



**SMT-IAQ3**



# Indoor Air Quality Monitor

Manual Ver 1.6

Thank you for your purchase of the Smart Temp Australia P/L SMT-IAQ3 indoor air quality monitor and controller. This device has been designed and built by Smart Temp Australia P/L to be an exceptionally reliable and advanced control system. Great effort has been taken to ensure that the SMT-IAQ3 is extremely easy to use and capable of monitoring and controlling indoor air quality in the safest and the most energy efficient manner possible.

This manual is comprehensive and detailed and as such is quite large. Fortunately, this document is not a novel that you need read from cover to cover, simply use the parts of the manual that are of interest to you and disregard the parts of the manual irrelevant to your needs.

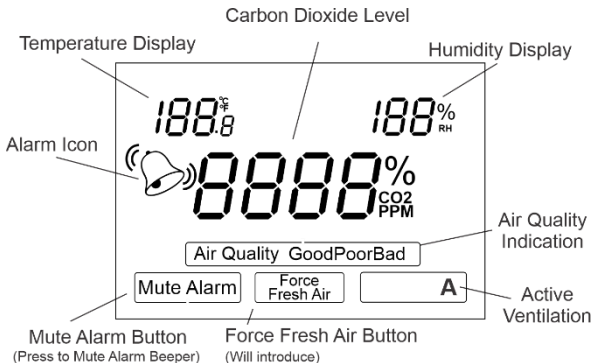
*Great care has been taken in the preparation of this manual. Smart Temp Australia P/L takes no responsibility for errors or omissions contained in this document. It is the responsibility of the user to ensure this monitor or the equipment connected to it is operating to their respective specifications and in a safe manner.*

*Due to ongoing product improvement Smart Temp Australia P/L reserves the right to change the specifications of the SMT-IAQ3 monitor (or its components) without notice.  
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# LCD

Not all display elements or buttons shown may be active in your SMT-IAQ3. The display is dynamic and functions not applicable will not be shown. The alarm mute button for example, will not be shown until the alarm is sounding.

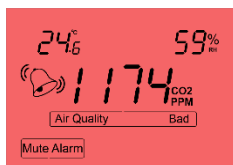
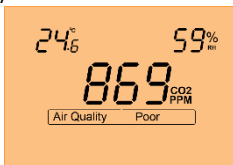
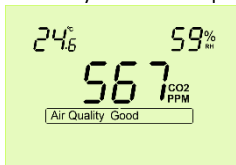


# User Operation

The SMT-IAQ3 requires very little user interaction. It will monitor the levels of carbon dioxide, humidity and temperature in the local environment and is capable of initiating alarms and corrective action if any of these exceed pre-set levels.

If enabled, the user can press the “Force Fresh Air” button which will bring in fresh air. The “Force Fresh Air” button will flash when pressed to indicate that it is running.

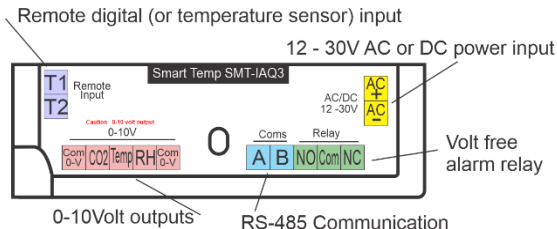
If enabled, the SMT-IAQ3 backlight can also change colour from green, to amber then red to visually indicate the quality of the air in the room in a clear manner.



If permitted, you may be able to mute the audible alarm by pressing the “Mute Alarm” button when shown. If Active Ventilation is enabled, you can tap the “A” icon to briefly display the outside air temperature.

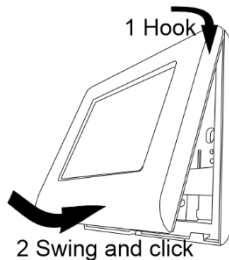
# Terminal Layout

By using a small, flat blade screwdriver placed in the bottom centre of the enclosure you can pry the sensor enclosure apart. Take care not to drop the display as damage may occur.



When replacing the face on the sensor ensure all wiring is free of the terminals on the base and will not foul on the pins when you close the two halves.

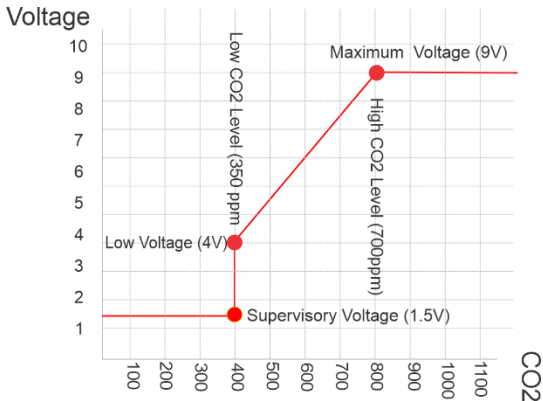
Hook the top of the display into the top of the base and swing the lower section in. Press firmly to snap the two case halves together. **DO NOT** press on the glass display, press on the plastic only.



## O-10V Output

The SMT-IAQ3 has 3 x 0-10V outputs. One each for carbon dioxide, temperature, and relative humidity. All 0-10V output wiring is the same. Wire between the required output and the 0V / Com terminals. The output voltage will increase with increasing temperature, humidity, or carbon dioxide levels. (Default range is 0-2000ppm)

The output voltage and scale for each of the 3 0-10V outputs is independently adjustable from within the Installer options menu. (See installer options starting page 15)



# Relay

The SMT-IAQ3 has a single volt free relay with changeover contacts. The relay is rated to carry 30V @1A Max. Any voltage applied to the relay common terminal will switch between the normally open (NO) and normally closed (NC) terminals. This relay can be set to respond to high levels of temperature, relative humidity or carbon dioxide as selected in the installer options. Each sensor has its own selectable alarm threshold.

You can assign just one sensor, such as CO2 to the relay, or multiple sensors such as Temp and RH to the relay.



The Installer menu options will permit you to set this relay as a normally de-energised or as a fail-safe normally energised relay. This will change the NO/NC wiring logic.

## T1 T2

A single universal input has been provided that will permit several additional functions to be performed. This input can be used as a remote temperature sensor input or as a volt free switch input that will control many of the functions of the SMT-IAQ3. A complete list of options available to this input is available in the Installer options menu.



## Power

The SMT-IAQ3 can be powered from any AC or DC power supply from 12 to 30V AC or DC. AC power is not polarity dependent however if powering the SMT-IAQ3 from DC power ensure the positive voltage is applied to the top AC+ terminal and negative to the lower AC- terminal. Reverse polarity DC wiring will not damage the SMT-IAQ 3, it simply will not power on.



## Communications

The SMT-IAQ3 has an isolated RS-485 communications capability. You can select either Modbus RTU or BACnet MSTP communications protocol from within the Installer menu.

It is well beyond the scope of this small manual to detail the communications capabilities and provide information on all data points available within the SMT-IAQ3. For comprehensive information on the communications capability of the SMT-IAQ3 please see the separate communications documentation.



## Power Up

When you first apply power to the SMT-IAQ3 it will briefly show all LCD elements and then display the firmware version for a few seconds. During the next 180 seconds the display will countdown from 180 to 0 to permit the CO2 and other sensors to stabilise. During this countdown period no alarm conditions will be initiated. All 3 x 0-10V outputs will be held at their respective “safety voltage” as defined in the Installer menu (see page 16) and if the alarm relay is set as fail-safe it will energise. The LCD will also cycle its colour backlight through green, amber and red.

Once the countdown has reached zero, normal function will begin.

### **Important Notes**

The CO2 sensor within the SMT-IAQ3 has an advanced learning self-calibrating function. This calibration process takes place over an 8-day period. It is therefore essential that the SMT-IAQ3 is continuously powered and not turned on and off at frequent intervals.

## Installation & Mounting

As the sensing devices are contained within the SMT-IAQ3 enclosure it is important to locate it within the space to be monitored and controlled. If being used in a classroom or a public hall it should be placed on a wall, approximately 1.5m off the floor (in the breathing space) of the classroom, home, or office.

It should be kept out of direct sunlight, away from (openable) windows or drafts that may affect the ability of the sensors to measure the environment accurately.

Do not place the SMT-IAQ3 behind doors or other objects or in the corners of room in an area where the air is not moving. Do not place the SMT-IAQ3 on a wall above a printer or other possible sources of heat.

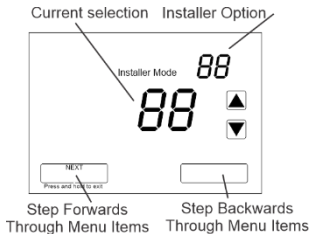
The hole in the rear of the SMT-IAQ3 case where wiring enters the rear of the case should be taped over and blocked as any drafts travelling down the inside of the wall could seriously affect the accuracy of the SMT-IAQ3 sensors.

# Advanced Installer Options Menu

The SMT-IAQ3 can be tuned to meet the needs of the specific application. Within this Advanced Installer options menu, you can adjust how the SMT-IAQ3 responds to and reports the levels of carbon dioxide, temperature, and humidity.

If you do not understand the importance of the changes you may make in this Installer options menu, it is strongly recommended that you call Smart Temp Australia P/L or an authorised distributor for clarification and advice.

To enter the Installer menu first tap then press and hold the centre of the display. After 10 seconds the display will change and show the digits "15" (fifteen) and the up / down and the next buttons. Use the up (or down) button to adjust the display to "21" (twenty-one) or your previously saved PIN. Press the next button to enter the menu. If you are returned to the previous screen, you have entered the incorrect PIN. Try again



To advance through the menu items tap the “Next” button and adjust the shown installer option with the up / down button.

To exit the Installer menu and save changes press and hold the “Next” button for 3 seconds.

**After making changes in this menu DO NOT power down for  
20 seconds or changes may be discarded.**

1	PIN	This sets the PIN to enter the Installer options menu for future entry. Please record any changes made to the PIN as it will affect how you enter the Installer options menu in the future. Default PIN is 21. Range from 00 to 99.
2	Display Temp	You can display the room Temp in degree C, degree F or hide the display of room temperature. Default is degree C. Options are C, F or Off.
3	Display RH	You can display or hide the room humidity display. Default is On. Options are On or Off.
4	Display CO2	You can display the room CO2 in ppm or percentage to alarm point or hide the CO2 display. 0% being displayed is clean fresh air (400ppm) and 100% displayed being at alarm point. Default is ppm. Options are ppm, % or Off.
5	Calibrate Temp	Should you feel that the IAQ3 temperature sensor accuracy has drifted you are permitted to apply a small, fixed offset. Default is 0.0. Options are +/- 5 deg C or F in 0.1 deg steps.

6	Calibrate RH	Should you feel that the IAQ3 humidity sensor accuracy has drifted you are permitted to apply a small, fixed offset. Default is 0%. Options are +/- 25% in 1% steps.
7	Calibrate CO2	Should you feel that the IAQ3 CO2 sensor accuracy has drifted you are permitted to apply a small, fixed offset. Default is 0ppm. Options are +/- 100ppm in 1ppm steps. <b>Caution. The NDIR sensor fitted to the IAQ3 is extremely stable and accurate. Investigate all other causes for perceived errors before adjusting.</b>
8	Temperature Alarm Relay	You can set a temperature value that will turn on the volt free alarm relay. Default is Off. Options are Off, then -20 to +120 (C or F) in 1 degree steps.
9	RH Alarm Relay	You can set a relative humidity value that will turn on the volt free relay. Default is Off. Options are Off, then 0% to +100% in 1% steps.
10	CO2 Alarm Relay	You can set a carbon dioxide value that will turn on the volt free alarm relay. Default is Off. Options are OFF, then 400ppm to 2000ppm in 50 ppm steps.
11	Alarm Relay Logic	You can drive the alarm relay as a normally energised or as a normally de-energised relay. If normally energised the alarm relay will energise on power up and de-energise in an alarm condition or loss of power. Default is 0 - Normally de-energised. Options are 0 - Normally de-energised or 1 - Normally energised
12	Beeper	The SMT-IAQ is fitted with a solid-state beeper. This beeper can be used to acknowledge a button press as well as be used for an alarm. Default is 1 = Beep on button press.

		Options are 0= No beeper. 1 = Beep on button press. 2 = Beep on alarm. 3 = Beep on button press & alarm.
13	Beeper Mute	The beeper may be set to sound when in alarm condition. If desired, you can show a beeper mute button when this occurs. Default is 0 = Do not permit mute. Options are 1 = Toggle mute. 2 = 1 Hour mute. 3 = 3 Hour mute. 4 = 12 Hour mute.
14	Show Force Fresh Air Button	The SMT-IAQ display can be set to show a “force fresh air” button. If this button is pressed the CO2 sensor 0-10V output will go to maximum voltage and the alarm relay (if set for CO2) will engage. Default is 0 = Do not show force fresh air button. Options are 1 = Show FFA. 2 = Show FFA & auto reset after 1 hour. 3 = Show FFA and auto reset 4 hours.
15	T1 T2 Input Function	The remote inputs have multiple functions including: 0= Override onboard sensor with remote sensor. 1= Average onboard sensor with remote sensor. 2 = Force fresh air. 3 = Remote mute. 4 = Reserved. 5 = Report status to Mobus/BACnet. 6 = Outside air sensor. 7 = Pause all alarms (Unoccupied).
16	Active Ventilation Outside Air Temperature	The SMT-IAQ3 Active Ventilation function uses the inside and outside (if fitted) air temperature sensors to determine if outside air is suitable to be used to ventilate the room. The outside air temperature must be under this value to be deemed suitable for the Active Ventilation function to operate. Default is OFF. Adjustments are Off, then 5 degrees to 100 degrees in 1-degree steps.

17	Active Ventilation Inside Air Temperature	<p>The SMT-IAQ3 Active Ventilation function uses the inside and outside (if fitted) air temperature sensors to determine if outside air is suitable to be used to ventilate the room. This setting defines the inside air temperature threshold that if exceeded (and if outside air is suitable) will begin the Active Ventilation function.</p> <p>Default is Off. Options are Off, then 5 degrees to 100 degrees in 1 degree steps.</p>
18	Active Ventilation Output	<p>The SMT-IAQ3 can introduce fresh outside air into the room when conditions are suitable. This option defines the output(s) that control this function. The letter "A" will be shown on the display when this function is enabled and flash when it is working. (Tap the "A" to see outside temp)</p> <p>Default is 0 = Function off</p> <p>Options are 0= Function Off. 1 = Relay only. 2 = Temp 0-10V only. 3 = Relay and temp 0-10V.</p>
19	Temp Min Value	<p>This option permits you to select the lowest temperature value to be used by the SMT-IAQ. Temperatures below this value will be ignored. (See graph on page 6)</p> <p>Default is 5 degrees. Adjustments are -20 degrees to 150 degrees in 1-degree steps.</p>
20	Temp Max Value	<p>This option permits you to select the highest temperature value to be used by the SMT-IAQ. Temperatures above this value will be ignored. (See graph on page 6)</p> <p>Default is 35 degrees. Adjustments are -20 degrees to 150 degrees in 1-degree steps.</p>
21	Temp Low Voltage	<p>This sets the minimum temperature 0-10V output voltage when at the minimum temperature value. (See graph on page 6)</p> <p>Default is 0V. Adjustments are 0-10V in 0.5V steps.</p>

22	Temp Max Voltage	This sets the maximum temperature 0-10V output voltage when at the maximum temperature value. (See graph on page 6) Default is 10V. Adjustments are 0-10V in 0.5V steps.
23	Temp Safety Voltage	This sets a constant voltage to the temperature 0-10V output. This voltage will be present whenever the SMT-IAQ is powered. (See graph on page 6) Default is 0V. Adjustments are 0-10V in 0.5V steps.
24	RH Min Value	This option permits you to select the lowest RH value to be used by the SMT-IAQ. RH below this value will be ignored. (See graph on page 6) Default is 0 RH. Adjustments are 0 to 100 in 5% steps.
25	RH Max Value	This option permits you to select the highest RH value to be used by the SMT-IAQ. RH above this value will be ignored. (See graph on page 6) Default is 100%. Adjustments are 0 to 100% in 5% steps.
26	RH Low Voltage	This sets the RH 0-10V output minimum voltage when at the minimum RH value. (See graph on page 6) Default is 0V. Adjustments are 0-10V in 0.5V steps.
27	RH Max Voltage	This sets the RH 0-10V maximum output voltage when at the maximum RH value. (See graph on page 6) Default is 10V. Adjustments are 0-10V in 0.5V steps.
28	RH Safety Voltage	This sets a constant voltage to the RH 0-10V output. This voltage will be present whenever the SMT-IAQ is powered. (See graph on page 6) Default is 0V. Adjustments are 0-10V in 0.5V steps.



29	CO2 Min Value	This option permits you to select the lowest CO2 value to be used by the SMT-IAQ. CO2 levels below this value will be ignored. (See graph on page 6) Default is 0ppm. CO2 Adjustments are 0 to 2000ppm in 50ppm steps.
30	CO2 Max Value	This option permits you to select the highest CO2 value to be used by the SMT-IAQ. CO2 levels above this value will be ignored. (See graph on page 6) Default is 2000ppm. Adjustments are 0 - 2000ppm in 50ppm steps.
31	CO2 Low Voltage	This sets the CO2 0-10V output minimum voltage when at the minimum CO2 value. (See Graph on page 6) Default is 0V. Adjustments are 0-10V in 0.5V steps.
32	CO2 Max Voltage	This sets the CO2 0-10V maximum output voltage when at the maximum CO2 value. (See graph on page 6) Default is 10V. Adjustments are 0-10V in 0.5V steps
33	CO2 Safety Voltage	This sets a constant voltage to the CO2 0-10V output. This voltage will be present whenever the SMT-IAQ3 is powered. (See graph on page 6) Default is 0V. Adjustments are 0-10V in 0.5V steps.
34	Back light	The back light can be set to provide an indication of the current air quality by changing colour from green to amber to red or simply illuminate the display in green when a button is pressed. Default is 1. Options are 0 = No Back light. 1 = Alarm. 2 = Button press only.
35	Amber Temp Backlight Threshold	This option sets the threshold of where the backlight turns from green to amber for temperature. Default is Off. Options are Off, then 0 to 100 degrees in 1-degree steps.

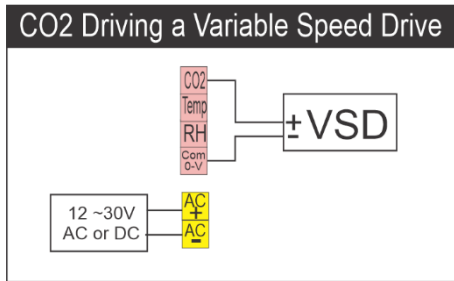
36	Red Temp Backlight Threshold	This sets the threshold of where the backlight turns from amber to red for high temperature. Default is Off. Options are Off, then 0 to 100 degrees in 1- degree steps.
37	Amber RH Backlight Threshold	This sets the threshold of where the backlight turns from green to amber for humidity. Default is Off. Options are Off, then 0 to 100 % in 1 % steps.
38	Red RH Backlight Threshold	This sets the threshold of where the backlight turns from amber to red for high temperature. Default is Off. Options are Off, then 0 to 100 % in 1 % steps.
39	Amber CO2 Backlight Threshold	This sets the threshold of where the backlight turns from green to amber for high carbon dioxide. Default is 650ppm. Options are Off, then 0 to 2000 ppm in 50ppm steps.
40	Red CO2 Backlight Threshold	This sets the threshold of where the backlight turns from amber to red for high carbon dioxide. Default is 850pp. Options are Off, then 0 to 2000 ppm in 50ppm steps.
41	Communication Protocol	The SMT-IAQ3 has an isolated RS-485 communications capability. You can select ModBus RTU or BACnet MSTP communications protocol. The full stop in the temperature display will flash if communications are running. Default is 0 = Modbus. Options 0 = Modbus. 1 = BACnet.
42	Communications Speed	This option permits you to define the communications speed for the selected communications protocol. Default is dependent on protocol selected.

43	Communications Parity	Communications protocols require a parity to be set. Default is dependent on protocol selected. Options are 0 = None. 1 = Odd. 2 = Even.
44	Communications Address	This setting defines the communications address on the network as used by the SMT-IAQ3. Default is 7. Adjustments are 1 to 127.
45	CO2 Sensor Response speed	The NDIR sensor fitted to the SMT-IAQ3 can respond to changing CO2 levels very rapidly. If the sensor is in a location where it is very close to people, exhaled breath directly onto the sensor can cause rapid spikes in CO2 readings which may not be typical of general Indoor Air Quality levels. Default is 1 (Fast). Adjustments are 1, 2 & 3 3 being slowest.
46	Good / Poor / Bad display enable	Ver 1.03 + firmware. You can show or hide the Good / Poor / Bad display on the LCD. Default is ON
47	CO2 Relay Off Threshold	Ver 1.03 + firmware. This value permits you to define, in PPM, how far from the CO2 alarm point the alarm will deactivate. Default is 20ppm Adjustable from 20 to 1000ppm.
r	Reset	Setting this value to 1 then exiting the installer menu will factory reset the SMT-IAQ3.

## Typical Wiring Examples

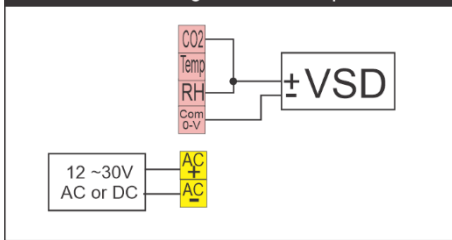
We have provided several wiring examples that may assist in setting up the SMT-IAQ3 for your application. These are not the limits of the SMT-IAQ capabilities.

These wiring examples shown require you to adjust the various options in the Installer menu. For example, should you wish to use the volt free relay to control a 24V drive open / closed damper based on CO2 levels, you must activate and define the CO2 Relay Alarm on page 13.



In this example we are simply controlling a standard Variable Speed Drive with the CO2 0-10V output. The Installer menu permits you to scale the 0-10V output to match your requirements such as output 0V at 450ppm and output 10V at 800ppm.

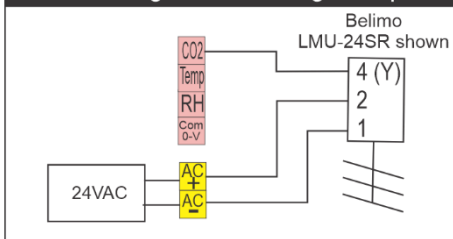
## CO2 & RH Driving a Variable Speed Drive



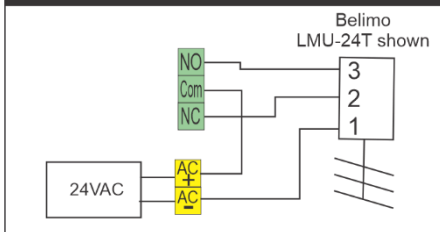
In this example the CO2 and RH is controlling the VSD with a high select. Both the CO2 and RH outputs are individually scalable so, should you wish, the CO2 range can be 450ppm to 1,000ppm and the RH range can be 75% to 100%. Also, the RH output can be limited to 7V max if required.

Whether you wish to control a Variable Speed Drive or a modulating damper the wiring and setup are the same. If you would like, you are free to mix the devices you wish to control with the three SMT-IAQ3 0-01V outputs. All three outputs can be individually scaled.

## CO2 Driving a Modulating Damper



## Driving a Open / Close Damper



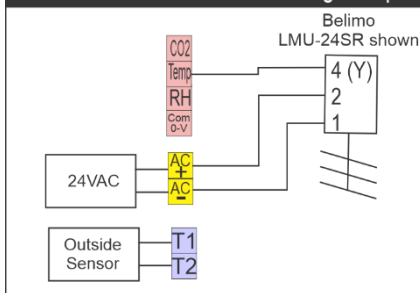
An open/close or an off/on output can be controlled by the SMT-IAQ3 should you wish, using the volt free relay provided. This relay's thresholds can be individually adjusted for each of the SMT-IAQ3 sensors. (30V @ 1A max)

## Active Ventilation Function

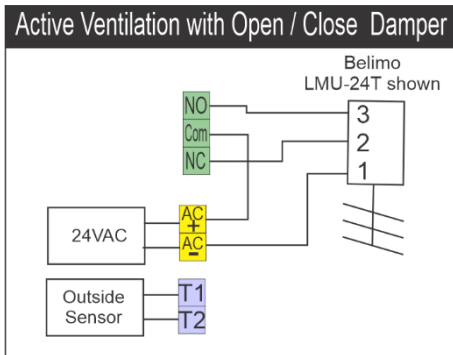
By fitting an outside air sensor, the SMT-IAQ3 can bring in fresh air to improve the room air quality if the outside air temperature is suitable.

To use this function, you must first fit an outside air temperature sensor such as the RS-01/2 or RS1D to the SMT-IAQ3 T1 T2 terminals.

## Active Ventilation with Modulating Damper



In the Installer menu you must activate the Active Ventilation function by setting the inside and outside air temperature thresholds (page 15 explains this) and defining the active ventilation output options. Once you have completed these three steps the letter “A” will be shown in the lower right corner of the LCD to confirm the Active Ventilation function is active.



If selected in the Active Ventilation options menu, the SMT-IAQ3 will modulate the temperature 0-10V output so that the output is at the maximum voltage set when the room temperature is 1 degree above the inside temperature setpoint. If introducing outside air the icon “A” will flash on the LCD. Tapping the “A” icon will briefly show the outside air temperature.

Should you wish, you can also have the volt free relay used for active ventilation by selecting it in the Active Ventilation Output options menu.





# Cautions

DO NOT use any solvents or aggressive cleaning chemicals such as strong chlorine-based cleaners in the air near the SMT-IAQ3 as these solvents, if used frequently may affect the accuracy of the CO2 sensor.

This sensor should be protected from fine dust if possible. It is not suited (unless modified) for monitoring the indoor air quality in a bakery for example where flour is used. Other sensors from Smart Temp are more suitable for use in dusty environments.

This sensor is not to be used outdoors or in moist environments. It has an IP rating 40.

The display fitted to this sensor is glass, caution should be used when touching the display or cleaning that excessive pressure is not applied. Dropping this sensor may damage the LCD or Touch Screen. This damage is not covered by warranty.

# Specifications

Power	12 to 30V AC or DC
Power Consumption	50mA max
Relay Output	SPDT 30V AC/DC @ 1A Max
Operating Temperature	0°C To 50°C
Operating Rh	0 To 85% (Non-Condensing)
IP Rating	40
Touch Method	“XY” Resistive
Back Light	Multicolour LED (Green, Red, Amber)
Back Light Life	40,000 Hours to Half Intensity
0-10V Outputs	15ma Max
Temperature Sensor Range	-40 - +120c
Temp Sensor Accuracy	+/- 0.5°C at 25°C
Temp Sensor response Time	20 seconds to $\tau$ 63%
RH Sensor Range	0 to 95% RH
RH Sensor Accuracy	+/-3% at 25°C (30% to 80% RH)
RH Sensor response Time	8 seconds to $\tau$ 63%
CO2 Sensor Range	0-2000ppm (2001 to 6000 with reduced accuracy)
CO2 Sensor Accuracy	+/- 40ppm at 25°C
CO2 Sensor response Time	12 seconds to $\tau$ 63%
Warranty	3 Years RTB
Approvals	CE (pending)
Communications	9.6 /19.2 / 38.4k /57.6 / 76.8 115.2
Size	103mm X 113mm X 26mm

**The SMT- IAQ3 has been proudly designed and manufactured by  
Smart Temp Australia.**

**For further information, sales or support please contact  
Smart Temp Aust P/L or an authorised distributor.**

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