Carbon Dioxide (CO_2) Detector
Freeze and Refrigeration, -35° . . . +40° C

AFR Apr. 18

Wall

Duct

Features

- **Life span, 15 years**
- **Internal function control with integrated hardware watchdog**
- **Data / measured values sensor controller, therefore simple exchange uncalibrated <> calibrated**
- **High accuracy, selectivity and reliability**
- **Low zero point drift**
- **Hardware & software compliant according to SIL2**
- **Easy maintenance and calibration by exchange of the sensor unit or by comforting on-site calibration**
- **4 – 20 mA (or 2 - 10Vdc) analog output with selectable signal output for special mode, fault etc.**
- **Reverse polarity protected, overload and short-circuit proof**
- **Built-in heating element for temperatures as low as -35** °C
- **Display (option)**
- **Display with two open-collector outputs for horn (resettable) and warning lamp (option)**

Technical Data

Gas type	Carbon Dioxide (CO_2)
Detector element	Infrared NDIR
Power supply	16 – 29Vdc, reverse-polarity protected, 18-27Vac (only for output signal 2-10Vdc)
Power consumption	70 mA, max. (1.7VA for 24V)
Analog output signal	Proportional, overload and short-circuit proof, load ≤ 500 Ohm **4- 20mA or 2-10V** = meas. range **3.2 <4mA or 1.6-2V** = underrange **>20-21.6 mA or 10-10.8V** = overrange **2.5 mA or 1.25V** = fault, low **>21.8mA or 10.9V** = fault, high
Measuring range	0 – 2000 ppm, 0 - 5000 ppm, 0 - 2 vol%, 0 - 5 vol%
Measurement interval	2 sec.
Accuracy	< 10% of its range
Relative gas density	**1.53 (Air = 1)**
t90 Time (time allowed for sensor to detect 90% of existing gas conc.)	120 sec.
Temperature range	**-35 to +40 °C (-31 to 104 °F)**
Humidity range	0 - 95% rH non-condensing
Pressure range	Atmospheric ± 30% (interface +1.6% of measured value per kPa)
Sensor life time	15 years/normal ambient conditions

Design Features

Exchangeable sensor unit including digital value processing, temperature compensation and self control for the continuous monitoring of the ambient air.

The gas detector unit houses a micro a controller with analog output and power supply including amplifier.

The micro controller calculates a linear 4 – 20 mA (or 2 – 10 Vdc) signal out of the measurement signal and also stores all relevant measured values and data of the sensor element.

Calibration is done either by simply replacing the sensor unit or by using the comfortable, integrated calibration routine directly at the system.

Application

The gas detector is used for the detection of carbon dioxide leaks in dispensing, freeze and refrigeeration systems etc.

Ordering codes

AFR 2000	Gas detector 0 - 2000 ppm
AFR 5000	Gas detector 0 - 5000 ppm
AFR 002	Gas detector 0 - 2 vol%
AFR 005	Gas detector 0 - 2 vol%
ZAFR 2000	Replacement detector 0 - 2000 ppm
ZAFR 5000	Replacement detector 0 - 5000 ppm
ACAL	Calibration Kit
ASPLASH	Splash Guard

Technical data (cont'd)

Coverage area	1 detector/80 - 120 m², as a rule of thumb
Calibration interval[1]	5 years
Storage temperature	5°C to 30°C (41°F to 86°F)
Storage time	6 months
Enclosure	Industrial plastic, fireproof according to UL94-VO
Enclosure colour	White
Dimensions	68 x 85 x 62 mm
Weight	Appr. 0.2 kg
Protection class	IP 65
Mounting height	**0.3 - 1 m above floor**
Cable glands	M25
Mounting	Screw mounting / M25
Wire connection	Screw-type terminal min. 0.25 mm², max. 1.5 mm², 3-pin
Directives	EMC directives 2004/108/EC, CE Compliance with: EN 61010-1:2010, ANSI/UL 61010-1 CAN/CSA-C22.2 No. 61010-1
Warranty	1 year on sensor

[1] Manufacturer recommended calibration interval for normal environmental conditions.

Ordering codes (cont'd)

ZAFR 2000	Replacement Detector 0 - 2 vol%
ZAFR 5000	Replacement Detector 0 - 5 vol%
ADUCT	Duct mount kit
SP600	Stainless steel protection
ASTAIN	Stainless steel enclosure
DR24/30	DC power supply, 24Vdc, 30W
ADISPLAY	Display, two lines 16 characters each
ADISPLAYR	Open Collector, 2 outputs
Alarm Units	
AAW 24	Warning Horn 24Vdc 98 dB
AAW 230	Warning Horn 230Vac 98 dB
OA 24	Flashlight 24Vdc röd
OAW 24	Combined Warning Horn/Flashlight 24Vdc 98dB
OAW 230	Combined Warning Horn/Flashlight 230Vac 98dB
OAW 24T	Combined Warning Horn/Flashlight with reset button 24Vdc 98dB
Gas Alarm IP54	Warning Plate flash "GASALARM" 24Vac/dc
Gas Alarm IP65	Warning Plate flash "GASALARM" 24Vac/dc

Special protection for persons and buildings

The devices are manufactured according to the regulations and various directives such as EN50545.

Products delivered by AP meet and even exceed the requirements stipulated by the new European standard EN50545.

The safety features check the connecting warning devices on functionality and open circuit - day and night.

Level SIL2 according to EN 50271

Set-up and Standard Alarm Levels

0 - 2000 ppm
- Pre-warning alarm level set at **900 ppm**
- Emergency alarm level ser at **1000 ppm**
- Hysteresis 12 ppm

Special protection for people and buildings.

The units are manufactured in accordance with the rules and directives such as EN50545.

Products delivered by the AP meets and exceeds the requirements of the new European standard EN50545.

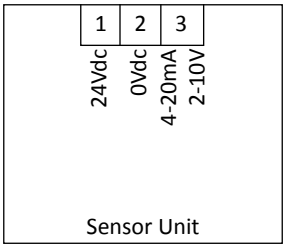
Safety functions control devices for connection warnings regarding functionality and open circuit - day and night.
Level SIL2 according to EN 50271.

Set-up:
At 4mA the detector indicates that the sensor´s service life has ended and links the fault indication to a relay output for alarm or similar.

3.2 mA and 21,6mA indicate sensor errors.

This is nonetheless an error and these values can be used for diagnostics as an internal check on functionality.

Wiring Configuration

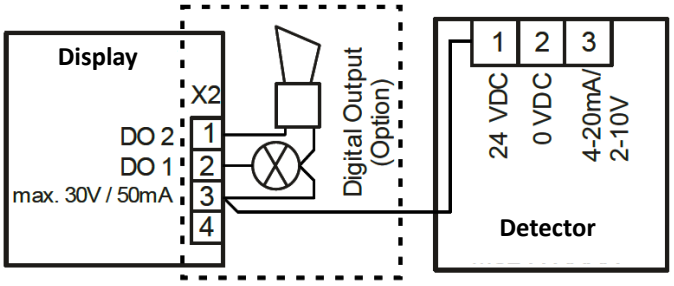


The detector is supplied with a 2-10Vdc control signal.

For a 4-20mA control signal, remove the resistor between terminals 2 and 3.


Duct Mounted Version

Wiring Configuration (Including optional)



Note: The installation of the unit directly on the S, M or C-version housing is not possible only external connection with separate housing!

General information

When and where is comprehensive monitoring needed to cover a large area? You may fear that leaks could occur over the whole area. One example could be a solvent storage depot. In similar places you have to assume that an area of 20 - 40 m^2 per detector could be affected depending on to what extent the vapours can spread (shelving, obstacles, etc.).

In a garage, the sensors are distributed rather evenly. It is estimated that no dangerously high concentrations would form in a garage between two detectors at the specified alarm thresholds with one detector covering 400 m^2.

Concern about combustible gases has to be based on similar considerations with 80 - 120 m^2 per detector.

In a brewery, it is assumed that on a floor to be supervised the CO_2 will spread relatively evenly and close to the floor level.

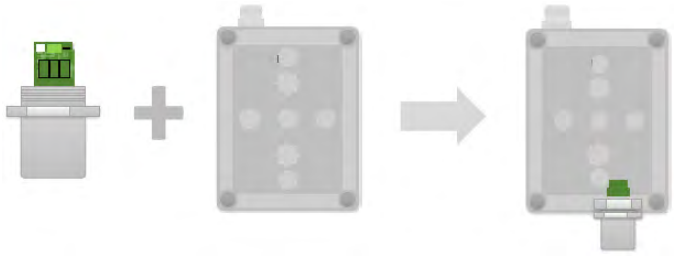
In a storage depot one detector per 100 m^2 would probably be sufficient. It is important at on-site visits to detect the deeper located areas where CO_2 could accumulate. If there are several such places, each of these areas has to be monitored with (at least) one detector independent of the other detectors. In addition you would have to consider obstacles disturbing uniform spread of vapour.

For a comprehensive monitoring of toxic gases it is important to consider the rate of propagation for this gas. Chlorine for instance, diffuses only very slowly. One detector can monitor a maximum of 10 m^2.

Ammonia is lighter than air and propagates easily. But if there is moisture somewhere between the leak and the detector, a great deal of ammonia will be bound there and the detector will only detect a small amount of gas .

If there are ice deposits in cold stores, the ammonia will also be bound there and a detector will detect nothing. In this respect there is no general statement for a comprehensive monitoring, but in most applications this is not necessary.

The picture below shows how easy it is to replace the sensor element



GACE

CE

XACE xxx

Replaceable sensor