![Produal - measure-be sure.]

TRT-P-1R Series Programmable Touchscreen Thermostats

The TRT-P-1R series programmable thermostats offer a modern flush mounted slim design look for the heating and cooling control. The thermostats can be used for various zone control or underfloor heating/cooling control applications. The 50 series thermostats have attractive 3.5" backlit touchscreen and have 7 day time clock automatically adjust switching targets during the day.

The TRT family covers a wide range of power options.

The MOD models have built-in Modbus RTU communications and the BAC models provide BACnet MS/TP communications.

Features

- 12VDC, 24VAC/DC or 90-250VAC Power Supply
- 7 Day and 5+2 Day Programmable
- 3.5" Inch Backlit Touchscreen Display
- BACnet and Modbus Communication Models
- Flush Mounting in the UK, EURO and US Wall Mounting Box
- Attractive Modern Designer Look

- Built-In Temperature Sensor
- Remote NTC10 Control Sensor
- Underfloor Max/Min Temperature Sensor
- TRT-P-1R: 250V 7A Switched Output Relay
- Digital Input for Overrides

Ordering guide

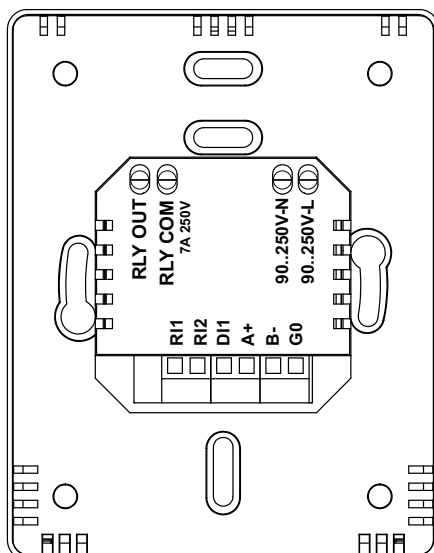| Ordering guide		Type	0	1	2	3	4	5	6
0 Touchscreen room thermostats			6001					0	
1 Device type	Room thermostat, 2RI, 1DI, 1RO, 7-days schedule	TRT-P-1R		2					
2 Communication	No communication				A				
	Modbus	-MOD			M				
	BACnet	-BAC			B				
3 Power supply	24 Vac/dc	-24				2			
	12 Vdc	-12				1			
	90…250 Vac	-230				M			
4 Additional measurements	No additional measurement						0		
	Relative humidity	-RH					1		
5 Reserved								0	
6 Body colour	Chrome								0
	White (RAL 9010)	-W							W
	Black (RAL 8022)	-B							B

Technical Data

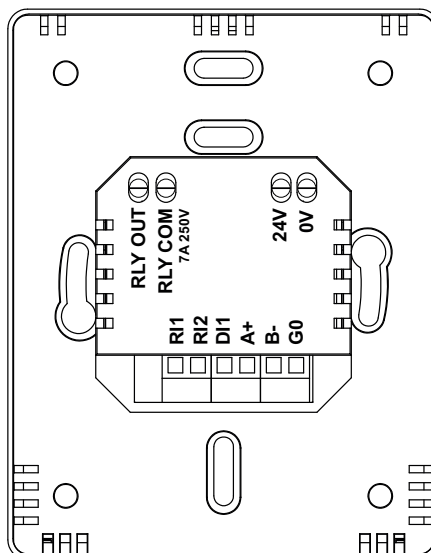|		
Power Supply	12-Models: 24- Models: M- Models:	Models -12: 12VDC -5%/+15% Models -24: 24VAC/DC -10%/+15% Models -M: 90..250VAC/DC 50/60Hz
Display	Touchscreen	3.5" Backlit Touchscreen, 320 x 480 pixels, 255K colours
Signal Outputs	Relay Output	TRT-P-1R: 1 x 7A 230Vac Relay, SPST
Signal Inputs	Built-In Sensor	0..50°C (32..122°F) ±0.5°C (±0.9°F) @ 25°C (@77°F)
	External Sensor Inputs	1 x External NTC10K3 Sensors
	Digital Input	1 x Digital Input, Volt-Free Contact, Impedance <1KOhm
Optional Sensing	Humidity (RH Models)	

Characteristics	Range	0..100%rH
	Accuracy	±2% rH (within 20..80% rh)
Communication	Modbus (-MOD models)	
	Protocol	Modbus RTU
	Interface	RS485; maximum 63 devices per segment
	Addressing	1..247 via Touchscreen
	Communication	9k6/19k2/38k4/57k6/76k8 Baud; Parity None/Even/Odd, 1 or 2 Stop Bits (adjustable through Touchscreen)
	BACnet (-BAC models)	
	Protocol	BACnet MS/TP
	Interface	RS485; maximum 63 devices segment
	MAC Addressing	0.127 via Touchscreen
	Device ID	Default 651000 + MAC Address, Adjustable
	Communication	9k6/19k2/38k4/57k6/76k8 Baud; Parity None/Even/Odd, 1 or 2 Stop Bits
Connections	Terminal Connections (Relay & Power Supply)	Solid and Stranded Cable Maximum Size: Solid; 0.05-2.5mm^2, Stranded: 0.05-1.50mm^2 / 14 to 30 AWG (UL) Rising Clamp: Size 2.5 x 2.2mm
	Terminal Connections (Low Voltage Terminals)	Solid and Stranded Cable; 90° Angle for Wiring Maximum Size: 0.05 to 1.5mm^2 (EN ISO) / 14 to 30 AWG (UL) Rising Clamp: Size 2.5 x 1.9mm
Environmental Conditions	Operating	
	Temperature	0°C...+50°C (32..122°F)
	Humidity	0...95%rh (non-cond.)
	Storage	
	Temperature	-30°C...+70°C (-22..158°F)
	Humidity	0...95%rh (non-cond.)
Standards	CE Conformity	CE Directive 2004/108/EC (EMC), 2006/95/EC (LVD) EN61000-6-3: 2001 (Generic Emission) EN61000-6-1: 2001 (Generic Immunity) EN60950 (Low Voltage Directive) EN60730-1 (Low Voltage)
	Degree of Protection	IP20
Housing	Housing Material	Polycarbonate Plastics, Self Extinguishing
	Housing Colour	Black with Chrome Frame Option: Black with Black Frame Option: White with White Frame
	Mounting	Wall or Junction Box Mounting
	Dimensions	W88mm (3.46") x H112mm (4.41") x D43mm (1.68") Flush: W88mm (3.46") x H112mm (4.41") x D14.5mm (0.57")
	Weight	220g

TRT-P-1R Wiring Connections

90-250V MODEL WIRING

24V MODEL WIRING

90-250V Model Wiring

RELAY	250VAC/30VDC 7A Relay Contact
RELAY	250VAC/30VDC 7A Relay Contact
90..250V-N	Mains Power Supply Neutral (90-250V)
90..250V-L	Mains Power Supply Live (90-250V)
Rin1	Remote NTC10 Temperature Sensor Input (Control, Floor, Outside, Network Only)
Rin2	Remote NTC10 Temperature Sensor Input (Control, Floor, Outside, Network Only)
Din	Volt-Free Digital Input Contact (Holiday etc Override)
485A+	Modbus / BACnet MS/TP RS485 A+ Connection
485B-	Modbus / BACnet MS/TP RS485 B- Connection
G0	0V Common

24V Model Wiring

RELAY	250VAC/30VDC 7A Relay Contact
RELAY	250VAC/30VDC 7A Relay Contact
24V	24Vac/dc Supply
0V	0V Supply
Rin1	Remote NTC10 Temperature Sensor Input (Control, Floor, Outside, Network Only)
Rin2	Remote NTC10 Temperature Sensor Input (Control, Floor, Outside, Network Only)
Din	Volt-Free Digital Input Contact (Holiday etc Override)
485A+	Modbus / BACnet MS/TP RS485 A+ Connection
485B-	Modbus / BACnet MS/TP RS485 B- Connection
G0	0V Common

WARNING:Switch off the power before any wiring is carried out.

Typical Thermostat Screens

The images below illustrate the typical home screens on the TRT thermostats. The screen is touch sensitive and shows the current status of the thermostat. Inside the red/blue/white ring the thermostat shows the current target temperature. The intensity of the red/blue ring changes based on the temperature differing from the target temperature.

The small circle indicates the current room temperature (and if enabled the floor temperature and/or outside temperature, and/or relative humidity via a rotating transition).

In Cleaning Mode the number inside the large circle indicates the remaining cleaning time. The Boost icon changes to Cleaning icon and by pressing it the cleaning mode can be cancelled.

In Holiday Mode the home screen shows the current ECO mode target temperature, and by pressing the Holiday Mode Icon, the holiday can be cancelled.

ICON DESCRIPTION

Icon	Description
(red ring)	HEATING DEMAND
(blue ring)	COOLING DEMAND
(white ring)	RELAY OFF (NO HTG/CLG)
	COMMS MESSAGE
	HOLIDAY MODE
	CLEANING MODE
	SCREEN LOCKED
	LIGHTS ON
	AIR/CON ON
	ERROR
	POWER OFF
	SETPOINT LIMITED
	MAINTENANCE MODE
	BOOST MODE
	ECO MODE
	FROST PROTEC-TION ACTIVE
	SET TIME AND DATE
	SET TIME PROGRAMS
	SCREEN DIM ICON

HEATING DEMAND

Wed 12:43

21.5 °C
Target > Wed 17:00

Room 20.1 °C

- STATUS INFORMATION BANNER
- FUNCTION BASED ICON: BOOST ICON (IF BOOST TIME SET)
- INTENSITY OF THE RED AND BLUE CHANGES DEPENDING ON DIFFER-ENCE BETWEEN TARGET AND ROOM, AT 2°C FULL RED
- LIGHTS STATUS AND SWITCH ON/OFF
- SHOWS THE CURRENT TARGET TEMPERATURE AND DURATION
- SMALL ACTION CIRCLE

COOLING DEMAND

Wed 12:43

21.5 °C
Target > Wed 18:20

Room 23.8 °C

- PRESS UP AND DOWN ARROWS TO ADJUST TEMPERATURE TARGET TEMPORARILY (UNTIL NEXT SWITCHING POINT)

TRANSITIONS BETWEEN ROOM - FLOOR - OUTSIDE IF FITTED / ENABLED

Floor 20.8 °C

Outside 10.5 °C

Humidity 45 %

CANCEL BY TOUCHING CLEANING ICON

THE SMALL INFO CIRCLE ACTS ALSO AS A TOUCH AREA FOR FURTHER SETTINGS

OFF MODE, CLEANING ACTIVE

Fri 19:43

180 Cleaning Mins.

Room 22.7 °C

ECO MODE ON

Fri 19:43

16.5 °C
Target

Room 20.1 °C

ECO MODE STATUS AND CANCEL ICON

The TRT-P-1R room thermostat home screen has four touch sensitive areas that allow the thermostat settings to be changed.

- UP and DOWN arrows; to alter the current main zone target temperature temporarily. The thermostat returns to the programmed temperatures at the next switching point.
- TARGET UNTIL area; shows until what time the current target tempeature is active
- AC ICON (TRT-P-1R); when AC icon is enabled the AC unit can be enabled/disabled from this icon (systems only, switches network variable)
- LIGHTS ICON; when LIGHTS are enabled, the lights can be enabled/disabled from this icon (systems only, switches network variable).
- SMALL ACTION CIRCLE (that contains current main zone temperature etc.); allows access to FURTHER SETTINGS AND INFORMATION screen. From this screen e.g. the time programme can be changed.
- FUNCTION BASED ICON; in cleaning mode shows the cleaning icon; in BOOST mode shows the BOOST icon from where the main zone output can be Boosted on; in OFF mode shows the OFF icon; in HOLIDAY mode shows the holiday icon, in HOLD MODE shows the hold icon. Pressing the icon the mode can can be cancelled
- ECO icon; when ECO mode is on, the ECO mode can be cancelled from the button

Touchscreen Backlight

The touchscreen backlight level can be adjusted through the maintenance mode. During the normal operation after 30 seconds of inactivity, the touchscreen dims to the "stand-by" level set. If the backlight level is set to 0, the screen backlight switches off.

By pressing the DIM icon when the screen is active the screen is immediately dimmed to the "stand-by" level. Pressing the DIM icon when the device is in the "stand-by level", switches the backlight OFF.

The screen backlight is automatically activated when it is touched.

Temperature Displays

The TRT thermostats show the measured temperatures inside the SMALL ACTION CIRCLE. The enabled temperatures rotate in and out in a sequence.

Room
20.1 ℃

Room temperature is always displayed on the ACTION CIRCLE. The room temperature uses as default the built-in temperature sensor but can be configured to use an external sensor connected to RI1. The description for the room temperature can be changed via *Room Text* parameter in the configuration pages.

Floor
20.1 ℃

Floor Temperature is displayed on the ACTION CIRCLE if the MIN-MAX operation has been selected for the RI2 input (underfloor minimum/maximum control). The description for the floor temperature can be changed via *Floor Text* parameter in the configuration pages.

Outside
20.1 ℃

Outside Temperature is displayed on the ACTION CIRCLE if RI1/RI2 has been selected or if the *Outside Temp Source* parameter has been set to Network and valid network value is sent to the thermostat. The description for the outside temperature can be changed via *Outside Text* parameter in the configuration pages. By changing the description the outside temperature display can be used to indicate many other types of measurements.
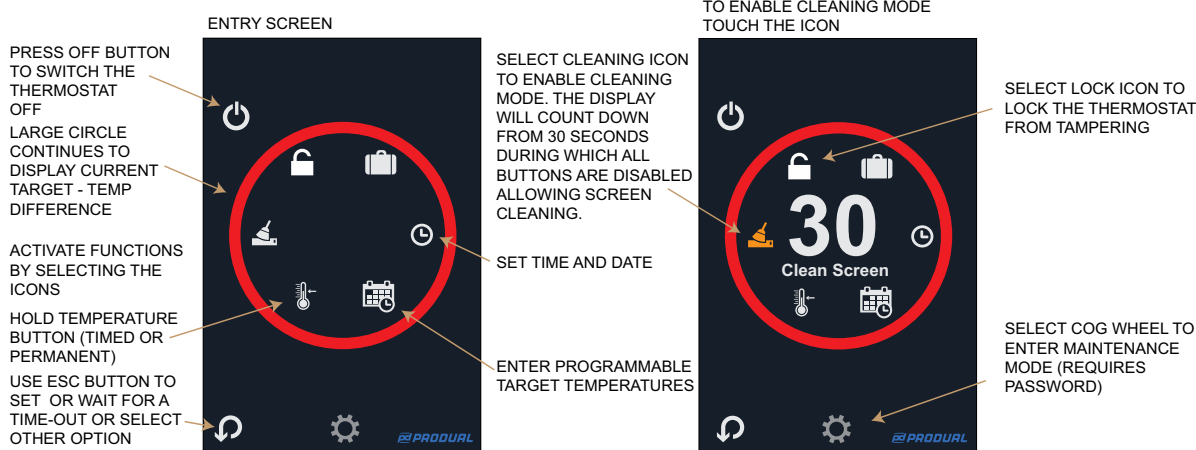
Further Settings and Information

NOTE: To enter FURTHER SETTINGS screen, press SMALL ACTION CIRCLE (temperature display) on the home screen.

The FURTHER SETTINGS shows additional user settings options on the TRT thermostats:-

- OFF icon to switch thermostat to OFF.
- HOLD TEMPERATURE icon to switch the temperature to hold the current setting. The hold can be set for a fixed period or permanently via numeric pad screen.
- LOCK icon is used to lock the thermostat. Number of different lock modes options exist.
- HOLIDAY icon is used to switch the thermostat to holiday mode.
- CLEANING icon is used to enable timed cleaning mode.
- CLOCK icon is used to set the time.
- CALENDAR icon is used to enter the programming screens to set the switching times, the temperature targets.
- COG WHEEL icon allows entry to the maintenance mode.

FURTHER SETTINGS AND INFORMATION

ENTRY SCREEN

TO ENABLE CLEANING MODE TOUCH THE ICON

PRESS OFF BUTTON TO SWITCH THE THERMOSTAT OFF

LARGE CIRCLE CONTINUES TO DISPLAY CURRENT TARGET - TEMP DIFFERENCE

ACTIVATE FUNCTIONS BY SELECTING THE ICONS

HOLD TEMPERATURE BUTTON (TIMED OR PERMANENT)

USE ESC BUTTON TO SET OR WAIT FOR A TIME-OUT OR SELECT OTHER OPTION

SELECT CLEANING ICON TO ENABLE CLEANING MODE. THE DISPLAY WILL COUNT DOWN FROM 30 SECONDS DURING WHICH ALL BUTTONS ARE DISABLED ALLOWING SCREEN CLEANING.

SET TIME AND DATE

ENTER PROGRAMMABLE TARGET TEMPERATURES

30
Clean Screen

SELECT LOCK ICON TO LOCK THE THERMOSTAT FROM TAMPERING

SELECT COG WHEEL TO ENTER MAINTENANCE MODE (REQUIRES PASSWORD)

The FURTHER SETTINGS screen is protected by the Staff Code. As default the Staff Code is disabled (0000). If activated, the user will need to enter the *Staff Code* to enter the screen.

Programming Times and Targets

The TRT-P-1R thermostats have up to five programmable time switching times and up to four temperatures per day. The times and target temperatures can be set for individual weekdays or the thermostat can be switched 5+2 mode where the targets are set for WEEKDAYS or WEEKENDS.

The SCHEDULE OVERVIEW screen shows the current switching temperatures and switching targets. By selecting the day it is possible to adjust the switching times and targets of the device.

NOTE: Switching from the 7 DAYS mode to 5+2 DAYS mode will set all weekday/weekend to the group settings. When returning back to 7 DAYS mode the setting are required to be re-entered for each day.

A copy function is available to copy times and target temperatures from one day (or group) to other day.

SETTING PROGRAM SCHEDULES

7 DAYS PROGRAMMING MODE

ENTER TARGET TEMP

UP TO 4 TARGET TEMPERATURES

VISUAL SCHEDULE OVERVIEW

SELECT DAY

7 DAYS OR 5+2 DAYS MODE SELECTTION

ENTER SELECTED PERIOD SWITCHING TIME

TOUCH TIME TO CHANGE SWITCHING TIME

TOUCH TARGET TO SELECT SWITCHING TARGET

Temperature Modes

The thermostat controls to the target temperature by switching the relay ON/OFF as required. The control logic has hysteresis i.e. in the heating mode the temperature has to exceed the target setpoint plus the hysteresis to switch the relay OFF to prevent fast on/offs. In cooling mode this operates in reverse. The diagram below illustrates the temperature control operation.
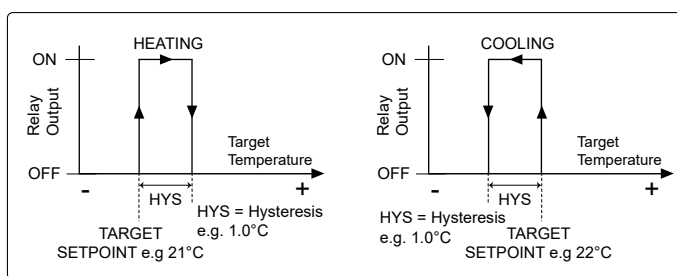
The target temperature is set by the PROGRAMMED TIMES and TARGETS and can be temporarily adjusted via UP and DOWN arrows.

In addition thermostat has;

- ECONOMY MODE; target temperature switched to the ECONOMY setpoint
- OFF MODE; the thermostat is OFF, but FROST setpoint is active protecting the building
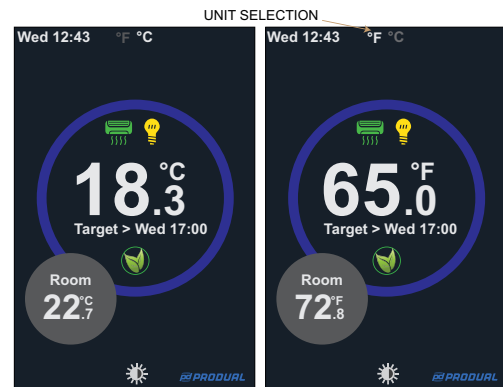
Centigrade to Fahrenheit Display

If Centigrade to Fahrenheit icon has been enabled it is possible on the front screen to change the units by touching this icon.

This option is particularly useful in hospitality applications where the client base is expected to be international.

In addition (from Fw 4.04 onwards) at the commissioning it is possible to select default units from parameter System/Native Units. When changing the Native Units the device carries out Factory Default reload using the selected units (for all relevant settings).

Warning: After changing the Native Units, the controller reloads defaults for ALL PARAMETERS.The Native Unit selection should be done at the start of the commissioning.

UNIT SELECTION

Wed 12:43   °F °C   Wed 12:43   °F °C

18.3 °C   65.0 °F
Target > Wed 17:00   Target > Wed 17:00

Room   Room
22.7 °C   72.8 °F

ECO Mode

The thermostat is switched to ECO mode via network or via digital input. The thermostat can also operate in the ECO mode when the Holiday mode has been activated.

In the ECO mode the thermostat controls to the ECO heating/cooling setpoint and the current target setpoint is displayed on the screen.

When in the ECO mode, the ECO mode can be cancelled by pressing the ECO icon on the front screen. Last command controls the thermostat state i.e if the thermostat has been switched to ECO mode via a digital input or over the network, the user can cancel the mode through the touchscreen.

Fri 19:43

ECO MODE STATUS AND CANCEL ICON

16.5 °C
Target

Room
20.1 °C
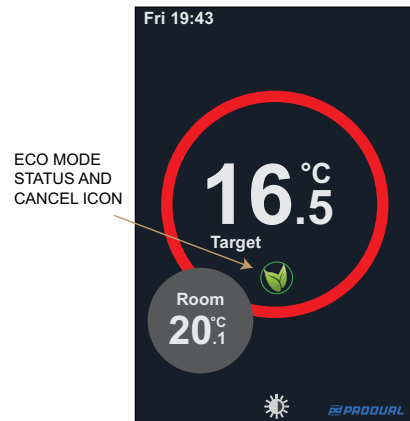
OFF Mode

The thermostats can be switched to OFF mode via the touchscreen, digital volt-free input (e.g. time clock) or via the communication network (system configuration), or when in holiday mode. The thermostat switches also to OFF mode when the cleaning mode has been activated.

In the OFF mode the current Frost Setpoint is displayed as the target temperature.

When in OFF mode if room temperature drops below the Frost Setpoint, the frost protection is activated, the SNOWFLAKE icon is displayed on the screen and the relay output is switched ON. When the temperature exceeds the frost setpoint plus two degrees, the frost condition is cleared.

The OFF mode can be cancelled by pressing the OFF icon. The system is designed so that the last command controls the current state. E.g. if the thermostat has been overridden to OFF mode via the network, or a digital input transition, the user can cancel the OFF mode by pressing the OFF icon. Similarly a networked thermostat driven to OFF mode by the user can be overridden back to COMFORT mode using the network master.

Note: The OFF mode button is as default available through the FURTHER SETTINGS screen. By activating the 'Show OFF Icon' parameter, the OFF icon is displayed on the front screen (as long as Boost button has not been activated).

When the device switches to OFF mode and then returns to the comfort mode, the setpoint is reset to the Nominal Setpoint setting. To disable this function (i.e. to retain last user setpoint), set the 'Setpoint Reset' parameter to disabled.

OFF CANCEL ICON

Fri 19:43

8.0 °C
Target

Room
20.1 °C
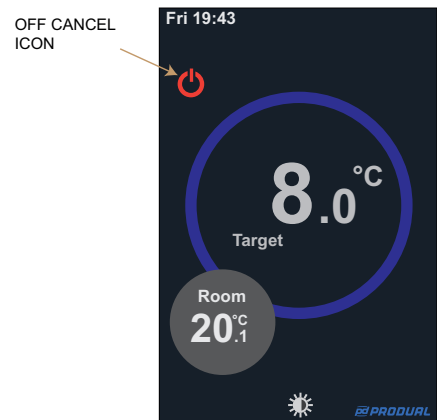
Boost

The thermostat relay can be switched ON for a timed period by activating the BOOST function. The BOOST overrides the automatic temperature control and switches the output ON. As default the boost time is set to 0 (deactivated).

.

BOOST ICON, PRESS TO ACTIVATE THE BOOST, TO CANCEL RE-PRESS
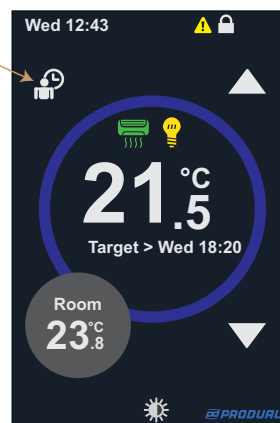
Cleaning Mode

After entering FURTHER INFORMATION screen, by selecting the CLEANING icon, it is possible to activate the cleaning mode. Initially the thermostat will enter a "Clean Screen" state where all touchscreen presses are ignored and 30 second countdown timer is displayed. This allows cleaning of the thermostat itself.

Once the "Clean Screen" timeout has expired the thermostat enters a "Cleaning" state during which control is automatically switched to the OFF/FROST mode and a countdown timer showing the cleaning time remaining is displayed on the home screen. The cleaning period can be set to 0..480 minutes via Maintenance Mode. If the cleaning period is set to 0 (default) only the "Clean Screen" function is applied.

Hold Mode

The HOLD button in the FURTHER INFORMATION screen allows the thermostat target to held either permanently or the time set (up to 48 hours). This is used e.g. when the user does not want the switching times to adjust the temperature at the set times. The active HOLD mode is indicated in the FUNCTION BASED AREA on the home screen, and by pressing the HOLD button can be cancelled.

Holiday Mode

After entering FURTHER INFORMATION screen, by selecting the HOLIDAY icon, it is possible to set the number of days of holidays. The available range is 0-31 days. After setting the holiday, the thermostat immediately switches to OFF or ECO mode (configurable).

By setting holiday to 0 or just by pressing ENTER button the thermostat switches to permanent HOLIDAY MODE. The HOLIDAY MODE can be cancelled by pressing the HOLIDAY ICON.
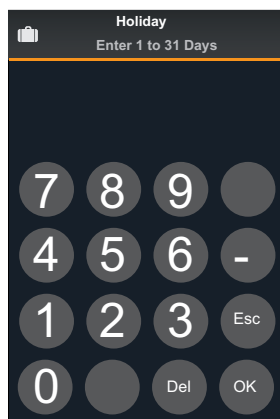
ENTER HOLIDAY TIME OR JUST PRESS ENTER FOR HOLIDAY. AFTER ACTIVATING THE HOLIDAY THE HOME SCREEN INDICATES THE HOLIDAY TIME REMAINING IN THE ACTION CIRCLE.
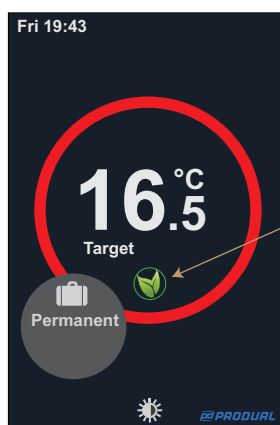
OFF ICON TO CANCEL HOLIDAY

ECO MODE ICON TO CANCEL HOLIDAY
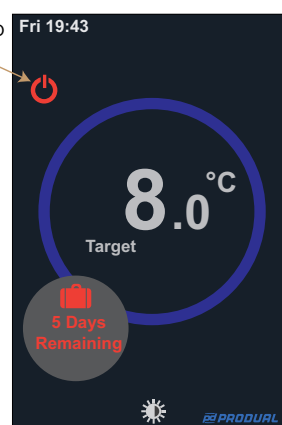
Lights Control (Systems Only with BACnet/Modbus Networking)

It is possible to enable LIGHTS button. The light button and its current status is displayed on the front screen.

The button is enabled through the Maintenance Mode in the Display settings.

Note: These options will only switch corresponding network variable on/off. The thermostat does not have any physical outputs tto drive Lights.

LIGHTS STATUS, AND ON/OFF SWITCH

LIGHTS ON

LIGHTS OFF

AC Control Icon (Systems Only with BACnet/Modbus Networking)

It is possible to enable AC (air conditioning) button. The AC button and its current status is displayed on the front screen.

The button is enabled through the Maintenance Mode in the Display settings.

Note: These options will only switch corresponding network variable on/off. The thermostat does not have any physical outputs to drive AC unit.

Note: If both Lights and AC Icon have been enabled they are displayed next to each other.

A/C STATUS, AND ON/OFF SWITCH

A/C ON

A/C OFF

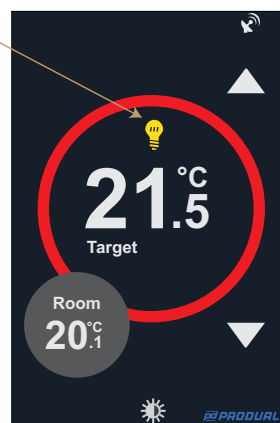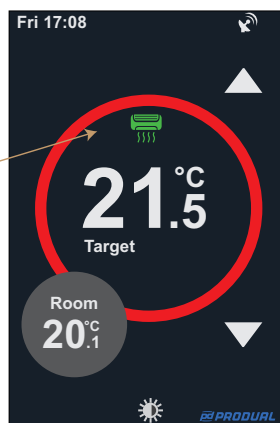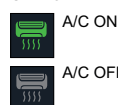**Lock Mode**

After entering FURTHER INFORMATION screen, by selecting the LOCK icon it is possible to lock the thermostat. Now by entering the LOCK CODE (default 0000), the thermostat lock state can be activated.

The lock mode can be configured to work in different ways:-

- DISABLED: Lock Mode Icon Not Available
- ADJUST ONLY: Allows Temporary Temperature Adjustment Only
- SCHEDULES ONLY: Allows adjustment of the Programmed Times and Targets
- NO INPUT: All Buttons Locked
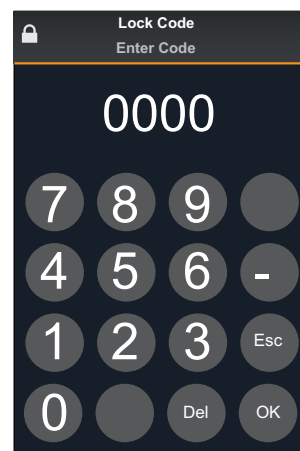
Lock Mode Options	Icon Active							
	Lock	Up and Down	Boost / OFF	ECO / HOLD Cleaning	Programs	AC	Lights	Clock
DISABLED	NO	YES	YES	YES	YES	YES	YES	YES
ON/OFF ONLY	YES	NO	YES	NO	NO	YES	YES	YES
ADJUST ONLY	YES	YES	NO	NO	NO	NO	NO	YES
NO INPUT	YES	NO	NO	NO	NO	NO	NO	YES

Alarm Display

FURTHER SETTINGS AND INFORMATION
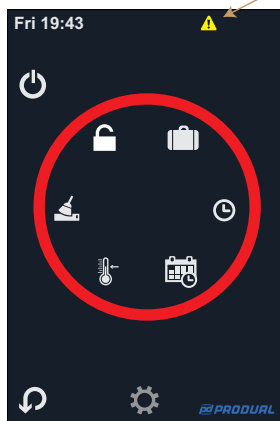
SELECT ALARM ICON FOR MORE INFORMATION

Fri 19:43 ⚠️

Notifications

Internal Sensor Failure
External Sensor 1 Fault
External Sensor 2 Fault
Digital Contact Fault
Time Lost
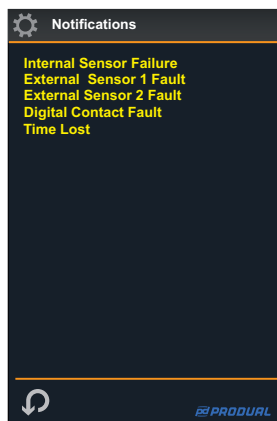
When entering FURTHER INFORMATION AND SETTINGS screen and an alarm is active, select the alarm icon for more information.

The typical alarm reasons are:

•External sensor 1 (Res1) fault (when activated; not connected)
•External sensor 2 (Res2) fault (when activated; not connected)
•Built-in sensor fault
•Digital Contact Fault
•Time Lost

External Sensor RI1 and RI2 Inputs

A remote NTC10k3 sensor can be connected to these inputs to used for the temperature control and monitoring purposes. The options are:-

- DISABLED: RI is disabled.
- MAIN CONTROL: RI is used for the main temperature control.
- MIN-MAX: RI is used for the underfloor minimum/maximum temperature limiting control.
- OUTSIDE: RI is used to display (Outside) Temperature on the ACTION CIRCLE. It is possible to change the text to indicate alternative measurement.
- NETWORK: RI is available over the communication network for system purposes.

Note: If both RI1 and RI2 inputs are set to outside, the RI2 input takes the precedence

Outside Temperature Source

It is possible to configure the thermostat to show the outside temperature from the External Sensor inputs RI1 or RI2. In networked systems it is also possible to send the outside temperature from the network by configuring the *Outside Temp Source* parameter as *Network*.

DI1 Digital Volt-Free Input

The digital volt-free contact can be used to override the thermostat to ECO and OFF/FROST modes. The configuration options are:-

- Close for ECO Mode
- Open for ECO Mode
- Close for OFF/FROST Mode
- Open for OFF/FROST Mode
- Heating/Cooling (Change-Over Configuration)
- Alarm
- Network

"Close For" Configuration - The digital volt-free contact can be linked to e.g. external timer to switch the thermostat to ECO/OFF mode during the timed period.

"Open For" Configuration - The digital volt-free input can be used to activate ECO or OFF mode when the contact opens. In this mode it can be connected to a window switch or door card switch.

Heating/Cooling Change-Over Configuration - The digital input can be used to override from heating to cooling mode. The thermostat works in the heating mode when the contact is open, and in the cooling mode when the contact is closed.

Alarm Configuration - when the contact closes the "DI Contact Alarm" alarm message is displayed on the screen.

Network option is selected when the digital input is used for monitoring purposes only.

Humidity Measurement (-RH option)

The models with RH option have a 2%rH accurate humidity sensor for room space humidity measurement. The humidity reading is displayed inside the SMALL ACTION CIRCLE (display as default enabled, option to disable through configuration pages) and available over the communication network.

Underfloor Heating Control

When underfloor high/low limit sensor is fitted, the thermostat monitors the floor temperature.

If in HEATING CONTROL in COMFORT/ECO/BOOST modes:

- The relay is switched OFF if the Max. Floor Temp Limit is exceeded
- The relay switches back ON if the floor temp drops 1°C (Hysteresis) below the Max Temp Limit
- The relay is switched ON if the Floor Temperature drops below the Min Floor Temp Limit. This override is removed if the Floor Temperature exceeds 1°C the Min Floor Limit (Hysteresis)

This high limit is typically used to protect the floor surface. The minimum temperature limit is typically used in bathrooms to provide minimum comfort level for bare feet and to dry up water.

If in COOLING CONTROL in COMFORT/ECO/BOOST modes:

- The relay is switched OFF if the temperature drops below the Min. Floor Temp Limit
- The relay switches ON with the temperature exceeds 1°C (hysteresis) above the Min Floor Temp Limit

The low limit is typically used to prevent condensation.

The hysteresis is adjustable. To indicate the limit being active, the thermostat home screen shows a limit icon next to setpoint.

Touchscreen Calibration

The touchscreen can be re-calibrated by pressing the screen on power-up. Alternatively the calibration screen is activated by pressing the screen after exiting the System Configuration after which the device performs soft reset. Calibrate the screen by swiping to the all four edges of the screen and then press OK to accept the new settings.

Language Selection

The TRT50 user pages can be displayed in different languages by selecting the language from the System Configuration pages.

Configuration Parameters
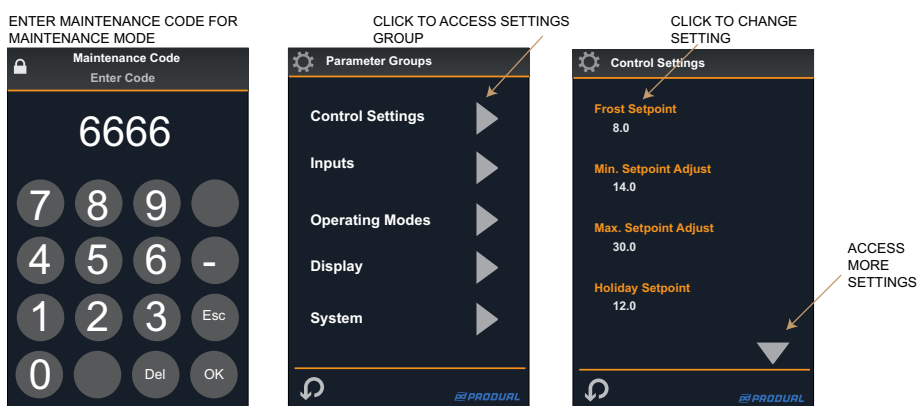
The TRT thermostats are configured to operate in different modes via the configuration parameters accessible through the maintenance mode.

To enter the maintenance mode click the COG WHEEL icon in the FURTHER SETTINGS SCREEN and enter the maintenance mode password (default 6666).

Note: The maintenance mode password can be changed in the configuration settings. Make sure that you note the new password if changed.

CONTROL SETTINGS		
Parameter Name	**Description**	**Range**
Nominal Setpoint	Not Applicable	
ECO Heating Setpoint	ECO Mode Heating Setpoint	0.0...95.0°C/°F (Default 16.0°C)
ECO Cooling Setpoint	ECO Mode Cooling Setpoint	0.0...95.0°C/°F (Default 28.0°C)
Frost Setpoint	Night Frost Setpoint (OFF Mode)	0.0...95.0°C/°F (Default 8.0°C)
Min Setpoint Adj	Minimum Adjustable Setpoint (HOME screen only)	0.0...95°C/°F (Default 14.0)
Max Setpoint Adj	Maximum Adjustable Setpoint (HOME screen only)	0.0...95°C/°F (Default 30.0)
Hysteresis	Temperature Control Hysteresis	0.0...20.0°C/°F (Default 1.0°C)
Control Type	Heating and/or Cooling Control (change-over via Digital input or over the communications network)	0 = Heating Control (default) 1 = Cooling Control 2 = Heating/Cooling Change-Over
Min Limit	Underfloor Heating Minimum Limit Setpoint	0.0...95.0°C/°F (Default 18.0°C)
Max Limit	Underfloor Heating Maximum Limit Setpoint	0.0...122.0°C/°F (Default 30.0°C)
Limit Hysteresis	Underfloor Heating Control Hysteresis	0.0..10.0 (default 1.0)

INPUTS		
Parameter Name	**Description**	**Range**
RI1 Mode	Remote Temperature Sensor RI1 Mode (status monitoring over the network is active for all active modes)	0 = Disabled (Default) 1 = Control 2 = Underfloor Min-Max Control 2 = Outside Temperature (Display) 3 = Network (Networked Solutions) 4 = IR Control (Not Applicable)
RI2 Mode	Remote Temperature Sensor RI1 Mode (status monitoring over the network is active for all active modes)	
Digital Input Mode	Digital Input Operation (status monitoring over the network is active for all modes)	0 = Disabled (no TRT effect) 1 = Close for ECO 2 = Open for ECO 2 = Close for OFF/FROST 3 = Open for OFF/FROST 4 = Heating / Cooling Mode 5 = DI Contact Alarm 6 = Network
Digital Input Delay	Digital Input Delay Timer (transition from active to non-active)	0..7200 seconds (Default 0s)
Outside Temp Source	Source for the Outside Temperature Display	0 = Built-In Sensor 1 = Network Sensor
Internal Sensor Cal	Internal Sensor One Point Compensation	-10.0..+10.0 °C/°F
RI1 Cal	Sensor Connected to RI1 Calibration	-10.0..+10.0 °C/°F
RI2 Cal	Sensor Connected to RI2 Calibration	-10.0..+10.0 °C/°F
Humidity Cal	Humidity Calibration (with RH option)	-10.0..+10.0 % rH
Setpoint Reset	Activates Setpoint Reset on Transition to OFF (Fw 4.04 onwards)	0 = Enabled (Default) 1 = Disabled

OPERATING MODES		
Parameter Name	**Description**	**Range**
Lock Mode	Lock Operation	0 = Disabled (default) 1 = On/Off/Boost Workable Only 2 = Temp Adjust Only Available 3 = No Input - All Buttons Disabled
Lock Mode Password	Lock Mode Password	0000 - 9999 (default 0000)
Cleaning Time	Cleaning Mode Running Time	0..480 minutes (Default 30)
Relay Mode	Select Relay Operation (Main Loop)	0 = Control Normally Open (Default) 1 = Control Normally Closed
Relay 2 Mode	Select Relay Operation for the Infrared Control (Relay 2) - Not Available on TRT-P-1R	0 = Control Normally Open (Default) 1 = Control Normally Closed
Boost Time	Boost Mode Running Time	0..480 minutes (Default 0) 0 = Disabled
Holiday Mode	Holiday Mode Override Target	0 = Off Mode (default) 1 = ECO Mode

DISPLAY		
Parameter Name	**Description**	**Range**
Brightness	Backlight Brightness	0..20 (default 5)
Enable Lights	Enable Lights Icon / Network Variable	0 = Disabled (default) 1 = Enabled
Enable AC/IR	Enable AC/IR Control Icon Note: TRT-P-1R has AC Icon	0 = Disabled (default) 1 = Enabled
Enable Holiday	Enable Holiday Icon	0 = Disabled 1 = Enabled (default)
Humidity Display	Enable / Disable Humidity Display (if option fitted)	0 = Disabled 1 = Enabled (default)
Show Unit Swap	Enable Temperature Display Unit Selection Button (°C/°F)	0 = Disabled (default) 1 = Enabled

DISPLAY		
Parameter Name	**Description**	**Range**
Room Text	Description for the Room Sensor (Built-In Sensor / RI1) Default; 1 = Room	0 = Disables 1 = Room (Default) 2 = Floor
Floor Text	Description for the Floor Sensor (RI2) Default; 2 = Floor Note: Disabled removes Floor Text and Measurement from Display	3 = Outside 4 = Zone 1 5 = Zone 2 6 = Zone 3
Outside Text	Description for the Outside Sensor (RI1 / RI2 / Network Value) Default; 3 = Outside Note: Disabled removes Outside Text and Measurement from Display	7 = Bathroom 8 = Sauna 9 = Bedroom 10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
Show Off Icon	Shows OFF Icon on the Home Screen (Fw 4.04 onwards)	0 = Disabled (Default) 1 = Enabled

SYSTEM		
Parameter Name	**Description**	**Range**
Address	Modbus Address (Only Modbus versions) BACnet MAC Address (Only BACnet versions)	0..247 (Default 1) 0..127 (Default 1)
Baud Rate (Only Modbus/BACnet versions)	Modbus / BACnet Baud Rate	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600 4 = 76800
Parity (Only Modbus/BACnet versions)	Parity	0 = None (Default) 1 = Odd 2 = Even
Stop Bits (Only Modbus/BACnet versions)	Stop Bits	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
Device ID (Only BACnet versions)	BACnet Device ID	0..4,194,303 (Default Auto=651001)
Service Pin (Only BACnet versions)	Bacnet Service Pin (when activated the device sends BACnet I-AM message)	0 = Disabled (default) 1 = Enabled
Maintenance Code	Maintenance Mode Password	0000 - 9999 (default 6666)
Staff Code	Staff Page Password - Access Password to Further Settings Screen	0000 - 9999 (default 0000 = disabled)
Language	Default Language for User Screens	EN = English (Default) FI = Finnish SE = Swedish IT = Italian NL = Dutch FR = French
Screen Refresh Rate	Refresh Rate of the LCD Screen	0 = Fast (default) 1 = Medium 2 = Slow
Reload Default	Reload Factory Default Settings	0 = Off (default) 1 = On
Version	Software Version	x.xx (Modbus/BACnet)

NOTE: If the communication settings have been changed they are activated upon exiting the Maintenance Mode - the device carries out a soft reset. Alternatively power cycle will activate the new communication settings.

Parameter Storage The configuration parameters are stored in the non-volatile memory. When the changes are carried out via the display, the parameters are stored in the non-volatile memory when the controller returns to a normal display mode. If the changes are carried out over the network (Modbus), then "NonVol Update" flag is required to be forced on to save the changes. When configured via the display, the parameters are stored after the timeout or exit button.

Modbus Registers The controller supports the following Modbus registers and function codes. The default communication speed is 9600 bps, 8 data bits, Parity None and 1 Stop Bit. The default Modbus Slave

address is 1. The device Parity can be changed between Odd, None and Even. The baud rate is selectable between 9600, 19200, 38400, 57600 and 76800 bps. The table shows the register offsets starting from 0 (0 Base) register address. For example, the Temperature is read from Modbus register 100 using Function Code 04. Some Modbus masters will require one to be added to Modbus registers (i.e. 1 Base). In this case Function Code 04, register 101 needs to be entered.

Register	Parameter Description	Data Type	Raw Data	Range
	FUNCTION CODE 01 - READ COILS **FUNCTION CODE 05 - WRITE SINGLE COIL** **FUNCTION CODE 15 - WRITE MULTIPLE COILS**			
100	Off Mode Override (last transition commands)		0..1	Off - On
101	ECO Mode Override (last transition commands)		0..1	Off - On
102	Heating/Cooling Mode (change-over mode)		0..1	0 = Heating, 1 = Cooling
103	Setpoint Hold Mode		0..1	Off - On
	FUNCTION CODE 02 - READ DISCRETE INPUTS (Add 10,000 for Modicon Addressing)			
100	Digital Input Status		0..1	Off - On
101	Relay Output Status		0..1	Off - On
102	Holiday Mode Status		0..1	Off - On
103	Light Switch Status		0..1	Off - On
104	AC Icon		0..1	Off - On
105	Cleaning Mode Status (after clean screen)		0..1	Off - On
106	Screen Lock Status		0..1	Off - On
107	Boost Status		0..1	Off - On
108	ECO Mode Status		0..1	Off - On
109	Frost Status		0..1	Off - On
	FUNCTION CODE 04 - READ INPUT REGISTERS (Add 30,000 for Modicon Addressing)			
100	Built-In Temperature Measurement	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
101	External Temperature Measurement (Resistive Input 1)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
102	Underfloor Temperature Measurement (Resistive Input 2)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
103	Current Calculated Setpoint (°C)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
104	Thermostat Current Mode	Unsigned 16	0..3	0 = Comfort 1 = ECO 2 = OFF 3 = Boost
105	Relative Humidity Measurement (with RH option)	Unsigned 16	0..1000	0..100.0 %rH
106	Alarm State	Unsigned 16	0..256	Bit 0 - Interal NTC (1) Bit 1 - RI1 (2) Bit 2 - RI2 (4) Bit 3 - Humidity Sensor (8) Bit 4 - DI1 (16) Bit 5 - DI2 (Not Applicable) Bit 6 - Time Los (64)t
107	Discrete Input Registers (Bit 0 = DI1, Bit1 = Relay, Bit 2 = Holiday etc.)	Unsigned 16	0..65,535	N/A
108	Next Schedule Switching Time	Unsigned 16	0..2400	0..2400
109	Next Schedule Switching Day	Unsigned 16	0..6	0..6
110	Next Schedule Switching Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F
111	Comfort Mode User Setpoint [Nominal Setpoint + User Adjustment) (°C) (Fw 4.04 onwards)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
112	Room Control Temperature (Fw 4.04 onwards)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
113	Floor Control Temperature (Fw 4.04 onwards)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
114	Outside Dsiplay Temperature (Fw 4.04 onwards)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
200	Firmware Version	Unsigned 16	N/A	N/A

Register	Parameter Description	Data Type	Raw Data	Range
	FUNCTION CODE 03 - READ HOLDING REGISTERS (For Modicon Addressing Add 40,000) **FUNCTION CODE 06 - WRITE SINGLE HOLDING REGISTER** **FUNCTION CODE 16 - WRITE MULTIPLE HOLDING REGISTERS**			
101	ECO Heating Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 16°C)
102	ECO Cooling Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 28°C)
103	Frost Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 8°C)
104	Minimum Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 14°C)
105	Maximum Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 30°C)
106	Hysteresis	Unsigned 16	0..200	0.0..20.0°C/°F (Default 1.0°C)
107	Rin1 Remote Temperature Sensor Mode	Unsigned 16	0..4	0 = Disabled (Default) 1 = Control 2 = Underfloor Min-Max Control 3 = Outside Temperature (Display) 4 = Network (Networked Solutions)
108	Rin2 Underfloor Temperature Sensor Mode	Unsigned 16	0..4	0 = Disabled (Default) 1 = Control 2 = Underfloor Min-Max Control 3 = Outside Temperature (Display) 4 = Network (Networked Solutions)
109	Control Type	Unsigned 16	0..2	0 = Heating Control (default) 1 = Cooling Control 2 = Heating/Cooling Change-Over
110	Min Floor Temp Limit	Unsigned 16	0...950	0.0...95.0°C/°F (Default 18.0°C)
111	Max Floor Temp Limit	Unsigned 16	0...1220	0.0...122.0°C/°F (Default 30.0°C)
112	Floor Limit Hysteresis	Unsigned 16	0...100	0.0...10.0 (default 1.0)
113	Digital Input Mode	Unsigned 16	0..7	0 = Disabled 1 = Close for ECO (Default) 2 = Open for ECO 3 = Close for OFF/FROST 4 = Open for OFF/FROST 5 = Heating / Cooling Mode 6 = Digital Input Alarm 7 = Network
114	Digital Input Delay	Unsigned 16	0..7200	0..7200 seconds (Default 0s)
115	Enable Lights Symbol	Unsigned 16	0..1	0 = Disabled (default) 1 = Enabled
116	Enable AC Symbol	Unsigned 16	0..1	0 = Disabled (default) 1 = Enabled
118	Lock Mode	Unsigned 16	0..3	0 = Lock mode disabled (default) 1 = On/Off/Boost workable only 2 = Temp settings only available 3 = All buttons disabled
119	Enable Temperature Units Swap	Unsigned 16	0..1	0 = Disabled (default) 1 = Enabled
120	Sensor Calibration	Signed 16	-100..+100	-10.0..+10.0 °C/°F
121	RI1 Sensor Calibration	Signed 16	-100..+100	-10.0..+10.0 °C/°F
122	RI2 Sensor Calibration	Signed 16	-100..+100	-10.0..+10.0 °C/°F
123	Humidity Sensor Calibration	Signed 16	-100..+100	-10.0..+10.0 %rH
124	Humidity Display	Unsigned 16	0..1	0 = Disabled 1 = Enabled (default)
125	Cleaning Mode Time	Unsigned 16	0...480	0..480 minutes (Default 0)
126	Boost Mode Time	Unsigned 16	0...480	0..480 minutes (Default 0) 0 = Disabled
127	Backlight Brightness	Unsigned 16	0..20	0..20 (default 5)
128	Relay Control Mode	Unsigned 16	0..1	0 = Normally Open (Default) 1 = Normally Closed
129	Lock Mode Password	Unsigned 16	0..9999	0000...9999
130	Maintenance Mode Password	Unsigned 16	0..9999	0000...9999
131	Override IR Enable Icon Note: To release override set to None, otherwise the user cannot set/unset.	Unsigned 16	0..2	0 = None (default) 1 = Override On 2 = Override Off

Register	Parameter Description	Data Type	Raw Data	Range
132	Override Lights Note: To release override set to None, otherwise the user cannot set/unset	Unsigned 16	0..2	0 = None (default) 1 = Override On 2 = Override Off
133	Override Lock Mode Note: The parameter returns automatically to 0 allowing local control.	Unsigned 16	0..2	0 = None (default) 1 = Lock Screen 2 = Cancel Lock Mode
134	Enable Holiday Symbol	Unsigned 16	0..1	0 = Disabled 1 = Enabled (default)
135	Holiday Mode Target	Unsigned 16	0..1	0 = OFF/Frost Mode (default) 1 = ECO Mode
136	Relay Network Override (Overrides the relay drive directly, local)	Unsigned 16	0..2	0 = No Override (Default) 1 = Override Relay On 2 = Override Relay Off
137	Staff Code	Unsigned 16	0..9999	0000...9999
138	Language	Unsigned 16	0..4	0 = English (Default) 1 = Finnish 2 = Swedish 3 = Italian 4 = Dutch
139	Room Text (Room Sensor Description)	Unsigned 16	1..15	1 = Room (Default) 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
140	Floor Text (Floor Sensor Description) Default: 2 = Floor Note: Disabled removes the text and the Floor measurement from the display.	Unsigned 16	0..15	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
141	Outside Text (Outside / Network Sensor Description) Default: 3 = Outside Note: Disabled removes the text and the Floor measurement from the display.	Unsigned 16	0..15	
142	Outside Temperature Source	Unsigned 16	0..1	0 = Buillt-In Sensor (Default) 1 = Network Sensor
143	Outside Air Temperature - Network Write	Signed 16	-580...1220	-58.0...122.0°C/°F (Default 0.0)
144	Current Hour	Unsigned 16	0..23	0..23
145	Current Minute	Unsigned 16	0..59	0..59
146	Current Day	Unsigned 16	1..31	1..31
147	Current Month	Unsigned 16	1..12	1..12
148	Current Year	Unsigned 16	2015..2099	2015..2099
149	Current Hour Update Register	Unsigned 16	0..23	0..23
150	Current Minute Update Register	Unsigned 16	0..59	0..59
151	Current Day Update Register	Unsigned 16	1..31	1..31
152	Current Month Update Register	Unsigned 16	1..12	1..12
153	Current Year Update Register	Unsigned 16	2015..2099	2015..2099
154	Update Time	Unsigned 16	0..1	0 = No Action 1 = Update
155	Target Setpoint 1	Unsigned 16	0...950	0.0...95.0°C/°F (Default 16°C)

Register	Parameter Description	Data Type	Raw Data	Range
156	Target Setpoint 2	Unsigned 16	0...950	0.0...95.0°C/°F (Default 18°C)
157	Target Setpoint 3	Unsigned 16	0...950	0.0...95.0°C/°F (Default 20°C)
158	Target Setpoint 4	Unsigned 16	0...950	0.0...95.0°C/°F (Default 22°C)
162	Setpoint Reset from Comfort to OFF (Fw 4.04 onwards)	Unsigned 16	0..1	0 = Enabled (Default) 1 = Disabled
163	Show OFF Icon on the HOME screen (Fw 4.04 onwards)	Unsigned 16	0..1	0 = Disabled (Default) 1 = Enabled
164	Thermostat Mode Override (Fw 4.04 onwards)	Unsigned 16	0..3	0 = Comfort 1 = ECO 2 = Frost 3 = Boost (Read Only)
200	Monday / Weekday Switching Time 1	Unsigned 16	0..2400	0..2400 (Default 0600)
201	Monday / Weekday Switching Time 2	Unsigned 16	0..2400	0..2400 (Default 1000)
202	Monday / Weekday Switching Time 3	Unsigned 16	0..2400	0..2400 (Default 1300)
203	Monday / Weekday Switching Time 4	Unsigned 16	0..2400	0..2400 (Default 1700)
204	Monday / Weekday Switching Time 5	Unsigned 16	0..2400	0..2400 (Default 2200)
205	Monday Switching Time 1 Target	Unsigned 16	0..4	0..4 (Default 3)
206	Monday Switching Time 2 Target	Unsigned 16	0..4	0..4 (Default 2)
207	Monday Switching Time 3 Target	Unsigned 16	0..4	0..4 (Default 2)
208	Monday Switching Time 4 Target	Unsigned 16	0..4	0..4 (Default 3)
209	Monday Switching Time 5 Target	Unsigned 16	0..4	0..4 (Default 1)
210	Tuesday / Weekend Switching Time 1	Unsigned 16	0..2400	0..2400 (Default 0600)
211	Tuesday / Weekend Switching Time 2	Unsigned 16	0..2400	0..2400 (Default 1000)
212	Tuesday / Weekend Switching Time 3	Unsigned 16	0..2400	0..2400 (Default 1300)
213	Tuesday / Weekend Switching Time 4	Unsigned 16	0..2400	0..2400 (Default 1700)
214	Tuesday / Weekend Switching Time 5	Unsigned 16	0..2400	0..2400 (Default 2200)
215	Tuesday Switching Time 1 Target	Unsigned 16	0..4	0..4 (Default 3)
216	Tuesday Switching Time 2 Target	Unsigned 16	0..4	0..4 (Default 2)
217	Tuesday Switching Time 3 Target	Unsigned 16	0..4	0..4 (Default 2)
218	Tuesday Switching Time 4 Target	Unsigned 16	0..4	0..4 (Default 3)
219	Tuesday Switching Time 5 Target	Unsigned 16	0..4	0..4 (Default 1)
220	Wednesday Switching Time 1	Unsigned 16	0..2400	0..2400 (Default 0600)
221	Wednesday Switching Time 2	Unsigned 16	0..2400	0..2400 (Default 1000)
222	Wednesday Switching Time 3	Unsigned 16	0..2400	0..2400 (Default 1300)
223	Wednesday Switching Time 4	Unsigned 16	0..2400	0..2400 (Default 1700)
224	Wednesday Switching Time 5	Unsigned 16	0..2400	0..2400 (Default 2200)
225	Wednesday Switching Time 1 Target	Unsigned 16	0..4	0..4 (Default 3)
226	Wednesday Switching Time 2 Target	Unsigned 16	0..4	0..4 (Default 2)
227	Wednesday Switching Time 3 Target	Unsigned 16	0..4	0..4 (Default 2)
228	Wednesday Switching Time 4 Target	Unsigned 16	0..4	0..4 (Default 3)
229	Wednesday Switching Time 5 Target	Unsigned 16	0..4	0..4 (Default 1)
230	Thursday Switching Time 1	Unsigned 16	0..2400	0..2400 (Default 0600)
231	Thursday Switching Time 2	Unsigned 16	0..2400	0..2400 (Default 1000)
232	Thursday Switching Time 3	Unsigned 16	0..2400	0..2400 (Default 1300)
233	Thursday Switching Time 4	Unsigned 16	0..2400	0..2400 (Default 1700)
234	Thursday Switching Time 5	Unsigned 16	0..2400	0..2400 (Default 2200)
235	Thursday Switching Time 1 Target	Unsigned 16	0..4	0..4 (Default 3)
236	Thursday Switching Time 2 Target	Unsigned 16	0..4	0..4 (Default 2)
237	Thursday Switching Time 3 Target	Unsigned 16	0..4	0..4 (Default 2)
238	Thursday Switching Time 4 Target	Unsigned 16	0..4	0..4 (Default 3)
239	Thursday Switching Time 5 Target	Unsigned 16	0..4	0..4 (Default 1)

Register	Parameter Description	Data Type	Raw Data	Range
240	Friday Switching Time 1	Unsigned 16	0..2400	0..2400 (Default 0600)
241	Friday Switching Time 2	Unsigned 16	0..2400	0..2400 (Default 1000)
242	Friday Switching Time 3	Unsigned 16	0..2400	0..2400 (Default 1300)
243	Friday Switching Time 4	Unsigned 16	0..2400	0..2400 (Default 1700)
244	Friday Switching Time 5	Unsigned 16	0..2400	0..2400 (Default 2200)
245	Friday Switching Time 1 Target	Unsigned 16	0..4	0..4 (Default 3)
246	Friday Switching Time 2 Target	Unsigned 16	0..4	0..4 (Default 2)
247	Friday Switching Time 3 Target	Unsigned 16	0..4	0..4 (Default 2)
248	Friday Switching Time 4 Target	Unsigned 16	0..4	0..4 (Default 3)
249	Friday Switching Time 5 Target	Unsigned 16	0..4	0..4 (Default 1)
250	Saturday Switching Time 1	Unsigned 16	0..2400	0..2400 (Default 0600)
251	Saturday Switching Time 2	Unsigned 16	0..2400	0..2400 (Default 1000)
252	Saturday Switching Time 3	Unsigned 16	0..2400	0..2400 (Default 1300)
253	Saturday Switching Time 4	Unsigned 16	0..2400	0..2400 (Default 1700)
254	Saturday Switching Time 5	Unsigned 16	0..2400	0..2400 (Default 2200)
255	Saturday Switching Time 1 Target	Unsigned 16	0..4	0..4 (Default 3)
256	Saturday Switching Time 2 Target	Unsigned 16	0..4	0..4 (Default 2)
257	Saturday Switching Time 3 Target	Unsigned 16	0..4	0..4 (Default 2)
258	Saturday Switching Time 4 Target	Unsigned 16	0..4	0..4 (Default 3)
259	Saturday Switching Time 5 Target	Unsigned 16	0..4	0..4 (Default 1)
260	Sunday Switching Time 1	Unsigned 16	0..2400	0..2400 (Default 0600)
261	Sunday Switching Time 2	Unsigned 16	0..2400	0..2400 (Default 1000)
262	Sunday Switching Time 3	Unsigned 16	0..2400	0..2400 (Default 1300)
263	Sunday Switching Time 4	Unsigned 16	0..2400	0..2400 (Default 1700)
264	Sunday Switching Time 5	Unsigned 16	0..2400	0..2400 (Default 2200)
265	Sunday Switching Time 1 Target	Unsigned 16	0..4	0..4 (Default 3)
266	Sunday Switching Time 2 Target	Unsigned 16	0..4	0..4 (Default 2)
267	Sunday Switching Time 3 Target	Unsigned 16	0..4	0..4 (Default 2)
268	Sunday Switching Time 4 Target	Unsigned 16	0..4	0..4 (Default 3)
269	Sunday Switching Time 5 Target	Unsigned 16	0..4	0..4 (Default 1)
300	Modbus Address	Unsigned 16	0..247	0..247 (Default 1)
301	Modbus Baud Rate	Unsigned 16	0..4	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600 4 = 76800
302	Modbus Parity	Unsigned 16	0..2	0 = None (Default) 1 = Odd 2 = Even
303	Stop Bits	Unsigned 16	0...1	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
304	Screen Refresh Rate	Unsigned 16	0..2	0 = Fast (Default) 1 = Medium 2 = Slow
400	Force Reset	Unsigned 16	0..1	0 = Normal 1 = Force Reset
401	Non Volatile Memory Update	Unsigned 16	0..1	0 = Normal 1 = Update
403	Force Factory Defaults	Unsigned 16	0..1	0 = Normal 1 = Force Factory Defaults

BACnet Interoperability Building Blocks Supported (Annex K)

Application Service	Initiate	Execute	BIBB
ReadProperty		Yes	DS-RP-B

Application Service	Initiate	Execute	BIBB
ReadPropertyMultiple		Yes	DS-RPM-B
WriteProperty		Yes	DS-WP-B
ReinitializeDevice		Yes	
Who-Is		Yes	DM-DDB-B
I-Am	Yes		
Who-Has		Yes	DM-DOB-B
I-Have	Yes		
DeviceCommunicationControl		Yes	DM-DCC-B
TimeSynhronisation		Yes	DM-TS-B

BACnet Standard Object Types Supported

No dynamic Creation or Deletion supported. Objects, and object instances, are assigned to fixed functions within the proprietary control application of the product as follows

Object	Number Of Instances	Instance Assignments
Device Object	1	
Analog Input	7	AI(0) – Room Temperature AI(1) - Outside Temperature AI(2) - Floor Temperature AI(3) - Current Active Setpoint AI(4) - Humidity Measurement AI(5) – RI1 External Sensor 1 AI(6) – RI2 External Sensor 2
Analogue Value	13	AV(0) - Target Setpoint 1 AV(1) - Target Setpoint 2 AV(2) - Target Setpoint 3 AV(3) - Target Setpoint 4 AV(4) – ECO Heating Setpoint AV(5) – ECO Cooling Setpoint AV(6) – Frost Setpoint AV(7) – Min Floor Limit AV(8) – Max Floor Limit AV(9) – LCD Brightness AV(10) - Control Hysteresis AV(11) - Network Temp AV(12) - Not Applicable (Nominal SP)
Binary Input	3	BI(0) – Digital Input (DI1) BI(1) – Cleaning Mode Status BI(2) – Boost Mode Status
Binary Output	10	BO(0) – Relay BO(1) - OFF Status BO(2) - ECO Status BO(3) – Lights BO(4) – A/C Icon BO(5) – Lock BO(6) – Change-Over (Htg/Clg) BO(7) - Non Volatile Update (updates setpoints/configuration parameters) BO(8) - Setpoint Hold Mode BO(9) – Relay_2 (Not Applicable)
MutliState Input	2	MSI(0) - Device Mode (1=Comfort, 2=ECO, 3=OFF, 4=Boost) MSI(1) - Alarm (Add 1 to to bit values)

Device Object Properties

Property Name /ID	Attributes	Range	Default
Object Identifier	R/W		20
Object Name	R/W	32 Characters Max	Concatenation of product type and MAC address i.e. "TRT001"
Object Type	R		Device
System Status	R		STATUS_OPERATIONAL
Vendor Name	R		Produal Oy
Vendor Identifier			783
Model Name	R		TRT5
Protocol Version	R		1
Protocol Revision	R		10
Max APDU Length	R		480
Segmentation Support	R		No
APDU Timeout	R		6000 ms
Number APDu Retries	R		3
MaxMaster	R		127
Max_Info_Frames	R		1
Database Revision	R		0

App_Config Object

NOTE: Application Configuration Object exposes the configuration parameters over the BACnet. However please check if your BACnet client can support Proprietary Object types to be able to access these parameters. Alternatively set the configuration parameters through the TRT touchscreen.

	Property Name /ID	Attributes	Range	Default
Required Object Properties	Object Identifier	R		proprietary-128
	Object Name	R/W		"App_Config"
	Object Type	R		proprietary-128
Optional Properties	None			

	Property ID	Description	BACnet Data Type	Range
Proprietary Properties	30106	Alarm State	Unsigned	Read Only
	40101	ECO Heating Setpoint	REAL	0.0...95.0°C/°F (Default 16°C)
	40102	ECO Cooling Setpoint	REAL	0.0...95.0°C/°F (Default 28°C)
	40103	Frost Setpoint	REAL	0.0...95.0°C/°F (Default 8°C)
	40104	Minimum Setpoint	REAL	0.0...95.0°C/°F (Default 14°C)
	40105	Maximum Setpoint	REAL	0.0...95.0°C/°F (Default 30°C)
	40106	Hysteresis	REAL	0.0..20.0°C/°F (Default 1.0°C)
	40107	Rin1 Remote Temperature Sensor Mode	Unsigned	0 = Disabled (Default) 1 = Control 2 = Underfloor Min-Max Control 2 = Outside Temperature (Display) 3 = Network (Networked Solutions)
	40108	Rin2 Underfloor Temperature Sensor Mode	Unsigned	0 = Disabled (Default) 1 = Control 2 = Underfloor Min-Max Control 2 = Outside Temperature (Display) 3 = Network (Networked Solutions)
	40109	Control Type	Unsigned	0 = Heating Control (default) 1 = Cooling Control 2 = Heating/Cooling Change-Over
	40110	Min Floor Temp Limit	REAL	Min Floor Temp Limit (Default 18)
	40111	Max Floor Temp Limit	REAL	Max Floor Temp Limit (Default 30)
	40113	Floor Limit Hysteresis	REAL	0.0..10.0 (default 1.0)

	40113	Digital Input Mode	Unsigned	0 = Disabled 1 = Close for ECO (Default) 2 = Open for ECO 3 = Close for OFF/FROST 4 = Open for OFF/FROST 5 = Heating / Cooling Mode 6 = Digital Input Alarm 7 = Network
	40114	Digital Input Delay	Unsigned	0..7200 seconds (Default 0s)
	40115	Enable Lights Symbol	Unsigned	0 = Disabled (default) 1 = Enabled
	40116	Enable AC/IR Symbol	Unsigned	0 = Disabled (default) 1 = Enabled
	40118	Lock Mode	Unsigned	0 = Lock mode disabled (default) 1 = On/Off/Boost workable only 2 = Temp settings only available 3 = All buttons disabled
	40119	Temperature Unit Selection	Unsigned	0 = Disabled (default) 1 = Enabled
	40120	Sensor Calibration	REAL	-10.0..+10.0 °C/°F
	40121	RI1 Sensor Calibration	REAL	-10.0..+10.0 °C/°F
	40122	RI2 Sensor Calibration	REAL	-10.0..+10.0 °C/°F
	40123	Humidity Sensor Calibration	REAL	-10.0..+10.0 %rH
	40124	Humidity Display	Unsigned	0 = Disabled 1 = Enabled (default)
	40125	Cleaning Mode Time	Unsigned	0..480 minutes (Default 0)
	40126	Boost Mode Time	Unsigned	0..480 minutes (Default 0) 0 = Disabled
	40127	Backlight	Unsigned	0..20 (default 5)
	40128	Relay Control Mode	Unsigned	0 = Normally Open (Default) 1 = Normally Closed
	40129	Lock Mode Password	Unsigned	0000...9999
	40130	Maintenance Mode Password	Unsigned	0000...9999
	40134	Enable Holiday Symbol	Unsigned	0 = Disabled 1 = Enabled (default)
	40135	Holiday Mode Target	Unsigned	0 = OFF/Frost Mode (default) 1 = ECO Mode
	40137	Staff Code	Unsigned	0000...9999
	40138	Language	Unsigned	0 = English (Default) 1 = Finnish 2 = Swedish 3 = Italian 4 = Dutch
	40139	Room Text (Room Sensor Description) Default: 1 = Room	Unsigned	0 = Disabled 1 = Room 2 = Floor 3 = Outside 4 = Zone 1
	40140	Floor Text (Floor Sensor Description) Default: 2 = Floor Note: Disabled removes the text and the Floor measurement from the display.	Unsigned	5 = Zone 2 6 = Zone 3 7 = Bathroom 8 = Sauna 9 = Bedroom
	40141	Outside Text (Outside / Network Sensor Description) Default: 3 = Outside Note: Disabled removes the text and the Floor measurement from the display.	Unsigned	10 = Kitchen 11 = Cooler 12 = Flow 13 = Hot Water 14 = Tank 15 = Pool
	40160	IR Relay Control Mode - Not Applicable TRT-P-1R		
	40162	Setpoint Reset from Comfort to OFF (Fw 4.04 onwards)	Unsigned	0 = Enabled (Default) 1 = Disabled
	40163	Show OFF Icon on the HOME screen (Fw 4.04 onwards)	Unsigned	0 = Disabled (Default) 1 = Enabled

40300	BACnet MAC Address	Unsigned	0..127 (Default 1)
40301	BACnet Baud Rate	Unsigned	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600 4 = 76800
40302	Parity	Unsigned	0 = None (Default) 1 = Odd 2 = Even
40303	Stop Bits	Unsigned	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
40304	Screen Refresh Rate	Unsigned	0 = Fast (Default) 1 = Medium 2 = Slow
40400	Force Reset	Unsigned	0 = Normal (Default) 1 = Force Reset
40401	Non Volatile Memory Update	Unsigned	0 = Normal 1 = Update
40403	Force Factory Defaults	Unsigned	0 = Normal (Default) 1 = Force Factory Defaults

Legacy Modbus Registers The below Modbus registers are duplicate registers for legacy product support.

Register	Parameter Description	Data Type	Raw Data	Range
	FUNCTION CODE 01 - READ COILS FUNCTION CODE 05 - WRITE SINGLE COIL			
3	Relay Output (Read Only, Relay Mode=Control) Relay Output Override (Relay Mode=Network)		0..1	Off - On
	FUNCTION CODE 04 - READ INPUT REGISTERS			
0	Built-In Temperature Measurement	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
1	Underfloor Temperature Measurement (Resistive Input 2)	Signed 16	-40...302	-40...302
	FUNCTION CODE 03 - READ HOLDING REGISTERS FUNCTION CODE 06 - WRITE SINGLE HOLDING REGISTER FUNCTION CODE 16 - WRITE MULTIPLE HOLDING REGISTERS			
1	Unit Status. Reports Day/ECO status. Can be used to override to ECO. Reset locally.	Unsigned 16	0..1	0 = Day 1 = Night ECO Mode
2	Nominal Setpoint	Unsigned 16	0...95	0...95°C/°F (Default 20°C)
14	Minimum Setpoint	Unsigned 16	0...95	0...95°C/°F (Default 14°C)
15	Maximum Setpoint	Unsigned 16	0...95	0...95°C/°F (Default 30°C)
16	Hysteresis	Unsigned 16	0..20	0...20°C/°F (Default 1°C)
18	Frost Setpoint	Unsigned 16	0...95	0...95C/°F (Default 8°C)
19	Modbus Address	Unsigned 16	0..247	0..247 (Default 1)

NOTE: Information is subject to change without prior notice.

Dimensions

87.40mm / 3.46"

14.5mm / 0.56"

112mm / 4.41"

42.7mm / 1.68"

52mm / 2.05"