



PolyGard[®] AT82- 1160

Infrared Carbon Dioxide transmitter
Serial No. AT81-001

User Manual

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Infrared carbon dioxide transmitters

1 Intended Use:

The PolyGard CO₂ Transmitter is used for the stationary and continuous monitoring of gas mixtures containing carbon dioxide in the range of 0 - 2 000 ppm / 0 - 4 Vol-% CO₂, as well as for measuring, transmitting and displaying the ambient temperature (only possible for the appropriate device version).

The transmitter is predominantly used in rooms where the number of people vary with respect to time, e.2. auditoriums, open-plan offices, meeting and training rooms, ticket offices, cinemas, theatres in order to control and regulate the HVAC systems according to the requirements and in an energy-saving way.

Two analog outputs (0-10 V, 2-10 V) allow the control and regulation of ventilation devices e.g. air damper or speed governor, depending on the actual CO₂ concentration. The signal can also be used for further processing via a superior DDC system. The analog output AN2 is used to control the relay, if the optional relay is ordered; the output is not available as analog output any more in this case.

A micro-processor records and evaluates the energy absorption of an infra-red beam, which is a function of the occurring CO₂ concentration (NDIR*- principle). This measuring principle differs from other methods by reduced maintenance, increased long-time stability, high protection from errors, insensibility to flow rate and catalytic poison, no cross sensitivity to reactive, acid gases and/or humidity, as well as to gases with high or low heat conductivity, and unlimited measuring sensitivity in mixtures containing little or no oxygen. The integrated micro-processor ensures an optimal linearization of the measuring signal, as well as the detection of any errors and temperature compensation.

A special RS 232 adapter allows the adjustment of switching points, the activation of the ABC**-function for automatic drift correction of the CO₂ output signal, as well as the calibration. Due to the analog output freely adjustable concerning conversion range, proportional range and integral time the transmitter can be configured as P or PI controller. Thereby the direct connection of e.g. a frequency converter is possible.

The Polygard CO₂ transmitter is used in areas, which have a direct connection to the public low voltage mains. E.g. housing areas, business areas or small enterprises (according to EN 50 082).

The Polygard CO₂ transmitter is not suitable for applications in areas of explosion hazard.

*NDIR = Non Dispersive Infrared

**ABC = Automatic Baseline Correction

2 Function

The transmitter continuously monitors the ambient air for detecting too high Carbon Dioxide concentrations.

The actual CO₂ concentration is available in form of linear analogue signals 0 - 10 V, 0 - 20 V as a linear function of the conversion range.

3 Terminal Connections

Terminal name	Function	Electrical values
G +	Power supply	24 VAV/DC (+20%), 2W
G0	System ground	0 V
Out 1	Output V	0 – 10 V
Out 2	Output V	0 – 10 V

Note 1:

The power supply is provided with an internal half-wave rectifier.
The power supply is connected to the terminals G+ and G0.

4 Calibration

When leaving the factory every transmitter is calibrated concerning CO₂ and temperature. Further calibration during commissioning is not necessary.

The recommended time interval for calibration is 5 years (to adjust the zero-point of the CO₂ measurement). The calibration can be done with a PC and the UIP-Software (calibration software) only.

Recommended accessories for calibration:

- synthetic air
- test gas
- flow meter
- UIP software with special RS 232 cable
- calibration set
- PC or Laptop MSDOS 3.0 or higher, incl. RS232 Interface

For the calibration use a standard calibration gas with a CO₂ concentration between 10% and 100% of the required measuring range. The calibration is made menu-guided via the UIP-software (see User Manual UIP-Software).

Note:

CO₂-transmitter are calibrated to the following measuring ranges, when leaving the factory:

- Analog output for CO₂: OUT1 0 - 10 V, OUT2 2 - 10V
- Conversion range analog output 1: 0 – 10V, ex works adjusted to 0 – 2000* ppm
- Function ABC: ON

* Measuring range depend from type.

Change of the measuring range is only possible by the manufacturer.

4.1 Calibration without Software

The sensor can be calibrated by the jumper. The jumper shorts two pins on the PCB to activate the calibration. After the calibration the jumper is removed.

A background calibration using fresh air with 400 ppm CO₂ can be done. Place the sensor in fresh air above freezing. The sensor should be warmed up and stabilised for ten minutes. **The exhaled air contains carbon dioxide. Don't breath onto the sensor.** When the measured values are stable, put the jumper in position 3 marked Background Calibration in figure 1. The calibration takes about ten seconds. The yellow LED blinks once when the calibration is executed. Remove the jumper.

A zero calibration using gas without carbon dioxide, e.g. nitrogen from a gas bottle. The sensor has a small blue or white protective cap covering a nipple. Open the lid and connect a 4 mm plastic tubing to the nipple. The test gas flow should be about 0,2 l/min. Check the measured values. When the values are stable put the jumper in position 4 marked Zero Calibration in figure 1. The calibration takes about ten seconds. The yellow LED blinks once when the calibration is executed. Remove the jumper.

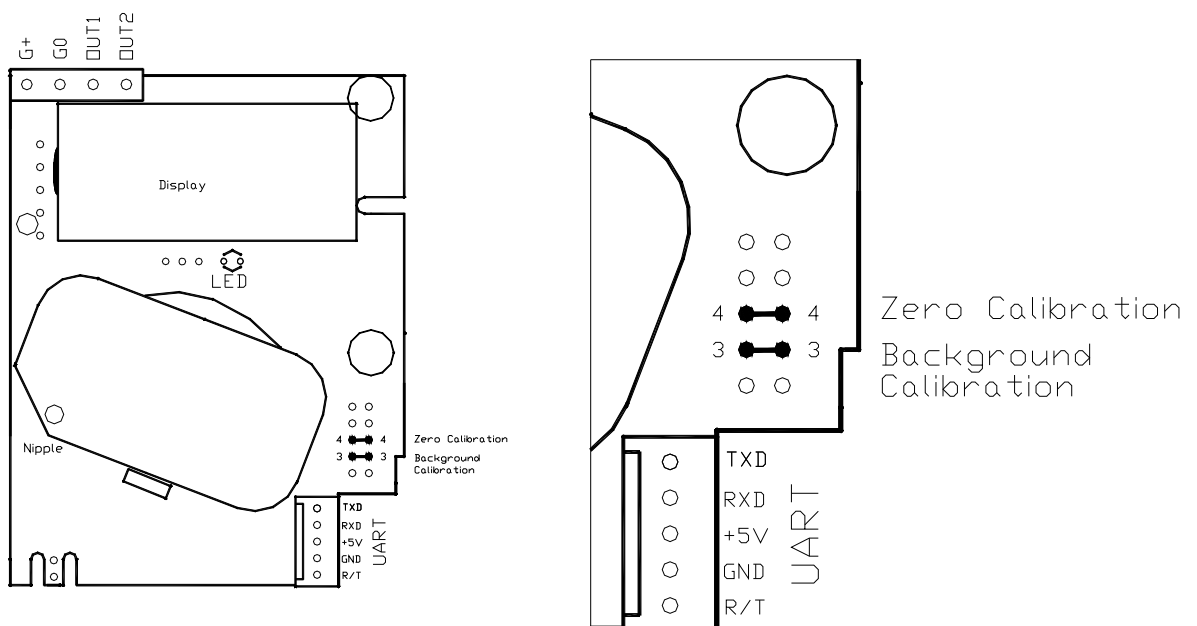
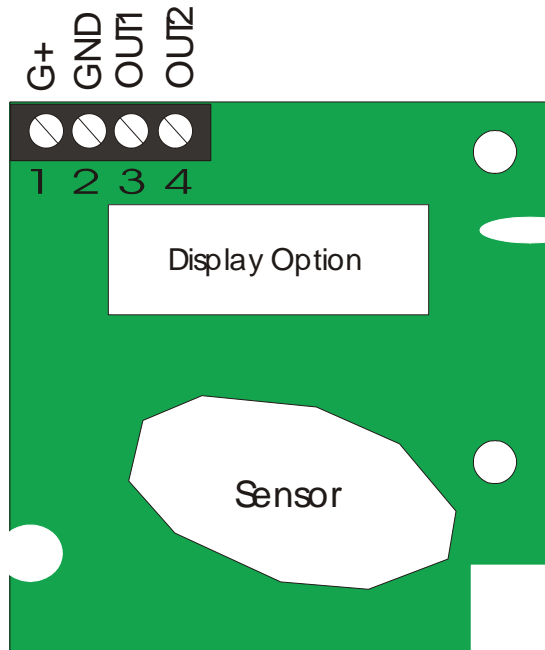


Figure 1. The PCB with pins for shorting. Enlarged corner showing the shorting for background and zero calibration.

5 Electrical Connections



Electrical Installation:

- Laying and connection of the electrical installation has to be done by authorised persons (experts), paying attention to the local regulations and according to the connection diagram!
- Screened cables have to be used, in order to avoid external interference.

6 Mounting, Maintenance and Inspection

6.1 Mounting Location

The location for mounting has to be selected in accordance to local regulations.

Just like a thermostat the Polygard Control CO₂ transmitter has to be located in a spot respective for the area to be controlled. Because of the high CO₂ content in the human exhalation (up to 5 Vol.-%) it is recommended that the sensor should not be placed in the nearness of persons. The place should be vibration-free and as far as possible temperature-stable (no direct sunlight). It should be between 1,5 and 2 metres above floor-level. Avoid influences from outside such as water, oil etc., and the possibility of mechanical damages.

6.2 Mounting

Take the transmitter unit apart into its three main components - the mounting plate, the sensor with its printed circuit board and the cover. All parts are fixed with snap-ins. Study this prior to attachment! Fasten the mounting plate with two screws to the wall through pre-drilled holes (max. 4 mm Ø) in such a way that the wires will exit through the opening in the mounting plate. Afterwards plug the electronic-board with the sensor into the mounting plate (snap ins) and connect the wiring to the terminals. Because of the danger of electrostatic discharges (ESD) which may destroy the electronics, electrical connections must be done by electrically earthed persons only, e.g. by a conductive ground material or by an earthed wrist band. The ground material and the wrist band have to be electrically connected to the local grounding conductor or to the potential equalisation panel via a grounding cable with integrated safety resistance. Electrostatic charges result from solid materials being rubbed against each other, e.g. when a person is walking on a floor with PVC covering.

Note:

Tensions up to 30000 V can arise from electrostatic charges. Persons who touch the electrical grounding conductor by the hand without being connected to the grounding cable with integrated safety resistance, in order to discharge the static to the ground (body discharge), can obtain an electric shock.

6.3 Maintenance and Inspection

Calibration (see section 4)

When leaving the factory the sensors are already calibrated. Further calibration during commissioning is not necessary. The recommended time interval for calibration is 5 years. Calibration can only be effected by means of PC and UIP-software.

Inspections:

For regular check and calibration of the installation by well-trained service technicians we recommend to place a service contract with MSR Service.

6.4 Normal Operation / Function Test

Function Test:

The transmitter can be checked If you take breath and blow right into the sensor from a couple of decimetres distance. The controller will register a strong rise of the carbon dioxide level. Thus the LC indication and the analog output will follow this increase.

7 Technical Data

Electrical	
Power supply	24 VAC/VDC±20%, 50 Hz (half-wave rectifier input)
Power consumption	< 1 Watt (average)
Sensor	
Sensor technique	Gold-plated infrared (NDIR) wave guide technology with Automatic Background Calibration (ABC) and passive gas diffusion (no moving parts)
Response time (T1/e)	< 10 s. @ 300 mm ³ / min. flow rate < 3 min. diffusion time
Repeatability	± 20 ppm ± 1 % of reading
Accuracy	± 30 ppm ± 2 % of reading
Annual zero drift	< ± 10 ppm
Pressure dependence	+ 1.6 % reading per kPa deviation from normal pressure 100 kPa
Sensor life expectancy	> 15 years
Output Signal	
OUT1 linear*	0 -10 VDC / 0 - 2000 ppm to 0- 4 vol. %
OUT2 linear*	2 -10 VDC / 0 - 2000 ppm/ to 0- 4 vol. % with 1 VDC used as FAULT status signal
Option: Temperature output (OUT 2)	0/2 to 10 VDC / 0 – 50 °C
D/A resolution	10 Bit, 10 mV
Electrical parameters	R _{OUT} < 100 Ohm, R _{LOAD} > 5 kOhm
Environmental Conditions	
Humidity	0 to 95% RH non-condensing
Working temperature	0 °C to + 50 °C (32 °F to 122 °F)
Storage temperature	-10 °C to + 50 °C (14 °F to 122 °F)
General Information	
Operating environment	residential, commercial and industrial spaces
Warm-up time	1 min. (@ full specs 15 minutes)
Option LC display	4 digits, 7 segments LCD with ppm indicator
Enclosure	Plastics
Color	Light gray
Protection class	IP 30 / IP 65 dependent on version
Weight	0,2 kg (0.45 lbs.)
Installation	Wall mounting, duct mounting
Wire connection	1,5 mm ² for (G+, G0) and (OUT1, OUT2)
Dimensions (W x H x D) Standard	100 x 80 x 27 mm (3.9 x 3.15 x 1.1 in.)
Option IP 65 protected	122 x 120 x 80 mm (4.8 x 4.75 x 3.15 in.)
Guideline	EMC Directive 89/336/EEC
Warranty	1 year / material

* Standard measuring range, other ranges are depend at the type.

8 Notes and General Information

It is important to read this user manual carefully in order to understand the information and instructions. The PolyGard® transmitters may only be used for applications in accordance to the intended use. The appropriate operating and maintenance instructions and recommendations must be followed.

Due to permanent product development, MSR reserves the right to change specifications without notice. The information contained herein is based on data considered to be accurate. However, no guarantee or warranty is expressed or implied regarding the accuracy of these data.

8.1 Intended Product Application

The PolyGard® CO₂ AT-82-1160 transmitter is designed and manufactured for control applications and air quality compliance in commercial buildings and manufacturing plants (i.e. detection and automatic exhaust fan control for automotive maintenance facilities, enclosed parking garages, engine repair shops, warehouses with forklifts, fire stations, tunnels, etc.).

8.2 Installers` Responsibilities

It is the installer`s responsibility to ensure that all PolyGard® transmitters are installed in compliance with all national and local codes and OSHA requirements. All installation shall be executed only by technicians familiar with proper installation techniques and with codes, standards and proper safety procedures for control installations and the latest edition of the National Electrical Code (ANSI/NFPA70). It is also essential to follow strictly all instructions as provided in the user manual.

8.3 Maintenance

We recommended to checking the PolyGard® transmitter regularly. Due to regular maintenance differences in efficiency can easily be corrected. Re-calibration and part replacement in the field may be implemented by a qualified technician and with the appropriate tools. Alternatively, the easily removable plug-in transmitter card with the sensor may be returned for service to MSR-Electronic-GmbH.

8.4 Limited warranty

MSR-Electronic-GmbH warrants the PolyGard® transmitter for a period of one (1) year from the date of shipment against defects in material or workmanship. Should any evidence of defects in material or workmanship occur during the warranty period, MSR-Electronic-GmbH will repair or replace the product at their own discretion, without charge.

This warranty does not apply to units that have been altered, had attempted repair, or been subject to abuse, accidental or otherwise. The warranty also does not apply to units in which the sensor element has been overexposed or gas poisoned. The above warranty is in lieu of all other express warranties, obligations or liabilities.

This warranty applies only to the PolyGard® transmitter. MSR-Electronic-GmbH shall not be liable for any incidental or consequential damages arising out of or related to the use of the PolyGard® transmitters.