Model aSENSE™ m III

Integrated CO / CO_2 sensor & ventilation controller

PRODUCT DESCRIPTION

aSENSE™ m III is a controller with built-in sensors to monitor at the same time *carbon dioxide* and *carbon monoxide*. With these parameters, the programmable unit can control, for example, ventilation rates, and generate alarm signals for personal safety devices.

aSENSE™ m III is designed for both stand-alone operation, as well as being connected to larger building automation systems.

FEATURES

- State-of-the-art infrared (NDIR) technology to measure carbon dioxide gas
- State-of-the-art hybrid thick film sensor (MMOS) technology to measure carbon monoxide gas.
- Flexible control outputs for connection to DDC, or direct control of dampers and speed regulated fans
- Contributes to lower energy costs when applied in Demand Controlled Ventilation
- Internal data recorder for environmental trend logging
- Serial com port for connection to PC, GSM-module or local network
- Maintenance free more than 5 years

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APPLICATIONS

The *aSENSE™ m III* is applicable in most large spaces where *combustion* is the source of the potential toxic danger, such as in *public garages, truck terminals, tunnels and mines*. It offers the possibility to combine CO and CO_2 measurements which not just guarantees public safety, but also saves energy when applied to Demand Controlled Ventilation.

The *aSENSE™ m III* offers the possibility to regulate ventilation systems stand-alone, as well as being just a sensor in a larger system. To cover larger spaces, several sensors could be joined in a simple relay loop and together control an intermittent two-speed exhaust fan, for example. The sensors can also be connected together in a *MODBUS RS485 network* (optional) for serial communication to a global control system or to a simple *webb Gateway* for data presentation on the internet.

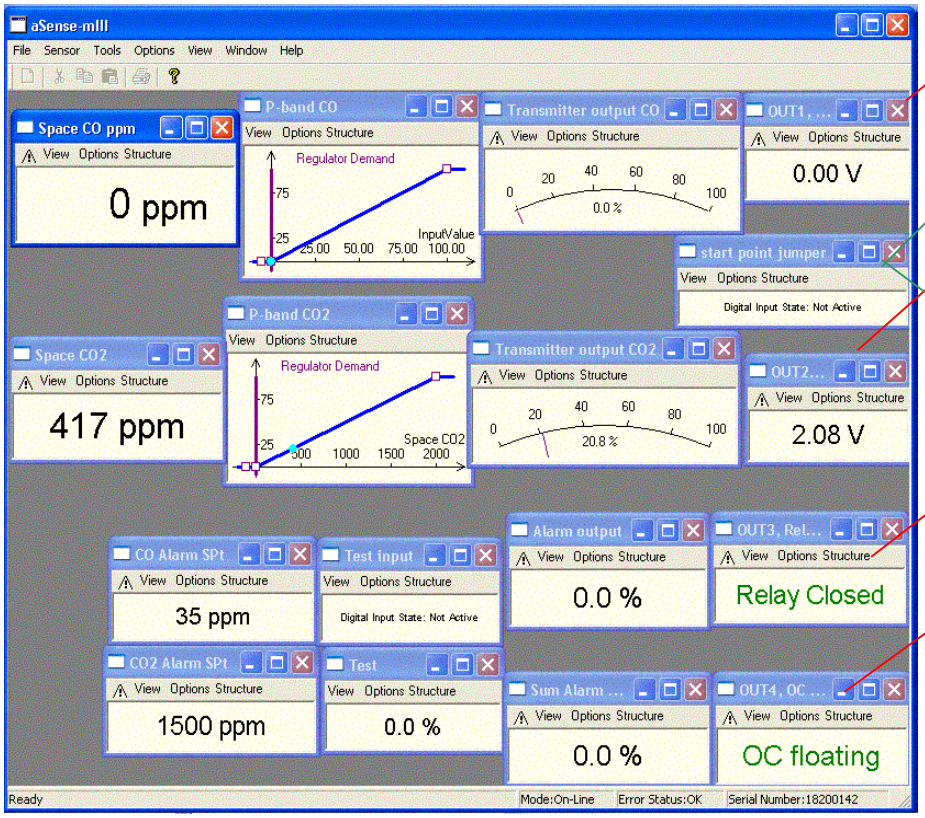
All engines generate CO and we need protection against this toxic gas. What we do not seem to realize is that a warm, modern engine with catalytic exhaust system typically generates 140 times more CO_2 than CO, in which case the CO_2 constitutes the potential threat. This fact forces us to measure both gases to be able to guarantee personal safety.

FUNCTIONAL DESCRIPTION

aSENSE™ m III is delivered pre-programmed (see description below). With the free software *UIP4.3* (or later versions) and standard communication cable for PC (art.no. A232 Cable) the user can adjust the product to his/hers application by, for example, changing the measurement ranges of the linear outputs, modify the set points of the alarm outputs, invert outputs and also reconfigure the functions and the logic that controls the outputs.

Read more about *aSENSE™ mIII* *on the Technical Notes*

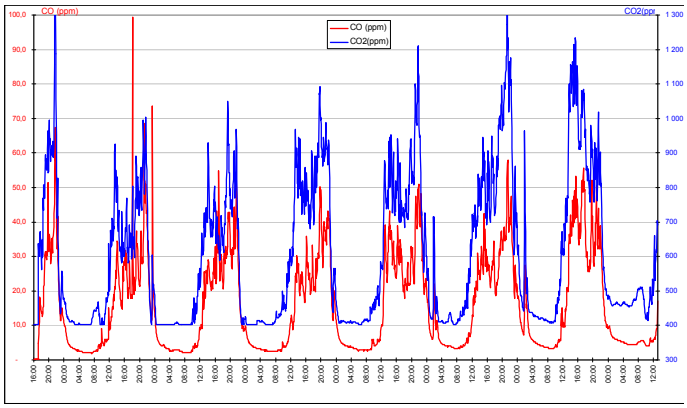
TN-012, TN-020, TN-021, TN-022



Print screen of UIP4.3 PC work space of aSENSE™ mIII where the pre set functions can easily be redefined. The four outputs (far right) are here arranged in rows together with the function blocks that controls the output.

Functions (default)

- **OUT1 = CO-transmitter**, 0/2..10 VDC or 0/4…20 mA for 0…100 ppm CO, for DDC connection. Position of jumper determines current or voltage output mode. Start point jumper for 0-100% or 20-100% signal is common for output 1 and output 2.
- **OUT2 = CO_2 transmitter**, 0/2..10 VDC or 0/4…20 mA for 0…2000 ppm CO_2, for DDC connection. Position of jumper determines current or voltage output mode. Start point jumper for 0-100% or 20-100% signal is common for output 1 and output 2.
- **OUT3 = Gas alarm relay** (Normally Closed) OFF/ON (with hysteresis) for…*35/30 ppm CO* OR…*1500/1400 ppm CO_2*
- **OUT4 = Sum alarm** (Normally Open) ON/OFF (with hysteresis) for… *35/30 ppm CO* OR…*1500/1400 ppm CO_2,* OR…*not ready* (15 min delay@cold start OR…*error* (discovered by the internal diagnostics)



Internal CO and CO_2 recorder samples data continuously every 20 minutes. After 13 days and 8 hours the storage memory is full and the oldest data are eventually overwritten one by one. The other values can be studied with the software UIP4.3 and exported to a text file for further treatment in e.g. MS-EXCEL

aSENSE™ m III CO / CO_2 sensor & ventilation controller
Technical Specification * (rev 080228)

General Performance

Compliance with	EMC directive 89/336/EEC
Operating Temperature Range [1]	0 to +50 °C
Storage Temperature Range	-20 to +70 °C
Operating Humidity Range	0 to 95% RH (non-condensing)
Warm-up Time	≤ 15 minutes (more when un-powered for a long time)
Step response ($T_{1/e}$)	8 minutes [2]
Expected Life Time	> 5 years [2]
Self Diagnostics	complete function check of the sensor
Status LED Indicators	*yellow* = maintenance support, green = relay closed, *red* = active open collector output
Display	4 Digits, 7 segments LCD with ppm indicator
Pushbuttons	offer a selection of set point adjusts and calibration operation functions
Data logger	internal data logger of CO and CO_2 readings, 2 x 960 samples, corresponding to just under 2 weeks data sampling of CO- and CO_2-values in 20 minutes intervals

Housing Options

WALL MOUNT: with and without display
Protection class: IP54

DUCT MOUNT: with and without display
Protection class: IP65

Electrical/Mechanical/Dimensions

Power Input	24 VAC/VDC±20%, 50-60 Hz (half-wave rectifier input)
Power Consumption	≤ 3 Watts average
Wiring Connections	max 1,5 mm^2 wires for screw terminal (main terminal) and spring loaded terminal
UART connector	5-pin, 2.54 mm pitch, slide connector (standard)
Dimensions of housing	150 x 85 (+ cable throughput 25 mm) x 46 mm (L x W x D). For duct mounted *–K* sampling probe 245 x 40 mm (L x diameter of hole)

CO_2 Measurement

Operating Principle	Non-dispersive infrared (NDIR) with Automatic Baseline Correction (ABC) [3]
Accuracy [4]	±1% of measurement range ± 5 % of measured value
Pressure Dependence	+ 1.6 % reading per kPa deviation from normal pressure, 100 kPa
Measurement ranges	0 to 3 000 ppm (ranges up to 20 $\%_{vol.}$ offered on request)

CO Measurement

Operating Principle	Fuel type electrochemical gas sensor with compensation for *temperature variations*
Accuracy [4]	± 10 ppm
Measurement range	0 to 100 ppm (standard)
Extended measurement ranges	100 to 500 ppm
Accuracy in extended range [4]	±20% of reading

Not 1: Lower temperature operation range can be reached by adding a box heater assembly.

Not 2: Is limited by the CO probe. More information on the Technical note ***TN-012*** .

Not 3: The *ABC*–function is the key to maintenance free operation. It assumes normal operation applications, where ventilation to *some* degree will occur (at least during *some* moment over a week period). This function automatically corrects for any possible *zero* drifts for the CO_2 and the CO sensors.

Not 4: In normal ventilated environments. Accuracy is defined at continuous operation (3 weeks minimum after installation)

Please Note! *The CO probe also responds to some other chemicals than CO , i.e. silicon. Some non-common operation environments therefore may not be applicable for this product!*

* ***Can be changed without notice***

Outputs / Terminals

No.	Label	Electrical connection	Function (may be configured with UIP4)
	Main terminal	Screw terminal	
1	G+	24 V AC/DC	
2	G0	Power ground	
3	OUT1	Linear signal (+) 10V/20mA	CO-transmitter. 0…100 ppm
4	OUT2	Linear signal (+) 10V/20mA	CO_2-transmitter. 0…2000 ppm
5	M	Signal ground (-)	
6 7	OUT3	OFF/ON-relay (N.C.)	Gas alarm CO = 35/30 ppm or CO_2 = 1500/1400 ppm
8	OUT4	open-collector (N.O.) or control signal (+)	Operation disturbance alarm or Gas alarm (OUT3-relay closed)
	Extra terminal	Spring-loaded terminal	
9 10	DI 1	Switch with delay timer	Test function (N.O.)

Analogue outputs [5]

Protection	PTC fuse (auto reset) on signal return *M*, short-circuit safe
Output limits	MIN & MAX limits may be individually set to all outputs
Linear outputs OUT1 & OUT2	0/2-10 VDC R_{OUT} < 100 OHM, R_{load} > 5k OHM 0/4-20 mA R_{load} < 500 OHM
Linear output OUT4	0-10 VDC R_{OUT} < 100 OHM, R_{load} > 5k OHM
D/A Resolution	10 bits, 10 mV / 0.016 mA
D/A Conversion Accuracy	voltage mode: ± 2% of reading ± 50 mV current loop : ± 2% of reading ± 0.3 mA

ON/OFF

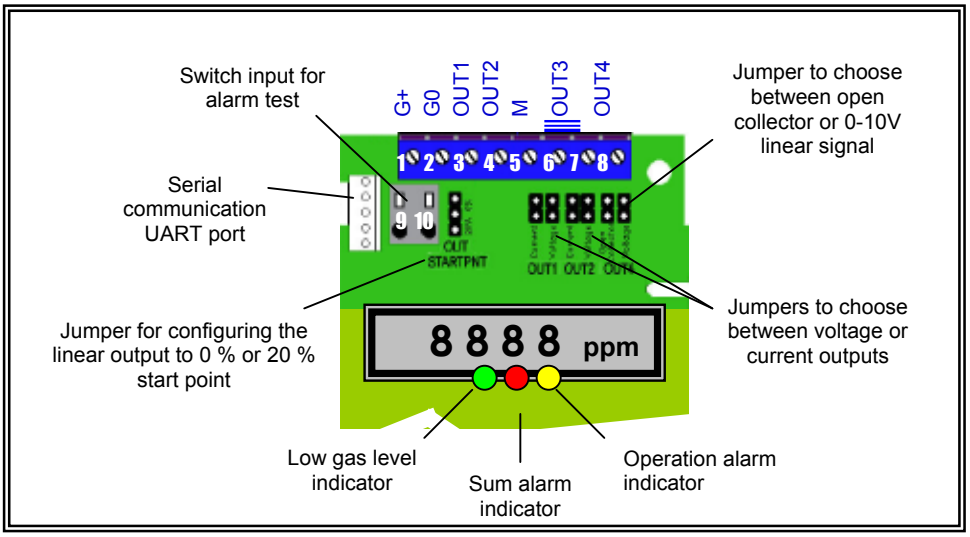
Relay (OUT3)	isolated N.C., 1mA/5V till 1A/50VAC/24VDC.
Open collector OUT4	in ON/OFF mode: max 0.5A/55VDC (half-wave rectifier for AC), closed to ground

UART Serial com port

Protocol	*MODBUS*, protocol [6] *(see comprot 0800xx rev 1_051.pdf)*
PC-interface	RS232 UART cable with sliding contact and driver (model *A232 Cable*)
PC User Interface Program	UIP version 4.3 (or higher) [6] for reconfiguration, maintenance and reading of internal data logger
RS485 network com.	(accessory *-485)* RS485 PCB mounted onto the UART terminal, network capabilities up to 30 units.

Visual signals

		Default @ delivery
Green LED	Relay output (OUT3) active	= gas levels below alarm limits
Red LED	Open-collector output (OUT4) active	= operation alarm or gas alarm activated
Yellow LED	Operation error indication	= lit by error status



Note 5: The specifications are valid for outputs connected to power ground *G0* or the common signal ground *M*.