PMA50 EX

Oxygen Analyzer Series PMA®

Version PMA 50 EX
Heated, in an explosion-proof wall-mount housing

Special Features

- **ATEX certified versions for hazardous zone 1 areas**
- **SIL approval according to DIN EN 61508**
- **Thermostated, in an explosion-proof housing**
- **Accurate and reliable, small space requirements**
- **Analog/digital indicator, linear measuring ranges**
- **Physical measuring principle**
- **Small dead volume, fast response time**
- **Remote measuring range indication and selection**
- **Flow alarm sensor in the outlet**
- **Status alarm, maximum operating reliability**

Application

Due to the extremely fast response time, the small dead volume, the paramagnetic M&C measuring cell as well as the negligible cross-sensitivity to other sample gas components, the M&C oxygen analyzer PMA 50 EX is a reliable instrument for measuring oxygen concentrations in a wide range of applications.

Description

The heated M&C Oxygen Analyzer PMA 50 EX is suitable for continuous oxygen measurements in dry and particle-free gases with a flow rate from 0 to 60 Nl/h.

The PMA50 EX is reliable and easy to operate. It is designed in a pressure-resistant, explosion-proof wall-mounted housing EX d IIC T4 with stainless steel tubing and certified breathing and draining devices at the sample gas inlet and outlet.

The thermostat is set to 55 °C [131 °F] which is indicated by a flashing LED on the front panel. The analog meter with the 30- and 100- vol%-scale shows the 5 switchable measuring ranges, the digital display shows the 100-vol%-range. The pre-selected measuring range is indicated at the front via LED. The connection terminals for mains, 2 output signals, remote measuring range switching and remote detection as well as for the status contact are located in the EX e terminal box. The sample gas enters the analyzer via the breathing and draining devices downstream the gas conditioning with at least one ultra-fine filter and a flow meter with needle valve for adjusting the sample gas quantity (also available from M&C). It then flows through the M&C measuring cell, the flow sensor, to the breathing and draining device in the gas outlet.

The Measuring Principle of the M&C Oxygen Analyzer

The PMA 50 EX applies a physical measuring principle to determine the oxygen concentration and uses the paramagnetic M&C measuring cell. The measuring method is based on the very high paramagnetic susceptibility of oxygen, which almost exclusively posesses this feature.

The flow-through measuring cell is characterized by robustness, extremely low drift, only 2 ml dead volume, fast response time and low cross-sensitivity to other gases. The measuring method is one of the most accurate quantitative determination methods for oxygen in the range from 0 to 100 vol%.

When used correctly, the M&C measuring cell has a very long service life. A diamagnetic dumbbell with a mirror at its pivot point is attached to suspension wires and mounted in an inhomogenous magnetic field. Due to its paramagnetism, the oxygen strives into the inhomogenous magnetic field of the measuring cell. The O_2 molecules exert a torque on the dumbbell and cause the dumbbell to rotate. The optical scanning electronically induces a current which flows through the wire loop around the dumbbell and rotates the dumbbell back to its neutral position.

The compensation current is proportional to the oxygen content of the sample gas, thus rendering the O_2 display absolutely linear.

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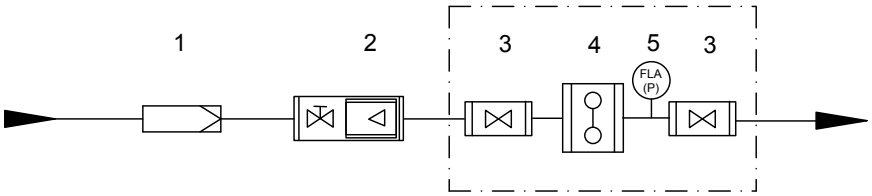
Gas Flow Diagram PMA 50 EX

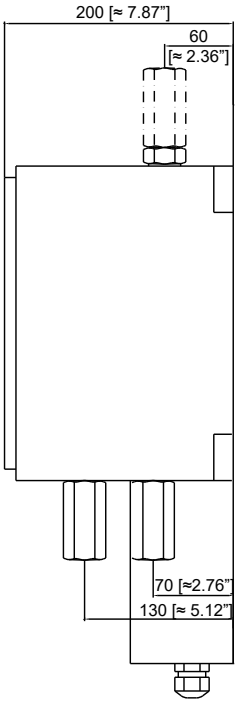
1. External fine filter
2. External flow meter with needle valve
3. Breathing and draining device
4. Oxygen measuring cell PMA
5. Flow alarm sensor
   (and with option 05A9000 or 05A9005:
   with pressure sensor)



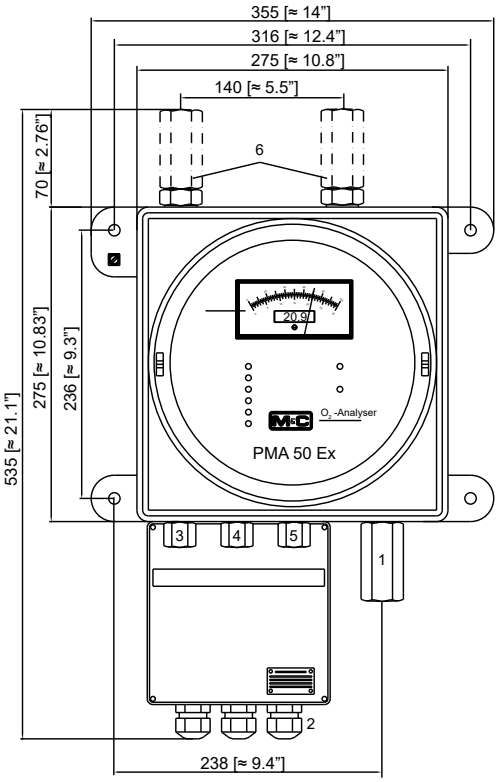
Dimensions

1. Sample gas IN/OUT with certified breathing and draining devices
2. Cable glands 2 x M20 1 x M25
3. Zero-point control
4. Measuring range selection
5. Span control
6. Optional purging with certified breathing and draining devices

Side view



Front view



Dimensions in mm [inch]

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Technical Data

	Version PMA50 EX Thermostated Oxygen Analyzer in Explosion-Proof Housing
Part No. **05A1000:**	**PMA50 EX**, power supply 230 V, pressure range 0.6 to 1.1 bar abs.
05A1000a:	**PMA50 EX**, power supply 115 V, pressure range 0.6 to 1.1 bar abs.
05A2500:	**PMA50 EX/P/PD-1-50**, power 230 V (not with SIL certification) pressure compensation 0.6 to 1.5 bar abs. with purging the enclosure via breathing and draining devices in the in- and outlet NPT 1/4" i
05A2500a:	**PMA50 EX/P/PD-1-50**, power 115 V (not with SIL certification) pressure compensation 0.6 to 1.5 bar abs. with purging the enclosure via breathing and draining devices in the in- and outlet NPT 1/4" i
05A2505:	**PMA50 EX/P/PD**, power 230 V (not with SIL certification), pressure compensation 0.6 to 1.1 bar abs.
05A2505a:	**PMA50 EX/P/PD**, power 115 V (not with SIL certification), pressure compensation 0.6 to 1.1 bar abs.
Power supply	230 V AC (standard) or 115 V AC (a)* -15 % to +10 %, 40 - 60 Hz, 35.5 VA
Electrical connections	Via Ex e connection box 3 x cable gland, cable diameter : 7 mm to 13 mm (M20), 14 mm to 18 mm (M25) terminals 0.5 to 2.5 mm^2, tightening torque 0.6 Nm, (power, signals, range position and remote selection, status signal)
Measuring ranges	Selectable for 0 to 1, 0 to 3, 0 to 10, 0 to 30 and 0 to 100 vol% O_2 linear, selection via turning selection switch at PMA50 EX or remote switching
External range indication	One potential-free contact for each measuring range, switching capacity 48 V DC, 200 mA DC, minimum contact rating 5 V/1 mA
Remote range selection	Measuring ranges selectable via potential-free contacts max. 30 V DC, 3 mA DC, the function is displayed at the PMA50 EX via LED
Combined analog/digital indicator	Analog meter with 0 to 30 and 0 to 100 vol% scales for each selected range. Digital meter 4 ½-digit 9 mm high LCD-indicator for 0 to 100 vol% O_2 measuring range, selectivity 0.01 vol% O_2
Output signals	0/4 to 20 mA, electrically isolated, burden 270 Ω for every measuring range; output voltage max. 15 V (factory setting), switchable max. burden 800 Ω, output voltage max. 30 V, output current limiting adjustable 20 mA to 22 mA, **factory setting: 20.5 mA**, 0 to 10 V DC, burden >100 KΩ for range 0 to 100 vol% electrically isolated.
Response time for 90 % FSD	< 5 seconds at 60 Nl/h air
Accuracy after calibration	±1 % of of full scale value or ±0.02 vol% O_2 depending on which value is higher
Reproducibility deviation	Analog output = < 1 % of measuring range/digital indication = ±0.1 vol% O_2
Influence of ambient temperature	No influence up to 50 °C [122 °F]
Influence of barometric pressure	The oxygen reading varies in direct proportion to changes of the barometric pressure. With option 05A9000 or 05A9005 no influence from 0.6 to 1.5 bar abs. for version PMA 50 EX/P/PD(-1-50) with process pressure compensation
Influence of sample gas flow	luctuations of the sample gas flow in a range from 10 to 60 Nl/h nitrogen (N_2) cause a change of the oxygen reading which is smaller than 0.1 vol% O_2
Sample gas inlet pressure	Standard max. 1.1 bar abs. or with option 05A9000 or 05A9005 up to 1.5 bar abs. for version with enclosure venting or purging. (minimum inlet pressure is required for necessary gas flow, PMA50 EX has no integrated pump)
Sample gas outlet pressure	Outlet of analyzer must discharge freely into atmosphere or 0.6 - 1.5 bar abs. with version PMA 50 EX/P/PD(-1-50) with process pressure compensation
Flow rate of sample gas	Min. 10 Nl/h up to max. 60 Nl/h adjustable externally via flow meter (PMA50 EX has no flow meter inside)
Temperature of sample gas	-10 to +50 °C [14 to 122 °F] dry gas
O_2 transmitter temperature	Set to at +55 °C [131 °F] at the factory
Temperature cutoff	At 72 °C [161.6 °F] via thermal fuse, non-reversible
Ambient temperature	0 to +50 °C [14 to 122 °F]
Storage temperature	-20 to +60 °C [-4 to 140 °F] , relative humidity 0 to 90 % RH
Sample-contacting parts	Platinum, glass, PTFE, PVDF, stainl. steel 316Ti, epoxy resin
Sample gas connection	NPT 1/4" i
Flow alarm	Thermo-conductive flow sensor downstream mounted after measuring cell
Status alarm	Change-over contact, potential-free, switching capacity 250 V AC 2 A AC, 48 V DC, 200 mA DC minimum contact rating 50 mW for temperature < +45 °C [113 °F] / > +60 °C [140 °F], defect light beam, measuring cell not coupled, flow alarm < 5 Nl/h/ > 80 Nl/h, power supply error control, mains voltage breakdown
Classification	Ex II 2G Ex db eb IIC T4 Gb
Protection class	IP54 EN 60529
Housing/color	EX-d e explosion-proof wall-mounted housing/white
Dimensions (H x W x D)	475 (535 with enclosure venting or purging) x 355 x 200 mm [≈ 18.7" (21.1" with enclosure venting or purging) x 14" x 7.9"]
Weight	Approx. 22 kg [≈ 48.5 lbs]
Certificate No.	IBExU 16 ATEX 1192 IECEx IBE 16.0041

* Please specify with order.
Please note: Nl/h and Nl/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C [32 °F], 1013 mbar.

WARNING! **IMPORTANT!**

An external fine filter must always be used at the gas inlet of the analyzer. Depending on the composition of the sample gas, it may be necessary to use a sample conditioning system.

Technical Data

Options	
Part No. 05A9005	Extra charge for one breathing and draining device for PMA50 EX enclosure, for sample gas pressures up to max. 1.5 bar abs. and non-corrosive gases
Part No. 05A9000	Purging the enclosure via 2 breathing and draining devices in the gas inlet and outlet, connection NPT 1/4" i, for sample gas pressures up to max. 1.5 bar abs. and/or corrosive gases, purge gas flow rate 10 to 60 Nl/h, purge gas inlet pressure max. 1.1 bar abs.
Part No. 90A0009	Measuring cell type PMC-1LB, solvent-resistant
Part No. 90A0006	Measuring cell PMC-1G with glass solder. O-ring made of Chemraz®

Chemraz® is a registered trademark for perfluoroelastomer by Greene Tweed, USA.

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