Indoor Air Quality VOC/CO2 Room Detector

BIO 010

Dec.10

BIO 010

Features

- **Senses presence of gases to monitor air quality**
- **Response closely tracks CO_2 levels**
- **Precalibrated for ease of commisioning**
- **Long term reliability**
- **Internal automatic self-diagnostics with auto adjustment**
- **Sequence Control up to three levels e.g. heating/ cooling/ damper**

Technical Data

Sensor technique	Bio-conductor	
Measuring range	0-4000ppm	
Response time (T1/e)	< 30 sec.	
	< 3 min. diffusion time	
Repeatability	± 95% (testing gas 20ppm CO)	
Pressure dependence	± 1,6% per kPa deviation from normal pressure 100kPa	
Accuracy	±300ppm	
Output signal		
VOC/CO2	0-10Vdc	0-4000ppm
Temperature	0-10Vdc	0-30C
D/A resolution	10Bit,	10mV
Electric parameters	Rout<100ohm, Rload>5 kOhm	
Maintenance interval	> 5 years	
Element life	> 10 years	
Consumption	approx 30 mA	
Power supply	24Vac/dc ±20% 50Hz	
Warm-up time	1 min. @ full specs 15minutes	
Installation	Wall mounting	
Cable inlet	Back-side	
Connection	Screw terminals 0,25 to 1,5mm	
Protection	IP30	
Housing		
Material	ABS	
Dimensions	78,3 x 83,4 x 37mm	
Ambient range		
Temperature	0...+50°C	
Relative humidity	5-95% RH non-condensing	
Guideline	EMC Directive 2004/108/EC	
Weight	130 g	

Design Features

The indoor quality detector is a simple. low-maintenance VOC/CO2 transmitter based on modern bio-conductor.

The trasnsmitter detects the VOC content air and emits a proportional, linaer analogue 0-10Vdc or digital RS485/ Modbus signal.

The normal CO2 values are not causing any problems in closed areas but different substances like VOC can be responsible for symptoms like eye irritations, headaches, feebleness, dizziness, as well as diseases and accordingly overexertion lika sick-building-syndrome.

Beyond measurement of CO2 concentration the BIO transmitter detects the air quality **similar to human sensation.**

That´s why VOC measurement is the perfect method todefine air quality.

Additionally the BIO is suitable for almost all application areas.

Furthermore there are a lot of integrated options for measurement and regulation of the temperature.

Ordering Code

BIO 010	Air Quality Detector, 0-4000ppm
BIOT 010	Air Quality Detector 0-4000ppm/ Active temperature 0-30C
BIOO 010	Air Quality Detector 0-4000ppm/ Digital output on/off
BIO2O 010	Air Quality Detector 0-4000ppm/ 2 digital output on/off
BIOTO 010	Air Quality Detector 0-4000ppm/ Active temp. 0-30C, Digital output on/off
BIO DI	Digital input (max 2) as option
BIO LED	2 pcs LEDs as option
BIO MOD	Modbus interface
BIO BAC	Bacnet interface

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Application

The BIO 010 air quality detector should be installed as part of the building management system or as an addition to electrically operated damper control systems and configured to override the air control dampers minimum position when the signal is low and allow the dampers to close off the fresh air intake.

When the signal level rises the air dampers should start to modulate to the fresh air position.

The BIO air quality transmitter incorporates a rate of rise damping circuit which may be deselected if required, during commissioning for example.

This facility rejects short term disturbances which would otherwise cycle the air dampers unnecessarily.

It is not practical to give specific signals for exact damper positions as the location, building type and design of the ventilation system serving it have to be taken into account, however:

- **as guide signal levels below 2 volts indicate clean air and therefore, the fresh air dampers may remain closed.**
  Fresh air is from 450 to 600ppm in towns 450 to 800ppm
- **2-4 volts correnspondes to occupied environment, dampers between closed and normal fresh air position e.g.10% setting and is a suitable range for dampers to move to required fresh air position**
- **signals over 4 volts indicating the need of further ventilation**.
- **all levels over 3000ppm (over a longer period) is unhealthy.**
- **ideal ventilation to under ventilation is 4 volts=1500ppm**

Location

The BIO 010 air quality detector should, in common with other building services room sensing devices, be mounted at a height of 1,6 meters from floor level, away from areas of possible disturbance, in particular avoid areas near windows, doors, or air inlet grilles.

The air quality detector should not be located in any area where localised pollution occurs no matter how small, for example food vending machines and any open flame.

Room mount air quality detector should not be located in areas where oil mist, smoke or excessive amounts of dust are present as these will contaminate the sensing element, for this reason kitchen and industrial plants should be avoided.

If it is required to monitor the air quality in these areas the duct mount version (BIO 124) should be used as a wall mounted device as this is fitted with a filter.

The BIO 010 is intended for use in controlled environments and normal changes in temperature and humidity have little effect, however, extremes of temperature and in particular humidity affect the way some gasses react and this should be considered prior to installation.

Typical areas where air quality detectorss will cater for variable occupancy are theaters, cinemas, conference centers, schools and colleges, restaurants and office buildings.

Commissioning & Calibration

Units are supplied factory calibrated and do not generally require adjustment.

Units can be adjusted to compensate for high levels of background contaminants in high pollution areas.

Following power up, a stabilisation period of 2-3 minutes should be allowed before checking functionality.

Pre-commissioning checks are made after approximately 15 minutes.

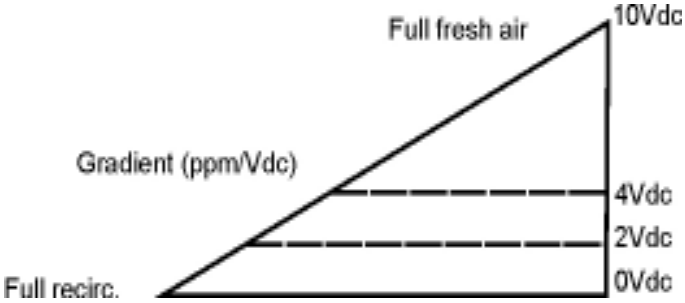
In case of restart/voltage breakdown a signal output **is set** to 100 % for 20 minutes of maximum ventilation.

During this time the BIO transmitter adopts the current VOC value as **450 ppm basic value** (CO_2 equivalent).

Due to the thereby output signal of 1,125V there is a basic ventilation (basic value) of approx.11 %.

In case of improvement of the air quality an automatic correction of the basic value is effected.

Output Signal

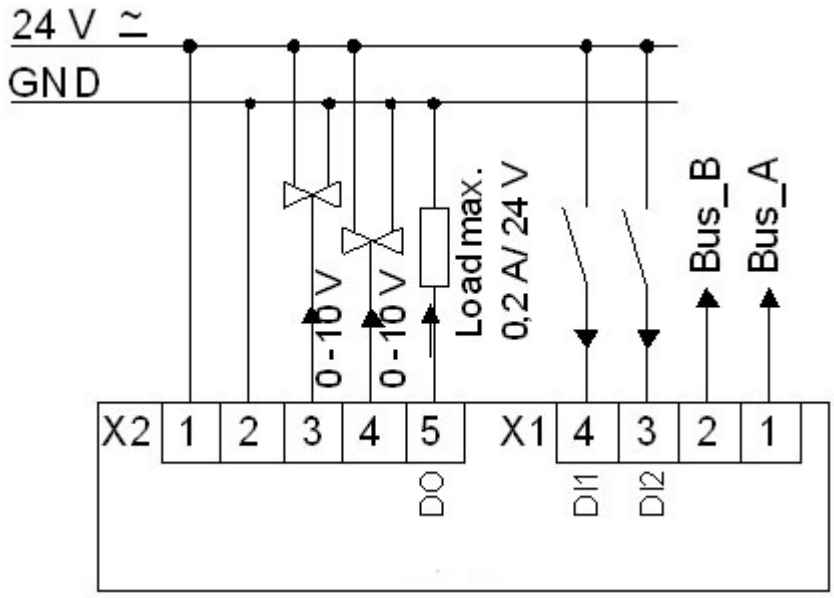


Normal operation is to set dampers to minimum fresh air at below 2Vdc.

As the signal increases, dampers are modulated to fully open at 4 - 10Vdc.

Sensitive to a range of Contminants, Typical

- Acetone
- Nonanal
- Esters
- Benzene
- **Carbon dioxide**
- Carbon Monoxide
- Alkanes
- Ketones
- Ethanol
- Xylene
- Styrene
- Decanal
- Pinene
- Limonene
- Alcohols
- Unburnt Hydrocarbons
- Formaldehyde
- Aldehydes
- Siloxanes
- Tolouene
- Decane
- Phenole


24 V ≃
GND
0 - 10 V
0 - 10 V
Load max.
0,2 A/ 24 V
Bus_B
Bus_A
X2
1
2
3
4
5
X1
4
3
2
1
DO
DI1
DI2