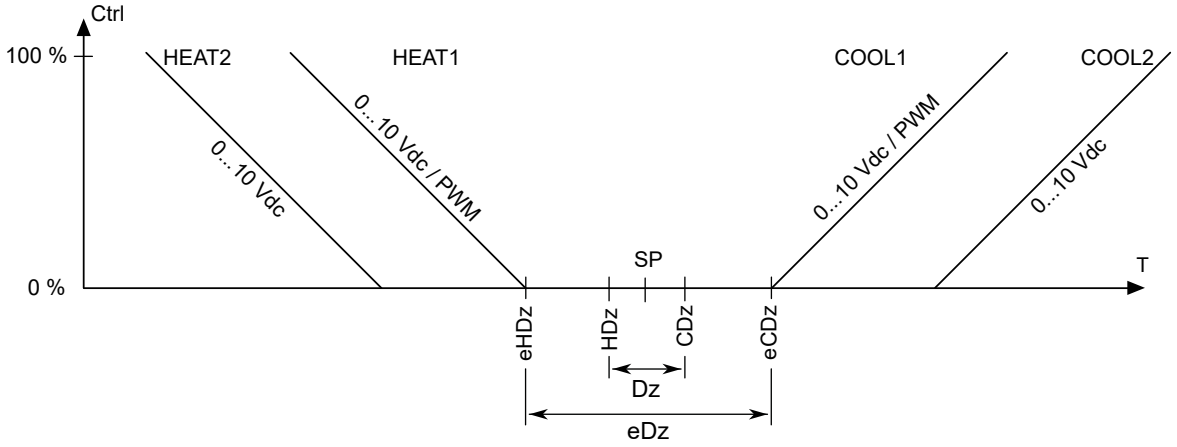
2.2.1 Comfort mode

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, via digital input (e.g. occupancy detection) or via display button.

In the eco mode the controller controls the temperature according to eco mode dead zone (*eDz*) and the user setpoint adjustment is reset.



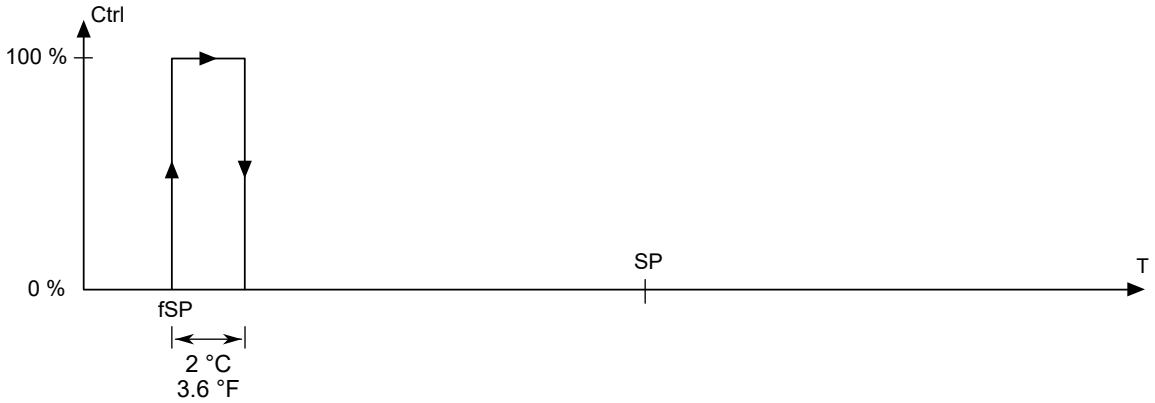
In the eco mode the CO_2, humidity and auxiliary controls are set to 0 %.

The eco mode can be activated by pressing the operation mode button and selecting the eco mode (). The eco mode can be cancelled by pressing the operation mode button and selecting another operation mode.

2.2.3 Off mode

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

In the off mode, all temperature, CO_2 and humidity control output signals are 0 %.



If the temperature drops below the off mode setpoint (*fSP*), is displayed, the heating stages are controlled to 100 %, and the fan speed is controlled to 33 %. 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 by pressing the operation mode button and selecting the off mode (). The off mode can be cancelled by pressing the operation mode button and selecting another operation mode.

2.2.4 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 button available.
Adjust Only	Temperature setpoint buttons available.
No Input	All buttons unavailable.

A lock mode protection code can be set via the configuration mode. 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.

2.2.5 Boost mode

Boost mode can be set to boost selected control output. The device can be switched to boost mode via network, via digital input (e.g. occupancy detection) or via display button ().

The boost mode sets the selected control output to 100 % for the set boosting time. The following options are available:

Selection	Description
Nominal SP	The boost mode affects to the temperature control setpoint.
CO2 SP	The boost mode affects to the CO_2 control setpoint.
Humidity SP	The boost mode affects to the humidification control setpoint.
DeHum SP	The boost mode affects to the de-humidification control setpoint.
Fan Demand	The boost mode affects to the fan control.
Aux. SP	The boost mode affects to the auxiliary temperature control setpoint.

The boost time can be adjusted to 0...480 minutes. If the time is set to 0, the boost mode stays active until either cancelled through the display (button) or over the network. The remaining boost time is viewed on the display.

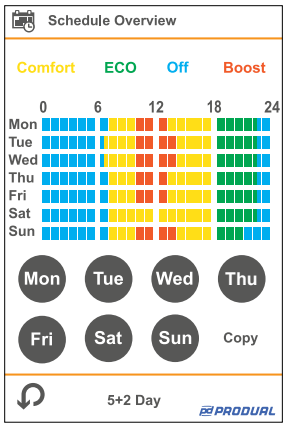
If a digital input is set to operate boost function, the boost mode can't be cancelled through the display, and the boost is active until the input state changes.

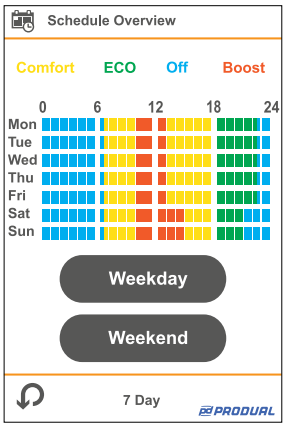
2.3 Calendar functions

The controllers have up to five programmable switching times for changing the operation mode. The times and operation modes can be set separately for all days, or to 5+2 day mode where the settings are made separately for weekdays and weekends.

Schedule overview display shows the current switching times and operation modes.

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Times and operating modes 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 and analogue inputs in AI models.

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.
Room	The input is used for the main temperature control (NTC 10). This allows external temperature sensor to be used for the main temperature control. The internal temperature sensor is disabled from the control.
Floor	The input is used for high and low temperature limit. When *Floor* is selected, the secondary information view starts to display the temperature (the measurement text is selectable). If both resistive inputs are set to *Floor*, RI1 takes precedence.
Aux. loop	The input is used for auxiliary temperature control input and outside temperature display input. When the *Aux. loop* is selected, secondary information view starts to display the temperature (the measurement text is selectable). If both resistive inputs are set to *Aux. loop*, RI1 takes precedence.
Heating/ Cooling	The input is used for switching between cooling and heating modes according to the measured temperature (changeover function)
Network NTC10	The input is available over the communication network as temperature measurement (NTC 10).
Network 0-10V	The input is available over the communication network as temperature measurement (0...10 Vdc = 0...100 %). This function is available in AI models.
CO2	The input is used for CO_2 measurement (0...10 V = 0...2000 ppm). This function is available in AI models.
Main loop	The input is used for the main temperature control (0...10 Vdc = 0...50 °C). This function is available in AI models.
Close for ECO	The input is used as a contact for activating the eco mode. The eco mode activates when the contact closes.
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.

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Selection	Description
Open for OFF	The input is used as a contact for activating the off mode. The off mode activates when the contact opens.
Humidity	The input is used for humidity measurement (0...10 V = 0...100 %rH). This function is available in AI models.

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
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.
Change-Over	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.
Disable Cooling	The input is used to disable cooling. The cooling is disabled when the contact is closed.
DI Contact Alarm	When the contact closes, "DI Contact Alarm" alarm message is viewed on the display.
Close for BOOST	The input is used for activating the boost mode. The boost mode activates when the contact closes. This function is available in -CE models.
Open for BOOST	The input is used for activating the boost mode. The boost mode activates when the contact opens. This function is available in -CE models.
Network	The input is available over the communication network as digital input.

2.4.3 Analogue inputs

RI1 and RI2 inputs are analogue (0...10 Vdc) inputs in -AI models. Input information can be used for different control and display purposes.

The following options are available:

Selection	Description
Network 0-10V	The input is available over the communication network (0...10 Vdc = 0...100 %).
CO2	The input is used for CO_2 measurement (0...10 V = 0...2000 ppm).
Main loop	The input is used for the main temperature control (0...10 Vdc = 0...50 °C).
Humidity	The input is used for humidity measurement (0...10 V = 0...100 %rH).

2.5 Outputs

2.5.1 Analogue outputs

The controller has three analogue 0...10 Vdc outputs that are typically used as control outputs.

The following options are available:

Selection	Description
Network	The output is controlled from communication network.
Htg Stage 1	The output is controlled by heating stage 1.
Htg Stage 2	The output is controlled by heating stage 2.
Clg Stage 1	The output is controlled by cooling stage 1.
Clg Stage 2	The output is controlled by cooling stage 2.
Modulating Fan	The output is controlled by fan control output.
CO2	The output is controlled by CO_2 control output. This function is available in -CO2 models.
Max. VAV	The output is controlled by maximum selection of cooling stage 1 and CO_2 control output.
Max. Fan	The output is controlled by maximum selection of CO_2 and fan control output.
Humidification	The output is controlled by humidification control output.
De-Humidification	The output is controlled by de-humidification control output.
Amber/Red	The output is controlled by red and amber alarms. The output value is 50 % when amber or red alarm is active.
Red	The output is controlled by red alarm. The output value is 100 % when red alarm is active.
Htg Stage 1 Stat	Relay output setting (this function is available in models with relay outputs). The output switches on when heating stage 1 control rises to 10 % or over. The output switches off when the heating stage 1 control is 0 %.
Clg Stage 1 Stat	Relay output setting (this function is available in models with relay outputs). The output switches on when cooling stage 1 control rises to 10 % or over. The output switches off when the cooling stage 1 control is 0 %.
Fan Stat	Relay output setting (this function is available in models with relay outputs). The output switches on when fan control rises to 10 % or over. The output switches off when the fan control is 0 %.
Aux. Loop	The output is controlled by auxiliary heating control output.
6-Port	The output is used to control Belimo's 6-way valve.
6-Port reverse	The output is used to control Belimo's 6-way valve in reverse mode.

2.5.1.1 Analogue output scaling

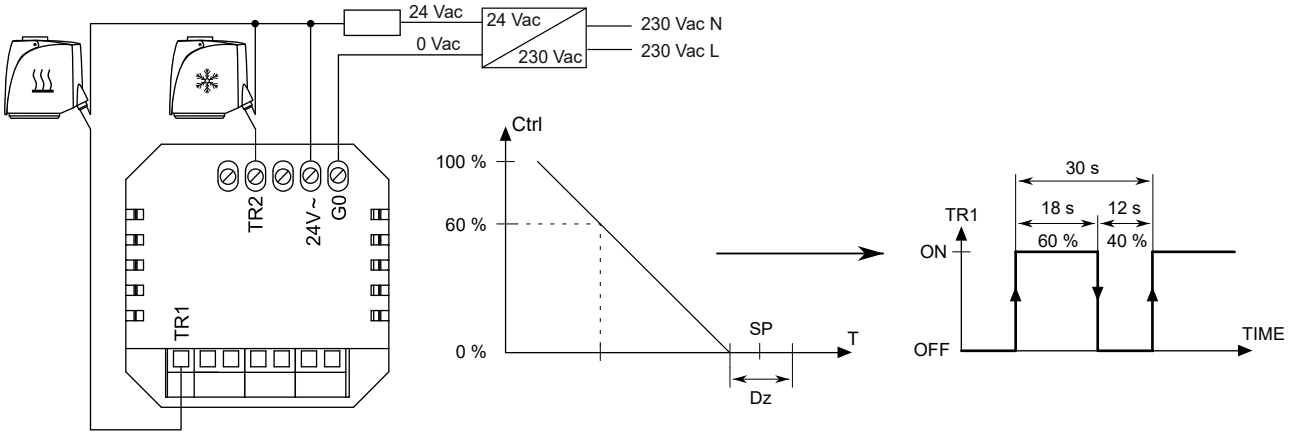
Each of the analogue outputs (Y1, Y2, Y3) can have minimum and maximum output voltage (percentage). The connected control output is scaled from minimum voltage to maximum voltage.

For example in the EC fan control, if the fan is wanted to run always at minimum level, the minimum control output voltage can be set to 10 % (1 V). Also, the maximum output can be limited to 70 % (7 V) to keep fan noise levels down. In this case the control output (0...100 %) is scaled to 10...70 % for the analogue output.

2.5.2 PWM outputs

xx2T models has two digital triac outputs that are switching to 0 V. These outputs are used to control heating and cooling valves. By setting the PWM period to 0, the output operates as on/off output. In this case, the output switches on at 10 % and off at 0 %.

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The source of the thermal actuator control can be selected separately for each output. The following options are available:

Selection	Description
Htg Stage 1	The output is controlled by heating stage 1.
Htg Stage 2	The output is controlled by heating stage 2.
Clg Stage 1	The output is controlled by cooling stage 1.
Clg Stage 2	The output is controlled by cooling stage 2.
CO2	The output is controlled by CO_2 control output. This function is available in CO2 models.
Humidification	The output is controlled by humidification control output.
De-Humidification	The output is controlled by de-humidification control output.
Aux. Loop	The output is controlled by auxiliary heating control output.
Network	The output is controlled from communication network.

2.5.3 Relay outputs for fan

TRC-P-H-2A3R and TRC-P-H-3R2T have three relay outputs that can be used to control 3-speed fans. The relay 1 is switched on at approx. 30 % of fan demand, relay 2 is switched on at approx. 60 % of fan demand and relay 3 is switched on at approx 90 % of fan demand. Only one relay is on at the same time. The relays are switched off when the fan demand is approx 20 % below on level.

To enable fan relay outputs, set the Y1 output setting to *Modulating fan* (factory setting).

Important: These products have different ratings for the relay output maximum current. See the product wiring diagram for the correct relay details.

2.5.4 Relay outputs for heating and cooling

TRC-P-H-1A2R models have two relays that can be used to on/off heating and cooling. The relay 1 follows the Y1 output setting and the relay 2 follows the Y2 output setting.

The following options are available:

Selection	Description
Htg Stage 1 Stat	The output switches on when heating stage 1 control rises to 10 % or over. The output switches off when the heating stage 1 control is 0 %.
Htg Stage 1 Stat	The output switches on when cooling stage 1 control rises to 10 % or over. The output switches off when the cooling stage 1 control is 0 %.
Fan Stat	The output switches on when fan control rises to 10 % or over. The output switches off when the fan control is 0 %.

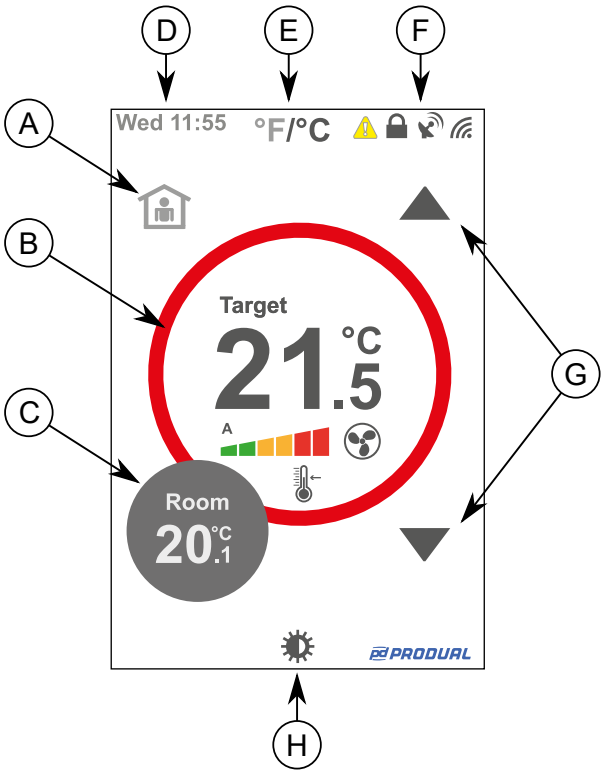
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2.5.5 Valve jam prevention function

Valve jam prevention function monitors actuator outputs for inactivity. If the actuators have been fully closed or fully open longer than the set period, the controller will open/close the outputs to by 30 % for a short period of time.

The valve jam prevention function is not available for 6-way valve control output.

2.6 User interface



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

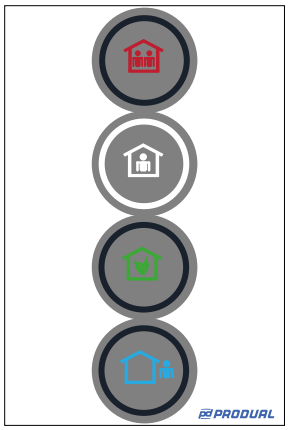
The user interface includes touch sensitive areas that can be used to change the device settings.

- 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 fan speed.
- 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.

2.6.1 Operation mode button

The operation mode button shows the current operation mode. When the button is pressed, the operation mode selection view is displayed.

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Symbol	Description
	Boost mode.
	Comfort mode.
	Eco mode.
	Off mode.

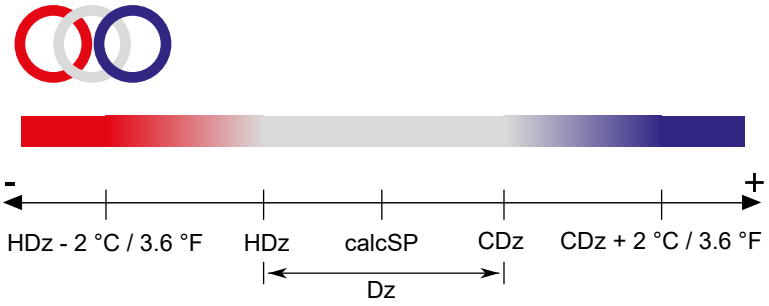
2.6.2 Main information view



Symbol	Description
	Energy ring. The energy ring colour illustrates how far the measured temperature is from the setpoint.
21.5 °C Target	Setpoint view.
A	Fan speed view and adjustment button.
	Low and high temperature limit indicator.

2.6.2.1 Energy ring colours

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



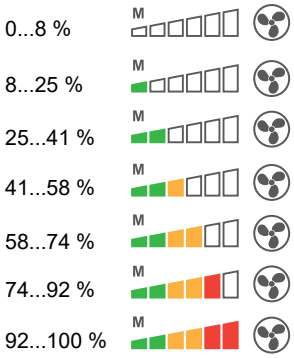
2.6.2.2 Fan speed view and button

Fan speed is displayed using coloured bar and rotating fan symbol. The display can be enabled through the configuration mode.

Following options are available:

- No fan display (factory setting)
- Speed viewing only
- Off/on
- 2-speed
- 3-speed
- 6-speed

'A' is displayed above the coloured bar when the fan speed control is automatic. The number of bars displayed depends on the fan speed. See the following figure for examples.



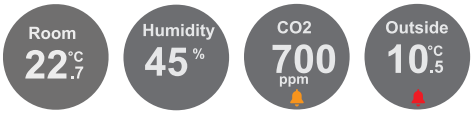
The user can control the fan speed by using the fan speed view on the main information view. The wanted speed can be set by touching the view multiple times. When the manual fan speed is set, 'M' is displayed above the coloured speed bar.

Note: When the fan speed is set manually, the minimum fan speed parameter is ignored.

In ECO mode, the manual speed setting is available. In OFF mode, the manual speed setting is disabled.

2.6.3 Secondary information view and action button

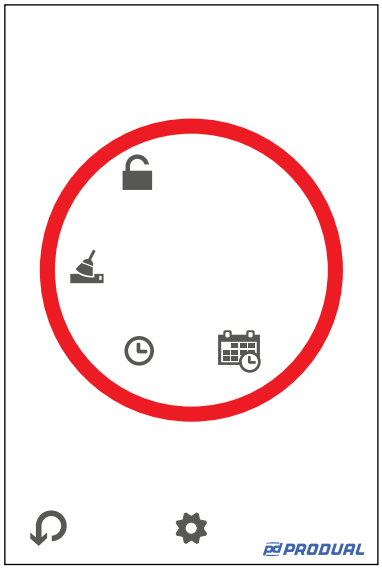
Secondary information view shows measurement information and alarms.



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.

2.6.3.1 Additional settings view

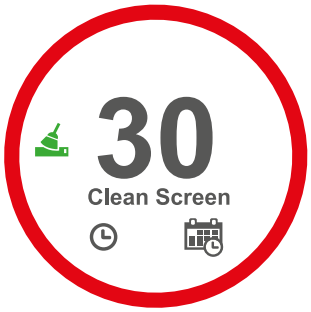
The additional settings view can be accessed by pressing the secondary information view.



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.
	Time setting button.
	Calendar button. The button is used to access the calendar management view.
	Configuration mode button. The button is used to access configuration mode.
	Escape button. The button is used to exit the additional settings view.

2.6.3.2 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 and 30 second countdown timer is displayed. This allows cleaning the touchscreen display.



2.6.4 Display backlight

The display backlight has three 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.

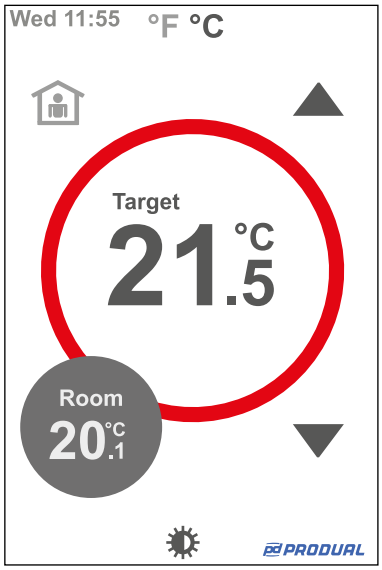
The backlight level can also be controlled by pressing button. Pressing the button when the display backlight is in normal level, the backlight changes to stand-by level. Pressing the button when the backlight is in stand-by level, the backlight switches off.

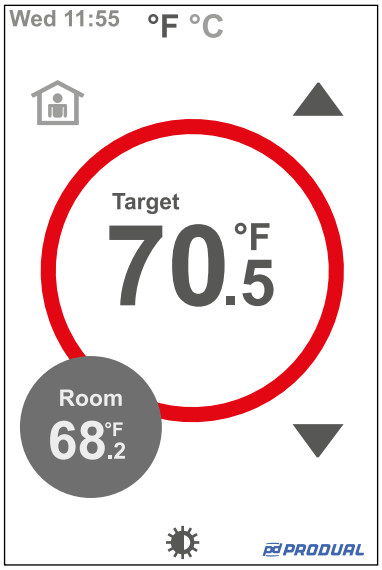
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The display backlight stand-by level can be adjusted through the configuration mode.

2.6.5 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.





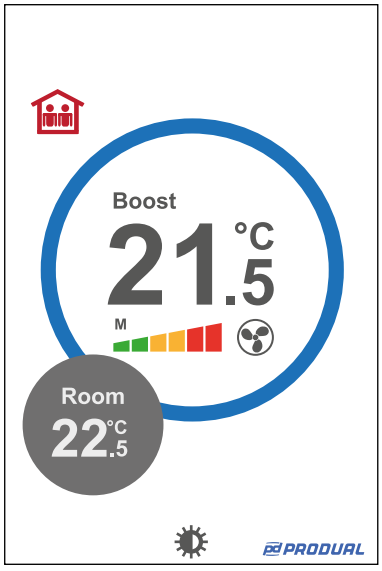
It is also possible to select temperature unit for the display at the commissioning through the configuration mode (*Native Units (Defaults)*).

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

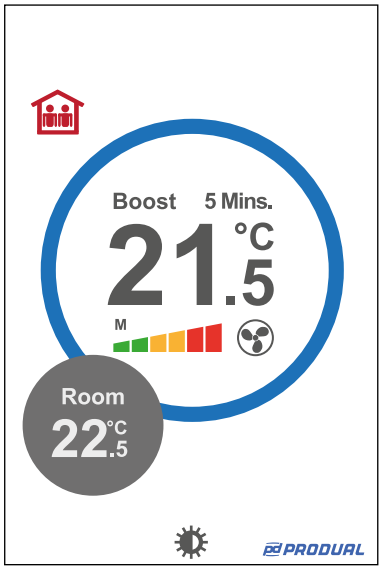
2.6.6 Boost mode view

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

The view depends on the boosting time settings. If the boost time is set to 0 minutes, the boost mode is indicated as in the following figure.

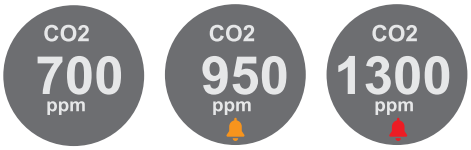


If the boost time is not 0 minutes, the remaining boosting time is viewed on the display.



2.6.7 Alarm views

The device has two configurable alarms that are viewed in secondary information view. Alarms are disabled by default.



The alarm sources can be temperature (internal or external), CO_2, or humidity measurements. The alarm function can be disabled by setting the alarm source to *none*.

Alarms have three states, which are no alarm, amber alarm (🔔) and red alarm (🔔). The alarm is displayed below the measurement that causes the alarm. The alarm is displayed only when the corresponding measurement is displayed.

To setup a high limit alarm set the red alarm limit higher than the amber alarm limit:

- If measured value ≥ amber alarm limit -> 🔔
- If measured value ≥ red alarm limit -> 🔔

Hysteresis prevents the alarm to return to a lower alarm level until the measured value drops low enough.

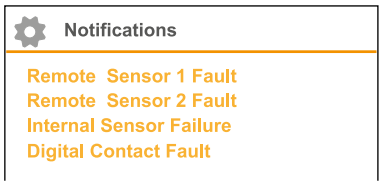
To setup a low limit alarm set the amber alarm limit higher than the red alarm limit:

- If measured value ≤ amber alarm limit -> 🔔
- If measured value ≤ red alarm limit -> 🔔

Hysteresis prevents the alarm to return to a lower alarm level until the measured value rises high enough.

2.6.8 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.

2.6.9 Display language

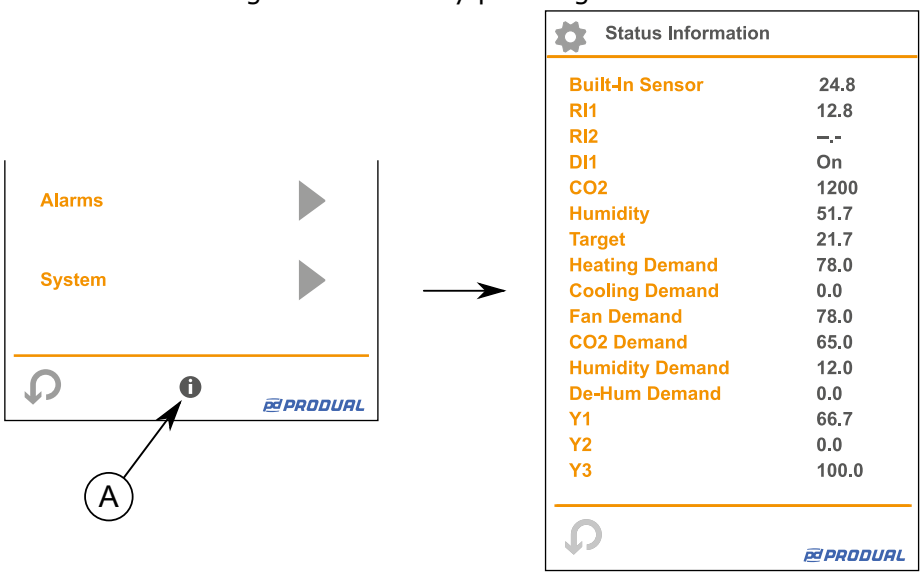
The user interface can be displayed in different languages. The language can be selected via configuration mode.

The following languages are available.

EN	English
FR	French
ES	Spanish

2.6.10 Status information view

Status information view shows the current measurement and output information. The view can be accessed via configuration view by pressing status information button (ⓘ).



A. Status information button

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.

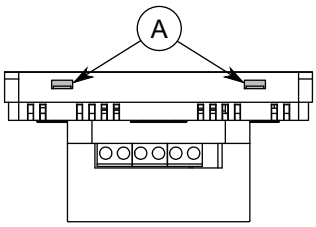
   The device location should be selected carefully. All the error factors that can affect to the measurements should be eliminated as well as possible. The following list defines the typical measurement error factors.

   - 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.

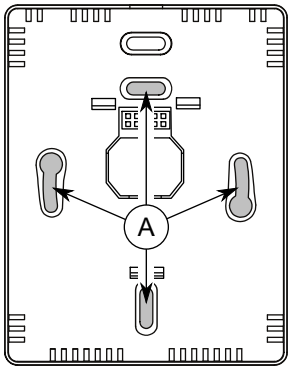


   A. Locking clips

   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.

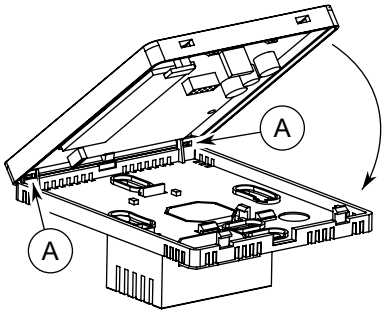


A. Mounting points

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.

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.

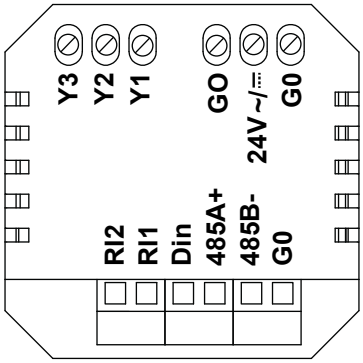
CAUTION: Use single stranded wires or use wire end sleeves if multi stranded wires are used.

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3.2.1 Wiring TRC-P-3A

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.

Important: The supply voltage source must be the same in the controller and in the connected 24 Vac devices.



Y3	Analogue output 3, 0...10 Vdc, configurable (the default function is cooling stage 1)
Y2	Analogue output 2, 0...10 Vdc, configurable (the default function is heating stage 1)
Y1	Analogue output 1, 0...10 Vdc, configurable (the default function is fan speed)
G0	0 V, common
24V	Supply, 24 Vac/dc
G0	0 V, common
RI2	External temperature sensor input 2, NTC 10 (0...10 Vdc with AI option)
RI1	External temperature sensor input 1, NTC 10 (0...10 Vdc with AI option)
Din	Digital input, potential free contact
485A+	Modbus RTU / BACnet MS/TP, RS-485
485B-	
G0	0 V, common

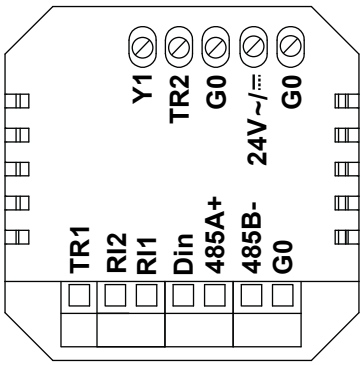
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3.2.2 Wiring TRC-P-1A2T

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.

Important: Outputs *TR1* and *TR2* are switching *G0*. Connect the thermal actuators between *TR1* or *TR2* output and *G* (24 Vac).

Important: The supply voltage source must be the same in the controller and in the connected 24 Vac devices.

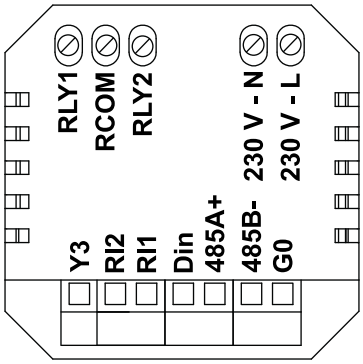


Y1	Analogue output 1, 0...10 Vdc, configurable (the default function is fan speed)
TR2	Triac output 2, 24 Vac, max. inrush 1 A (switching to 0 V), configurable (the default function is cooling) **Important:** The maximum wire length is 30 m.
G0	0 V, common
24V	Supply, 24 Vac/dc
G0	0 V, common
TR1	Triac output 1, 24 Vac, max. inrush 1 A (switching to 0 V), configurable (the default function is heating) **Important:** The maximum wire length is 30 m.
RI2	External temperature sensor input 2, NTC 10 (0...10 Vdc with AI option)
RI1	External temperature sensor input 1, NTC 10 (0...10 Vdc with AI option)
Din	Digital input, potential free contact
485A+	Modbus RTU / BACnet MS/TP, RS-485
485B-	
G0	0 V, common

3.2.3 Wiring TRC-P-H-1A2R

WARNING: This product is appliance class III product according to IEC 60664-1.

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.



RLY1	Relay output 1, 230 V / 7 A (res.), e.g. heating **Important:** The maximum load (7 A, res.) is common for both outputs.
RCOM	Relay outputs, common **WARNING:** Add an external fuse to relay common connector. Use a time-lag fuse or a circuit breaker (max 10 A). The product doesn't have an internal fuse for the relays.
RLY2	Relay output 2, 230 V / 7 A (res.), e.g. cooling **Important:** The maximum load (7 A, res.) is common for both outputs.
230 V - N	90...250 Vac, neutral
230 V - L	90...250 Vac, live
Y3	Analogue output, 0...10 Vdc, configurable (e.g. fan speed)
RI2	External temperature sensor input 2, NTC 10 (0...10 Vdc with AI option)
RI1	External temperature sensor input 1, NTC 10 (0...10 Vdc with AI option)
Din	Digital input, potential free contact
485A+	Modbus RTU / BACnet MS/TP, RS-485
485B-	
G0	0 V, common

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3.2.4 Wiring TRC-P-H-2A3R

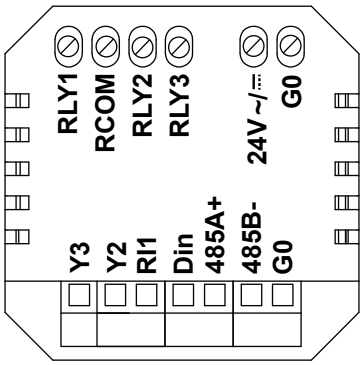
WARNING: This product is appliance class III product according to IEC 60664-1. The product may only be connected to SELV (safety extra low voltage) electricity network.

WARNING: Fuse at load supply (normally 6 A, 10 A, 16 A) does not always limit the relay output load current to 4 A. The relay maximum load is 1000 VA (250 V x 4 A res.). Maximum inductive load is 2.2 A.

CAUTION: The relay connection wiring cross sections must be adapted to the overload protection conditions (max. 6 A). The wirings must always comply with local regulations.

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

Important: The supply voltage source must be the same in the controller and in the connected 24 Vac devices.



RLY1	Relay output 1, 230 V / 4 A (res.), fan speed 1
RLCOM	Relay outputs, common **WARNING:** Add an external fuse to relay common connector. Use a time-lag fuse or a circuit breaker (max 6 A). The product doesn't have an internal fuse for the relays.
RLY2	Relay output 2, 230 V / 4 A (res.), fan speed 2
RLY3	Relay output 3, 230 V / 4 A (res.), fan speed 3
24V	Supply, 24 Vac/dc
G0	0 V, common
Y3	Analogue output 3, 0...10 Vdc, configurable (the default function is cooling stage 1)
Y2	Analogue output 2, 0...10 Vdc, configurable (the default function is heating stage 1)
RI1	External temperature sensor input, NTC 10 (0...10 Vdc with AI option)
Din	Digital input, potential free contact
485A+	Modbus RTU / BACnet MS/TP, RS-485
485B-	
G0	0 V, common

3.2.5 Wiring TRC-P-H-3R2T

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.

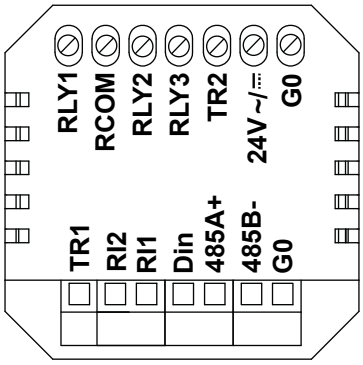
WARNING: Fuse at load supply (normally 6 A, 10 A, 16 A) does not always limit the relay output load current to 4 A. The relay maximum load is 1000 VA (250 V x 4 A res.). Maximum inductive load is 2.2 A.

CAUTION: The relay connection wiring cross sections must be adapted to the overload protection conditions (max. 6 A). The wirings must always comply with local regulations.

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

Important: Outputs *TR1* and *TR2* are switching *G0*. Connect the thermal actuators between *TR1* or *TR2* output and *G* (24 Vac).

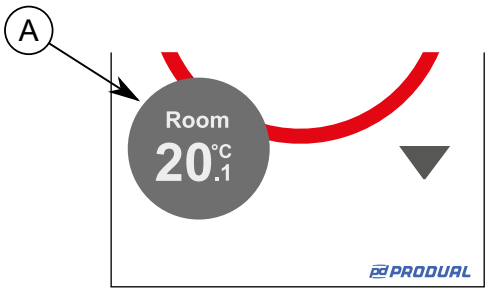
Important: The supply voltage source must be the same in the controller and in the connected 24 Vac devices.



RLY1	Relay output 1, 230 V / 4 A (res.), fan speed 1
RLCOM	Relay outputs, common **WARNING:** Add an external fuse to relay common connector. Use a time-lag fuse or a circuit breaker (max 6 A). The product doesn't have an internal fuse for the relays.
RLY2	Relay output 2, 230 V / 4 A (res.), fan speed 2
RLY3	Relay output 3, 230 V / 4 A (res.), fan speed 3
TR2	Triac output 2 (switched to 0 V), 24 Vac / 1 A, configurable (the default function is cooling)
24V	Supply, 24 Vac/dc
G0	0 V, common
TR1	Triac output 1 (switched to 0 V), 24 Vac / 1 A, configurable (the default function is heating)
RI2	External temperature sensor input 2, NTC 10 (0...10 Vdc with AI option)
RI1	External temperature sensor input 1, NTC 10 (0...10 Vdc with AI option)
Din	Digital input, potential free contact
485A+	Modbus RTU / BACnet MS/TP, RS-485
485B-	
G0	0 V, common

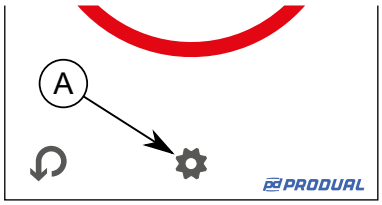
3.3 Configuring the device

1. Press the action button on the main view.

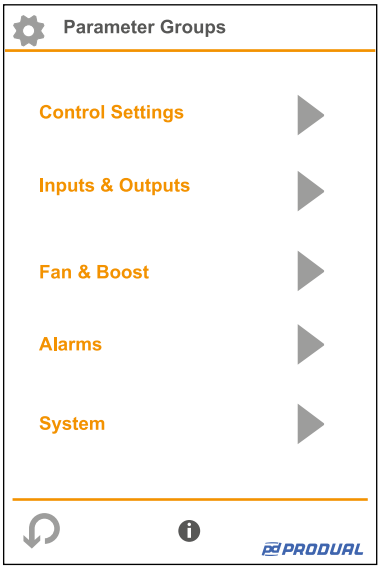


A. Action button

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).

Menu item	Available values	Factory setting	Description
Heating DZ COMFORT	*0.0...25.0*	*0.5*	Heating control dead zone in comfort mode (°C/°F).
Cooling DZ COMFORT	*0.0...25.0*	*0.5*	Cooling control dead zone in comfort mode (°C/°F).
Heating DZ ECO	*0.0...25.0*	*4.0*	Heating control dead zone in eco mode (°C/°F).
Cooling DZ ECO	*0.0...25.0*	*4.0*	Cooling control dead zone in eco mode (°C/°F).
Frost SP	*0.0...95.0*	*8.0*	Off mode temperature setpoint (°C/°F).
SP Adj. Max.	*0.0...20.0*	*3.0*	Temperature setpoint adjustment high limit (°C/°F).
SP Adj. Min.	*-20.0...0.0*	*-3.0*	Temperature setpoint adjustment low limit (°C/°F).
PB	*1.0...50.0*	*4.0*	Temperature control proportional band (°C/°F).
IA	*0...1200*	*600*	Temperature control integral time (seconds). Set the value to 0 to disable integration.
Heating Stages	*1-Stage / 2-Stages*	*1-Stage*	Number of heating stages.
Heating Stage 1 Dir	*Direct / Reverse*	*Reverse*	Heating stage 1 direction.
Heating Stage 2 Dir	*Direct / Reverse*	*Reverse*	Heating stage 2 direction.
Cooling Stages	*1-Stage / 2-Stages*	*1-Stage*	Number of cooling stages.
Cooling Stage 1 Dir	*Direct / Reverse*	*Direct*	Cooling stage 1 direction.
Cooling Stage 2 Dir	*Direct / Reverse*	*Direct*	Cooling stage 2 direction.
Aux. SP	*0.0...95.0*	*21.0*	Auxiliary temperature control setpoint (°C/°F).
Aux. PB	*1.0...50.0*	*4.0*	Auxiliary temperature control proportional band (°C/°F).
Aux. IA	*0...1200*	*600*	Auxiliary temperature control integral time (seconds). Set the value to 0 to disable integration.
Aux. Dir.	*Direct / Reverse*	*Direct*	Auxiliary temperature control actuator direction.
CO2 SP	*0...5000*	*1000*	CO_2 control setpoint (ppm).
CO2 PB	*10...5000*	*300*	CO_2 control proportional band (ppm).
CO2 IA	*0...10000*	*0*	CO_2 control integral time (seconds). Set the value to 0 to disable integration.
CO2 Dir	*Direct / Reverse*	*Direct*	CO_2 control actuator direction.
Humidity SP	*0.0...100.0*	*50.0*	Humidity control setpoint (%rH).
Humidity PB	*0.1...100.0*	*20.0*	Humidity control proportional band (%rH).
Humidity IA	*0...10000*	*0*	Humidity control integral time (seconds). Set the value to 0 to disable integration.
Humidity Dir	*Direct / Reverse*	*Direct*	Humidity control actuator direction.
DeHum Dir	*Direct / Reverse*	*Direct*	De-humidification control actuator direction.
Limit High	*0.0...95.0*	*35.0*	High limit control setpoint (°C/°F).
Limit Low	*0.0...95.0*	*16.0*	Low limit control setpoint (°C/°F).
Limit Ratio	*0.0...5.0*	*0.0*	Low/high limit control ratio. Set the value to 0.0 to disable ratio.
Changeover Low	*0.0...95.0*	*20.0*	Changeover function cooling mode limit.
Changeover High	*0.0...95.0*	*25.0*	Changeover function heating mode limit.

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3.3.2 Inputs & outputs menu

Menu item	Available values	Factory setting	Description
Room Sensor Text	*Room / Floor / Outside / Zone 1...3 / Bathroom / Sauna / Bedroom / Kitchen / Cooler / Flow / Hot Water / Tank / Pool / Cabin*	*Room*	Internal temperature sensor text. See the texts in other languages from the chapter Display text translations on page 33.
Floor Sensor Text		*Floor*	RI1 temperature sensor text.
Aux. Sensor Text		*Outside*	RI2 or network temperature sensor text.
Humidity Display	*Enabled / Disabled*	*Enabled*	Enable or disable the humidity measurement view on the display. The selection is available only in -RH models.
Digital Input Mode	*Close for ECO / Open for ECO / Close for OFF / Open for OFF / Change-Over / Disable Cooling / DI Contact Alarm / Network / Close for Boost / Open for Boost*	*Close for ECO*	Digital input usage. *Close for ECO* — Eco mode activates when the contact closes. *Open for ECO* — Eco mode activates when the contact opens. *Close for OFF* — Off mode activates when the contact closes. *Open for OFF* — Off mode activates when the contact opens. *Change-Over* — Changes between heating and cooling in changeover control. *Disable Cooling* — Cooling is disabled when the contact is closed. *DI Contact Alarm* — Alarm contact. *Network* — Network value. *Close for Boost* — Boost mode activates when the contact closes. Only available in -CE models. *Open for Boost* — Boost mode activates when the contact opens. Only available in -CE models.
Digital Input Delay	*0...28800*	*0*	Input delay when the contact changes from active to passive (seconds).

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Menu item	Available values	Factory setting	Description	
RI1 Mode *RI2 Mode*	*Disabled / Room / Floor / Aux. Loop / Heating/Cooling / Network NTC10 / Network 0-10V / CO2 / Main Loop / Close for ECO / Open for ECO / Close for OFF / Open for OFF / Humidity*	*Disabled*	Resistive input usage.	
			Disabled	The input is not in use.
			Room	Temperature for temperature control (NTC10).
			Floor	Temperature for low and high limit control (NTC10).
			Aux. Loop	Temperature for auxiliary heating control (NTC10).
			Heating/ Cooling	Temperature for changeover control (NTC10).
			Network NTC10	Measurement for communication network (NTC10).
			Network 0-10V	Measurement for communication network (0...10 V). Available only in -AI models.
			CO2	CO_2 measurement (0...10 V = 0...2000 ppm). Available only in -AI models.
			Main Loop	Temperature for temperature control (0...10 V = 0...50 °C). Available only in -AI models.
			Close for ECO	Eco mode activates when the contact closes.
			Open for ECO	Eco mode activates when the contact opens.
			Close for OFF	Off mode activates when the contact closes.
			Open for OFF	Off mode activates when the contact opens.
			Humidity	Humidity measurement (0...10 V = 0...2000 ppm). Available only in -AI models.
Aux. Loop Source	*Built-In Sensor / Network Temp*	*Built-In Sensor*	Auxiliary temperature control measurement source.	
			Built-In Sensor	Connected temperature sensor.
			Network Temp	Temperature from communication bus.
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).	
CO2 Cal.	*-500...500*	*0*	CO_2 sensor tuning (ppm).	
Hum Cal.	*-10.0...10.0*	*0*	Humidity sensor tuning (%rH).	

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Menu item	Available values	Factory setting	Description
Y1	*Network / Htg Stage 1 / Htg Stage 2 / Clg Stage 1 / Clg Stage 2 / Modulating Fan / CO2 / Max. VAV / Max. Fan / Humidification / De-Humidification / Amber/Red / Red / Htg Stage 1 Stat / Clg Stage 1 Stat / Fan Stat / Aux. Loop / 6-Port / 6-Port Reverse*	*Modulating Fan*	Y1/Y2/Y3 output control source. *Network* — The output is controlled via communication network. *Htg Stage 1* — Heating stage 1 analogue output. *Htg Stage 2* — Heating stage 2 analogue output. *Clg Stage 1* — Cooling stage 1 analogue output. *Clg Stage 2* — Cooling stage 2 analogue output. *Modulating Fan* — Fan control analogue output. *CO2* — CO_2 control output. *Max. VAV* — Maximum of VAV control output. *Max. Fan* — Maximum of fan control output. *Humidification* — Humidification control output. *De-Humidification* — De-humidification control output. *Amber/Red* — Amber and red alarm output. *Red* — Red alarm output. *Htg Stage 1 Stat* — Heating stage 1 relay output. *Clg Stage 1 Stat* — Cooling stage 1 relay output. *Fan Stat* — Fan control relay output. *Aux. Loop* — Auxiliary temperature control output. *6-Port* — 6-way valve output. *6-Port Reverse* — Reversed 6-way valve output.
Y2		*Htg Stage 1*	
Y3		*Clg Stage 1*	
Y1 Min.	*0.0...100.0*	*0.0*	Output scaling (%)
Y1 Max.		*100.0*	
Y2 Min.		*0.0*	
Y2 Max.		*100.0*	
Y3 Min.		*0.0*	
Y3 Max.		*100.0*	
Anti-JAM	*0...14*	*0*	Valve jam prevention function frequency. Set the value to 0 to disable function.
PWM Period	*0...120*	*30*	PWM output pulse width (seconds). Only available in -1A2T and -3R2T models.

3.3.2.1 Display text translations

English	French	Spanish
Room	*Pièce*	*Sala*
Floor	*Plancher*	*Suelo*
Outside	*Ext*	*Exterior*
Zone 1	*Zone 1*	*Zona 1*

English	French	Spanish
Zone 2	*Zone 2*	*Zona 2*
Zone 3	*Zone 3*	*Zona 3*
Bathroom	*SdB*	*Baño*
Sauna	*Sauna*	*Sauna*
Bedroom	*Chambre*	*Habit.*
Kitchen	*Cuisine*	*Cocina*
Cooler	*Clim*	*Chiller*
Flow	*Débit*	*Caudal*
Hot water	*Eau Ch.*	*A. Cal.*
Tank	*Réservoir*	*Depósito*
Pool	*Piscine*	*Piscina*
Cabin	*Cabine*	*Cabina*

3.3.3 Fan & boost menu

Menu item	Available values	Factory setting	Description
Fan Speed Display	*None / No Input / 0-1 / 0-1-2 / 0-1-2-3 / 0-1-2-3-4-5-6*	*None*	Fan speed visibility and adjustment on the display. *None*: Fan speed view and adjustment are disabled. *No Input*: Fan speed view only. *0-1*: On/off fan (0 %, 50 %, 100 %). *0-1-2*: 2-speed fan (0 %, 50 %, 100 %). *0-1-2-3*: 3-speed fan (0 %, 33 %, 66 %, 100 %). *0-1-2-3-4-5-6*: 6-speed fan (0 %, 16 %, 33 %, 50 %, 66 %, 85 %, 100 %).
Fan Speed Source	*Htg/Clg Stage 1 / Htg Stage 1 / Clg Stage 1 / Htg/Clg Stage 2 / Htg Stage 2 / Clg Stage 2 / CO2 / Humidification / De-Humidification / Max. VAV / Max. Temp/Hum / Aux. Loop*	*Htg/Clg Stage 1*	Fan speed control source. *Htg/Clg Stage 1*: Heating and cooling stage 1. *Htg Stage 1*: Heating stage 1. *Clg Stage 1*: Cooling stage 1. *Htg/Clg Stage 2*: Heating and cooling stage 2. *Htg Stage 2*: Heating stage 2. *Clg Stage 2*: Cooling stage 2. *CO2*: CO_2 control. *Humidification*: Humidification control. *De-Humidification*: De-humidification control. *Max. VAV*: Maximum selection control according to VAV. *Max. Temp/Hum*: Maximum selection control according to temperature and humidity. *Aux. Loop*: Auxiliary temperature control.
Min. Fan Level	*0...100*	*0*	Minimum fan control (%).

Menu item	Available values	Factory setting	Description
Fan Off Delay	*0...28800*	*0*	The delay after fan switches off, when the fan speed control drops below the value set to *Min. Fan Level* parameter. If the *Fan Off Delay* parameter value is 0, the fan control stays at minimum level even if the fan control drops below the minimum level. The function is only active when the *Min. Fan Level* parameter value is not 0.
Boost Time	*0...480*	*0*	Boost mode running time (minutes). If the value is 0, the boost mode is active until manually stopped.
Boost Target	*Nominal SP / CO2 SP / Humidity SP / DeHum SP / Fan Demand / Aux. SP*	*Nominal SP*	Boost mode target. *Nominal SP* — Temperature control setpoint. *CO2 SP* — CO_2 control setpoint. *Humidity SP* — Humidification control setpoint. *DeHum SP* — Dehumidification control setpoint. *Fan Demand* — Fan speed. *Aux. SP* — Auxiliary temperature control setpoint.
Boost value	*0...5000*	*25*	Boost value.
Mode button	*Active / Indication only*	*Active*	Mode button function. *Active* — Button can be used to change operation mode. *Indication only* — Only views the active operation mode.

3.3.4 Alarms menu

Menu item	Available values	Factory setting	Description
Alarm 1 Source	*None / CO2 / Room / Humidity*	*None*	Source for alarm 1. *None* — Alarm is disabled. *CO2* — CO_2 measurement. *Room* — Room temperature measurement. *Humidity* — Humidity measurement.
Alarm 1 Amber Threshold	*0...5000*	*0*	Amber alarm 1 setpoint.
Alarm 1 Red Threshold	*0...5000*	*0*	Red alarm 1 setpoint.
Alarm 1 Hysteresis	*0...5000*	*0*	Alarm 1 hysteresis.
Alarm 2 Source	*None / CO2 / Room / Humidity*	*None*	Source for alarm 2. *None* — Alarm is disabled. *CO2* — CO_2 measurement. *Room* — Room temperature measurement. *Humidity* — Humidity measurement.
Alarm 2 Amber Threshold	*0...5000*	*0*	Amber alarm 2 setpoint.

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Menu item	Available values	Factory setting	Description
Alarm 2 Red Threshold	*0...5000*	*0*	Red alarm 2 setpoint.
Alarm 2 Hysteresis	*0...5000*	*0*	Alarm 2 hysteresis.

3.3.5 System menu

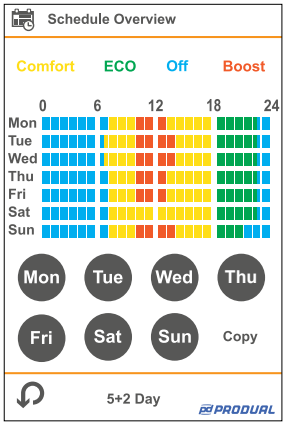
Menu item	Available values	Factory setting	Description
Address	*0..247* (MOD models) / *0...127* (BAC models)	*1*	Communication bus address.
Baud Rate	*9600 / 19200 / 38400 / 57600 / 76800*	*9600*	Communication bus speed.
Parity	*None / Odd / Even*	*None*	Communication bus parity.
Stop Bits	*1 Stop Bit / 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. *Disabled* — Function is disabled. *Enabled* — The device sends BACnet I-AM message.
Brightness	*0...20*	*5*	Display backlight brightness level.
Show Unit Swap	*Disabled / Enabled*	*Disabled*	Measurement unit swap button visibility.
Lock Mode	*Disabled / On/ Off Only / Adjust Only / No Input*	*Disabled*	Lock mode. *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.
Lock Code	*0000...9999*	*0000*	Lock mode password (0000 = no password).
Maintenance Code	*0000...9999*	*6666*	Configuration mode password (0000 = no password).
Staff Code	*0000...9999*	*0000*	Additional settings view password (0000 = no password).
Language	*EN / FR / ES*	*EN*	Display language. *EN* — English *FR* — French *ES* — Spanish

Menu item	Available values	Factory setting	Description
Native Units (Defaults)	*Celsius / Fahrenheit*	*C*	Default temperature unit (Celsius / Fahrenheit). **Important:** After changing the unit here, the controller reloads defaults for all settings. Select the native units when starting the commissioning.
Auto Daylight Savings	*Disabled / Enabled*	*Disabled*	Automatic summer / winter time adjustment. *Disabled* — Function is disabled. *Enabled* — The real time clock updates according to the calendar.
Screen Cycle Speed	*Fast / Medium / Slow*	*Medium*	Additional settings view measurement cycling interval. *Fast* — The interval is 4.3 seconds. *Medium* — The interval is 7.8 seconds. *Slow* — The interval is 10.8 seconds.
Screen Refresh Rate	*Fast / Medium / Slow*	*Fast*	Display refresh rate.
Reload Default	*Off / On*	*Off*	Reload factory settings. **Important:** The factory defaults are loaded immediately when pressing the menu item.
Version	*x.xx BACnet / x.xx Modbus*	-	Firmware version.

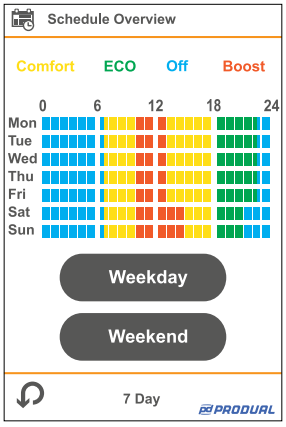
3.4 Using calendar functions

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



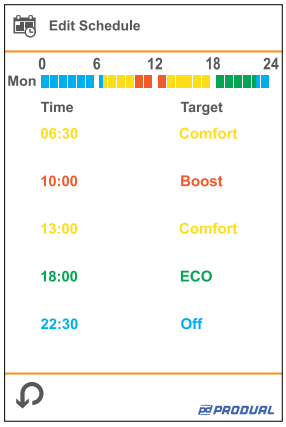
5+2 Day mode



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. Press the day or weekday/weekend button.

5. Set the switching times and operating modes.



a. Press the time value to set the switching time.
b. Press the operation mode to toggle the operation modes.

6. Press ↩ button to return to main calendar view.

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

7. Press ↩ button to return to additional settings view.

8. Press ↩ button to exit from additional settings view.

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4 Modbus

4.1 Modbus properties

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 1. On	*0*
101	Eco mode override.	Bit	*0 - 1*	0. Off 1. On	*0*
102	Heating/cooling mode selection (change-over function).	Bit	*0 - 1*	0. Heating 1. Cooling	*0*

4.3.2 Discrete inputs

Register	Parameter description	Data type	Values	Range
100	Digital input 1 status (DI1)	Bit	*0 - 1*	0. Off 1. On

Register	Parameter description	Data type	Values	Range
101	Boost status	Bit	*0 - 1*	0. Off 1. On
102	Screen locking status	Bit	*0 - 1*	0. Off 1. On
103	Digital output 1 status (-1A2T models)	Bit	*0 - 1*	0. Off 1. On
104	Digital output 2 status (-1A2T models)	Bit	*0 - 1*	0. Off 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
104	Current function mode.	U16	*0 - 1 - 2 - 3*	0. Comfort 1. Eco 2. Off 3. Boost
105	Relative humidity measurement.	U16	*0...1000*	0.0...100.0 %rH
106	CO_2 measurement.	U16	*0...5000*	0...5000 ppm
107	Output 1 value (Y1).	U16	*0...1000*	0.0...100.0 %
108	Output 2 value (Y2).	U16	*0...1000*	0.0...100.0 %
109	Output 3 value (Y3).	U16	*0...1000*	0.0...100.0 %
110	Alarm 1 status.	U16	*0 - 1 - 2*	0. No alarm 1. Amber alarm 2. Red alarm
111	Alarm 2 status.	U16	*0 - 1 - 2*	0. No alarm 1. Amber alarm 2. Red alarm
114	Analogue input 1 (RI1) value.	U16	*0...1000*	0.0...100.0 %
115	Analogue input 2 (RI2) value.	U16	*0...1000*	0.0...100.0 %
116	Fan speed demand (-2A3R models).	U16	*0...1000*	0.0...100.0 %
117	Thermal actuator 1 demand.	U16	*0...1000*	0.0...100.0 %
118	Thermal actuator 2 demand.	U16	*0...1000*	0.0...100.0 %
200	Firmware version.	U16	-	-

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*

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Register	Parameter description	Data type	Values	Range	Default
101	Comfort mode heating dead zone.	U16	*0...250*	0.0...25.0 °C/°F	*5*
102	Comfort mode cooling dead zone.	U16	*0...250*	0.0...25.0 °C/°F	*5*
103	Eco mode heating dead zone.	U16	*0...250*	0.0...25.0 °C/°F	*40*
104	Eco mode cooling dead zone.	U16	*0...250*	0.0...25.0 °C/°F	*40*
105	Frost guard function setpoint.	U16	*0...950*	0.0...95.0 °C/°F	*80*
106	Temperature setpoint adjustment range, low limit	S16	*-200...0*	-20.0...0.0 °C/°F	*-30*
107	Temperature setpoint adjustment range, high limit	S16	*0...200*	0.0...20.0 °C/°F	*30*
108	Temperature control proportional band.	U16	*10…500*	1.0…50.0 °C/°F	*40*
109	Temperature control integration time.	U16	*0…1200*	0…1200 s	*600*
110	Number of heating stages.	U16	*0 - 1 - 2*	0. None 1. 1 stage 2. 2 stages	*1*
111	Heating stage 1, direction.	U16	*0 - 1*	0. Reversed 1. Direct	*0*
112	Heating stage 2, direction.	U16	*0 - 1*	0. Reversed 1. Direct	*0*
113	Number of cooling stages.	U16	*0 - 1 - 2*	0. None 1. 1 stage 2. 2 stages	*1*
114	Cooling stage 1, direction.	U16	*0 - 1*	0. Reversed 1. Direct	*1*
115	Cooling stage 2, direction.	U16	*0 - 1*	0. Reversed 1. Direct	*1*
116	Setpoint, high limit	U16	*0...950*	0.0...95.0 °C/°F	*350*
117	Setpoint, low limit	U16	*0...950*	0.0...95.0 °C/°F	*160*
118	Setpoint limit ratio.	U16	*0...50*	0.0...5.0 °C	*0*
119	CO_2 control setpoint.	U16	*0…5000*	0...5000 ppm	*1000*
120	CO_2 control proportional band.	U16	*10…5000*	10...5000 ppm	300
121	CO_2 control integration time.	U16	*0…10000*	0…10000 s	*0*
122	CO_2 output direction.	U16	*0 - 1*	0. Reversed 1. Direct	*1*
123	Humidity control setpoint.	U16	*0...1000*	0.0...100.0 %rH	*500*
124	Humidity control proportional band.	S16	*10...1000*	1.0...100.0 %rH	*200*
125	Humidity control integration time.	U16	*0…10000*	0…10000 s	*0*
126	Humidification output direction.	U16	*0 - 1*	0. Reversed 1. Direct	*1*
127	De-humidification output direction.	U16	*0 - 1*	0. Reversed 1. Direct	*1*

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Register	Parameter description	Data type	Values	Range	Default
128	Fan speed on display.	U16	*0 - 1 - 2 - 3 - 4 - 5*	0. No display 1. Display only, user can't control 2. 0 - 1 (0 % / 100 % 3. 0 - 1 - 2 (0 % / 50 % / 100 % 4. 0 - 1 - 2 - 3 (0 % / 33 % / 66 % / 100 % 5. 0 - 1 - 2 - 3 - 4 - 5 - 6	*0*
129	Fan speed source.	U16	*0 - 1 - 2 … - 11*	0. Heating and cooling stage 1 1. Heating stage 1 2. Cooling stage 1 3. Heating and cooling stage 2 4. Heating stage 2 5. Cooling stage 2 6. CO_2 7. Humidification 8. De-humidification 9. Maximum VAV (cooling / CO_2) 10. Maximum temperature / humidity 11. Auxiliary loop	*0*
130	Minimum fan output.	U16	*0...100*	0...100 %	*0*
131	Y1 output mode.	U16	*0 - 1 - 2 ... - 18*	0. Network value 1. Heating stage 1 2. Cooling stage 1 3. Heating stage 2 4. Cooling stage 2 5. EC fan 6. CO_2 control 7. Maximum VAV 8. Maximum fan 9. Humidification 10. De-humidification 11. Amber / red alarm 12. Red alarm 13. Heating 1 (triac) 14. Cooling 1 (triac) 15. Fan (triac) 16. Auxiliary loop 17. 6-way valve 18. 6-way valve reverse	*5*
132	Y2 output mode.	U16	*0 - 1 - 2 ... - 18*		*1*
133	Y3 output mode.	U16	*0 - 1 - 2 ... - 18*		*3*
134	Y1 output override value.	U16	*0...1000*	0.0...100.0 % (0.00...10.00 V)	*0*
135	Y2 output override value.	U16	*0...1000*	0.0...100.0 % (0.00...10.00 V)	*0*

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Register	Parameter description	Data type	Values	Range	Default
136	Y3 output override value.	U16	*0...1000*	0.0...100.0 % (0.00...10.00 V)	*0*
137	Minimum Y1 output.	U16	*0...1000*	0.0...100.0 %	*0*
138	Maximum Y1 output.	U16	*0...1000*	0.0...100.0 %	*1000*
139	Minimum Y2 output.	U16	*0...1000*	0.0...100.0 %	*0*
140	Maximum Y2 output.	U16	*0...1000*	0.0...100.0 %	*1000*
141	Minimum Y3 output.	S16	*0...1000*	0.0...100.0 %	*0*
142	Maximum Y3 output.	U16	*0...1000*	0.0...100.0 %	*1000*
143	Valve jam prevention interval.	U16	*0 - 1 - 2 … - 14*	0 = function disabled, 1...14 days	*0*
144	RI1 input mode.	U16	*0 - 1 - 2 … - 11*	0. Disabled 1. Room (NTC 10 control) 2. Floor (NTC 10 high/low limit) 3. Auxiliary loop 4. Network NTC 10 5. Network 0...10 V 6. CO_2 (0..10 V = 0...2000 ppm) 7. Main loop (0..10 V = 0...50 °C) 8. Close for Eco mode (digital input) 9. Open for Eco mode (digital input) 10. Close for Off mode (digital input) 11. Open for Off mode (digital input)	*0*
145	RI2 input mode.	U16	*0 - 1 - 2 … - 11*		*0*
146	Outdoor temperature source.	U16	*0 - 1*	0. Internal sensor 1. Network sensor	*0*
147	Outdoor temperature network value. 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*

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Register	Parameter description	Data type	Values	Range	Default
148	Digital input mode.	U16	*0 - 1 - 2 ... - 9*	0. Close for Eco mode 1. Open for Eco mode 2. Close for Off mode 3. Open for Off mode 4. Heating / cooling change-over 5. Disable cooling 6. Alarm contact 7. Network measurement 8. Close for boost mode 9. Open for boost mode	*0*
149	Digital input delay.	U16	*0...28800*	0...28800 s	*0*
150	Internal temperature measurement tuning.	S16	*-100...100*	-10.0...10.0 °C/°F	*0*
151	RI1 input tuning.	S16	*-100...100*	-10.0...10.0 °C/°F	*0*
152	RI2 input tuning.	S16	*-100...100*	-10.0...10.0 °C/°F	*0*
153	CO_2 measurement tuning.	S16	*-500...500*	-500...500 ppm	*0*
154	Humidity measurement tuning.	S16	*-100...100*	-10.0...10.0 %rH	*0*
155	Lock mode	U16	*0 - 1 - 2 - 3*	0. Disabled 1. Off mode, lighting and blinds buttons available. 2. Temperature setpoint buttons available. 3. All buttons unavailable	*0*
156	Lock mode password.	U16	*0...9999*	0000...9999	*0000*
157	Boost mode duration.	U16	*0...480*	0 = permanent boost mode, 1...480 min	*0*
158	Boost target.	U16	*0 - 1 - 2 ... - 5*	0. Temperature setpoint 1. CO_2 setpoint 2. Humidification setpoint 3. De-humidification setpoint 4. Fan control 5. Auxiliary temperature setpoint	*1*
159	Boost target value.	U16	*0...5000*	0...5000	*25*
160	Operation mode button function.	U16	*0 - 1*	0. Indication only 1. Button active	*1*
163	Display backlight level.	U16	*0...20*	0...20	*5*

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Register	Parameter description	Data type	Values	Range	Default
164	Humidity display.	U16	*0 - 1*	0. Disabled 1. Enabled	*1*
165	Temperature unit changing button.	U16	*0 - 1*	0. Disabled 1. Enabled	*0*
166	Zone 1 sensor text on the display.	U16	*1 - 2 ... - 16*	0. Disabled 1. *Room* 2. *Floor* 3. *Outside* 4. *Zone 1* 5. *Zone 2* 6. *Zone 3* 7. *Bathroom* 8. *Sauna* 9. *Bedroom* 10.*Kitchen* 11.*Cooler* 12.*Flow* 13.*Hot water* 14.*Tank* 15.*Pool* 16.*Cabin*	*1*
167	Zone 2 sensor text on the display.	U16	*0 - 1 - 2 ... - 16*		*2*
168	Zone 3 sensor text on the display.	U16	*0 - 1 - 2 ... - 16*		*3*
169	Alarm 1 source.	U16	*0 - 1 - 2 - 3*	0. CO_2 1. Room temperature 2. Humidity 3. None	*3*
170	Alarm 1 amber switching point.	U16	*0...5000*	0...5000	*0*
171	Alarm 1 red switching point.	U16	*0...5000*	0...5000	*0*
172	Alarm 1 hysteresis.	U16	*0...5000*	0...5000	*0*
173	Alarm 2 source.	U16	*0 - 1 - 2 - 3*	0. CO_2 1. Room temperature 2. Humidity 3. None	*3*
174	Alarm 2 amber switching point.	U16	*0...5000*	0...5000	*0*
175	Alarm 2 red switching point.	U16	*0...5000*	0...5000	*0*
176	Alarm 2 hysteresis.	U16	*0...5000*	0...5000	*0*
179	Override locking.	U16	*0 - 1 - 2*	0. No override 1. Override on 2. Override off	*0*
180	Configuration mode password.	U16	*0...9999*	0000...9999	*6666*
181	Staff mode password.	U16	*0...9999*	0000...9999	*0000*
182	PWM pulse width (only -1A2T and -3R2T models).	U16	*0...120*	0 = on/off, 1...120 s	*30*
183	Digital output 1 (DI1) network override (direct, only -1A2T models).	U16	*0 - 1 - 2*	0. No override 1. Override on 2. Override off	*0*

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Register	Parameter description	Data type	Values	Range	Default
184	Digital output 2 (DI2) network override (direct, only -1A2T models).	U16	*0 - 1 - 2*	0. No override 1. Override on 2. Override off	*0*
185	Heating / cooling change-over, minimum temperature.	U16	*0...950*	0.0...95.0 °C/°F	*200*
186	Heating / cooling change-over, maximum temperature.	U16	*0...950*	0.0...95.0 °C/°F	*250*
187	Fan speed override.	U16	*0 - 1 - 2 ... - 7*	0. Automatic 1. Off 2. Speed 1 3. Speed 2 4. Speed 3 5. Speed 4 6. Speed 5 7. Speed 6	*0*
188	Fan off delay. Only applicable if the minimum fan output is set (register 130).	U16	*0...28000*	0 = Infinite, 1...28000 s	*0*
189	Auxiliary heating loop setpoint.	U16	*0...950*	0.0...95.0 °C/°F	*200*
190	Auxiliary heating loop proportional band.	U16	*10...500*	1.0...50.0 °C/°F	*40*
191	Auxiliary heating loop integration time.	U16	*0...1200*	0...1200 s	*600*
192	Auxiliary heating loop actuator direction.	U16	*0 - 1*	0. Reversed 1. Direct	*1*
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*	0. Comfort mode 1. Eco mode 2. Off mode 3. Boost mode	*0*
206	Monday / weekday switching time 2 target	U16	*0 - 1 - 2 - 3*		*0*
207	Monday / weekday switching time 3 target	U16	*0 - 1 - 2 - 3*		*0*
208	Monday / weekday switching time 4 target	U16	*0 - 1 - 2 - 3*		*0*
209	Monday / weekday switching time 5 target	U16	*0 - 1 - 2 - 3*		*0*
210	Tuesday / weekend switching time 1	U16	*0...2400*	0...2400	*0600*
211	Tuesday / weekend switching time 2	U16	*0...2400*	0...2400	*1000*

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Register	Parameter description	Data type	Values	Range	Default
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*	0. Comfort mode 1. Eco mode 2. Off mode 3. Boost mode	*0*
216	Tuesday / weekend switching time 2 target	U16	*0 - 1 - 2 - 3*		*0*
217	Tuesday / weekend switching time 3 target	U16	*0 - 1 - 2 - 3*		*0*
218	Tuesday / weekend switching time 4 target	U16	*0 - 1 - 2 - 3*		*0*
219	Tuesday / weekend switching time 5 target	U16	*0 - 1 - 2 - 3*		*0*
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*	0. Comfort mode 1. Eco mode 2. Off mode 3. Boost mode	*0*
226	Wednesday switching time 2 target	U16	*0 - 1 - 2 - 3*		*0*
227	Wednesday switching time 3 target	U16	*0 - 1 - 2 - 3*		*0*
228	Wednesday switching time 4 target	U16	*0 - 1 - 2 - 3*		*0*
229	Wednesday switching time 5 target	U16	*0 - 1 - 2 - 3*		*0*
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*	0. Comfort mode 1. Eco mode 2. Off mode 3. Boost mode	*0*
236	Thursday switching time 2 target	U16	*0 - 1 - 2 - 3*		*0*
237	Thursday switching time 3 target	U16	*0 - 1 - 2 - 3*		*0*
238	Thursday switching time 4 target	U16	*0 - 1 - 2 - 3*		*0*
239	Thursday switching time 5 target	U16	*0 - 1 - 2 - 3*		*0*
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*

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Regis-ter	Parameter description	Data type	Values	Range	Default
245	Friday switching time 1 target	U16	*0 - 1 - 2 - 3*	0. Comfort mode 1. Eco mode 2. Off mode 3. Boost mode	*0*
246	Friday switching time 2 target	U16	*0 - 1 - 2 - 3*		*0*
247	Friday switching time 3 target	U16	*0 - 1 - 2 - 3*		*0*
248	Friday switching time 4 target	U16	*0 - 1 - 2 - 3*		*0*
249	Friday switching time 5 target	U16	*0 - 1 - 2 - 3*		*0*
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*	0. Comfort mode 1. Eco mode 2. Off mode 3. Boost mode	*0*
256	Saturday switching time 2 target	U16	*0 - 1 - 2 - 3*		*0*
257	Saturday switching time 3 target	U16	*0 - 1 - 2 - 3*		*0*
258	Saturday switching time 4 target	U16	*0 - 1 - 2 - 3*		*0*
259	Saturday switching time 5 target	U16	*0 - 1 - 2 - 3*		*0*
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*	0. Comfort mode 1. Eco mode 2. Off mode 3. Boost mode	*0*
266	Sunday switching time 2 target	U16	*0 - 1 - 2 - 3*		*0*
267	Sunday switching time 3 target	U16	*0 - 1 - 2 - 3*		*0*
268	Sunday switching time 4 target	U16	*0 - 1 - 2 - 3*		*0*
269	Sunday switching time 5 target	U16	*0 - 1 - 2 - 3*		*0*
300	Bus address.	U16	*0...247*	0...247	*1*
301	Bus speed.	U16	*0 - 1 - 2 - 3 - 4*	0. 9600 bits/s 1. 19200 bits/s 2. 38400 bits/s 3. 57600 bits/s 4. 76800 bits/s	*0*
302	Bus parity.	U16	*0 - 1 - 2*	0. None 1. Odd 2. Even	*0*
303	Stop bits.	U16	*0 - 1*	0. 1 stop bit 1. 2 stop bits	*0*
400	Reset device.	U16	*0 - 1*	0. N/A 1. Reset device	*0*
401	Non volatile memory update.	U16	*0 - 1*	0. N/A 1. Update memory	*0*
403	Reset to factory defaults.	U16	*0 - 1*	0. N/A 1. Reset to defaults	*0*

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Register	Parameter description	Data type	Values	Range	Default
404	Display refresh rate.	U16	*0 - 1 - 2*	0. Fast 1. Medium 2. Slow	*0*
405	Native temperature unit. **Important:** After changing the unit here, the controller reloads defaults for all settings. Select the native units when starting the commissioning.	U16	*0 - 1*	0. Celsius 1. Fahrenheit	*0*
406	Language.	U16	*0 - 1 - 2*	0. English 1. French 2. Spanish	*0*
407	Display updating frequency.	U16	*0 - 1 - 2*	0. Fast 1. Medium 2. Slow	*1*
408	Automatic summer / winter time adjustment.	U16	*0 - 1*	0. Disabled 1. Enabled	*0*
410	Current hour.	U16	*0...23*	0...23	-
411	Current minute.	U16	*0...59*	0...59	-
412	Current day.	U16	*1...31*	1...31	-
413	Current month	U16	*1...12*	1...12	-
414	Current year.	U16	*2015...2099*	2015...2099	-
415	Current hour update register.	U16	*0...23*	0...23	-
416	Current minute update register.	U16	*0...59*	0...59	-
417	Current day update register.	U16	*1...31*	1...31	-
418	Current month update register.	U16	*1...12*	1...12	-
419	Current year update register.	U16	*2015...2099*	2015...2099	-
420	Update time and date.	U16	*0 - 1*	0. No action 1. Update	*0*

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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*/19200/38400/56000/76800 bit/s
Stop bits	1
Unit load	1/2 UL
	* factory setting

5.2 Analog value objects

ID	Object name	Values	Reso-lution	Units
AV:0	*Built-In Sensor*	*-40...302*	*0.1*	*degrees-celsius (62)*
AV:1	*RI1*	*-40...302*	*0.1*	*degrees-celsius (62)*
AV:2	*RI2*	*-40...302*	*0.1*	*degrees-celsius (62)*
AV:3	*Target*	*-40...302*	*0.1*	*degrees-celsius (62)*
AV:4	*Humidity*	*0...100*	*0.1*	*percent-relative-humidity (29)*
AV:5	*CO2*	*0...5000*	*1.0*	*parts-per-million (96)*
AV:6	*Fan Demand*	*0...100*	*0.1*	*percent (98)*
AV:7	*Thermic 1 Demand*	*0...100*	*0.1*	*percent (98)*
AV:8	*Thermic 2 Demand*	*0...100*	*0.1*	*percent (98)*
AV:9	*Nominal SP*	*-40...302*	*0.1*	*degrees-celsius (62)*
AV:10	*Heating DZ COMFORT*	*0...25*	*0.1*	*degrees-celsius (62)*
AV:11	*Cooling DZ COMFORT*	*0...25*	*0.1*	*degrees-celsius (62)*
AV:12	*Heating DZ ECO*	*0...25*	*0.1*	*degrees-celsius (62)*
AV:13	*Cooling DZ ECO*	*0...25*	*0.1*	*degrees-celsius (62)*
AV:14	*Frost SP*	*0...95*	*0.1*	*degrees-celsius (62)*
AV:15	*Y1 Min.*	*0...100*	*0.1*	*percent (98)*
AV:16	*Y1 Max.*	*0...100*	*0.1*	*percent (98)*
AV:17	*Y2 Min.*	*0...100*	*0.1*	*percent (98)*
AV:18	*Y2 Max.*	*0...100*	*0.1*	*percent (98)*
AV:19	*Y3 Min.*	*0...100*	*0.1*	*percent (98)*
AV:20	*Y3 Max.*	*0...100*	*0.1*	*percent (98)*
AV:21	*PB*	*1...50*	*0.1*	*degrees-celsius (62)*
AV:22	*IA*	*0...1200*	*1.0*	*seconds (73)*
AV:23	*Brightness*	*0...20*	*1.0*	*no-units (95)*
AV:24	*Network Temp.*	*-58...122*	*0.1*	*degrees-celsius (62)*
AV:25	*CO2 SP*	*0...5000*	*1.0*	*parts-per-million (96)*

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ID	Object name	Values	Reso-lution	Units
AV:26	*Humidity SP*	*0...100*	*0.1*	*percent-relative-humidity (29)*
AV:27	*Y1*	*0...100*	*0.1*	*percent (98)*
AV:28	*Y2*	*0...100*	*0.1*	*percent (98)*
AV:29	*Y3*	*0...100*	*0.1*	*percent (98)*
AV:30	*Aux. SP*	*0...95*	*0.1*	*degrees-celsius (62)*

5.3 Binary value objects

ID	Object name	Values	Inactive/Active_Text	Default
BV:0	*DI1*	*0 - 1*	0. Off 1. On	*0*
BV:1	*Boost Status*	*0 - 1*	0. Off 1. On	*0*
BV:2	*Off Status*	*0 - 1*	0. Off 1. On	*0*
BV:3	*ECO Status*	*0 - 1*	0. Off 1. On	*0*
BV:4	*Lock*	*0 - 1*	0. Off 1. On	*0*
BV:5	*Change-Over*	*0 - 1*	0. Off 1. On	*0*
BV:6	*Update Nonvol*	*0 - 1*	0. Off 1. On	*0*
BV:7	*DO1*	*0 - 1*	0. Off 1. On	*0*
BV:8	*DO2*	*0 - 1*	0. Off 1. On	*0*

5.4 Multi state value objects

ID	Object name	Values	State text	Default
MSV:0	*Device Mode*	*1 - 2 - 3 - 4*	1. Comfort mode 2. Eco mode 3. Off mode 4. Boost mode	*1*

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ID	Object name	Values	State text	Default
MSV:1	*Alarm*	*1 - 2 ... - 32*	5-bit binary value. Bits are designated as follows: 0. Internal sensor 1. RI1 input 2. RI2 input 3. Humidity sensor 4. DI1 input The alarm value is the binary value + 1.	*1*
MSV:2	*Fan*	*1 - 2 ... - 8*	1. Automatic 2. Speed 0 3. Speed 1 4. Speed 2 5. Speed 3 6. Speed 4 7. Speed 5 8. Speed 6	*1*

5.5 Proprietary objects

5.5.1 Config1 object

Required object properties:

Property name	Properties	Value
Object identifier	Read	proprietary-128
Object name	Read / write	Config1
Object type	Read	proprietary-128

Optional properties: none

Property ID	Values	Default	Description
40106	*-20.0...0.0*	*-3.0*	Temperature setpoint adjustment range, low limit (°C/°F)
40107	*0.0...20.0*	*3.0*	Temperature setpoint adjustment range, high limit (°C/°F).
40110	*0 - 1 - 2*	*1*	Number of heating stages. 0. None 1. 1 stage 2. 2 stages
40111	*0 - 1*	*0*	Heating stage 1, direction. 0. Reversed 1. Direct
40112	*0 - 1*	*0*	Heating stage 2, direction. 0. Reversed 1. Direct
40113	*0 - 1 - 2*	*1*	Number of cooling stages. 0. None 1. 1 stage 2. 2 stages

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Property ID	Values	Default	Description
40114	*0 - 1*	*1*	Cooling stage 1, direction. 0. Reversed 1. Direct
40115	*0 - 1*	*1*	Cooling stage 2, direction. 0. Reversed 1. Direct
40116	*0...95.0*	*35.0*	Setpoint, high limit (°C/°F).
40117	*0...95.0*	*16.0*	Setpoint, low limit (°C/°F).
40118	*0.0...5.0*	*0.0*	Setpoint limit ratio.
40120	*10...5000*	*300*	CO_2 control proportional band (ppm).
40121	*0...10000*	*0*	CO_2 control integration time (seconds).
40122	*0 - 1*	*1*	CO_2 output direction. 0. Reversed 1. Direct
40124	*1.0...100.0*	*20.0*	Humidity control proportional band (%rH).
40125	*0...10000*	*0*	Humidity control integration time (seconds).
40126	*0 - 1*	*1*	Humidification output direction. 0. Reversed 1. Direct
40127	*0 - 1*	*1*	De-humidification output direction. 0. Reversed 1. Direct
40128	*0 - 1 - 2 - 3 - 4 - 5*	*0*	Fan speed on display. 0. No display 1. Display only, user can't control 2. 0 - 1 (0 % / 100 %) 3. 0 - 1 - 2 (0 % / 50 % / 100 %) 4. 0 - 1 - 2 - 3 (0 % / 33 % / 66 % / 100 %) 5. 0 - 1 - 2 - 3 - 4 - 5 - 6
40129	*0 - 1 - 2 ... - 11*	*0*	Fan speed source. 0. Heating and cooling stage 1 1. Heating stage 1 2. Cooling stage 1 3. Heating and cooling stage 2 4. Heating stage 2 5. Cooling stage 2 6. CO_2 7. Humidification 8. De-humidification 9. Maximum VAV (cooling / CO_2) 10.Maximum temperature / humidity 11.Auxiliary loop
40130	*0...100*	*0*	Minimum fan output (%).

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Property ID	Values	Default	Description
40131	*0 - 1 - 2 ... - 20*	*5*	Y1 output mode. 0. Network value 1. Heating stage 1 2. Cooling stage 1 3. Heating stage 2 4. Cooling stage 2 5. EC fan 6. CO_2 control 7. Maximum VAV 8. Maximum fan 9. Humidification 10.De-humidification 11.Lighting control 12.Blinds control 13.Amber / red alarm 14.Red alarm 15.Heating 1 status 16.Cooling 1 status 17.Fan status 18.Auxiliary loop 19.6-way valve 20.6-way valve reverse
40132	*0 - 1 - 2 ... - 20*	*1*	Y2 output mode. 0. Network value 1. Heating stage 1 2. Cooling stage 1 3. Heating stage 2 4. Cooling stage 2 5. EC fan 6. CO_2 control 7. Maximum VAV 8. Maximum fan 9. Humidification 10.De-humidification 11.Lighting control 12.Blinds control 13.Amber / red alarm 14.Red alarm 15.Heating 1 status 16.Cooling 1 status 17.Fan status 18.Auxiliary loop 19.6-way valve 20.6-way valve reverse

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Property ID	Values	Default	Description
40133	*0 - 1 - 2 ... - 18*	*3*	Y3 output mode. 0. Network value 1. Heating stage 1 2. Cooling stage 1 3. Heating stage 2 4. Cooling stage 2 5. EC fan 6. CO_2 control 7. Maximum VAV 8. Maximum fan 9. Humidification 10.De-humidification 11.Amber / red alarm 12.Red alarm 13.Heating 1 (triac) 14.Cooling 1 (triac) 15.Fan (triac) 16.Auxiliary loop 17.6-way valve 18.6-way valve reverse
40143	*0...14*	*0*	Valve jam prevention interval (days).
40144	*0 - 1 - 2 … - 11*	*0*	RI1 input mode. 0. Disabled 1. Room (NTC 10 control) 2. Floor (NTC 10 high/low limit) 3. Auxiliary loop 4. Network NTC 10 5. Network 0...10 V 6. CO_2 (0..10 V = 0...2000 ppm) 7. Main loop (0..10 V = 0...50 °C) 8. Close for eco mode (digital input) 9. Open for eco mode (digital input) 10.Close for off mode (digital input) 11.Open for off mode (digital input)
40145	*0 - 1 - 2 … - 11*	*0*	RI2 input mode. 0. Disabled 1. Room (NTC 10 control) 2. Floor (NTC 10 high/low limit) 3. Auxiliary loop 4. Network NTC 10 5. Network 0...10 V 6. CO_2 (0..10 V = 0...2000 ppm) 7. Main loop (0..10 V = 0...50 °C) 8. Close for eco mode (digital input) 9. Open for eco mode (digital input) 10.Close for off mode (digital input) 11.Open for off mode (digital input)
40146	*0 - 1*	*0*	Outdoor temperature source. 0. Internal sensor 1. Network sensor

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Property ID	Values	Default	Description
40148	*0 - 1 - 2 … - 9*	*0*	Digital input mode. 0. Close for eco mode 1. Open for eco mode 2. Close for off mode 3. Open for off mode 4. Heating / cooling change-over 5. Disable cooling 6. Alarm contact 7. Network measurement 8. Close for boost mode 9. Open for boost mode
40149	*0...28800*	*0*	Digital input delay (seconds).
40150	*-10.0...10.0*	*0.0*	Internal temperature measurement tuning (°C/°F).
40151	*-10.0...10.0*	*0.0*	RI1 input tuning (°C/°F).
40152	*-10.0...10.0*	*0.0*	RI2 input tuning (°C/°F).
40153	*-500...500*	*0*	CO_2 measurement tuning (ppm).
40154	*-10.0...10.0*	*0.0*	Humidity measurement tuning (%rH).

5.5.2 Config2 object

Required object properties:

Property name	Properties	Value
Object identifier	Read	proprietary-128
Object name	Read / write	Config2
Object type	Read	proprietary-128

Optional properties: none

Property ID	Values	Default	Description
40155	*0 - 1 - 2 - 3*	*1*	Lock mode. 0. Disabled 1. Off mode, lighting and blinds buttons available. 2. Temperature setpoint buttons available. 3. All buttons unavailable
40156	*0000...9999*	*0000*	Lock mode password.
40157	*0...480*	*0*	Boost mode duration. 0 = permanent boost mode, 1...480 min
40158	*0 - 1 - 2 … - 5*	*1*	Boost target. 0. Temperature setpoint 1. CO_2 setpoint 2. Humidification setpoint 3. De-humidification setpoint 4. Fan control 5. Auxiliary temperature setpoint
40159	*0...5000*	*25*	Boost target value.
40164	*0 - 1*	*1*	Humidity display. 0. Disabled 1. Enabled

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Property ID	Values	Default	Description
40165	*0 - 1*	*0*	Temperature unit changing button. 0. Disabled 1. Enabled
40166	*1 - 2 … - 16*	*1*	Zone 1 sensor text on the display. 1. *Room* 2. *Floor* 3. *Outside* 4. *Zone 1* 5. *Zone 2* 6. *Zone 3* 7. *Bathroom* 8. *Sauna* 9. *Bedroom* 10.*Kitchen* 11.*Cooler* 12.*Flow* 13.*Hot water* 14.*Tank* 15.*Pool* 16.*Cabin*
40167	*0 - 1 - 2 … - 16*	*2*	Zone 2 sensor text on the display. 0. Disabled 1. *Room* 2. *Floor* 3. *Outside* 4. *Zone 1* 5. *Zone 2* 6. *Zone 3* 7. *Bathroom* 8. *Sauna* 9. *Bedroom* 10.*Kitchen* 11.*Cooler* 12.*Flow* 13.*Hot water* 14.*Tank* 15.*Pool* 16.*Cabin*

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Property ID	Values	Default	Description
40168	*0 - 1 - 2 … - 16*	*3*	Zone 3 sensor text on the display. 0. Disabled 1. *Room* 2. *Floor* 3. *Outside* 4. *Zone 1* 5. *Zone 2* 6. *Zone 3* 7. *Bathroom* 8. *Sauna* 9. *Bedroom* 10.*Kitchen* 11.*Cooler* 12.*Flow* 13.*Hot water* 14.*Tank* 15.*Pool* 16.*Cabin*
40169	*0 - 1 - 2 - 3*	*3*	Alarm 1 source. 0. CO_2 1. Room temperature 2. Humidity 3. None
40170	*0...5000*	*0*	Alarm 1 amber switching point.
40171	*0...5000*	*0*	Alarm 1 red switching point.
40172	*0...5000*	*0*	Alarm 1 hysteresis.
40173	*0 - 1 - 2 - 3*	*3*	Alarm 2 source. 0. CO_2 1. Room temperature 2. Humidity 3. None
40174	*0...5000*	*0*	Alarm 2 amber switching point.
40175	*0...5000*	*0*	Alarm 2 red switching point.
40176	*0...5000*	*0*	Alarm 2 hysteresis.
40180	*0000...9999*	*6666*	Configuration mode password.
40181	*0000...9999*	*0000*	Staff mode password.
40182	*0...120*	*30*	PWM1 pulse width (only -1A2T and -3R2T models). 0 = on/off, 1...120 s.PWM pulse width (only -1A2T and -3R2T models). 0 = on/off, 1...120 s.
40185	*0.0...95.0*	*20.0*	Heating / cooling change-over, minimum temperature (°C/°F).
40186	*0.0...95.0*	*25.0*	Heating / cooling change-over, maximum temperature (°C/°F).
40188	*0...28800*	*0*	Fan off delay. Only applicable if the minimum fan output is set (property ID 40130).
40190	*1.0...50.0*	*4.0*	Auxiliary heating loop proportional band (°C/°F).
40191	*0...1200*	*600*	Auxiliary heating loop integration time (seconds).
40192	*0 - 1*	*1*	Auxiliary heating loop actuator direction. 0. Reversed 1. Direct

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Property ID	Values	Default	Description
40300	*0...127*	*1*	Bus address.
40301	*0 - 1 - 2 - 3 - 4*	*0*	Bus speed. 0. 9600 bits/s 1. 19200 bits/s 2. 38400 bits/s 3. 57600 bits/s 4. 76800 bits/s
40302	*0 - 1 - 2*	*0*	Bus parity. 0. None 1. Odd 2. Even
40303	*0 - 1*	*0*	Stop bits. 0. 1 stop bit 1. 2 stop bits
40400	*0 - 1*	*0*	Reset device. 0. N/A 1. Reset device
40401	*0 - 1*	*0*	Non volatile memory update. 0. N/A 1. Update memory
40403	*0 - 1*	*0*	Reset to factory defaults. 0. N/A 1. Reset to defaults
40404	*0 - 1 - 2*	*0*	Display refresh rate. 0. Fast 1. Medium 2. Slow
40406	*0 - 1 - 2*	*0*	Language. 0. English 1. French 2. Spanish
40407	*0 - 1 - 2*	*1*	Display updating frequency. 0. Fast 1. Medium 2. Slow
40408	*0 - 1*	*0*	Automatic summer / winter time adjustment. 0. Disabled 1. Enabled

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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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