



PMA45 K1

## Oxygen Analyzer Series PMA®

Thermostated version PMA45 K1  
in a rugged wall-mount cast aluminum housing

### Special Features

- Specially suitable for nuclear power plants
- Thermostated, in a rugged wall mount cast aluminum housing
- High compressive strength of up to 16 bar in case of a failure
- Gas tightness  $<10^{-6}$  mbar x l/s (Helium leak tight)
- Accurate and reliable, small space requirement
- Analog/digital display, linear measuring ranges
- Physical measuring principle
- Small stagnant space, fast response time
- Measuring range identification and remote control
- Flow alarm sensor at the gas outlet
- Status alarm, optimum operational reliability

### Application

The M&C oxygen analyzer PMA45 K1 is a suitable and reliable instrument for monitoring oxygen concentrations in nuclear power plants due to its extremely fast response time, small stagnant space, high compressive strength and gas tightness. The M&C magneto-dynamic measuring cell inside the analyzer has almost no stagnant volume and shows very little cross-sensitivity to other sample gas components. The device is NOT certified to be installed or operated in hazardous areas.

### Description

The thermostated PMA45 K1 oxygen analyzer has been designed for continuous measurements of oxygen concentrations in particle-free and dry sample gas with a flow rate between 0 and 60 NI/h.

The PMA45 K1 is a reliable and easy-to-operate instrument. It is built into a rugged wall-mount cast aluminum housing and is equipped with stainless steel tubing.

The transducer unit maintains a constant temperature of 55 °C [131 °F], and a flashing LED on the front panel indicates the proper operating temperature of the analyzer.

The five measuring ranges are displayed on the analog meter with 30/100 % scale and the 100 % range on the digital meter. The selected measuring range is displayed on the front panel by LEDs. Two output signals are available. The terminals for the incoming power supply, two output signals, measuring range identification, remote control and status alarm are located inside the cast aluminum housing.

The sample gas passes through an external sample conditioning system with at least one protective fine filter and a flow meter with needle valve to adjust the required flow rate of the sample gas (also available by M&C) before it enters the analyzer. After passing the M&C measuring cell and the flow sensor, the sample gas leaves the instrument through the gas outlet.

### Measuring principle of the M&C oxygen analyzer

The PMA45 K1 uses the M&C magneto-dynamic measuring cell to measure oxygen concentrations. The physical measuring principle of the measurement is based on the high paramagnetic susceptibility of oxygen, which is significantly higher compared to other common gases.

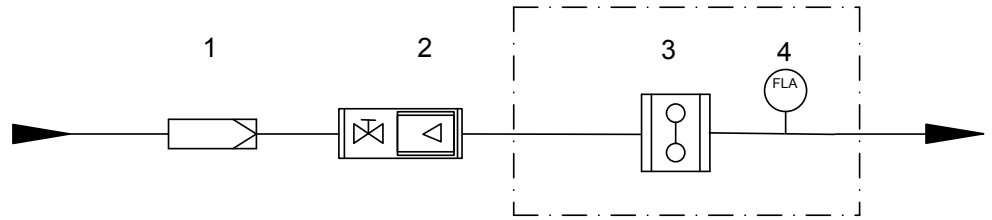
The robust M&C cross-flow cell features a stagnant volume of 2 ml, a fast response time, a flow rate of up to 60 NI/h, an extremely low drift and a negligible cross-sensitivity to other sample gas components. The measuring principle of the cell is one of the most accurate and reliable method to determine the oxygen concentration in a gas mixture from 0 to 100 vol%. If used properly, the M&C cell has an extremely long service life time. The cell design includes a dumbbell with a small mirror at its center, which is mounted in a strong inhomogeneous magnetic field. The paramagnetic oxygen gravitates towards the inhomogeneous magnetic field and forces the dumbbell to rotate. This rotation is detected by a system consisting of a light beam, mirror and a photo cell.

A compensation current is induced through a wire loop to rotate the dumbbell back to its zero-position. The required current is linear to the oxygen concentration of the sample gas.

# Gas flow diagram PMA45 K1

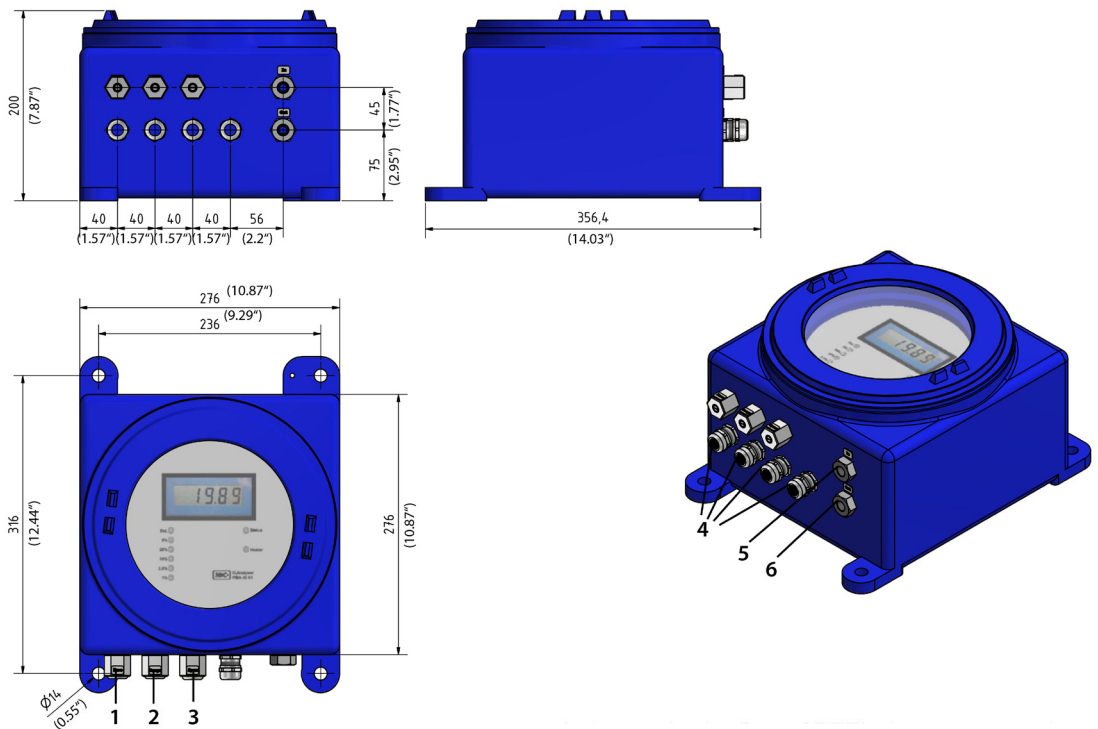


- 1. External fine filter
- 2. External flowmeter with needle valve
- 3. Oxygen measuring cell PMA
- 4. Flow alarm sensor



## Dimensions

- 1. Span control
- 2. Measuring range select
- 3. Zero control
- 4. Sample gas IN
- 5. Sample gas OUT
- 6. Cable glands 4 x M20



Dimensions in mm (inches)

Version PMA50 EX K1 Thermostated Oxygen Analyzer in Cast Aluminium Housing	
Part No.	05 A 4060 05 A 4060a
Measuring ranges	2 measuring ranges selectable: 0-1, 0-2.5, 0-5, 0-10 und 0-25 vol% O <sub>2</sub> linear and position EXTERNAL
External range identification	Externally: Potential-free contact for all measuring ranges, capacity 24 V DC 0.5 A DC,
Remote range control	All five measuring ranges selectable via external potential free contacts 30 V DC 3 mA DC
Analogue /Digital display	Analog meter with a scale of 0-30 and 0-100 % for each selected range digital display 4 1/2 digit, 9 mm high LCD indicator for 0-100 % O <sub>2</sub> reading, selectivity 0.1 vol% O <sub>2</sub>
Output signals	0-10 V DC, burden >100 KΩ for range 0-100 % isolated. 0/4-20 mA for every measuring range, electrically isolated; max. burden 300 Ω / 400 Ω
Response time for 90 % FSD	< 5 seconds at 60 NI/h air
Accuracy after calibration	Deviation: analogue signal output = ± 1% of span at range 2.5 - 25 /digital indicator = ±0.1 vol% O <sub>2</sub> = ± 2% of span at range 1%
Reproducibility	Deviation: analogue signal output = < 1% of span / digital indicator = ±0.1 vol% O <sub>2</sub>
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
Influence of sample gas flow	Variation in gas flow between 0-60 NI/h air will cause a difference of < 0.2 vol% O <sub>2</sub>
Flow rate of sample gas	Max. 60 NI/h
Flow alarm	Thermo-conductive flow sensor mounted downstream of measuring cell
Max. testing pressure	Operating pressure max. 0.6 bar, testing pressure of max. 16 bar in case of failure
Leakage rate of the measuring system	< 1 x 10 <sup>-6</sup> mbar x l/s (Helium leak-tight)
Gas volume of gas line	Approx. 12 ml
Temperature of sample gas	-10 up to +50 °C [14 up to 122 °F] dry gas
O <sub>2</sub> transducer temperature	Fixed at +55 °C [131 °F] factory setting
Ambient/storage temperature	-10 up to +50 °C [14 up to 122 °F] / -20 up to +60 °C [-4 up to 140 °F], relative humidity 0-90 % RH
Power supply	Internal power unit for 230 V AC standard or 115 V AC (a)* ±10 %, 40-60 Hz, 35.5 VA
Electrical connections	Terminals 2.5 mm <sup>2</sup> , 4 x M20 cable glands ø 11-13.5 mm (mains supply, signals, range indication, remote control, status alarm)
Materials in contact with sample gas	Platinum, glass, stainless steel 316Ti, Epoxy resin, PTFE, PVDF
Sample gas connection	1/4" NPTi
Status alarm	For gas flow minimum alarm, transmitter temperatures < +40 °C (104 °F), defect light beam, measuring system defect, mains voltage breakdown: LED indicator and contact output: change-over contact, potential-free, max. 24 V DC, 0.5 A
Degree of protection	IP54 EN 60529
Housing/colour	Wall-mount cast aluminum housing / blue
Dimensions (H x W x D)/weight	356 x 275 x 200 mm [≈ 14.0" x 10.8" x 7.9"] / approx. 20 kg [≈ 44.1 lbs]
Options for exchange of old devices	2 connection tubes 1/8", 500 mm [≈19.7"] long and 2 cable glands - straight connector; adaption mounting plate including mounting material.

\* Please specify with order.

Please note: NI/h and NI/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 always needs to be used at the gas inlet of the analyzer. Depending on the composition of the sample gas, it may be necessary to use an additional sample gas conditioning system.