

TER Active Room Temperature Sensors (Controllers)

The TER active sensors are designed to detect temperature in the room spaces. The TER sensors have linear 0..10V signals outputs relating to temperature. The TERC sensors have 2 x 4..20mA outputs.

The TER sensors can be installed on a wall surface or on a wall mounting box in dry indoor environment. The TER sensors come with a number of options such as display, active/passive setpoint, digital output, occupancy detection, push button, lux level measurement and passive resistive sensor elements.

The TER sensors can also operate as Temperature or Light Level controllers. Occupancy sensor allows integration of the occupancy control.

The optional display can be used for local indication and alarming.



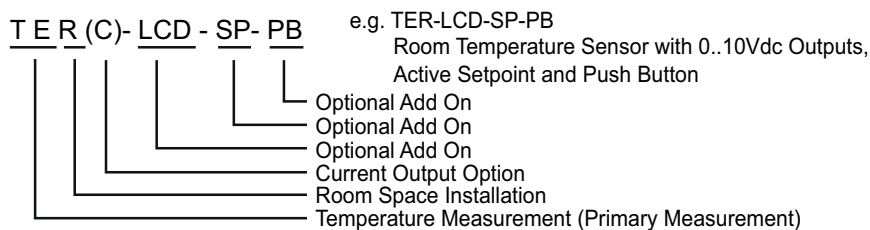
Model Type	Model	Description
	TER	TER Active Room Temperature Sensor (Controller), 0..10Vdc Outputs
	TERC	TER Active Room Temperature Sensor (Controller), 4..20mA Outputs
	-LCD	Display and Alarm Indication Option
	-SP	Active Setpoint Option (for control loops) ^{Note 1,2}
	-SPB	Active Setpoint Push Button Option ^{See Note 3}
	-SPR	Passive Setpoint Option (10kOhm potentiometer) ^{Note 1,2}
	-LL	Light Level Measurement and Occupancy Detection (with digital output) Option ^{Note 1}
	-PB	Push Button Interface Option (with digital output)
Accessories	Model	Description
	SW-DCT-USB	Windows Device Configuration Tool Software with Serial USB Interface, 1.8m USB Lead

Note 1: If -SP/-SPR Option is selected the -LL options are no longer available (and vice versa).

Note 2: SP and SPR options cannot be fitted at the same time.

Note 3: -SPB and -PB options cannot be fitted at the same time. Requires also -LCD option.

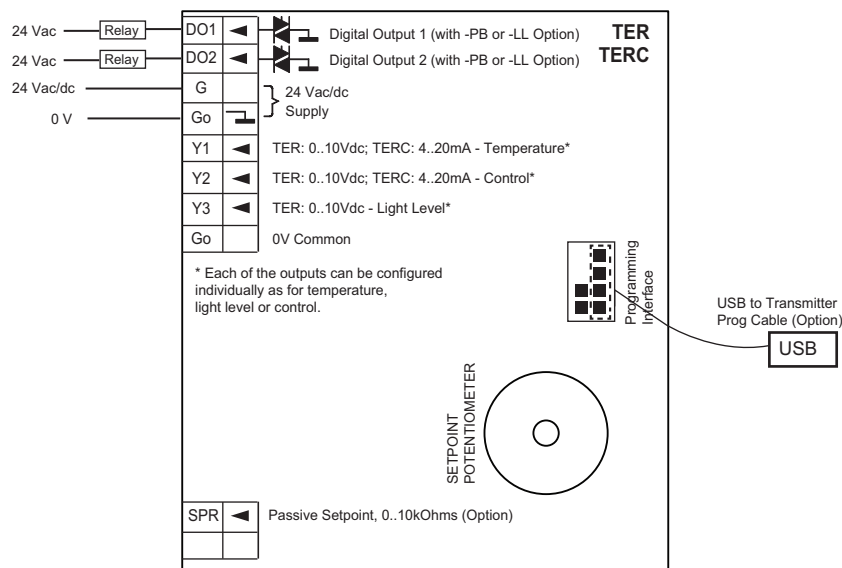
Order Codes



Technical Data

Power Supply	Power supply	24Vac/dc -10%/+15%, max 1VA
Displays and Interfaces	Option -LCD	LCD Display for Showing Temperature, Light Level and Alarm Condition using Backlight (configurable through the tool)
	Option -SP	Active Setpoint Potentiometer - Knob (for control setpoint; adjustable min/max limits)
	Option -SPR	Passive Setpoint Potentiometer (10kOhm potentiometer for external equipment)
	Option -PB	Push Button; status available through DO1 or DO2
Signal Outputs	TER Transmitters	3 x 0..10Vdc < 5mA; 100k min impedance for 1% accuracy
	TERC Transmitters	2 x 4..20mA max 250 Ohms
	Option -PB	2 x 24Vac Triacs (DO1); 2A maximum; requires 24Vac Power Supply (PB option is supplied with DOs fitted)
	Option -LL	2 x 24Vac Triacs (DO1); 2A maximum; requires 24Vac Power Supply (LL option is supplied with DOs fitted)
	Option -SPR	0..10kOhm Resistance; Common 0V
Sensing Characteristics	Temperature	
	Range	0..50°C (32..122°F)
	Accuracy	±0.3°C @ 25°C
	Occupancy; Option -LL	
Occupancy	Infrared Detection (Adjustable Delay)	
Light Level; Option -LL	Range	0..3,000 Lux
Connections	Terminal Connections	Solid and Stranded Cable; 55° 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/EY EN61000-6-3: 2001 (Generic Emission) EN61000-6-1: 2001 (Generic Immunity).
	Degree of Protection	IP20
Housing	Housing Material	ABS Plastics, Self Extinguishing, RAL9010 Pure White
	Mounting	Wall or Junction Box Mounting
	Dimensions	W86 x H120 x D29mm
	Weight	180g

Wiring Terminals



DO1	Digital Output; 24Vac Triac Switching to 0V; max. 2A (option, default Push Button status)
DO2	Digital Output; 24Vac Triac Switching to 0V; max. 2A (option, default Occupancy Status)
G	24Vac/dc Power Supply
G0	0V Common
Y1	TER: 0..10Vdc Analogue Output (Function Selectable, default temp) TERC: 4..20mA Analogue Output (Function Selectable, default temp)
Y2	TER: 0..10Vdc Analogue Output (Function Selectable, default control) TERC: 4..20mA Analogue Output (Function Selectable)
Y3	TER: 0..10Vdc Analogue Output (Function Selectable) TERC: Not Available
G0	0V Common
SPR	Passive Setpoint, 0..10kOhms (option)

Wiring Precautions

Switch off the power before any wiring is carried out. If the sensor has the LCD display fitted, unplug the LCD display and then wire the power supply and analogue outputs, if relevant.

After the wiring has been completed; plug-in the display and power up the sensor.

Y1/Y2/Y3 Analogue Output Operation (Modes)

The analogue outputs Y1/Y2/Y3 can be configured for the following options.

Output Modes	Description
Temperature Measurement (Default for Y1)	The output represents the temperature measurement. This is scaled over 0..10V (TER) or 4..20mA (TERC).
Light Measurement (requires -LL option)	The output represents the light level measurement. This is scaled over 0..10V (TER).
Temperature Control	The output represents the temperature control signal.
Light Control (requires -LL option)	The output represents the light level (LUX) control signal.
Potentiometer	Allows the setpoint potentiometer position to be fed to the analogue output as 0..10V signal.

Note: TERC transmitters have only Y1 and Y2 outputs.

DO1 Digital Output (Options)

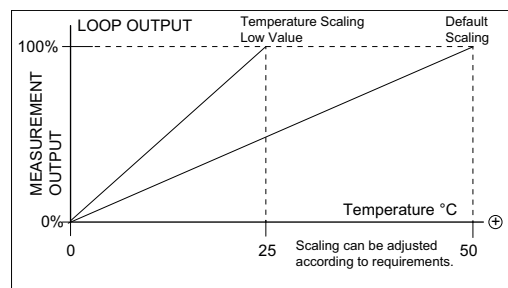
If OC (Occupancy Sensor) option is fitted and then selected, the DO1 is used to switch output on when occupancy is detected. If the push button option (-PB) is fitted then DO1 can be set to switch ON when push button is pressed (delayed switch off). When DO1 is fitted as a part of the above options, it can also be used for thermostatic control.

Digital Output Mode Options	Description (Typical Operation)
Temperature Control Mode (e.g. Low Temperature Limit)	Reverse Mode: The DO1 is switched ON when the temperature drops below the Temperature Setpoint - Temperature Mode Hysteresis. The output is switched OFF when the temperature exceeds the Setpoint. The control direction is adjustable; reverse (heating) / direct (cooling).
Light Level Control (LUX) Mode (e.g. Low Light Level) (requires -LL option)	Reverse Mode: The DO1 is switched ON when the light level drops below the Light Level Setpoint - Light Level Digital Output Mode Hysteresis, and switches OFF when the level increases above Setpoint. The control direction is adjustable.
Occupancy (requires -LL option)	The DO1 is switched ON when the occupancy sensor detects occupancy; the output remains on adjustable time "Occupancy Delay Time Setting" plus approx 10 seconds after occupancy has been detected.
Push Button (requires -PB option)	If -PB option is fitted, it is possible to have the DO1 on for the "Push Button Delay Time" specified in the settings after the pressing of button is detected.

Temperature Measurement Output Scaling and Single Point Calibration

The TER measures the room space temperature, and the measurement can be sent to any of the analogue outputs (Y1/Y2/Y3 for TER, and Y1/Y2 for TERC).

This output is scaled as default 0% = 0°C and 100% = 50°C). The scaling can be modified through the Maximum Temperature Scaling parameter. The output can also be scaled in Fahrenheit units.

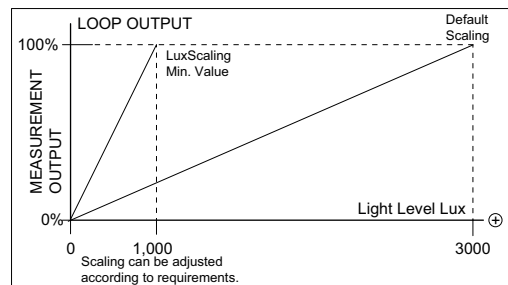


Furthermore the temperature measurement reading can be adjusted on site using the Single Point Calibration field.

Light Level Measurement Output Scaling; Only when -LL Option Fitted

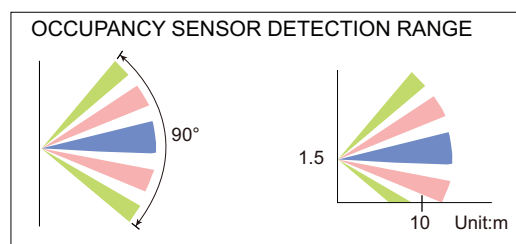
The TER sensors fitted with -LL option measure the light level. The light level (LUX) measurement is available over any of the analogue outputs (Y1/Y2/Y3 for TER, and Y1/Y2 for TERC)

This output is scaled as default 0% = 0 LUX and 100% = 3,000 LUX). The scaling can be modified through Maximum LUX Scaling parameter.



Occupancy Sensor (-LL Option)

The LL option offers a low power Passive Infrared Motion sensor with 21mm Fresnel lens designed for HVAC ventilation and lighting control applications. The sensor detects human body within its detection range. The LL sensor employs a dual element pyroelectric infrared sensor with advanced electronics circuitry.

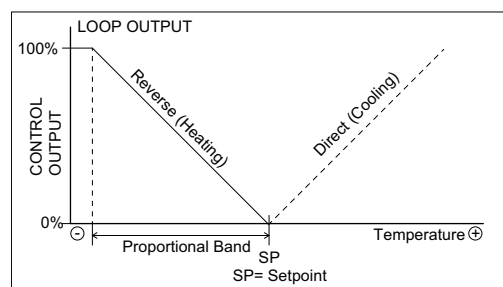


Temperature Control Loop Operation

Proportional or PI Control (Reverse/ Direct)

The temperature measurement can also be used for the temperature control. The calculated control demand is then sent to the output Y1, Y2 or Y3 (depending on the corresponding analogue output mode selection).

The temperature control loop output corresponds to the temperature setpoint and the temperature proportional band. If configured as Reverse Control (heating), then if the temperature level drops below



the setpoint the loop output starts to modulate to 100%. When the temperature is the amount of the Proportional Band below the setpoint the loop output is 100%. In the Direct Control mode the output modulates in reverse. The configuration is done via the configuration parameters.

The temperature control loop can also be configured to operate as Proportional + Integral control by changing the Integral Action Time from 0 to a required value.

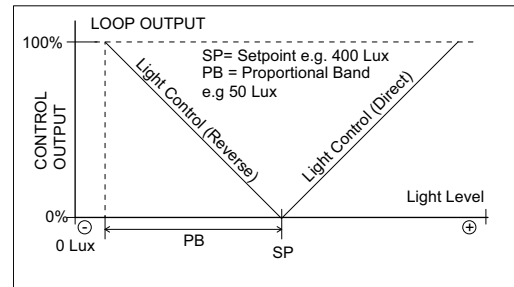
Boost Function

It is possible to boost/override the control output to 100%. This can be achieved via a push button on the device (PB-option). If the Push Button is used then the control output is boosted to 100% for the amount of Push Button Delay Time. When the boost is active the Blue Push Button backlight is lit.

Proportional Control (Reverse/ Direct)

The LUX measurement can also be used for the light control. The calculated control demand is sent to the output Y1, Y2 or Y3 (depending on the corresponding analogue output mode selection).

The light control loop output corresponds to the light level setpoint and the light control proportional band. If configured as Reverse Control, then if the light level drops below the setpoint the loop output starts to modulate to 100%. When the light level is the amount of the Proportional Band below the setpoint the loop output is 100%. In the Direct Control mode the output modulates in reverse. The configuration is done via the configuration parameters.



The LUX control loop can also be configured to operate as Proportional + Integral control by changing the Integral Action Time from 0 to a required value.

Boost Function

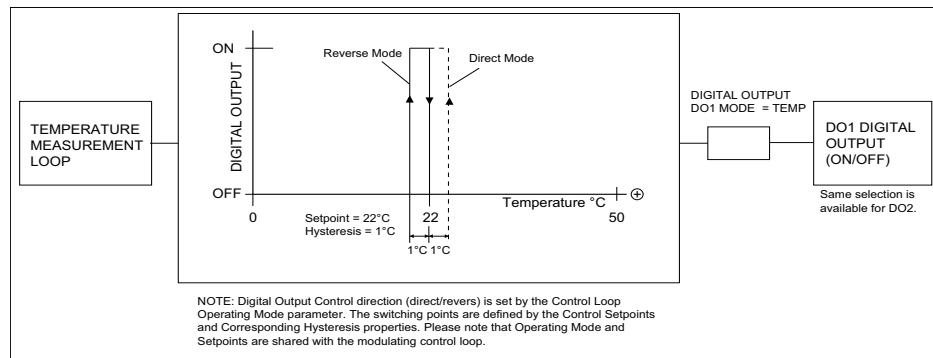
It is possible to boost/override the control output to 100%. This can be achieved via a push button on the device (PB-option). If the Push Button is used then the control output is boosted to 100% for the amount of Push Button Delay Time. When the boost is active the Blue Push Button backlight is lit.

Unoccupied Setpoint

If the sensor has been configured for control, then it is possible to set the control setpoint to a different setting during the unoccupied periods (controlled by the occupancy sensor). Great feature for energy savings.

When the digital output DO1 is fitted as a part of option -LL or -PB it can be configured to work in temperature or LUX control modes. In these modes the corresponding digital output is switched ON/OFF based on the corresponding Setpoint property and the corresponding hysteresis. The direction of the operation is also adjustable through Control Loop Operating Mode Parameter.

The diagram below illustrates the operation for Temperature Control Mode. The same concept is applicable for the LUX control mode.

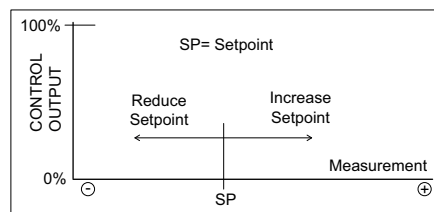


Light Level (LUX) Control Loop Operation; Only when -LL Option Fitted

Digital Output DO1 Control Modes (Optional)

Active Setpoint Potentiometer (-SP option) Setpoint with Push Buttons (-SPB option)

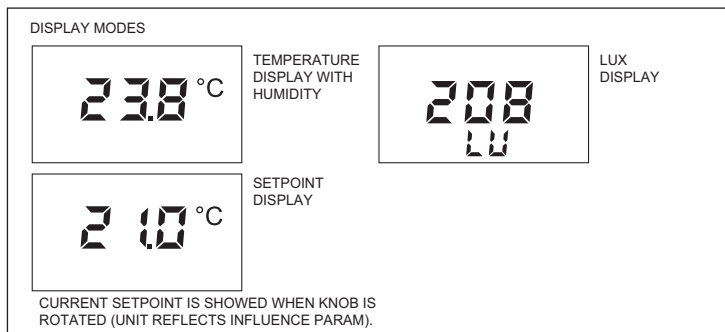
With setpoint potentiometer or setpoint push button options it is possible to adjust the current control setpoint. The adjustment shifts the temperature or LUX setpoint up or down depending on the configuration parameter settings up to the minimum and maximum settings.



It is also possible to send the setpoint potentiometer position (-SP option) to an analogue output as 0..10V signal.

Display (Requires Option -LCD)

The LCD display shows the temperature, and LUX readings. Temperature and LUX readings are primary readings displayed on the "top line". These readings can be rotated. The display has white backlight which is as default switched off. The backlight can be switched permanently on and its intensity can be adjusted.



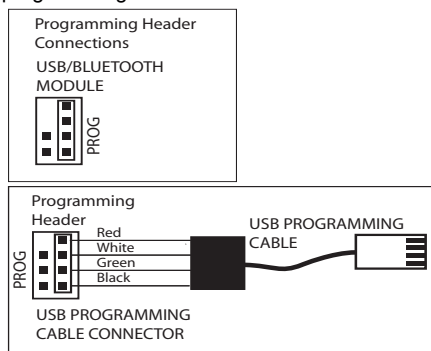
Note: The backlight is permanently on if activated. At 50% intensity the backlight lifetime is approx 10,000 hours. After this time the LCD module needs replacing if the backlight is required. The display continues to operate without the backlight.

Alarm Indication with -LCD Option

The sensor can configured to monitor the temperature or light levels for alarms. The alarm condition is displayed using the backlight colours of the LCD. If the measurement exceeds the amber alarm limit then the amber backlight is switched ON. If the measurement exceeds the red alarm limit, the red backlight is switched ON. At normal condition no backlight is ON (can be configured to be white backlight in normal mode - note the maximum life of 10,000 hours of the backlight). The alarm mode has an adjustable hysteresis to prevent the backlight flickering and all alarm limits are adjustable.

Configuration Parameters and Programming

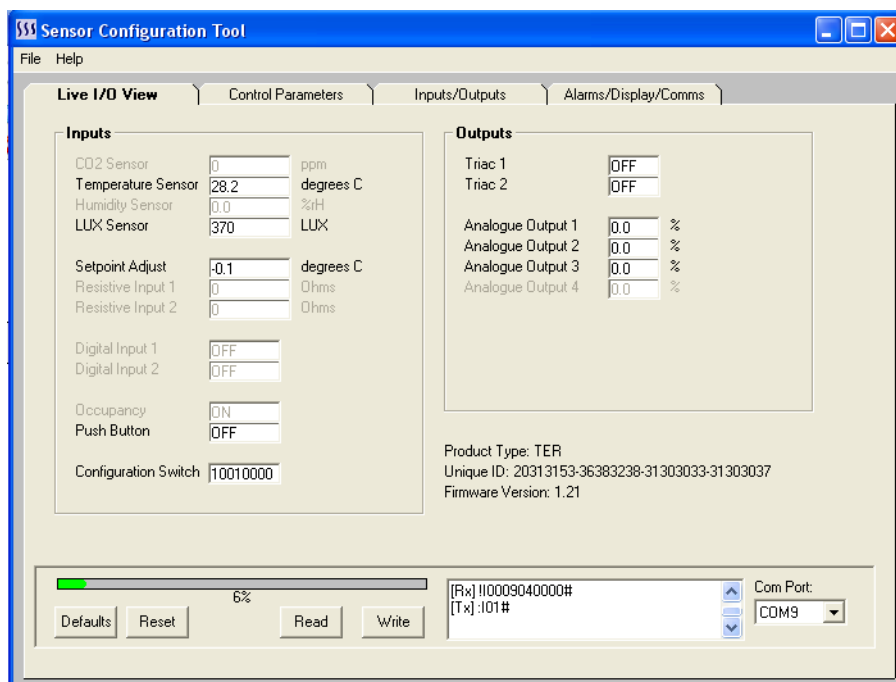
The parameter options can be configured using the SCT Sensor Configuration Tool software The SCT Configuration software is connected via the PC USB cable (or via Bluetooth module) to the programming header of the transmitter as shown on the image below.



The correct process for connecting the sensor via the USB is as follows:-

- Disconnect USB Connector from PC
- Disconnect the Sensor from Power
- Plug-In the 4-Way Connector to the Sensor
- Connect the USB to the PC
- Power Up the Sensor

NOTE: Always disconnect USB from PC before plugging the cable into the sensor.



Common Parameters	
Parameter Name	Description
Defaults	Reloads the default configuration from the sensor non-volatile memory. Note: All modified settings are lost.
Reset	Performs soft reset of the sensor. Apply after major changes.
Read	Reads the sensor data.
Write	Writes the new settings to the sensor (automatically stored in the non-volatile memory)
COM Port	Select the COM port for the USB Cable or Bluetooth. USB cable driver must be installed in order the Serial to TTL connection to operate.

Live IO-View		
Parameter Name	Description	Range
INPUTS		
Temperature Sensor	Temperature Sensor Reading	0..50°C (32..122°F)
LUX Sensor	LUX Sensor Reading	0..3,000 LUX
Setpoint Adjust	Setpoint Adjuster Reading	-500..+500
Occupancy	Occupancy Status	Off - On
Push Button	Push Button Status	Off - On
Configuration Switch	Bit Switch Status for Each Switch	00000000 - 11111111
OUTPUTS		
Triac 1	Digital Output 1	Off - On
Triac 2	Digital Output 2	Off - On
Analogue Output 1	Analogue Output 1	0..100%
Analogue Output 2	Analogue Output 2	0..100%
Analogue Output 3	Analogue Output 3	0..100%

Control Parameters		
Parameter Name	Description	Range
TEMPERATURE		
Temperature Loop Operating Mode	Direction of the temperature control loop.	0 = Reverse Control (Heating) 1 = Direct Control (Cooling)
Temperature Control Setpoint	Temperature Setpoint	0.0...150.0°C/°F (Default 20°C)
Temperature Proportional Band	Temperature Proportional Band	1.0...150.0°C/°F (Default 50°C)

Control Parameters		
Parameter Name	Description	Range
Temperature Control Integral Action	Integral Action time of the temperature control loop. Set to 0 to disable.	0..10,000 seconds
Temperature Digital Output Mode Hysteresis	Hysteresis for the digital output temperature control function.	0.1...150.0°C/°F (Default 2°C)
Temperature Loop Boost Input	Boosts the Control Output to 100%	Select Push Button 1 or 2

HUMIDITY (Not Applicable)**CO2 (Not Applicable)****LUX**

Lux Loop Operating Mode	Direction of the LUX control loop.	0 = Reverse Control 1 = Direct Control
Lux Control Setpoint	LUX Setpoint	0..3,000 Lux (Default 400 Lux)
LUX Proportional Band	LUX Proportional Band	1..3,000 Lux (Default 400 Lux)
LUX Control Integral Action	Integral Action time of the LUX control loop. Set to 0 to disable.	0..10,000 seconds (Default 0s)
LUX Digital Output Mode Hysteresis	Hysteresis for the digital output LUX control function.	1..3,000 Lux (Default 100 Lux)
LUX Loop Boost Input	Boosts the Control Output to 100%	Select Push Button 1 or 2

SETPOINT ADJUST

Setpoint Adjuster Minimum Value	Sets the minimum value for the setpoint (setpoint turned fully anti clockwise)	-500..0 (Default -3.0)
Setpoint Adjuster Maximum Value	Sets the maximum value for the setpoint (setpoint turned fully clockwise)	0..500 (Default 3.0)
Setpoint Value Influence to Control Setpoint	Setpoint Value Influence to Control Setpoint	0 = No Influence 1 = CO2 (Not Applicable) 2 = Temperature 3 = Humidity (Not Applicable) 4 = Lux
Unoccupied SPA	Changes the control setpoint to the set value when the space is unoccupied (requires -LL option)	0..500 (Default 0.0)

Inputs / Outputs

Parameter Name	Description	Range
SENSOR INPUTS		
Temperature Offset	One Point Temperature Calibration Field	-3.0..+3.0°C/°K (Default 0°C)
Temperature AO Scale	Analogue Output Maximum Temperature Scaling	0.1...150.0°C/°F (Default 50°C)
LUX AO Scale	Analogue Output Maximum Lux Scaling	1000..3,000 Lux (Default 3,000 Lux)
Occupancy Off Delay	Delay Time Setting for Occupancy	1..7200 Seconds (Default 600s)
Push Button Off Delay	Delay Time Setting for Push Button	1..7200 Seconds (Default 600s)

OUTPUTS

AO1 (Y1)	Analogue Output Y1 Mode	0 = Network (Not Applicable) 1 = CO2 (Not Applicable) 2 = Temperature Measurement 3 = Humidity (Not Applicable) 4 = Light Measurement 5 = CO2 Control (Not Applicable) 6 = Temperature Control 7 = Humidity (Not Applicable) 8 = Light Control 9 = Maximum (Not Applicable) 10 = Potentiometer
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Inputs / Outputs		
Parameter Name	Description	Range
AO2 (Y2)	Analogue Output Y2 Mode	0 = Network (Not Applicable) 1 = CO2 (Not Applicable) 2 = Temperature Measurement (Default) 3 = Humidity (Not Applicable) 4 = Light Measurement 5 = CO2 Control (Not Applicable) 6 = Temperature Control 7 = Humidity (Not Applicable) 8 = Light Control 9 = Maximum (Not Applicable) 10 = Potentiometer
AO3 (Y3)	Analogue Output Y3 Mode	0 = Network (Not Applicable) 1 = CO2 (Not Applicable) 2 = Temperature Measurement 3 = Humidity(Not Applicable) 4 = Light Measurement 5 = CO2 Control (Not Applicable) 6 = Temperature Control 7 = Humidity Cont (Not Applicable) 8 = Light Control 9 = Maximum (Not Applicable) 10 = Potentiometer
DO1	Digital Output 1 Mode	0 = Network (Not Applicable) 1 = CO2 Relay (Not Applicable) 2 = Temperature Relay 3 = Humidity (Not Applicable) 4 = Light Relay 5 = Occupancy Relay 6 = Push Button
DO2	Digital Output 2 Mode	0 = Network (Not Applicable) 1 = CO2 Relay (Not Applicable) 2 = Temperature Relay 3 = Humidity (Not Applicable) 4 = Light Relay 5 = Occupancy Relay 6 = Push Button

Alarm/Display/Comms		
Parameter Name	Description	Range
COMMS (NOT APPLICABLE)		
ALARMS		
Alarm Source	Alarm LED Mode	0 = Not Applicable (CO2) 1 = Temperature 2 = Humidity 3 = LUX
Alarm Amber Threshold	Amber Alarm LED Switching Point	0..5000 (Default 750)
Alarm Red Threshold	Red Alarm LED Switching Point	0..5000 (Default 1250)
Alarm Hysteresis	Alarm LED Hysteresis	0..5000 (Default 50)
DISPLAY		
Temperature Units	Temperature Unit Selection	0 = Celsius 1 = Fahrenheit
Display Mode	Display Mode	0 = Rotate Installed 1 = CO2 Only (Not Applicable) 2 = Temperature Only 3 = LUX Only 4 = Setpoint Only
LCD brightness	Brightness of the LCD	Off - 10% to 100%

Parameter Storage

The configuration parameters are stored in the non-volatile memory. The SCT (Sensor Configuration Tool) software will automatically store the register values on the non-volatile permanent memory after the changes are carried out.

Dimensions

