

TRC-A-3A Series Touchscreen Apartment Controllers and Interfaces

The TRC-A-3A series controllers have been designed for apartment control and have modern sharp slim line 3.5" colour touchscreen interface. The controllers have heating and/or cooling controls with summer / winter change-over.

The TRC-A-3A series have also Home / Away / Boost operation button allowing the apartment conditions to be set to required state with a simple press of a button. The TRC-A-3A series can control the apartment supply and extract flow together with the extractor fans allowing the correct pressurised conditions to be achieved in all operating conditions.

The TRC-A-3A controllers have 3 x analogue 0-10V outputs, two external sensors inputs (resistive or analogue) and one digital input. The devices are available with both Modbus RTU and BACnet MS/TP communication.

Features

- 24VAC/DC Power Supply
- 3.5" Backlit Touchscreen Display



- BACnet and Modbus Communication Models
- Flush Mounting in the US, UK or EURO Wall Mounting Box
- Built-In Temperature Sensor
- Temperature Control Modes: Comfort, ECO
- Flow Control Modes; Home, Away and Party

Ordering guide

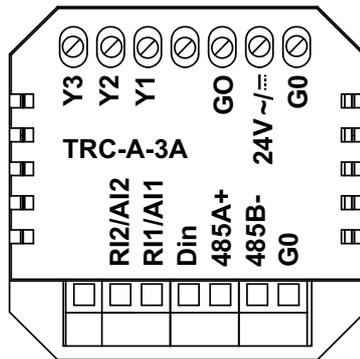
		Type	0	1	2	3	4	5	6
0	Touchscreen room controllers		6001			2			
1	Device type	Apartment controller, 2RI, 1DI, 3AO	TRC-A-3A	B					
2	Communication	Modbus	-MOD		M				
		BACnet	-BAC		B				
3	Power supply	24 Vac/dc	-24			2			
4	Additional measurements	No additional measurement					0		
		Relative humidity	-RH				1		
		CO ₂	-CO ₂				2		
		Relative humidity and CO ₂	-RH-CO ₂				3		
5	Advanced options	No advanced options						0	
		2 x 0..10 Vdc input (replaces 2 x RI)	-AI					1	
6	Body colour	Chrome							0
		White (RAL 9010)	-W						W
		Black (RAL 8022)	-B						

Technical Data

Power Supply	Power:	24VAC/DC -10%/+15%, 80mA
Display	Touchscreen	3.5" Backlit Touchscreen, 320 x 480 pixels, 255K colours
Signal Outputs	Analogue Outputs	3 x 0..10V < 5mA
Signal Inputs	Built-In Sensor	0..50°C (32..122°F) ±0.5°C (0.9°F) @ 25°C (77°F)
	External Measurement Inputs	2 x External NTC10K3 Sensors (RI1 & RI2) AI-Option: 2 x 0..10Vdc Inputs (replaces RI1 & RI2)
	Digital Input	1 x Digital Input, Volt-Free Contact, Impedance <1KOhm

Optional Sensing Characteristics	Carbon Dioxide (CO ₂ Models)	
	Range	0...5000ppm CO ₂
	Accuracy	± 50ppm + 3% of the reading @ 25°C (@77°F)
	Technology	Auto Calibrating; Patented Non-Dispersive Infrared (NDIR)
	Non-Linearity	<1% FS
	Warm-Up Time	<20 seconds
	Response Time	2 minutes
	Humidity (RH Models)	
	Range	0..100%rH
	Accuracy	±2% rH (within 20..80% rh)
Communication	Modbus (-MOD models)	
	Protocol	Modbus RTU
	Interface	RS485; maximum 63 devices
	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
	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 (adjustable through Touchscreen)
Connections	Terminal Connections (Power Supply & Analogue Outputs)	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 (Comms and Inputs)	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) EN6100-4-2/4/5/11 (ESD, Transient, Surges, Interruptions)
	Degree of Protection	IP20
Housing	Housing Material	Polycarbonate Plastics, Self Extinguishing, Black and Chrome
	Mounting	Wall or Junction Box Mounting
	Dimensions	W88 x H112 x D43mm; Flush: W88 x H112 x D14.5mm
	Weight	220g

TRC-A-3A Wiring Connections



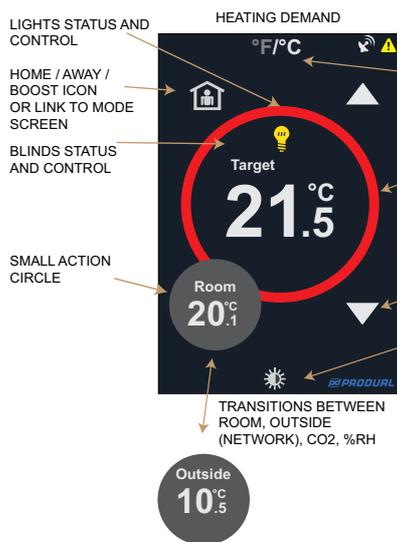
CONN	DESCRIPTION
Y1	0..10Vdc Analogue Output 1 - htg stage 1
Y2	0..10Vdc Analogue Output 2 - supply flow
Y3	0..10Vdc Analogue Output 3 - default extract flow
24V	24Vac/dc Supply
G0	0V Common
R11/AI1	Remote NTC10 Temperature Sensor Input 1 (0-10V with AI option)
R12/AI1	Remote NTC10 Temperature Sensor Input 2 (0-10V with AI option)
Din	Volt-Free Digital Input Contact (dry contact)
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.

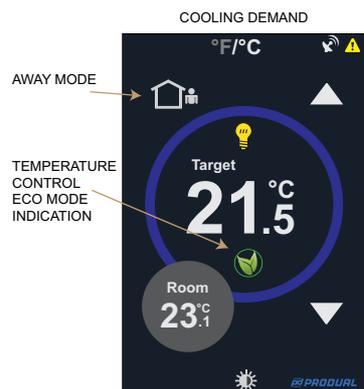
TRC-A-3A Controller User Interface

The figures below illustrate some of the TRC-A-3A controller user displays. The multi-colour LCD screen is touch sensitive, easy to adjust and illustrates clearly the plant status information.

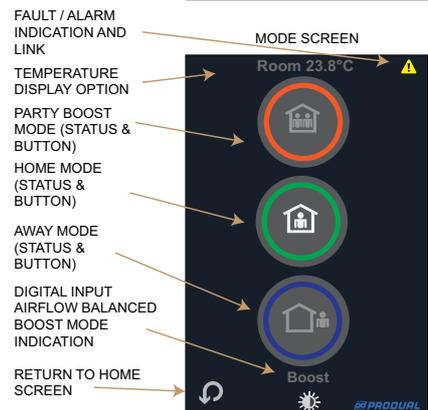
- ICON DESCRIPTION
- HEATING DEMAND
 - COOLING DEMAND
 - AT ZERO ENERGY ZONE (NO HTG/CLG)
 - COMMS MESSAGE
 - CLEANING MODE
 - SCREEN LOCKED
 - LIGHTS STATUS
 - ERROR
 - SCREEN DIM ICON
 - MAINTENANCE MODE
 - ECO MODE
 - HOME ICON
 - AWAY ICON
 - BOOST ICON
 - LOW/HIGH LIMIT APPLIED



- STATUS INFORMATION BANNER
- CENTIGRADE TO FAHRENHEIT SELECTION
- INTENSITY OF THE RED ON THE ENERGY RING CHANGES DEPENDING ON DIFFERENCE BETWEEN EFFECTIVE TARGET AND ROOM TEMPERATURES, AT 2°C/3.6°F FULL RED
- TARGET SETPOINT ADJUSTMENT BUTTONS
- PRESS DIM BUTTON TO SWITCH BACKLIGHT OFF
- TRANSITIONS BETWEEN ROOM, OUTSIDE (NETWORK), CO2, %RH



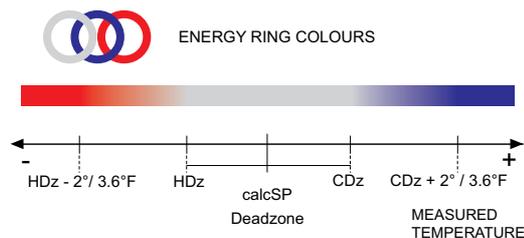
- AWAY MODE
- TEMPERATURE CONTROL ECO MODE INDICATION



- FAULT / ALARM INDICATION AND LINK
- TEMPERATURE DISPLAY OPTION
- PARTY BOOST MODE (STATUS & BUTTON)
- HOME MODE (STATUS & BUTTON)
- AWAY MODE (STATUS & BUTTON)
- DIGITAL INPUT AIRFLOW BALANCED BOOST MODE INDICATION
- RETURN TO HOME SCREEN

The colour of the 'Energy Ring' indicates the heating/cooling demand. The 'Energy Ring' is white at 'deadzone'. The density of red/blue on the 'Energy Ring' modulates based on how far from the

Effective Heating/Cooling Setpoint the temperature is. When the difference is 2°C/3.6°F the 'Energy Ring' is at full density.



Touchscreen

The TRC-A-3A controller home screen has a number touch sensitive areas that allow the device settings to be changed.

- UP and DOWN arrows; to alter the current control target setpoint temperature
- SCREEN DIM ICON; dims the screen backlight/ switches backlight off
- SMALL ACTION CIRCLE (that contains current room and/or floor temperature); allows access to FURTHER SETTINGS AND INFORMATION screen; password protected
- HOME/AWAY/PARTY BOOST ICON; used to select between Home, Away and Boost modes. Alternatively the Boost button mode can be configured so it is accessed from dedicated MODE SCREEN by pressing the button.
- LIGHTS ICON; when LIGHTS are enabled, the lights can be controlled from this icon

Touchscreen Backlight

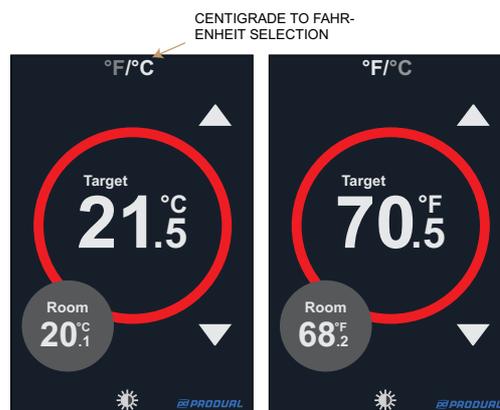
The touchscreen backlight level can be adjusted through the maintenance mode. During the normal operation after 30 seconds of inactivity, the touchscreen dims to the "stand-by" level set. If the backlight level is set to 0, the screen backlight switches off.

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.

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.



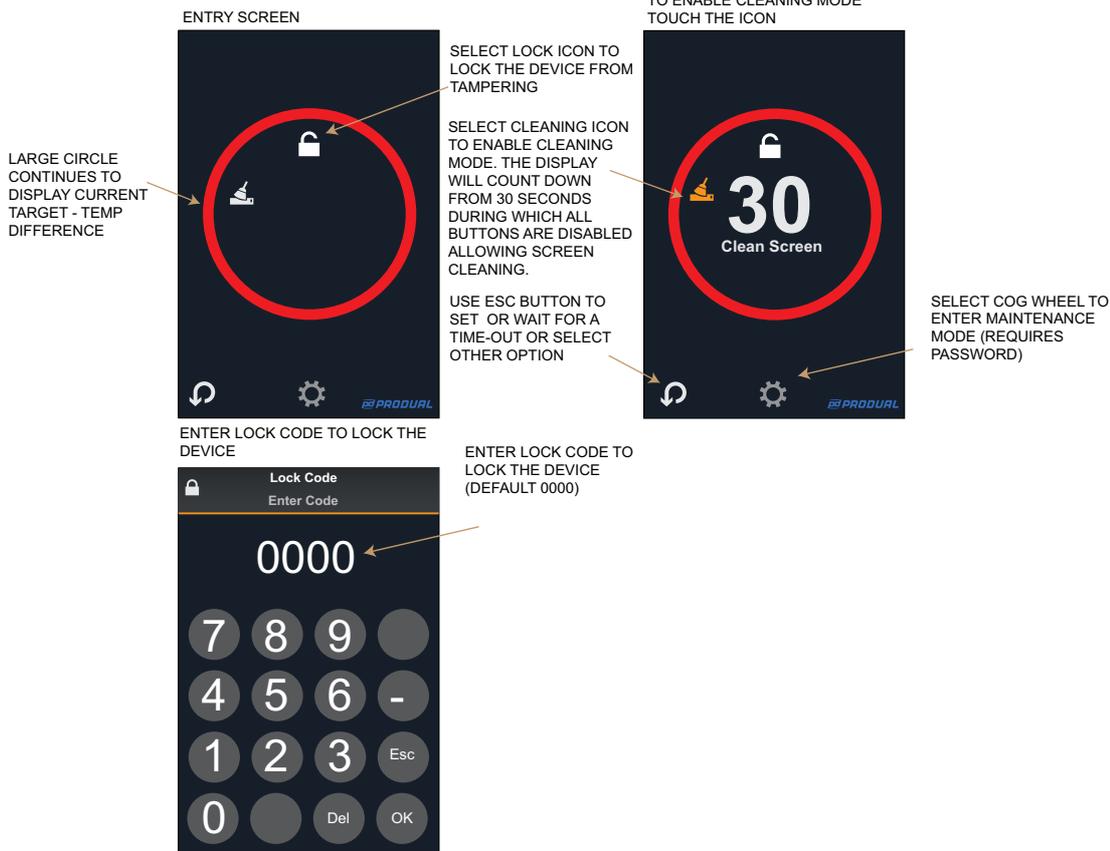
Further Settings and Information

The FURTHER SETTINGS screen shows additional user settings options on the TRC-A-3A controllers:-

- LOCK icon is used to lock the thermostat. Number of different lock modes options exist.
- CLEANING icon is used to enable timed (30 seconds) cleaning mode.
- COG WHEEL icon allows entry to the maintenance mode.

FURTHER SETTINGS screen is protected by STAFF ACCESS code. As default the STAFF CODE is set as '0000' and no password is required to enter the FURTHER SETTINGS screen.

FURTHER SETTINGS AND INFORMATION



Home / Away / Boost Button

The device has HOME / AWAY / PARTY BOOST MODE button from where the user can override the device operation. The mode can also be selected over the network.

When in HOME mode:-

- The temperature control operates in COMFORT
- The Supply and Extract airflow control outputs use the HOME settings for the analogue outputs

When in AWAY mode:-

- The temperature control operates in ECO
- The Supply and Extract airflow control outputs use the AWAY settings for the analogue outputs

When in PARTY BOOST MODE mode:-

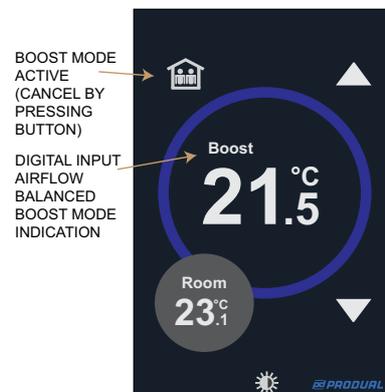
- The temperature control operates in COMFORT
- The Supply and Extract airflow control outputs use the BOOST settings for the analogue outputs

The Part Boost Mode Boost time (0-480 minutes) can be selected through the configuration settings. If the Boost time is set to 0 seconds, the boost is permanent until cancelled via the screen or via the network.

If Boost is set to Timed operation, the device returns to HOME mode after the Boost time has expired.

Note: The Boost text is only displayed in the BALANCED AIRFLOW BOOST condition (digital input). The user can rotate between HOME / AWAY / BOOST modes independently of this condition.

Dedicated MODE SCREEN for Home / Away / Party Boost



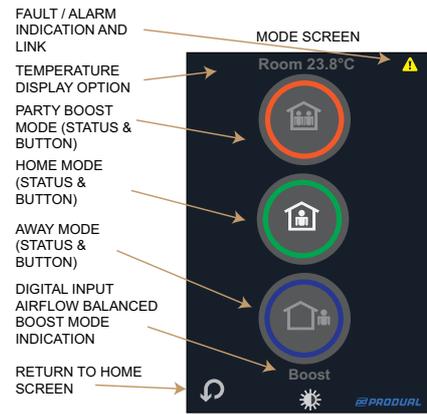
If selected (default) the HOME button takes to the MODE SCREEN. The MODE SCREEN remains displayed until return button is pressed.

In the MODE SCREEN the user can select the operating mode using a large button (useful for elderly and people not familiar with touchscreen technology etc.).

The dedicated MODE SCREEN can be protected using the Staff Code. In this case to exit the screen the Staff Code is required to be entered.

Note: If the Staff Code has been set and the Mode Screen has been activated, the Mode Screen becomes Home Screen (i.e. loads after the power failure)

Note: The user can always select the operating mode by pressing the button. However the AIRFLOW BALANCED BOOST (via digital input if configured) remains active until the input state changes to inactive. On return the devices returns to the operating mode set by the user.



Temperature Control Loop Operation

The controllers can have up to two heating stages and cooling stages (as default one heating stage and one cooling stage), and can also carry out automatic change-over from heating to cooling via digital input / temperature measurement / network.

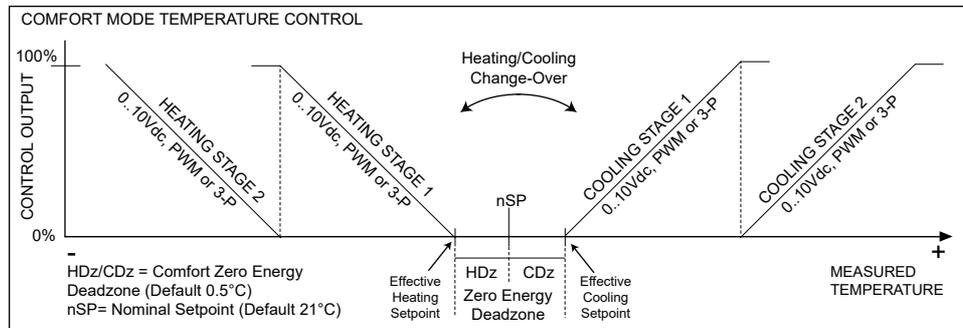
This allows various control configurations:-

- One/Two Stage Heating Control
- One/Two Stage Cooling Control
- One/Two Stage Heating and One/Two Stage Cooling Control (up to three outputs)
- One Stage Heating/Cooling Control (Change-Over)

The controller modulates the heating and cooling demand outputs according to the calculated setpoint and the current temperature. The control can be either P-control or PI-control. The calculated setpoint consists sum of Nominal Setpoint (nSP) and the user setpoint adjustment (SPA).

As default for TRC-A-3A, heating stage 1 is linked to Y1.

It is possible to set the control loop outputs to direct/reverse, which reverses the control output (valve) running direction (valve drives from 100% to 0%). This can be configured individually for each stage in the Configuration Parameters.



Between heating and cooling stage 1 is a 'deadzone'. With P-control in the 'deadzone' the cooling and heating loop demand is 0%. With PI-control, if the temperature remains in the 'deadzone' for a prolonged period, the heating/cooling demand ramps to 0%. The 'deadzone' allows the temperature to fluctuate around the setpoint without heating or cooling valves starting to open. The TRC-A-3A has a built-in lock that prevents cooling and heating demands to be on simultaneously.

The 'deadzone' has an individual settings (HDz and CDz) for both heating and cooling side allowing asymmetrical setting. E.g. in some cases it is important that the cooling starts to respond faster than heating when the temperature deviates away from the setpoint.

Note: Conceptually calcSP - HDz is effective Heating Setpoint and calcSP + CDz is Effective Cooling Setpoint. For the user it is easier to set and display a single setpoint and the 'deadzone' limits are set during the commissioning to provide effective heating and cooling setpoints..

The target temperature is typically adjusted by the user by pressing UP & DOWN buttons. The target temperature/deadzone is changed in different operating situations as follows;

- COMFORT CONTROL; target temperature as adjusted by the user (or via the networked system) and displayed on the screen. The calculated target setpoint (calcSP) consist of the Nominal

Setpoint plus the user adjustment (SPA) set via the screen. The user setpoint adjustment is limited by the Setpoint Adjust Max/Min settings (as default +/-3°).

- ECO CONTROL; target Nominal Setpoint remains the same. The user adjustment (SPA) is disabled and the 'deadzone' settings are expanded to Night Heating Deadzone and Night Cooling Deadzone.

The TRC-A-3A controller temperature control operates in COMFORT mode when the HOME/AWAY/BOOST selection switch has been set to HOME or BOOST. When the switch is in AWAY mode, the temperature control operates in ECO mode.

NOTE: If activated, the High/low Limit Control shifts the effective target temperature (calculated setpoint) as required.

Heating / Cooling Change-Over

The main temperature control loop heating stage 1 and cooling stage 1 can be forced to operate in heating or cooling mode using the change-over function. The change-over is carried out using digital input, temperature measurement or over the network. This allows the same pipe works to be used for both heating and cooling in different seasons.

The change-over function is activated if it is selected for the DI1/RI1/RI2.

With digital input the change-over is activated when the input is closed. Over the network the change-over can be activated by setting the change-over parameter on.

If RI1/RI2 is selected to carry out the change-over, the controller will switch to heating when the temperature exceeds 25°C and to cooling when the temperature drops below 20°C (adjustable).

Note: RI1/RI2 based change-over function is not available with AI-option.

High/Low Limit Control (Reset Control)

If an external NTC10 sensor is fitted (to RI1 or RI2) and the corresponding high/low limit input has been enabled, the controller can carry out high limit and/or low limit control. In high limit control, if the external temperature exceeds the High Limit setpoint, the main control setpoint is reduced by the amount set in the Limit Ratio per degree. E.g. if the Limit Ratio is 2, every degree that the external temperature exceeds the High Limit setpoint, the target (setpoint) is reset by 2 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 of the ratio for every degree below the Low Limit setpoint.

The setpoint reset amount follows the formula:-

$$\text{Setpoint_Reset} = (\text{Limit_Setpoint} - \text{Temperature}) * \text{Limit_Ratio}$$

NOTE: The target setpoint on the display is not changed during the limitation. The limit icon indicates active limitation. To see the effective limited setpoint enter Controller Status and Information display.

Note: The limit function is enabled by setting the Limit Ratio parameter (as default 0.0 = disabled).

Note: High/Low Limit function is not available with AI option.



Temperature ECO Control

The device has temperature ECO control function. The devices can be switched to ECO control via network by activating the AWAY mode, via digital input (e.g. PIR) or via the touchscreen by selecting the AWAY mode.

In the ECO temperature control the controller starts to control to ECO Heating/Cooling Deadzone and the user setpoint adjustment (SPA) is removed.

In the ECO mode the CO2 and Humidity loops are switched to 0%.

Note: The Digital Input ECO switch only switches the temperature control to operate in ECO control and does not affect flow control (set by AWAY button).

Depending on the configuration in the ECO mode the lights are switched off to 0%, or continued to be left at the same level as in COMFORT mode. The blinds control remains in the set position.



Supply and Extract Airflow Control

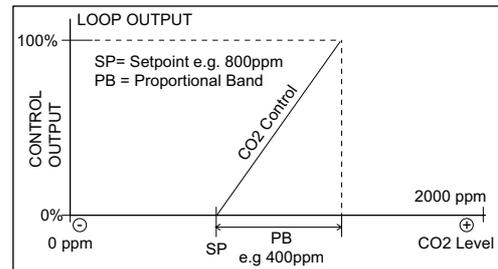
The TRC-A-3A controllers can control the supply and extract airflow via analogue outputs. The airflow (analogue output) settings can be set individually for HOME, AWAY and PARTY BOOST conditions to allow airflow balancing.

AIRFLOW BALANCED BOOST (Digital Input Boost)

The digital input can be configured to airflow balanced boost condition. There are separate parameters for both supply and extract airflow settings. This input is typically used with extractor fans to balance air flow when it is switched ON. The digital input boost is active in all HOME, AWAY and PARTY BOOST modes and overrides the airflow settings.

CO2 Sensor Control Loop Operation (TRC-A-3A-CO2 Models)

The CO2 models can measure and control the CO2 level. This can then be used in demand based control applications. The CO2 control output can then be configured to be linked to any of the physical control outputs Y1, Y2 or Y3, or used in maximum demand control (MAX VAV option)).



The CO2 control loop output corresponds to the CO2 setpoint and the CO2 proportional band. If configured as Direct Control (typical), then if the CO2 level increases above the setpoint the loop output starts to modulate to 100%. When the CO2 level is the amount of the Proportional Band above the setpoint, the loop output is 100%. The configuration is done via the configuration parameters. The CO2 control loop can also be configured to operate as Proportional + Integral control by changing the Integral Action Time from 0 to a required value. The actuator direction can be changed via Output Direction parameter (Direct, Reverse).

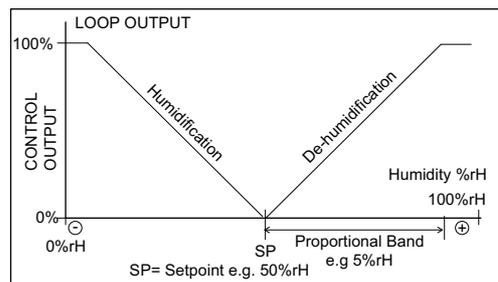
In the ECO mode the CO2 loop output is set to 0%.

VAV Maximum Demand

Each of the analogue outputs can also be configured as "Maximum VAV Demand". In this case the corresponding output (Y1, Y2, Y3) takes the maximum of the CO2 Loop and Cooling Temperature Loop demand output. This is typically used in demand based ventilation (VAV) to control fresh air damper when there is either demand for more fresh air, or demand for temperature cooling (typically fresh air cools down the room space).

Humidity Control Loop Operation (-RH option)

The RH models can measure and control the relative humidity level. This can then be used in demand based control applications to increase the fresh air supply e.g. in the high humidity conditions. The control loop has both de-humidification and humidification outputs that can be linked to any of the physical control outputs Y1, Y2, or Y3. The direction of the both outputs can also be reversed to driver the actuators 100-0% instead of 0-100%.



In the ECO mode the humidity output is set to 0%.

Cleaning Mode

After entering FURTHER INFORMATION screen, by selecting the CLEANING icon, it is possible to activate the cleaning mode. The TRC-A-3A will enter a "Clean Screen" state where all touchscreen presses are ignored and 30 second countdown timer is displayed. This allows cleaning of the device itself.

Lights Control

The Lights control can be activated by enabling Lights in the Configuration Settings. The lights output level is set automatically to 100% (fully on) when the controller goes to HOME/PARTY BOOST mode. The lights output level can be linked to any of the analogue outputs and/or is available as a network variable.

When the controller switches from HOME mode to AWAY mode, the Lights output is automatically switched to 0% (Lights Off). There is 30 seconds (adjustable) switch off delay on transition.

The Lights Icon is displayed in the HOME SCREEN (if enabled). By pressing the Lights icon it is possible to alter manually the light level (in steps) in HOME, AWAY and PARTY BOOST modes. The lights control can have 2 (0-1), three (0-1-2) or four steps (0-1-2-3).



When the Lights icon is pressed the device goes to COUNTDOWN mode for the time set in the Lights Delay Time parameter. In this mode the Lights icon changes colour to brown. If the Lights icon is re-pressed in this mode the countdown is cancelled and the lights are switched back to fully ON level.

The Lights Modes are changed through the configuration settings. The following options are available.

Lights Mode	Description (Typical Operation)
Disabled	Lights icon not visible to the user.
0 - 1	Lights Icon visible to the user in all modes. On/Off Lights Control (2-Steps)
0 - 1 - 2	Lights Icon visible to the user in all modes. 3 Levels Lights Control (0%, 50%, 100%)
0 - 1 - 2 - 3	Lights Icon visible to the user in all modes. 4 Levels Lights Control (0%, 33%, 66%, 100%)

The Lights Interlock parameter is used to define in which modes the Lights are ON.

Lights Interlock	Description (Typical Operation)
Disabled	Operating mode has no impact on the light control.
HOME (AND BOOST)	Lights Output 100% on transition to HOME/BOOST Mode. Lights Output 0% (OFF) on transition to AWAY Modes. Manual and Network Overrides active.
HOME + AWAY (AND BOOST)	Lights Output 100% on transition to HOME/BOOST Mode. Lights remain at the same level on transition to AWAY. Manual and Network Overrides active.

Lock Mode

After entering FURTHER INFORMATION screen, by selecting the LOCK icon it is possible to lock the device. Now by entering the LOCK CODE, the device lock state can be activated.

The lock mode can be configured to work in different ways as described at the below table.

- DISABLED: Lock Mode Icon Not Available
- MODE ONLY: Allows Home/Away/Boost and Lights Buttons Only
- ADJUST ONLY: Allows Temperature Adjustment Only
- NO INPUT: All Buttons Locked

If the lock code is set to 0000 (default), there is no need to enter the lock code and the lock entry screen is bypassed.



Lock Mode Options	Icon Active / Visible				
	Lock	Up and Down	Mode	Cleaning	Lights
DISABLED	NO	YES	YES	YES	YES
MODE ONLY	YES	NO	YES	NO	YES
ADJUST ONLY	YES	YES	NO	NO	NO
NO INPUT	YES	NO	NO	NO	NO

Remote Sensor RI1 and RI2 Inputs

A remote NTC10k3 sensor can be connected to the RI1 and RI2 inputs to be used for different control and display purposes. The options are:-

- DISABLED; the measurement is disabled
- ROOM; the input is used for the main temperature control loop
- FLOOR; the input is used for High/Low Limit Control
- OUTSIDE; the input is used to show the Outside Temperature
- HEATING/COOLING; the input is used to switch between heating/cooling modes (changeover)
- NETWORK NTC10; the resistive input is available over the communication network as temperature.
- NETWORK 0-10V; the input is used as 0-10V network monitoring input (requires AI option)
- SUPPLY AIRFLOW; the input is used for 0-10V pressure monitoring (requires AI option)
- EXTRACT AIRFLOW; the input is used for 0-10V pressure monitoring (requires AI option)

ROOM allows remote temperature sensor to be used for the main temperature loop control. The internal temperature sensor is disengaged from control.

FLOOR option links the temperature measurement to the High/Low Limit control. When the Floor Control is selected for RI1/RI2, the touchscreen SMALL ACTION CIRCLE starts to display the Floor Temperature (configurable). Note if both RI1/RI2 set to Floor Control RI1 takes precedence.

OUTSIDE allows outside (or network) temperature to be displayed on the screen. When the Outside is selected for RI1/RI2, the touchscreen SMALL ACTION CIRCLE starts to display the Outside Temperature (configurable). Note if both RI1/RI2 set to Outside RI1 takes precedence

HEATING/COOLING option monitors the temperature. If the temperature drops below 20°C cooling mode is activated. If the temperature exceeds 25°C the heating mode is activated (limits adjustable).

NETWORK NTC10 option makes the NCT10 measurement available as temperature over the network.

Note: RI1 / RI2 are not available with AI-option.

2 x 0..10Vdc Input (AI Options)

If the TRC-A-3A unit has been ordered with AI option, then inputs RI1 and RI2 become 0..10Vdc inputs.

NETWORK 0-10V; this selection allows the 0..10Vdc measurement to be converted to 0..100% and the measurement can be monitored over the network. This is often used for pressure monitoring.

SUPPLY AIRFLOW; this selection allows the 0..10Vdc measurement to be converted to 0..100% and the airflow measurement can be monitored over the network. It also activates the airflow alarm function.

EXTRACT AIRFLOW; this selection allows the 0..10Vdc measurement to be converted to 0..100% and the airflow measurement can be monitored over the network. It also activates the airflow alarm function.

DI Digital Input

The digital volt-free contact can be configured to the following options are:-

- CLOSE FOR ECO CONTROL; Default
- OPEN FOR ECO CONTROL
- CHANGEOVER; changes stage 1 control between heating and cooling
- DISABLE COOLING; disabling the cooling stages when ON (condensation)
- CONTACT ALARM
- NETWORK
- CLOSE FOR AIRFLOW BALANCED BOOST

"CLOSE FOR ECO CONTROL" Configuration - The digital volt-free contact can be linked to e.g. external timer to switch the device temperature ECO control during the timed period. When the device sees transition from open (COMFORT CONTROL) to close (ECO CONTROL), the operating mode does not change until the Delay Timer has expired.

"OPEN FOR ECO CONTROL" Configuration - The digital volt-free input can be used to activate temperature ECO CONTROL when the contact opens. In this mode it can be connected to a window switch, door card switch or PIR sensor. When the device sees transition from closed to open, the operating mode does not change until the countdown timer has expired (DIGITAL INPUT DELAY setting).

CHANGE-OVER - The digital input can also be used to override from heating to cooling mode. The device works in the heating mode when the contact is open, and in the cooling mode when the contact is closed.

CONDENSATION - when the digital input is closed the cooling loops are set to 0% to prevent condensation happening. In this mode digital input is typically connected to a condensation sensor.

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

NETWORK; the digital input is used for network monitoring purposes.

CLOSE FOR AIRFLOW BALANCED BOOST; in this condition the supply and extract air flow dampers are set to pre-defined values (see Supply and Extract Air Flow control chapter).

Note: Digital Input Delay Timer parameter (switch off delay) applies to all settings.

Analogue Outputs

The controller has three analogue 0-10Vdc outputs that are typically linked to the control loop outputs. The following list states the possible options:

- NETWORK; As a network 0-10Vdc output variable
- HEATING STAGE 1; 0-10Vdc output is linked to Heating Stage 1
- HEATING STAGE 2; 0-10Vdc output is linked to Heating Stage 2
- COOLING STAGE 1; 0-10Vdc output is linked to Cooling Stage 1
- COOLING STAGE 2; 0-10Vdc output is linked to Cooling Stage 2
- LIGHTS; 0-10Vdc linked to the Lights Level
- CO2; 0-10Vdc output is linked to CO2 Control Loop Output (CO2 Models)
- MAXIMUM VAV; 0-10Vdc linked to maximum of the Cooling stage 1 and CO2 loops
- HUMIDIFICATION; 0-10Vdc output is linked to Humidity Control Loop Output (RH Models)
- DE-HUMIDIFICATION; 0-10Vdc output is linked to De-Humidity Control Loop Output (RH Models)

- SUPPLY AIRFLOW; 0-10Vdc linked to Supply Airflow Control
- EXTRACT AIRFLOW; 0-10Vdc linked to Extract Airflow Control

Analogue Output Scaling / Output Limitation

Each of the analogue outputs (Y1,Y2,Y3) can have

- Output minimum voltage (percentage)
- Output maximum voltage (percentage)

The connected control loop output 0..100% is then scaled from minimum voltage to maximum voltage.

The values are available via the communication network from network master read/write.

AntiJAM Valve Exercise Function

If the AntiJAM function is enabled the controller monitors for inactivity. If the control outputs have been fully closed or fully open more than the AntiJAM period, the controller will open/close the outputs to by 30% for a short period of time. The AntiJAM function is enabled through the configuration parameters by selecting the required AntiJAM period by days.

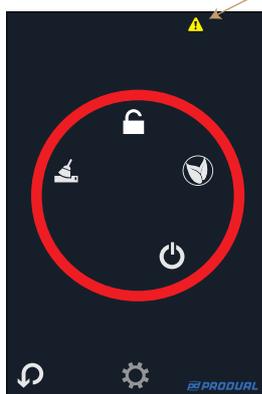
Sensor / Pressure Fault Display

When entering FURTHER INFORMATION AND SETTINGS screen and a sensor/input fault is active, select the fault icon for more information.

The typical alarm reasons are:

- External sensor 1 (Res1) fault (when activated; out of range)
- External sensor 2 (Res1) fault (when activated; out of range)
- Built-in sensor fault
- Digital Input Alarm
- Supply Airflow Fault
- Extract Airflow Fault

FURTHER SETTINGS AND INFORMATION



SELECT FAULT ICON FOR MORE INFORMATION



Supply / Extract Airflow Fault; if in HOME/BOOST modes and either AI1 or AI2 is reading less than the Airflow Alarm limit value after the alarm delay parameter (0..60 mins), the airflow alarm is raised.

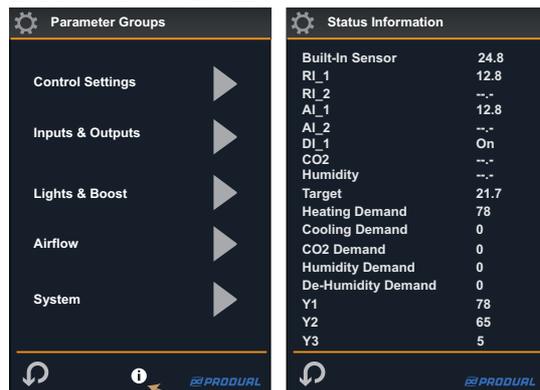
Note: Supply / Extract Airflow Fault requires AI-option.

Note: The fault display can also be accessed from the MODE VIEW screen.

Controller Status Information Display

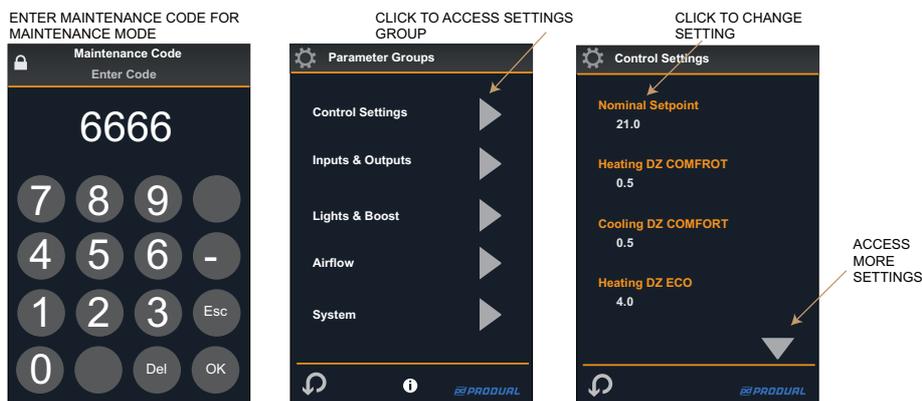
After entering CONFIGURATION PARAMETER GROUP screen and selecting the INFO icon it is possible to see the current status information of the controller. The page shows the current measurement and output information.

LIVE INFORMATION SCREEN



SELECT INFO ICON FOR CONTROLLER STATUS

Configuration Parameters



The TRC-A-3A devices 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. If the Maintenance Code is set as 0000, the Maintenance Code entry screen is bypassed (i.e. no protection).

NOTE:It is good practice to reset the device after the configuration has been completed. Soft reset is automatically carried out after entering and exiting System configuration menu, or alternative power cycle the device.

CONTROL SETTINGS		
Parameter Name	Description	Range
Nominal SP	Nominal Setpoint (Temperature Control)	0.0...95.0°C/°F (Default 21.0°C)
Heating DZ COMFORT	Heating Deadzone in COMFORT mode	0.0...25.0°C/°F (Default 0.5°C)
Cooling DZ COMFORT	Cooling Deadzone in COMFORT mode	0.0...25.0°C/°F (Default 0.5°C)
Heating DZ ECO	Heating Deadzone in ECO Mode	0.0...25.0°C/°F (Default 4.0°C)
Cooling DZ ECO	Cooling Deadzone in ECO Mode	0.0...25.0°C/°F (Default 4.0°C)
Setpoint Adj. Max.	Temperature Setpoint Maximum Adjustment	0.0...20°C/°F (Default 3.0)
Setpoint Adj. Min.	Temperature Setpoint Minimum Adjustment	-20.0...0°C/°F (Default -3.0)
PB	Temperature Control Proportional Ban	1.0..50.0 °C/°F (Default 4.0)
IA	Integral Action time of the temperature control loop. Set to 0 to disable.	0..1,200 seconds (Default 600s)
Heating Stages	Number of Heating Stages	0 = None 1 = 1-Stage (Default) 2 = 2-Stages
Heating Stage 1 Dir.	Heating Stage 1 Direction	0 = Reverse (Default) 1 = Direct
Heating Stage 2 Dir.	Heating Stage 2 Direction	0 = Reverse (Default) 1 = Direct
Cooling Stages	Number of Cooling Stages	0 = None 1 = 1-Stage (Default) 2 = 2-Stages
Cooling Stage 1 Dir.	Cooling Stage 1 Direction	0 = Reverse 1 = Direct (Default)
Cooling Stage 2 Dir.	Cooling Stage 2 Direction	0 = Reverse 1 = Direct (Default)
Limit High	High Limit Setpoint; High Limit Control	0.0..95.0°C/°F (Default 35.0°C)
Limit Low	Low Limit Setpoint; Low Limit Control	0.0..95.0°C/°F (Default 16.0°C)
Limit Ratio	Low/High Limit Ratio Note: 0.0 setting disables the reset control.	0.0..5.0 (0.0=Disabled, Default)
CO2 SP	CO2 Setpoint	0..5000ppm (Default 1,000 ppm)
CO2 PB	CO2 Proportional Band	10..5000 ppm (Default = 300 ppm)
CO2 IA	Integral Action time of the CO2 control loop. Set to 0 to disable.	0..10,000 seconds (Default 0)
CO2 Dir.	Direction of the CO2 control actuator.	0 = Reverse Acting 1 = Direct Acting (Default)

CONTROL SETTINGS		
Parameter Name	Description	Range
Humidity SP	Humidity Setpoint	0.0...100.0 %rH (Default 50%)
Humidity PB	Humidity Proportional Band	0.1...100.0 %rH (Default 20.0%)
Humidity IA	Integral Action time of the humidity control loop. Set to 0 to disable.	0..10,000 seconds (Default 0)
Humidification Dir.	Direction of the humidification output (actuator direction, Direct = 0..100%, Reverse = 100..0%).	0 = Reverse Acting 1 = Direct Acting (Default)
DeHum Dir.	Direction of the dehumidification output (actuator direction, Direct = 0..100%, Reverse = 100..0%).	0 = Reverse Acting 1 = Direct Acting (Default)
Changeover Low	Low Limit where the TRC-A-3A Automatically Switches to Cooling Mode (Cold water supplied)	0.0..95.0°C/°F (Default 20.0°C)
Changeover High	High Limit where the TRC-A-3A Automatically Switches to Heating Mode Mode (Hot water supplied)	0.0..95.0°C/°F (Default 25.0°C)

INPUTS & OUTPUTS		
Parameter Name	Description	Range
Room Sensor Text	Description for the Room Sensor (Built-In Sensor / RI1/RI2)	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 16 = Cabin
Floor Sensor Text	Description for the Floor Sensor (RI1/RI2) Default; 2 = Floor Note: Disabled removes Floor Sensor Text and Measurement from Display. The device may require Soft Reset after setting 'Disabled'. This is done by entering and exiting the System configuration menu.	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
Outside Sensor Text	Description for the Outside Sensor (RI1 / RI2 / Network Value) Default; 3 = Outside Note: Disabled removes Outside Sensor Text and Measurement from Display. The device may require Soft Reset after setting 'Disabled'. This is done by entering and exiting the System configuration menu.	0 = Disabled 1 = Enabled (default) 2 = Heating/Cooling Change-Over 3 = Disable Cooling 4 = Contact Alarm 5 = Network Measurement 6 = Close for Airflow Balanced Boost
Humidity Display	Enable / Disable Humidity Display (if option fitted)	0 = Disabled 1 = Enabled (default)
Digital Input Mode	Digital Input Operation	0 = Close for ECO (Default) 1 = Open for ECO 2 = Heating/Cooling Change-Over 3 = Disable Cooling 4 = Contact Alarm 5 = Network Measurement 6 = Close for Airflow Balanced Boost
Digital Input Delay	Digital Input Delay Timer (transition from active to non-active)	0..28,800 seconds (Default 0s)

INPUTS & OUTPUTS		
Parameter Name	Description	Range
RI1 Mode	Resistive Input 1 Mode	0 = Disabled (default) 1 = Room (NTC10 Temp Control) 2 = Floor (NTC10 Floor Low/High Limit Control) 3 = Outside (NTC10; Display) 4 = Heating / Cooling (NTC10 Change-Over) 5 = Network NTC10 6 = Network 0-10V (AI-option) 7 = Supply Airflow (AI-option) 8 = Extract Airflow (AI-option)
RI2 Mode	Resistive Input 2 Mode	
Outside Temp Source	Source for the Outside Temperature Display (Display activated when valid temperature is sent)	0 = Built-In Sensor 1 = Network Sensor
Mode Screen Sensor	Activates the Temperature Sensor Display in the Mode Screen	0 = Disabled (default) 1 = Room (Built-In) 2 = Floor (R1 or R12) 3 = Outside (R11/R12 or Network)
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 RI1 Calibration	-10.0..+10.0 °C/°F
CO2 Cal.	CO2 Sensor Calibration (CO2 Models)	-500...+500 ppm
Humidity Cal.	Humidity Calibration (RH Models)	-10.0..+10.0 % rH
Y1	Analogue Output Y1 Mode Default: Heating Stage 1	0 = Network Value 1 = Heating Stage 1 2 = Heating Stage 2 3 = Cooling Stage 1 4 = Cooling Stage 2 5 = Light Control 6 = CO2 7 = Maximum VAV 8 = Humidification 9 = De-Humidification 10 = Supply Air Flow 11 = Extract Air Flow
Y2	Analogue Output Y2 Mode Default: Supply Aiflow	
Y3	Analogue Output Y3 Mode Default: Extract Airflow.	
Y1 Min.	Analogue Output Y1 Minimum Value	0..100%(0% = default)
Y1 Max.	Analogue Output Y1 Minimum Value	0..100% (100% = default)
Y2 Min.	Analogue Output Y2 Minimum Value	0..100%(0% = default)
Y2 Max.	Analogue Output Y2 Minimum Value	0..100% (100% = default)
Y3 Min.	Analogue Output Y3 Minimum Value	0..100%(0% = default)
Y3 Max.	Analogue Output Y3 Minimum Value	0..100% (100% = default)
Anti-JAM	Valve Exercise	0..14 Days (default 0 = disabled)
PWM Period	PWM Period - Not Applicable	0..120 Seconds (default 0)

LIGHTS & BOOST		
Parameter Name	Description	Range
Mode Button	Home / Away / Boost Button Mode	0 = Screen 1 = Rotate (Icon) 2 = None (Not Displayed)
Party Mode (Boost) Time	Boost Mode Running Time	0 = Permanent 1..480 minutes (Default 0)
Lights Delay Time	Delay Time for Lights Switch Off	0..1,800 Seconds (Default 30)
Enable Lights	Enable Lights Icon and Operating Mode	0 = Disabled (default) 1 = 0 - 1 2 = 0 - 1 - 2 3 = 0 - 1 - 2 - 3
Lights Interlock	Select Lights Interlocked Operating Mode	0 = Disabled 1 = HOME 2 = HOME + AWAY

AIRFLOW		
Parameter Name	Description	Range
Home Supply Flow	Supply Flow Setting in HOME mode (used if analogue output is selected for Supply Airflow)	0..100% (Default 60%)
Home Extract Flow	Extract Flow Setting in HOME mode (used if analogue output is selected for ExtractAirflow)	0..100% (Default 60%)
Away Supply Flow	Supply Flow Setting in AWAY mode	0..100% (Default 20%)
Away Extract Flow	Extract Flow Setting in AWAY mode	0..100% (Default 20%)
Boost Supply Flow	Supply Flow Setting in BOOST mode	0..100% (Default 100%)
Boost Extract Flow	Extract Flow Setting in BOOST mode	0..100% (Default 100%)
DI Supply Flow	Supply Flow Setting if digital input has been activated in Airflow Balanced Boost Mode	0..100% (Default 100%)
DI Extract Flow	Extract Flow Setting if digital input has been activated in Airflow Balanced Boost Mode	0..100% (Default 70%)
Airflow Alarm Limit	Supply/Extract AirFlow Alarm Limit in HOME / BOOST modes	0..100% (Default 50%)
Airflow Alarm Limit	Time after switching to HOME/BOOST modes the Airflow Alarm is activated	0..60 minutes (Default 3 minutes)
Airflow Test	Sets Supply & Extract Airflow Settings to 100% (for measuring the airflow)	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
Brightness	Backlight Brightness	0..20 (default 5)
Show Unit Swap	Shows the Fahrenheit / Celcius Unit Selection Button	0 = Disabled (default) 1 = Enabled
Lock Mode	Lock Operation	0 = Disabled (default) 1 = Mode Only (Mode, Lights & Blinds) 2 = Temp Adjust Only Available 3 = No Input - All Buttons Disabled
Lock Code	Lock Mode Password	0000 - 9999 (default 0000)
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	Language for User Screens	0 = English (Default) 1 = Finnish
Reload Default	Reload Default Settings	0 = Off (default) 1 = On
Version	Software Version	x.xx (BACnet/Modbus)

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 or BACnet), then

"NonVol Update" register/object is required to be forced on to save the changes. The register will automatically return to normal state

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 0 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	AWAY Mode Override		0..1	Off - On
101	Airflow BOOST Override		0..1	Off - On
102	ECO Mode Override		0..1	Off - On
103	Heating/Cooling Mode (change-over mode)		0..1	0 = Heating, 1 = Cooling
104	Airflow Test Mode (Overrides Supply & Extract Airflow to 100%)		0..1	Off - On
FUNCTION CODE 02 - READ DISCRETE INPUTS (Add 10,000 for Modicon Addressing)				
100	Digital Input Status (DI1)		0..1	Off - On
101	Screen Lock Status		0..1	Off - On
102	Airflow Boost Status		0..1	Off - On
103	ECo Mode 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	Remote Sensor 1 Measurement (Resistive Input 1)	Signed 16	-400...3020	-40.0...150.0°C (-40.0...302.0°F)
102	Remote Sensor 2 Measurement (Resistive Input 2)	Signed 16	-400...3020	-40.0...150.0°C (-40.0...302.0°F)
103	Current Calculated Setpoint	Signed 16	-400...3020	-40.0...150.0°C (-40.0...302.0°F)
104	Device Current Temperature Mode	Unsigned 16	0..1	0 = COMFORT 1 = ECO
105	Relative Humidity Measurement	Unsigned 16	0..1000	0..100.0 %rH
106	CO2 Measurement	Unsigned 16	0..5000	0..5,000 ppm
107	Analogue Output Y1	Unsigned 16	0..1000	0..100.0 %
108	Analogue Output Y2	Unsigned 16	0..1000	0..100.0 %
109	Analogue Output Y3	Unsigned 16	0..1000	0..100.0 %
110	Device Current Mode	Unsigned 16	0..2	0 = HOME 1 = AWAY 2 = PARTY (BOOST)
113	Lights Level	Unsigned 16	0..1,000	0..100.0 %
114	Analogue Input 1 (RI1) Measurement (0-10V, Option)	Unsigned 16	0..1000	0..100.0 %
115	Analogue Input 2 (RI2) Measurement (0-10V, Option)	Unsigned 16	0..1000	0..100.0 %
200	Firmware Versions	Unsigned 16	N/A	N/A
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				
100	Nominal Setpoint	Unsigned 16	0...950	0.0...95.0°C/°F (Default 20°C)
101	Heating Comfort Deadzone	Unsigned 16	0...250	0.0...25.0°C/°F (Default 0.5°C)

Register	Parameter Description	Data Type	Raw Data	Range
102	Cooling Comfort Deadzone	Unsigned 16	0...250	0.0...25.0°C/°F (Default 0.5°C)
103	ECO Heating Deadzone	Unsigned 16	0...250	0.0...25.0°C/°F (Default 4.0°C)
104	ECO Cooling Deadzone	Unsigned 16	0...250	0.0...25.0°C/°F (Default 4.0°C)
106	Setpoint Adjust Minimum	Signed 16	-200..0	-20.0..0.0 °C/°F (Default -3.0)
107	Setpoint Adjust Maximum	Signed 16	0..200	0.0..20.0 °C/°F (Default 3.0)
108	Temperature Control Proportional Band	Unsigned 16	10...500	1.0...50.0°C/°F (Default 4°C)
109	Temperature Control Integral Action Time	Unsigned 16	0..1200	0..1200 seconds (600s default)
110	Number of Heating Stages	Unsigned 16	0..2	0 = None 1 = 1-Stage (Default) 2 = 2-Stages
111	Heating Stage 1 Direction	Unsigned 16	0..1	0 = Reverse (Default) 1 = Direct
112	Heating Stage 2 Direction	Unsigned 16	0..1	0 = Reverse (Default) 1 = Direct
113	Number of Cooling Stages	Unsigned 16	0..2	0 = None 1 = 1-Stage (Default) 2 = 2-Stages
114	Cooling Stage 1 Direction	Unsigned 16	0..1	0 = Reverse 1 = Direct (Default)
115	Cooling Stage 2 Direction	Unsigned 16	0..1	0 = Reverse 1 = Direct (Default)
116	High Limit Setpoint	Unsigned 16	0...950	0..95°C/°F (Default 35.0°C)
117	Low Limit Setpoint	Unsigned 16	0...950	0..95°C/°F (Default 16.0°C)
118	Limit Ratio	Unsigned 16	0..50	0.0..5.0 (0.0=Disabled, Default)
119	CO2 Control Setpoint	Unsigned 16	0..5,000	0..5000ppm (Default 1,000 ppm)
120	CO2 Proportional Band	Unsigned 16	10..5,000	10..5000 ppm (Default = 300 ppm)
121	CO2 Control Integral Action	Unsigned 16	0..10,000	0..10,000 seconds (Default 0)
122	CO2 Output Direction	Unsigned 16	0..1	0 = Reverse Acting 1 = Direct Acting (Default)
123	Humidity Control Setpoint	Unsigned 16	0..1000	0.0...100.0 %rH (Default 50%)
124	Humidity Proportional Band	Unsigned 16	10..1000	1.0...100.0 %rH (Default 20.0%)
125	Humidity Control Integral Action	Unsigned 16	0..10,000	0..10,000 seconds (Default 0)
126	Humidification Output Direction	Unsigned 16	0..1	0 = Reverse Acting 1 = Direct Acting (Default)
127	De-Humidification Output Direction	Unsigned 16	0..1	0 = Reverse Acting 1 = Direct Acting (Default)
128	Mode Screen Sensor	Unsigned 16	0..3	0 = Disabled (default) 1 = Room (Built-In) 2 = Floor (R1 or R2) 3 = Outside (R1/R2 or Network)
131	Y1 Output Mode	Unsigned 16	0..11	0 = Network Value 1 = Heating Stage 1 2 = Heating Stage 2 3 = Cooling Stage 1 4 = Cooling Stage 2 5 = Light Control 6 = CO2 7 = Maximum VAV 8 = Humidification 9 = De-Humidification 10 = Supply Air Flow 11 = Extract Air Flow
132	Y2 Output Mode	Unsigned 16	0..11	
133	Y3 Output Mode	Unsigned 16	0..11	
134	Analogue Output Y1 Override Value	Unsigned 16	0..1000	0..100% (0..10.0V) - Default 0
135	Analogue Output Y2 Override Value	Unsigned 16	0..1000	0..100% (0..10.0V) - Default 0
136	Analogue Output Y3 Override Value	Unsigned 16	0..1000	0..100% (0..10.0V) - Default 0
137	Y1 Minimum Output	Unsigned 16	0..1000	0...100.0 % (Default 0.0%)
138	Y1 Maximum Output	Unsigned 16	0..1000	0...100.0 % (Default 100.0%)
139	Y2 Minimum Output	Unsigned 16	0..1000	0...100.0 % (Default 0.0%)
140	Y2 Maximum Output	Unsigned 16	0..1000	0...100.0 % (Default 100.0%)

Register	Parameter Description	Data Type	Raw Data	Range
141	Y3 Minimum Output	Unsigned 16	0..1000	0...100.0 % (Default 0.0%)
142	Y3 Maximum Output	Unsigned 16	0..1000	0...100.0 % (Default 100.0%)
143	Anti-JAM Time-out	Unsigned 16	0..14	0..14 Days 0 = Disabled (Default)
144	RI1 Mode	Unsigned 16	0..8	0 = Disabled (default) 1 = Room (NTC10 Control) 2 = Floor (NTC10 High/Low Lim) 3 = Outside (NTC10 Display) 4 = Heating / Cooling (NTC10 Change-over) 5 = Network NTC10 6 = Network 0-10V 7 = Supply Airflow (AI-option) 8 = Extract Airflow (AI-option)
145	RI2 Mode	Unsigned 16	0..8	
146	Outside Temperature Source	Unsigned 16	0..1	0 = Built-In Sensor (Default) 1 = Network Sensor
147	Outside Air Temperature Network Write Note: If Outside Temperature Source is set to 1, and a valid (within range) value is sent to this parameter the touchscreen starts to show Outside temperature in the SMALL ACTION CIRCLE.	Signed 16	-580...1220	-58.0...122.0°C/°F (Default 0.0)
148	Digital Input Mode	Unsigned 16	0..6	0 = Close for ECO (Default) 1 = Open for ECO 2 = Heating/Cooling Change-Over 3 = Disable Cooling 4 = Contact Alarm 5 = Network Measurement 6 = Close for Airflow Balanced Boost
149	Digital Input Delay	Unsigned 16	0..28,800	0..28,800 seconds (Default 0s)
150	Internal Sensor Calibration	Signed 16	-100..+100	-10.0...+10.0 °C/°F
151	RI1 Calibration	Signed 16	-100..+100	-10.0...+10.0 °C/°F
152	RI2 Calibration	Signed 16	-100..+100	-10.0...+10.0 °C/°F
153	CO2 Calibration	Signed 16	-500...+500	-500...+500 ppm
154	Humidity Calibration	Signed 16	-100..+100	-10.0...+10.0 % rH
155	Lock Mode	Unsigned 16	0..4	0 = Lock mode disabled (default) 1 = On/Off workable only 2 = Temp settings only available 3 = All buttons disabled
156	Lock Mode Password	Unsigned 16	0..9999	0000...9999
157	Mode Button Operation (Home / Away / Party)	Unsigned 16	0..3	0 = Link to Dedicated Mode Screen 1 = Rotate Home / Away / Party 2 = None (Not Displayed)
158	Party Mode Boost Time	Unsigned 16	0..480	0 = Permanent (Default 0) 1..480 minutes
159	Lights Delay Time	Unsigned 16	0..1800	0..1,800 Seconds (Default 30)
160	Lights Mode	Unsigned 16	0..3	0 = Disabled (default) 1 = 0-1 2 = 0-1-2 3 = 0-1-2-3
161	Lights Interlock	Unsigned 16	0..2	0 = Disabled (default) 1 = HOME 2 = HO ME + AWAY
162	Blinds Mode	Unsigned 16	0..2	0 = Disabled (default) 1 = Enabled, ON/OFF 2 = Enabled, 4-Steps
163	Brightness (Backlight Level)	Unsigned 16	0..20	0..20 (default 5)
164	Display Humidity	Unsigned 16	0..1	0 = Disabled 1 = Enabled (default)
165	Show Swap Temperature Units Icon	Unsigned 16	0..1	0 = Disabled (default) 1 = Enabled

Register	Parameter Description	Data Type	Raw Data	Range
166	Zone 1 Room Sensor Text	Unsigned 16	1..16	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 16 = Cabin
167	Zone 2 Floor Sensor Text Default: 2 = Floor	Unsigned 16	0..16	0 = Disabled 1 = Room
168	Zone 3 Outside Sensor Text Default: 3 = Outside	Unsigned 16	0..16	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
177	Override Lights Notes: After overriding the level the parameter returns to 0. The lights object takes the last action (network or user). Notes: Override Level 1 is the next level after 0% and depends on the configuration. For On/Off = 100%, for 3-levels = 50%, for 4-levels = 33%. And so on.	Unsigned 16	0..5	0 = None (default) 1 = Override Level (0%) 2 = Override Level 1 (100%-On/Off, 50%-3 Levels, 33% - 4 Levels) 3 = Override Level 2 (100%-3-Levels, 66% - 4 Levels) 4 = Override Level 3 (100% - 4 Levels)
179	Override Lock Mode Notes: After overriding the Lock to On/Off the parameter returns to 0.	Unsigned 16	0..2	0 = None (default) 1 = Override On 2 = Override Off
180	Maintenance Mode Password	Unsigned 16	0..9999	0000...9999 (default 6666)
181	Staff Code	Unsigned 16	0..9999	0000...9999 (default 0000)
185	Heating/Cooling Changeover Min Temperature	Unsigned 16	0..950	0.0...95.0°C/°F (Default 20°C)
186	Heating/Cooling Changeover Max Temperature	Unsigned 16	0..950	0.0...95.0°C/°F (Default 25°C)
189	Home Supply Flow	Unsigned 16	0..100	0..100%
190	Home Extract Flow	Unsigned 16	0..100	0..100%
191	Away Supply Flow	Unsigned 16	0..100	0..100%
192	Away Extract Flow	Unsigned 16	0..100	0..100%
193	Boost Supply Flow	Unsigned 16	0..100	0..100%
194	Boost Extract Flow	Unsigned 16	0..100	0..100%
195	DI Supply Flow	Unsigned 16	0..100	0..100%
196	DI Extract Flow	Unsigned 16	0..100	0..100%
197	Airflow Alarm Limit	Unsigned 16	0..100	0..100%
198	Airflow Alarm Delay	Unsigned 16	0..60'	0..60
200	Modbus Address	Unsigned 16	0..247	0..247 (Default 1)
201	Modbus Baud Rate	Unsigned 16	0...4	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600 4 = 76800

Register	Parameter Description	Data Type	Raw Data	Range
202	Modbus Parity	Unsigned 16	0..2	0 = None (Default) 1 = Odd 2 = Even
203	Stop Bits	Unsigned 16	0..1	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
300	Force Reset	Unsigned 16	0..1	0 = Normal 1 = Force Reset
301	Non Volatile Memory Update	Unsigned 16	0..1 Note 3	0 = Normal 1 = Update
303	Force Factory Defaults	Unsigned 16	0..1	0 = Normal 1 = Force Defaults
304	Language	Unsigned 16	0..1	0 = English (Default) 1 = Finnish

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) –Built-In Sensor AI(1) - RI_1 (RI1 Temperature / AI1) AI(2) - RI_2 (RI2 Temperature / AI2) AI(3) - Target (Calculated Setpoint) AI(4) - Humidity AI(5) - CO2 AI(6) - Lights Demand
Analogue Value	15	AV(0) - Nominal Setpoint AV(1) – Heating DZ Comfort AV(2) – Cooling DZ Comfort AV(3) – Heating DZ ECO AV(4) – Cooling DZ ECO AV(5) – Y1 Minimum AV(6) – Y1 Maximum AV(7) – Y2 Minimum AV(8) – Y2 Maximum AV(9) – Y3 Minimum AV(10) – Y3 Maximum AV(11) - PB (Proportional Band) AV(12) – IA (Integral Action) AV(13) – Brightness (LCD) AV(14) - Network Temp. AV(15) - CO2 SP (Setpoint) AV(16) - Humidity SP (Setpoint) AV(17) – Y1 Output ³ AV(18) – Y2 Output ³ AV(19) – Y3 Output ³
Binary Input	2	BI(0) – DI1 (Digital Input 1) BI(1) – Boost Status (DI1 Airflow Boost)
Binary Output	5	BO(0) - ECO Status ¹ BO(1) – Lock ¹ BO(2) – Change-Over BO(3) - Non Volatile Update BO(4) - Test Mode
MutliState Value	4	MSV(0) - Device Mode (1=HOME, 2=AWAY, 3=PARTY BOOST) ¹ MSV(1) - Alarm (Binary Coded - Add 1 to bit values) Bit 0 - Internal NTC (1) Bit 1 - RI1 (2) Bit 2 - RI2 (4) Bit 3 - Humidity Sensor (8) Bit 4 - DI1 (16) Bit 5 - Supply Airflow (32) Bit 6 - Extract Airflow (64) MSV(2) - Light Level (1=Off, 2=Level_1, 3=Level_2, 4=Level_3) ²

Note1: Objects are used to change the mode HOME or AWAY or BOOST. The mode takes the last action e.g. after overriding the mode on via MVO(0), the user can change the mode from the screen. The present value field indicates the current state.

Note2: Multi-state Value is used to change the Lights level. The levels action last change. E.g. if the level is changed via BACnet the user can consequently change the level again. The current lights demand can be read from AI6 object.

Note3: It is possible to override the output level without changing the Y1/Y2/Y3 mode to network. The object returns to use the internal logic value once the priority inputs have been set to 'null'.

App_Config Objects

NOTE: Application Configuration Objects expose 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 TRC-A-3A touchscreen.

	Property Name /ID	Attributes	Range	Default
Required Object Properties	Object Identifier	R		proprietary-128
	Object Name	R/W		"Config2"
	Object Type	R		proprietary-128
Optional Properties	None			

	Property ID	Description	BACnet Data Type	Range
Proprietary Properties	40106	Setpoint Adjust Minimum	REAL	-20.0..0.0 °C/°F (Default -3.0)
	40107	Setpoint Adjust Maximum	REAL	0.0..20.0 °C/°F (Default 3.0)
	40110	Number of Heating Stages	Unsigned	0 = None 1 = 1-Stage (Default) 2 = 2-Stages
	40111	Heating Stage 1 Direction	Unsigned	0 = Reverse (Default), 1 = Direct
	40112	Heating Stage 2 Direction	Unsigned	0 = Reverse (Default), 1 = Direct
	40113	Number of Cooling Stages	Unsigned	0 = None 1 = 1-Stage (Default) 2 = 2-Stages
	40114	Cooling Stage 1 Direction	Unsigned	0 = Reverse, 1 = Direct (Default)
	40115	Cooling Stage 2 Direction	Unsigned	0 = Reverse, 1 = Direct (Default)
	40116	High Limit Setpoint	REAL	0..95°C/°F (Default 35.0°C)
	40117	Low Limit Setpoint	REAL	0..95°C/°F (Default 16.0°C)
	40118	Limit Ratio	REAL	0.0..5.0 (0.0=Disabled, Default)
	40120	CO2 Proportional Band	Unsigned	10..5000 ppm (Default = 300 ppm)
	40121	CO2 Control Integral Action	Unsigned	0..10,000 seconds (Default 0)
	40122	CO2 Output Direction	Unsigned	0 = Reverse Acting 1 = Direct Acting (Default)
	40124	Humidity Proportional Band	REAL	1.0...100.0 %rH (Default 20.0%)
	40125	Humidity Control Integral Action	Unsigned	0..10,000 seconds (Default 0)
	40126	Humidification Output Direction	Unsigned	0 = Reverse Acting 1 = Direct Acting (Default)
	40127	De-Humidification Output Direction	Unsigned	0 = Reverse Acting 1 = Direct Acting (Default)
	40128	Mode Screen Sensor (Temperature Sensor Display in Mode Screen)	Unsigned	0 = Disabled (default) 1 = Room (Built-In) 2 = Floor (RI1 or RI2) 3 = Outside (RI1/RI2 or Network)

	40131	Y1 Output Mode	Unsigned	0 = Network Value 1 = Heating Stage 1 2 = Heating Stage 2 3 = Cooling Stage 1 4 = Cooling Stage 2 5 = Light Control 6 = CO2 Control 7 = Maximum VAV 8 = Humidification 9 = De-humidification 10 = Supply Airflow 11 = Extract Airflow
	40132	Y2 Output Mode	Unsigned	
	40133	Y3 Output Mode	Unsigned	
	40143	Anti-JAM Time-out	Unsigned	0..14 Days 0 = Disabled (Default)
	40144	RI1 Mode	Unsigned	0 = Disabled (default) 1 = Room (NTC10 Control) 2 = Floor (NTC10 High/Low Lim) 3 = Outside (NTC10 Display) 4 = Heating / Cooling (NTC10 Change-over) 5 = Network NTC10 6 = Network 0-10V 7 = Supply Airflow 8 = Extract Airflow
	40145	RI2 Mode	Unsigned	
	40146	Outside Temperature Source	Unsigned	0 = Built-In Sensor (Default) 1 = Network Sensor
	40148	Digital Input Mode	Unsigned	0 = Close for ECO (Default) 1 = Open for ECO 2 = Heating/Cooling Change-Over 3 = Disable Cooling 4 = Contact Alarm 5 = Network Measurement 6 = Close for Airflow Balanced Boost
	40149	Digital Input Delay	Unsigned	0..28,800 seconds (Default 0s)
	40150	Internal Sensor Calibration	REAL	-10.0..+10.0 °C/°F
	40151	RI1 Calibration	REAL	-10.0..+10.0 °C/°F
	40152	RI2 Calibration	REAL	-10.0..+10.0 °C/°F
	40153	CO2 Calibration	REAL	-500...+500 ppm
	40154	Humidity Calibration	REAL	-10.0..+10.0 % rH

	Property Name /ID	Attributes	Range	Default
Required Object Properties	Object Identifier	R		proprietary-128
	Object Name	R/W		"Config2"
	Object Type	R		proprietary-128
Optional Properties	None			

	Property ID	Description	BACnet Data Type	Range
Proprietary Properties	40155	Lock Mode	Unsigned	0 = Lock mode disabled (default) 1 = On/Off workable only 2 = Temp settings only available 3 = All buttons disabled
	40156	Lock Mode Password	REAL	0000...9999
	40157	Mode Button Operation	Unsigned	0 = Link to Dedicated Mode Screen 1 = Rotate Home / Away / Party 2 = None (Not Displayed)
	40158	Party Mode Boost Time	Unsigned	0 = Permanent (Default 0) 0..480 minutes
	40159	Lights Delay Time	Unsigned	0..1,800 Seconds (Default 30)

40160	Lights Mode	Unsigned	0 = Disabled (default) 1 = 0-1 2 = 0-1-2 3 = 0-1-2-3
40161	Lights Interlock	Unsigned	0 = Disabled (default) 1 = HOME 2 = HOME + AWAY
40164	Display Humidity	Unsigned	0 = Disabled 1 = Enabled (default)
40165	Show Swap Temperature Units Icon	Unsigned	0 = Disabled (default) 1 = Enabled
40166	Zone 1 Room Sensor Text	Unsigned	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 16 = Cabin
40167	Zone 2 Floor Sensor Text Default: 2 = Floor	Unsigned	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
40168	Zone 3 Outside Sensor Text Default: 3 = Outside	Unsigned	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
40180	Maintenance Mode Password	Unsigned	0000...9999 (default 6666)
40181	Staff Code	Unsigned	0000...9999 (default 0000)
40182	Not Applicable	Unsigned	
40185	Heating/Cooling Changeover Min Temperature	REAL	0.0...95.0°C/°F (Default 20°C)
40186	Heating/Cooling Changeover Max Temperature	REAL	0.0...95.0°C/°F (Default 25°C)
40189	Home Supply Flow	Unsigned	0..100%
40190	Home Extract Flow	Unsigned	0..100%
40191	Away Supply Flow	Unsigned	0..100%
40192	Away Extract Flow	Unsigned	0..100%
40193	Boost Supply Flow	Unsigned	0..100%
40194	Boost Extract Flow	Unsigned	0..100%
40195	DI Supply Flow	Unsigned	0..100%
40196	DI Extract Flow	Unsigned	0..100%
40197	Airflow Alarm Limit	Unsigned	0..100%
40198	Airflow Alarm Delay	Unsigned	0..60
40200	Address	Unsigned	0..127 (Default 1)
40201	Daud Rate	Unsigned	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600 4 = 76800

40202	Parity	Unsigned	0 = None (Default) 1 = Odd 2 = Even
40203	Stop Bits	Unsigned	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
40300	Force Reset	Unsigned	0 = Normal 1 = Force Reset
40301	Non Volatile Memory Update	Unsigned	0 = Normal 1 = Update
40303	Force Factory Defaults	Unsigned	0 = Normal 1 = Force Defaults

NOTE:Information is subject to change without prior notice.

Dimensions

