Model *M-SENSE II*

Integrated CO / CO$_2$ / Moisture / Temperature sensor & ventilation controller

PRODUCT DESCRIPTION

The model M-SENSE II is an all-digital ventilation controller specifically designed to monitor carbon dioxide, carbon monoxide, temperature and humidity levels and regulate the indoor environment according to these 4 parameters. M-SENSE II is designed for maintenance-free operation and may be operated in stand-alone mode, as well as connected to larger building automation systems.

FEATURES

- Multi-functional sensing & controlling of *CO$_2$, CO, moisture, temperature* in ambient air with programmable delay timer and triggers for external override functions

- State-of-the-art non-dispersive infrared (NDIR) technology to measure carbon dioxide gas

- State-of-the-art hybrid thick film sensor (MMOS) to measure carbon monoxide gas

- Monolitic IC capacitive moisture sensor

- Precision NTC temperature sensor

- Saves energy costs by using flexible Demand Controlled Ventilation features

- Programmable mixed sensor analogue outputs *0-10 V, 4-20 mA & relays* for complex local decision making, as well as for connection to remote central computer and/or alarm panel

- Longer maintenace interval due to internal microprocessor control and self-diagnostics. *Typical maintenance interval > 5 years*

- Power output & digital inputs for external motion sensors or manual override switches

- Low-cost *RS-485* network options available

APPLICATION

M-SENSE II is applicable in most large spaces where *engines* are the sources of potential toxic danger, such as *public garages, tunnels and mines*. It can be used both to control the ventilation system and to be the vital part in an alarm system.

It is well known that all engines generate CO and that we need to protect against this toxic gas. What we do not seem to realize is that a warm, modern engine with catalytic exhaust system typically generates 140 times more CO$_2$ than CO, in which case the CO$_2$ constitutes the potential threat. This fact forces us to measure *both* gases to be able to guarantee personal safety.

M-SENSE II offers the possibility to regulate ventilation systems upon measurements of *CO, CO$_2$ temperature and moisture* combined, which not only guarantees public safety, but also saves energy by optimizing the concept of Demand Controlled Ventilation.
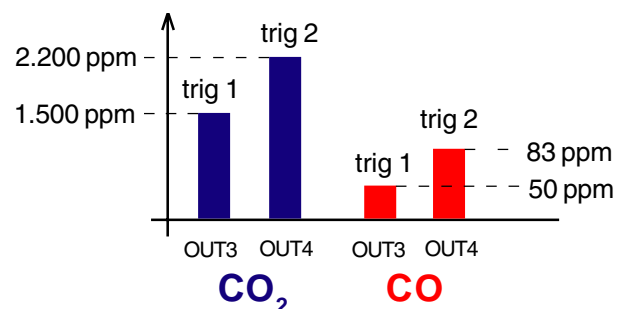
The gas (CO$_2$ or CO) which first reaches the preset trig point, activates the relay output. Ex.: 50 ppm CO or 1500 ppm CO$_2$ triggers OUT3 for increased ventilation. 83 ppm CO or 2200 ppm CO$_2$ triggers OUT4 forced ventilation. Other strategies are possible.

Made in Sweden CE

SPECIFICATIONS[*] model *M-SENSE II* - General purpose CO / CO_2 environmental sensor & controller for fixed installations

CO_2 Measurement:

Operating Principle	Non-dispersive infrared (NDIR)
Gas Sampling Mode	Diffusion & 3 mm diam. gas inlet nipple
Response Time (1/e)	2 min. diffusion time and 10 seconds at 0.1 litre/minute gas flow
Measurement Range [1]	0 to 2 % vol.
Accuracy [1]	± 200 ppm + 5 % rel.
Pressure Dependence	+ 1.4 % reading per kPa deviation from normal pressure, 100 kPa
Annual Zero Drift [2]	< ±0.1% of measurement range

CO Measurement:

Operating Principle	Gas sensitive thick film material (MMOS) with active carbon filter
Gas Sampling Mode	Diffusion
Response Time (1/e)	2 min. diffusion time
Measurement Range	0 to 100 ppm
Extended Measurement range	100 to 500 ppm (accuracy not specified)
Accuracy	± 10 ppm
Annual Zero Drift [2]	< ±5% of measurement range

Temperature / Moisture Measurement:

Operating Principle	NTC Thermistor	/ Monolitic IC
Accuracy [3]	± 0.5 °C	/ 2 %RH
Digital Resolution	0.1 °C	/ 0.1 %RH (0.01 °C / 0.01 %RH via UART)

General Performance:

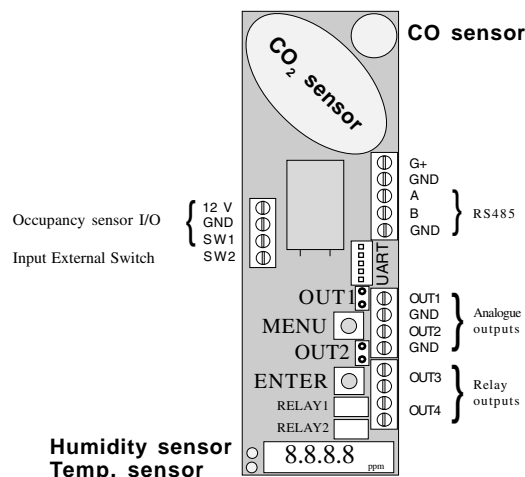|	
Compliance with	EMC Directive 89/336/EEC
Operating Temperature Range	-5 to +45 °C
Operating Humidity Range	0 to 100% RH (non-condensing)
Maintenance Interval	5 years *(supported by internal sensor pushbutton operations)*
Full Self Diagnostics	complete power/sensor/analogue outputs internal checks
Status LED Indicators	*green* = ok, *yellow* = maintenance call, *red* = relay closed
Dimensions (L x W x D)	170 x 57 x 44 mm (185 g), IP54 housing: 180 x 95 x 55 mm

Electrical:

Power Input	Min.:**18 VDC / 22 VAC**, Max.: **40 VDC / 29 VAC**
Power Consumption	£ 3 Watts average
Power Output [4]	12 VDC / 15mA
Digital Signal Inputs [4]	SW1, SW2, trig input. *Low level* = gnd, *High level* = open
Wiring Connections	Terminal block *(see figure)*, 2.5 mm^2 maximum
Digital Interface. Options:	**RS232** cable with sensor slide connector/com driver (m. *A232 Cable*)
	RS485 network driver (model *MSENSE II-485*)
Accessories	**Black Box Logger** 2-channel slide-on datalogger

Outputs:

Linear Analogue Controller Outputs [5]	**0/2-10 VDC** x 2 R_{OUT} < 100 Ω, R_{load} > 5 kΩ on OUT1 & 2 or
	0/4-20 mA x 2 R_{load} < 500 Ω on OUT1 & 2 (V/mA selected by jumper)
D/A Resolution	10 bits, 10 mV / 0.016 mA
D/A Conversion Accuracy	± 2 % of reading ± 15 mV / 0.3 mA
Response Time (1/e)	2-500 sec. programmable in x 2 steps
Protection	PTC fuse (auto reset), short-circuit safe
Relay	OUT3 & 4, isolated N.O., 1mA / 5V up to 1A / 50VAC/24VDC.
Display	**4 Digit LCD Display** with ppm / °C / % indicator
Pushbuttons	Offers a selection of calibration & checking commands.

Note 1: Other ranges available
Note 2: Under normal conditions
Note 3: Extended exposure to ≥ 90 % RH causes reversible shift of 3 %
Note 4: The 4 terminals (+12VDC output, SW1, SW2 and GND)are to facilitate installations of external devices, such as manual override and IR occupancy sensors, that can trigger the programmable internal delay timer to act on the outputs OUT1-4.
Note 5: OUT1-4 outputs can be set to any mix and range of 6 *p-bands*, each assigned to any sensor, with priorities and *offsets*, plus SW1/SW2 input information, using the PC software. OUT1-4 are also independently configurable as *on/off* outputs 0/100%, with programmable *dead bands,* for relay control, or with time proportional *on/off.*

[*] Can be changed without notice
    PATENT PENDING

PCB & terminals of model *M-SENSE II*

CO sensor

CO_2 sensor

G+
GND
A
B
GND } RS485

Occupancy sensor I/O { 12 V / GND / SW1 / SW2

Input External Switch

UART

OUT1
MENU
OUT2
ENTER
RELAY1
RELAY2

OUT1
GND
OUT2
GND } Analogue outputs

OUT3
OUT4 } Relay outputs

Humidity sensor
Temp. sensor

8.8.8.8 ppm

Honeywell