HSMO-DQ

MULTI-OUTPUT ROOM SENSOR c/w TEMPERATURE, HUMIDITY & CO2 OUTPUTS

The **HSMO** series of electronic room sensors are aesthetically modern wall mount sensors, incorporating multiple environmental measurement elements producing industry standard 0-10vdc outputs. A large clear LCDisplay allows easy reading of current measured values. This model includes temperature, humidity & CO2 outputs. Compatible with most stand alone controllers & BMS systems that except 0-10vdc analog inputs (in reference to power supply neutral), including Hevac's powerful versatile **ENDEAVOUR** temperature controller. The CO2 output can be configured for either full range 0-2000ppm output (default) or for direct 0-10v zone control over a settable control range ie 600-800ppm + the output signal can also be limited with minimum & maximum output levels ie 3-8 volts, which makes this sensor an ideal choice for local CO2 zone control to a fresh air EC fan or damper motor.

MAIN TECHNICAL DATA

Power Supply is half wave rectified allowing HSMO neutral (GO) connection to System 24vAC neutral for common reference for 0-10vdc outputs.
12 - 24vDC or AC

(note: if 12vDC power supply used maximum sensor voltage outputs although still linear will stall at 90% / 9v output.)

Temperature Output : 0 - 50c ~ 0 - 10vDC Accuracy +/- 0.5c

Humidity Output :   0 - 100% RH ~ 0 - 10vDC Accuracy +/- 3% RH

CO2 Output   Non-dispersive NDIR 0-2000ppm ~ 0-10vDC. Accuracy +/- 40ppm
   The CO2 cell uses a self calibrating algorithm making this sensor maintenance free over its life time.

100% Australian Owned Company

Technical Data

CO2

Measuring Accuracy	±40ppm ±3% of reading
Pressure dependence	+ 1.6 % reading per kPa deviation from normal pressure

Operating Principle

Non-dispersive infrared (NDIR)

Measurement interval	4 seconds
Response time	90% by 2 minutes
Life expectancy	15+ years
ABC period (AUTO CAL.)	8 days

ABC can be disabled ...(factory setting = ON) allowing manual calibration.

Relative Humidity

Measuring range	0 ... 100 %RH
Accuracy	±3%RH@25°C (20-80%RH)
Long term drift[1]	< 0.25%RH/year
Response time T63[2]	8 seconds

Temperature

Measuring range Accuracy	0 ... 50°C
Long term drift[3]	±0.5°C < 0.02°C /year
Response time T63[4]	5 ... 30 seconds

Analog outputs

DC Signal Outputs	0 ... 10 V
Accuracy of analog outputs@25°C	±0.1% full scale
Temperature dependence	±0.005%/°C full scale
External loads	voltage output outputs RL > 10k ohm

Display

LCD	128x64 dots without backlight
CO_2 offset range	-1000 ... +1000
Humidity offset range	-10.0 ... +10.0
Temperature offset range	-3.0 ... +3.0

Power supply

	15 ... 24vDC or AC
Analog output	0-10vDC

Mechanics

Housing material	ABS
Dimension	81.4 x 81.4 x 27.5 mm
Housing classification	IP20

Environment

Operating temperature	0 ... 50°C
Operating humidity	0- 85%RH non condensed
Storage temperature	-40 ... 70°C

Electrical protection

Over voltage, Inverse and short

Electromagnetic compatibility

Emission
   EN 61326-1:2013
   CISPR11:2009+A1:2010 Group1 Class B
Immunity

 EN 61326-1:2013
 IEC 61000-4-2:2008
 IEC 61000-4-3:2006+A1:2007+A2:2010
 IEC 61000-4-8:2009

CO2 CALIBRATION

The HSMO-xQxx sensors use a hi-tech self calibrating NDIR CO2 cell. The cells are basically maintenance free in normal environments thanks to the built-in self-correcting ABC algorithm. This algorithm constantly keeps track of the sensor's lowest reading over a preconfigured time interval and slowly corrects for any long-term drift detected as compared to the expected fresh air value of 400ppm (or 0.04%vol) CO2. When checking the sensor accuracy, PLEASE NOTE that the sensor accuracy is defined at continuous operation (at least 25 days after installation with ABC turned on)! Rough handling and transportation might result in a reduction of sensor reading accuracy. With time, the ABC function will fine tune the readings back to the correct numbers. The default "tuning speed" is however limited to about 30-50 ppm/week. This automatic calibration algorithm (ABC) can be turned off in the menu and manual calibration applied as an alternative calibration procedure, which should then be checked yearly.The cell manufacture states using the ABC method the sensor should be maintenance free for up to 25 years.

SENSOR SETTINGS & ADJUSTMENT PROCEDURE

Press UP & DOWN buttons together to access the menu's 4 layer system to edit settings & defaults as detailed below.

- Layer 1 : Running screen displaying real time sensor measurements.
- Layer 2A : Current temperature set point .
- Layer 2B : Access to Sub Menus : Offsets, ABC & About.
- Layer 3A (Offsets) : Access to sub menus for offsets (cal.) for each sensor enabled.
- Layer 3B (ABC) : Setting particular optional functions On or Off.
- Layer 3C (About) : Contact detail, version # etc.
- Layer 4 {from 3A} : Used for sensor calibration for each sensor measurement start value (offset).

***NEW SOFTWARE ADDED FEB 2025 , IT IS NOW POSSIBLE TO LIMIT THE CO2 DC OUTPUT LEVEL WITH BOTH MIN & MAX SETTINGS
(SEE CLIPPING IN THE MENU) WHICH AID IN LIMITING AN EC FAN SPEED OR F/A DAMPER MININUM & MAX POSITION***

		Temp+RH+CO2	Temp+RH
Layer 1, Reading display			
Layer 2A : press Up or Down **Layer 2B** : press the Up and Down buttons **simultaneously** at least 3 seconds *If not correctly pressed simultaneously a SETPOINT setting menu will appear instead*		**24.5** ℃ ppm 486 RH% 49.8	**24.5** ℃ **49.8** %
	Layer 2A, Temp set point		
	press Up or Down to adjusting temp set point Back to **Layer 1** after 3 sec of none of buttons was pressed.	adjusting **24**℃ Up Dn	adjusting **24**℃ Up Dn
	Layer 2B, Settings		
	Use Up button for selecting items. Use Down button for Ok.	Settings Offset Sel Scale ABC Ok About Exit	Settings Offset Sel Scale ABC Ok About Exit
		Layer 3, Offset	
		Use Up button for selecting items. Use Down button for Ok. **(MANUAL CALIBRATION)**	Offset Temp [℃] 0 Sel RH [%] 0 CO2 [ppm] 0 Ok Back
			Offset Temp [℃] 0 Sel RH [%] 0 CO2 [ppm] 0 Ok Back
			Layer 4, Temp, RH, CO2 offset
			Temp offset range ±3.0℃ (default 0) press Up or Down to adjust value Back to **Layer 3** after 3 sec of none of buttons was pressed.
			Offset Temp [℃] Up **+3.0** Dn	Offset Temp [℃] Up **+3.0** Dn
			RH offset range ±10.0 % (default 0) press Up or Down to adjust value Back to **Layer 3** after 3 sec of none of buttons was pressed
			Offset RH [%] Up **+10.0** Dn	Offset RH [%] Up **+10.0** Dn
			CO2 offset range ±1000 ppm (default 0) press Up or Down to adjust value Back to **Layer 3** after 3 sec of none of buttons was pressed
			Offset CO2 [ppm] Up **+1000** Dn	No data to set Sel Ok Back
	Layer 3, CO2 0-10v scale (range 0-10000, default 0-2000ppm)		
	Use Up button for selecting items. Use Down button for Ok. **SET LOW & HIGH SCALES FOR CO2 DIRECT CONTROL ie 0-10v / 600~800 ppm Default = 0-2000ppm**	CO2 0-10v High scale 2000 Sel Low scale 0 Ok Back	No data to set Sel Ok Back
	Layer 3, CO2 ABC on/off (default on)		
	Use Up button for selecting items. Use Down button for Ok. **(ABC) CO2 AUTO CALIBRATION ALGORITHM TO AUTO TRACK EXPECTED LOWEST CO2 LEVEL**	CO2 ABC Off Sel On Ok Back	No data to set Sel Ok Back
	Layer 3, About		
	Use Up button for selecting items. Use Down button for Ok.	About **HEVAC** Sel Ok Back	About **HEVAC** Sel Ok Back

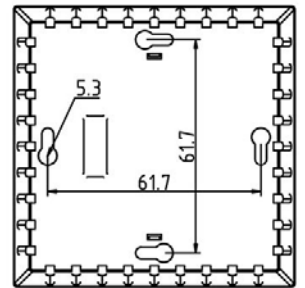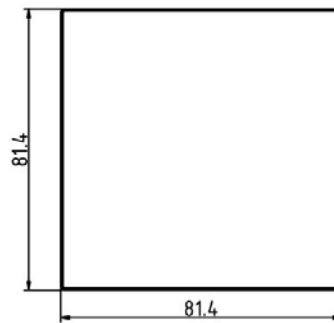***NEW MENU : "CLIPPING" , USED TO LIMIT CO2 MIN / MAX DC VOLT O/P

MENU ACCESS

The two push buttons on the pcb are used to edit values in the menu system ..see page 3. Menu access is gained by pressing both buttons in simultaneously which can take a couple of tries ...if not pressed in unisome a setpoint screen will appear instead which has no function in this version.
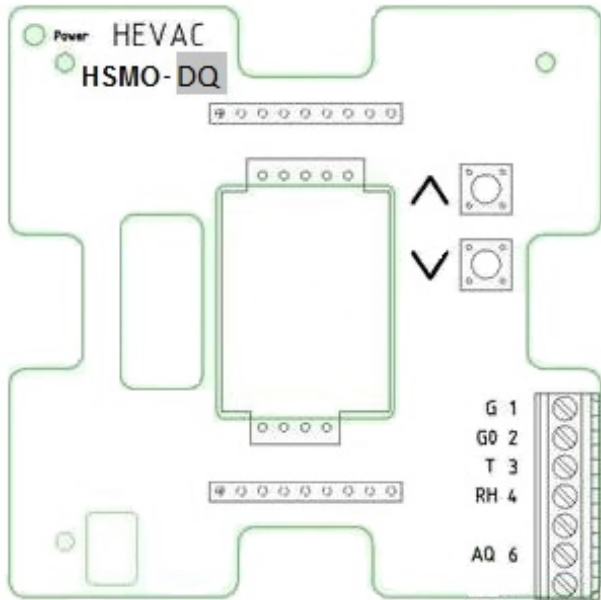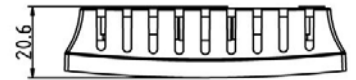

TERMINAL   IDENTIFICATION

1	G	ACTIVE (12-24V AC/DC)
2	G0	NEUTRAL
3	T	TEMPERATURE 0-10VDC OUTPUT
4	RH	HUMIDITY 0-10VDC OUTPUT
6	AQ	AIR QUALITY/CO2 0-10VDC OUTPUT

DIMENSIONS

MODEL OPTIONS & PART NUMBERS

HSMO - D A Q T

AHR TRIGGER BUTTON
CO2 (AIR QUALITY)ELEMENT
TEMP. SET POINT BUTTONS
DIGITAL LCD DISPLAY

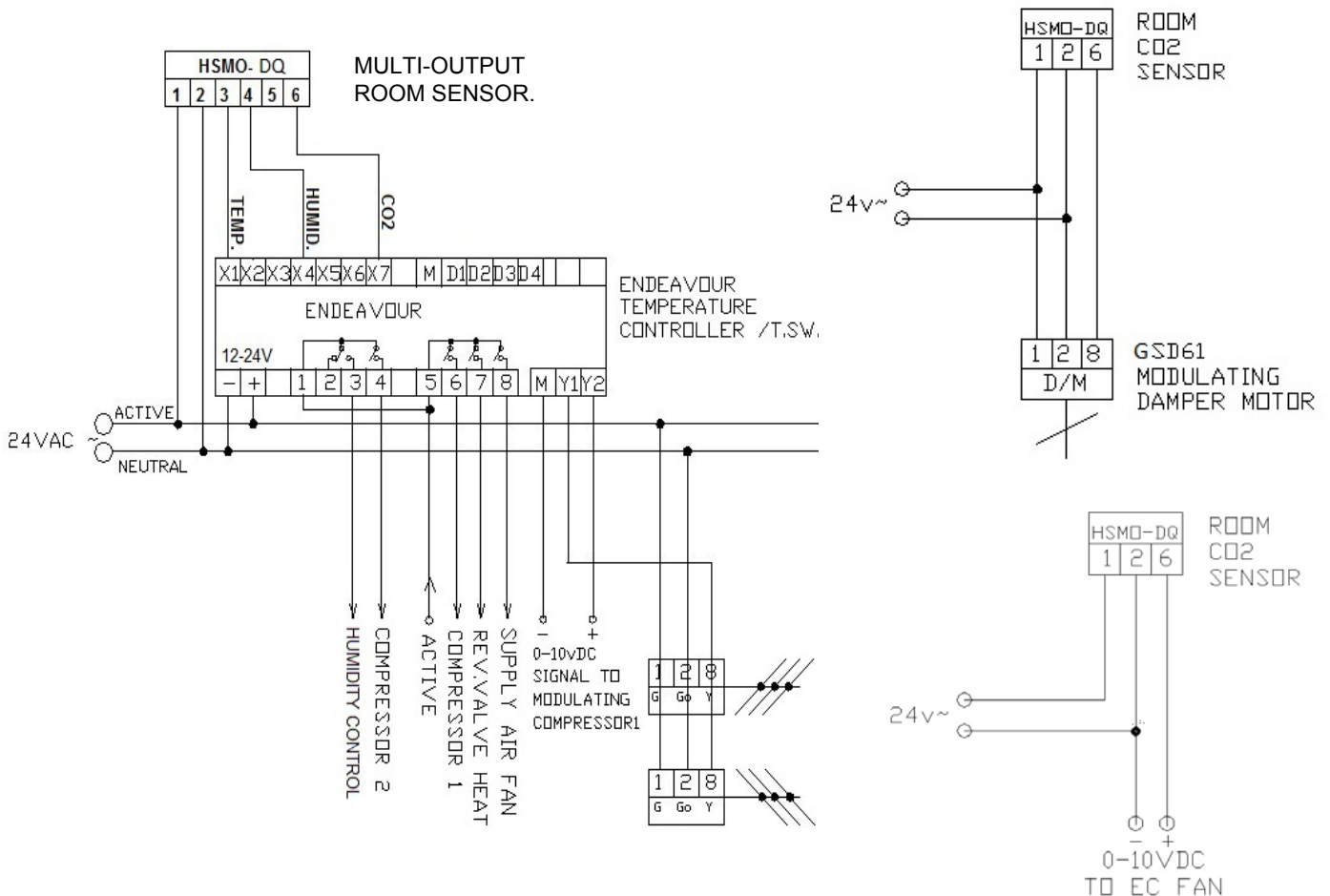Ordering examples of full range of available version:

HSMO   : Room sensor with Temperature & Humidity measurement only. (no display)
HSMO - Q   : Room sensor with Temperature, Humidity & CO2 measurement.(no display)
HSMO - DA   : Room sensor with Temperature, Humidity + Adjustable Temp. Setpoint
HSMO - DAT   : Room sensor with Temperature, Humidity, Adjustable Setpoint & A.H.R button
* HSMO - DQ   : Room sensor with Temperature, Humidity & CO2 measurement.
HSMO - DAQ   : Room sensor with Temperature, Humidity, CO2 measurement & Adjustable Setpoint
HSMO - DQT   : Room sensor with Temperature, Humidity, CO2 measurement & A.H.R button
HSMO - DAQT   : Room sensor with Temperature, Humidity, CO2 measurement, Adjustable Setpoint & A.H.R button

* THIS MODEL
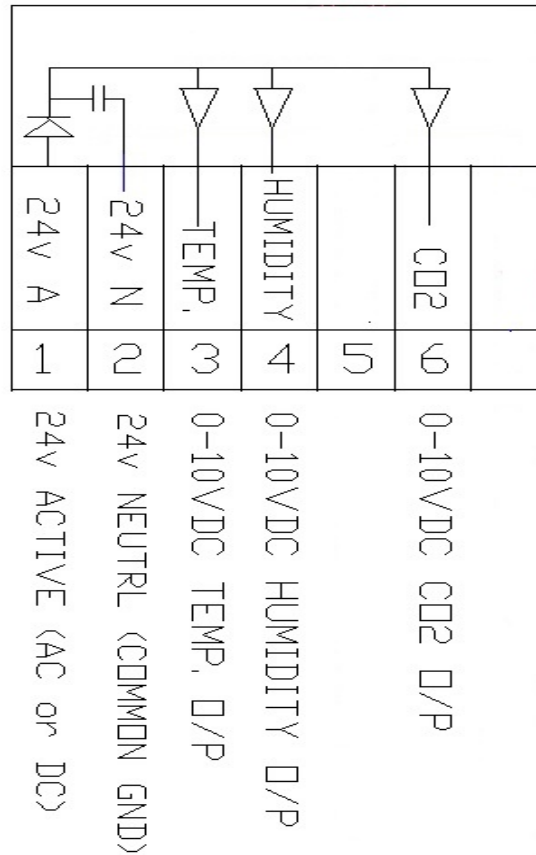
HSMO-DQ
SENSOR
OUTPUTS

1	2	3	4	5	6
24v A	24v N	TEMP.	HUMIDITY		CO2
24v ACTIVE (AC or DC)	24v NEUTRL (COMMON GND)	0-10VDC TEMP. O/P	0-10VDC HUMIDITY O/P		0-10VDC CO2 O/P

APPLICATION EXAMPLES

MULTI-OUTPUT
ROOM SENSOR.

ENDEAVOUR TEMPERATURE CONTROLLER /T.SW.

ENDEAVOUR

12-24V

ACTIVE

24VAC ~

NEUTRAL

HUMIDITY CONTROL
COMPRESSOR 2
ACTIVE
COMPRESSOR 1
REV.VALVE HEAT
SUPPLY AIR FAN
0-10vDC SIGNAL TO MODULATING COMPRESSOR1

ROOM CO2 SENSOR

HSMO-DQ 1 2 6

24v~

GSD61 MODULATING DAMPER MOTOR

1 2 8
D/M

ROOM CO2 SENSOR

HSMO-DQ 1 2 6

24v~

0-10VDC TO EC FAN

This sensor has three 0-10v outputs : Temperature , Humidity & CO2. The temperature & humidity output scales are fixed but the CO2 output settings can be altered to allow for direct CO2 zone control by altering both its ppm output response range (between 0 & 2000 ppm) and the 0-10v output voltage limits, as apposed to the factory default settings of full range which is typically used when connecting the sensor to a controller that than takes care of response to CO2 levels with **its** settings. All three sensor measurements cells can be manually calibrated (called Offset) in the menu but note that the CO2 sensor element also self calibrates with the so called ABC algorithm. Direct modulation control of a CO2 correction device, ie : a fresh air intake EC fan or fresh air intake damper motor allows for simple low cost control of CO2 levels without the need of a switchboard control module.

The sensors menu tree and its various settings are accessed with the use of only two buttons. Both buttons have two functions relative to the action required. An UP / SELECT button and a DOWN / OK (accept) button. Once a value has been altered and then no button touched for 3 seconds the edited value is automatically locked in (like pressing a virtual ENTER button) and the menu returns to the previous menu.

**Follow the procedure below to alter or edit the CO2 control settings.**

1.) Press & hold **simultaneously** both the **UP** & **DOWN** buttons together to cause the main menu to appear. Note : if not pressed simultaneously- a SETPOINT menu will alternatively appear, wait 3 seconds & try again....it takes a bit of practice.
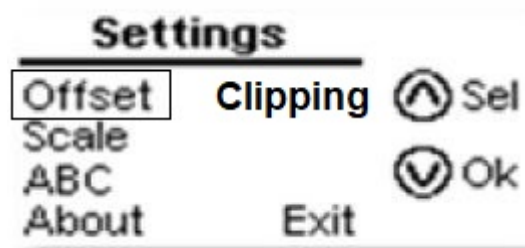
2.) Press the UP button (Select) 5 times to scroll the highlight around until the sub menu "**Scale**" is highlighted.

3.) Press the DOWN button (OK) to open this sub menu
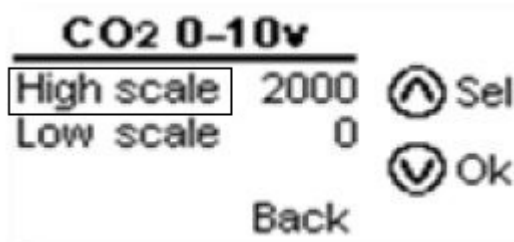
4.) Two values will appear in the sub menu , the High scale ppm value for when 10 volts would be produced and the Low scale ppm value for when Zero volts DC would be produced.
High scale default is 2000ppm & the Low Scale default is 0ppm.

5.) For direct CO2 control, typically the Max. & Min.(ppm) values are changed to the desired values to cause CO2 control, we would recommended 600ppm (low scale) to 800ppm (high scale).
Note : typically the fresh outside CO2 level is around 430ppm and inside building CO2 levels are usually around 500ppm.
To edit the High Scale which is already highlighted, press the DOWN (OK) button which will then display just this value. Pressing the UP or DOWN buttons will change the value to the desired upper limit ..ie 800ppm, once set, pause for 3 seconds and the display will automatically return to the previous screen showing both values.

6.) To than edit the Low Scale value, Press the UP (Select) button twice so that Low Scale is highlighted and than Press the DOWN (Ok) button to display just this value for editing.
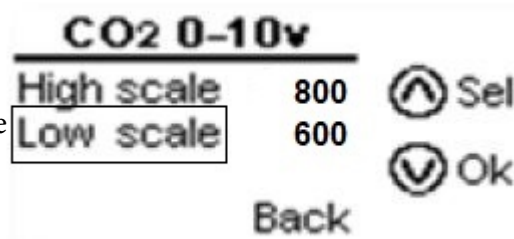
7.) Pressing the UP or DOWN buttons will change the value to the desired lower limit ..ie 600ppm, once set pause for 3 seconds and the display will return to the previous screen showing both values.

8.) The CO2 control output is now set for direct 0~10vDC control over the desired CO2 ppm range but still allowing the full 0-10vdc output voltage range. If thats fine, then now move the highlight with the UP or DOWN buttons until "Back" is highlighted, than pressing the DOWN (Ok) button will return the menu back to the main 1st menu with "Scale"highlighted.

Settings

Offset	Clipping	⌃ Sel
Scale		
ABC		⌄ Ok
About	Exit	

9a.) Move the highlight to "EXIT" and than press the DOWN (OK) button to exit editing for automatic control to begin.

OR

If a minimum & / or maximum DC output control voltage is also desired, either for absolute minimum fresh air regardless of the CO2 level or a trimmed back maximum output is desired to limit total amount of fresh air, both these values can be edited in the sub menu called "Clipping". Clipping means the ability to limit the min. & max. output voltage range.

9b.) Instead of exiting the menu after setting up the CO2 ppm output control range, scroll the highlight to "Clipping" and press the DOWN (OK) button to open this sub menu.

CO2 0-10v

High clipping	100	⌃ Sel
Low clipping	0	⌄ Ok
Back		

10.) With "**High clipping**" already highlighted, press the DOWN (Ok) button to display just this value and edit the value using the UP or DOWN buttons to the desired value,
ie 100(%) =10 volts , 80 = 8 volts, 0 = 0 volts etc.

11.) Wait 3 seconds after the maximum value is set to lock in this value & return to this sub menu then using the UP (select) button scroll the highlight so that "Low clipping" is highlighted. Press the DOWN (Ok) button to display just this value and edit the value using the UP or DOWN buttons to the desired value, ie 20 % (2 volts), wait 3 seconds to lock in this value and automatically return to previous menu.

12.) With all settings now completed scroll the highlight until "Back" is highlighted and press the DOWN (OK) button to return to the main 1st main menu.

13.) Move the highlight to "EXIT" and than press the DOWN (OK) button to exit editing and return to the normal running screen displaying the measured values and for automatic control to begin.

Settings

Offset	Clipping	⌃ Sel
Scale		
ABC		⌄ Ok
About	Exit	

24.5 ℃

| ppm | RH% |
| 486 | 49.8 |
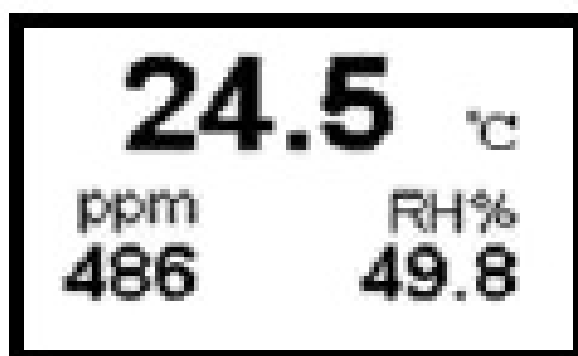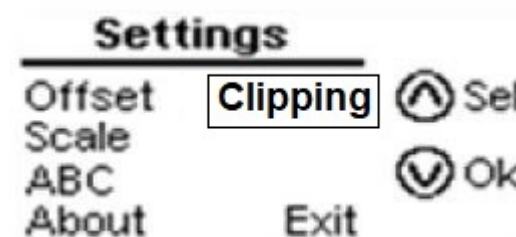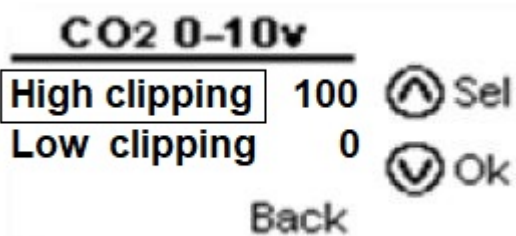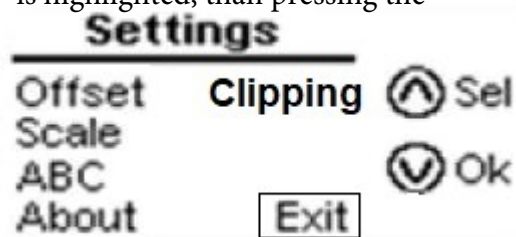
OPERATING DISPLAY

SENSOR INSTALLATION

To squeeze all this sensor technology into a modern slim line housing we have had to make some compromises on pcb arrangement and connection terminal size etc but has resulted in a very powerful modern sensor available in several versions to suit project requirements. Use of twisted pair shielded cable (earthed at the switchboard only) is highly recommended with a suggested maximum wire gauge of 0.5mm.

STEP 1.) The lid can be easily removed from sensor base by use of a small screw driver or even a finger nail plying apart the sensor housing parts in the center of the bottom side of housing.

USING A SMALL SCREW DRIVER OR FINGER NAIL PLY APART TWO HALFS OF SENSOR HOUSING HERE

REMOVEABLE LCD
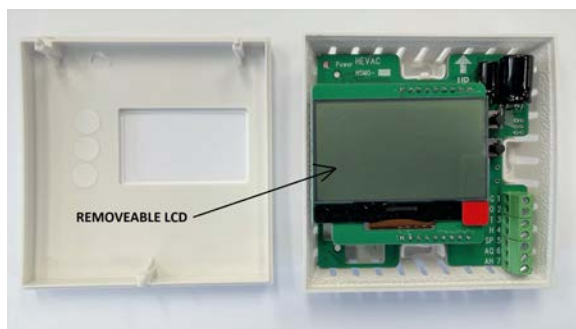
STEP 2.) Before affixing sensor to wall carefully unplug the display module from the main pcb and place in a safe location.

CAREFULLY PLY UP THE LCD MODULE FROM THE BOTTOM PCB.

PLACE LCD MODULE IN SAFE PLACE DURING INSTALLATION

AVOID TOUCHING OR STRESSING CO2 CELL DURING INSTALLATION.

CO2 CELL

ROUTE WIRES BELOW CO2 CELL TO TERMINAL STRIP

STEP 3.) Mount the sensor base on wall (with provided screws), with field wiring entering through provided slot in the middle left of the base. Strip back the shielded cable outer sleeve and shield wires so the wiring entering the housing is of less bulk. Avoid running cables over the center area as this may impinge on display module sitting properly on main pcb.

STEP 4.) Once mounted to wall & wired, carefully re-plugin the display module back onto the main pcb, taking care to line up the display module pins to matching main pcb pin sockets.

STEP 5.) Reattach lid & apply power. Current temperature, Humidity & CO2 values should appear . Correct values will stabilize in approximately 10 minutes,