

Overview

The OXYMAT 6 gas analyzers are based on the paramagnetic alternating pressure method and are used to measure oxygen in gases.



19" unit and field unit

Benefits

- Paramagnetic alternating pressure principle
 - Small measuring ranges (0-0.5% or 99.5-100% O₂)
 - Absolute linearity
- Detector element has no contact with the sample gas
 - Can be used to measure corrosive gases
 - Long lifetime
- Physically elevated zero through suitable selection of reference gas (air or O₂), e.g. 98-100% O₂ for purity monitoring/air separation
- Open interface architecture (RS 485, RS 232, PROFIBUS)
- SIPROM GA network for maintenance and servicing information (option)
- Electronics and physics: gas-tight isolation, purging is possible, IP65, high service life even in harsh environments (field unit only)
- Heated versions (option), use also in presence of gases condensing at low temperature (field unit only)
- EEx(p) for zones 1 and 2 according to ATEX 2G and ATEX 3G (field unit only).

Application

- For boiler control in firing systems
- In safety-relevant areas
- As a reference variable for emission measurements according to TA-Luft, 13. and 17. BImSchV
- In the automotive industry (engine test systems)
- Warning equipment
- In chemical plants
- In ultra-pure gases for quality monitoring
- Environmental protection
- Quality monitoring
- Inert gas monitoring as certified gas warning equipment (DMT)
- Version to analyze flammable and non-flammable gases or vapors for use in hazardous areas.

Special applications

Besides the standard combinations special applications concerning material in the gas path and material of the sample cells are available on request.

Design

19" unit

- With 4HU for installation
 - in hinged frames
 - in cabinets, with or without slide rails
- Front panel for service can be hinged down (laptop connection)
- Internal gas paths: flexible tube made of FKM (Viton) or pipe made of titanium or stainless steel (SS, type No. 1.4571)
- Gas connections for sample gas input and output and for reference gas: stubs, pipe diameter 6 mm or 1/4"
- Flowmeter for sample gas on the front panel (option).

Field unit

- Two-door housing with gas-tight separation of analyzer and electronics sections
- Each half of the enclosure can be purged separately
- Analyzer section and piping can be heated up to 130 °C (option)
- Gas path and stubs made of stainless steel (type No. 1.4571) or titanium
- Purging gas connections: pipe diameter 10 mm or 3/8"
- Gas connections for sample gas input and output and for reference gas: clamping ring connection for pipe diameter 6 mm or 1/4".

Display and control panel

- Large LCD panel for simultaneous display of:
 - Measured value (digital and analog displays)
 - Status line
 - Measuring ranges
- Contrast of LCD panel adjustable using menu
- Permanent LED backlighting
- Washable membrane keyboard with five softkeys
- Menu-based operation for configuration, test functions, calibration
- User help in plain text
- Graphic display of concentration trend; programmable time intervals
- Operating software in two languages: German/English, English/French, French/English, Spanish/English, Italian/English.

Continuous Gas Analyzers, extractive OXYMAT 6

General

Inputs and outputs

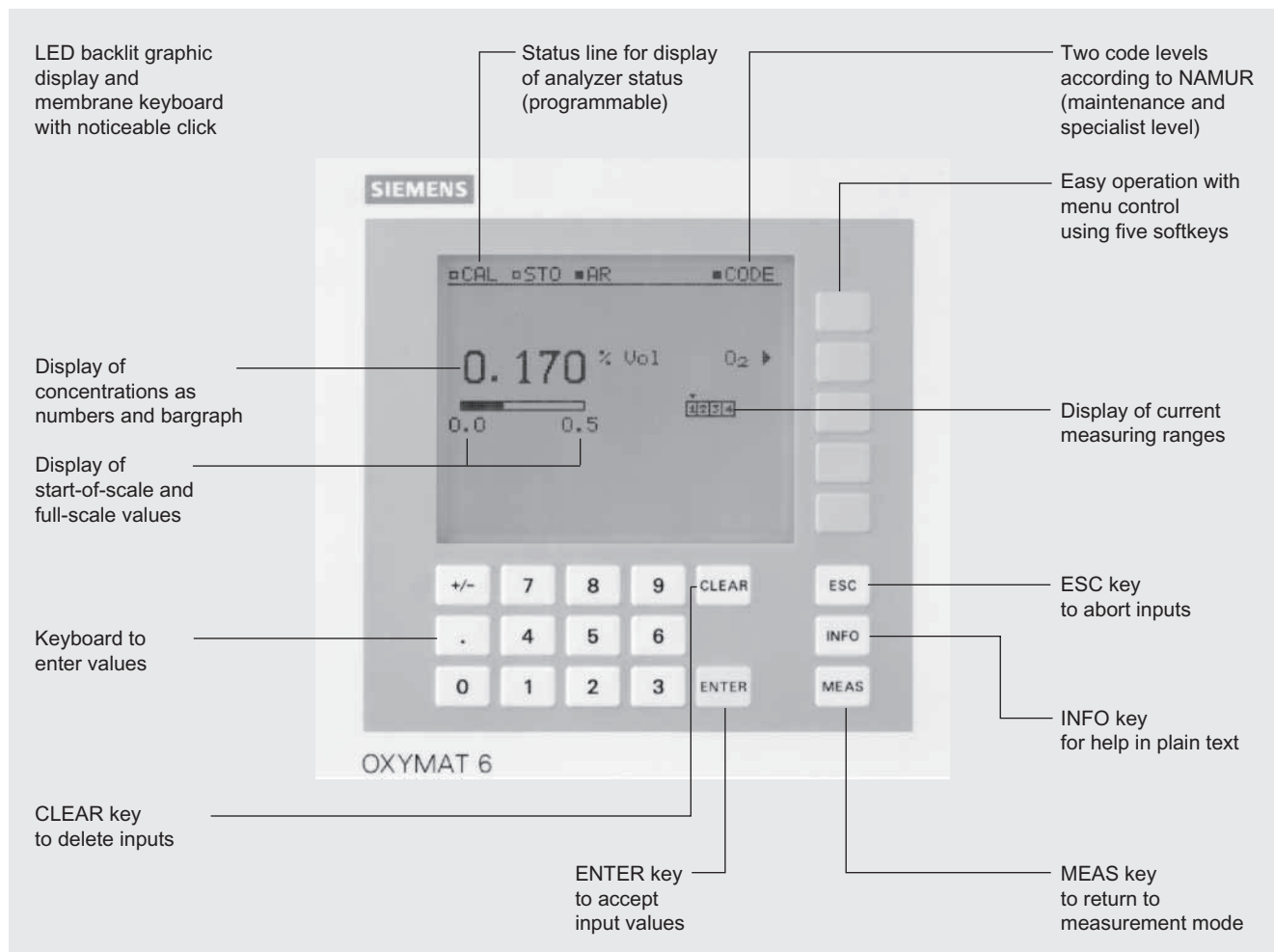
- One analog output
- Two analog inputs, programmable (e.g. correction of cross-interferences or external pressure sensor)
- Six binary inputs freely configurable (e.g. for range switching, processing external signals from sample conditioning)
- Six relay outputs freely configurable (e.g. failure, maintenance request, maintenance switch, limit alarm, external solenoid valves)
- Extension with eight additional binary inputs and eight additional relay outputs, e.g. for automatic calibration with up to four calibration gases.

Communication

- RS 485 present in basic unit (connection at the rear; with 19" unit also possibility of connection behind the front plate).

Options

- AK interface for the automotive industry with extended functions
- RS 485/RS 232 converter
- RS 485/Ethernet converter
- Linking to networks via PROFIBUS DP/PA interface
- SIPROM GA software as service and maintenance tool.



OXYMAT 6, membrane keyboard and graphic display

Continuous Gas Analyzers, extractive

OXYMAT 6

General

Versions– Wetted parts, standard

Gas path		19" unit	Field unit	Field unit Ex
With hoses	Connection Hose Sample cell Stubs sample cell Restrictor O-rings	SS, type No. 1.4571 FKM (e.g. Viton) SS, type No. 1.4571 or Ta SS, type No. 1.4571 PTFE (e.g. Teflon) FKM (e.g. Viton)	—	—
With pipes	Connection Pipe Sample cell Restrictor O-rings		Titanium Titanium SS, type No. 1.4571 or tantalum Titanium FKM (Viton) or FFKM (Kalrez)	
With pipes	Connection Pipe Sample cell Restrictor O-rings		SS, type No. 1.4571 SS, type No. 1.4571 SS, type No. 1.4571 or tantalum SS, type No. 1.4571 FKM (Viton) or FFKM (e.g. Kalrez)	
With pipes	Connection Pipe Sample cell Restrictor O-rings		Hastelloy C 22 Hastelloy C 22 SS, type No. 1.4571 or tantalum Hastelloy C 22 FKM (e.g. Viton) or FFKM (e.g. Kalrez)	

Options

Options				
Flowmeter	Metering pipe Float Float limit Elbows	Duran glass Duran glass, black PTFE (Teflon) FKM (Viton)	—	—
Pressure switch	Membrane Enclosure	FKM (Viton) PA 6.3 T	—	—

2

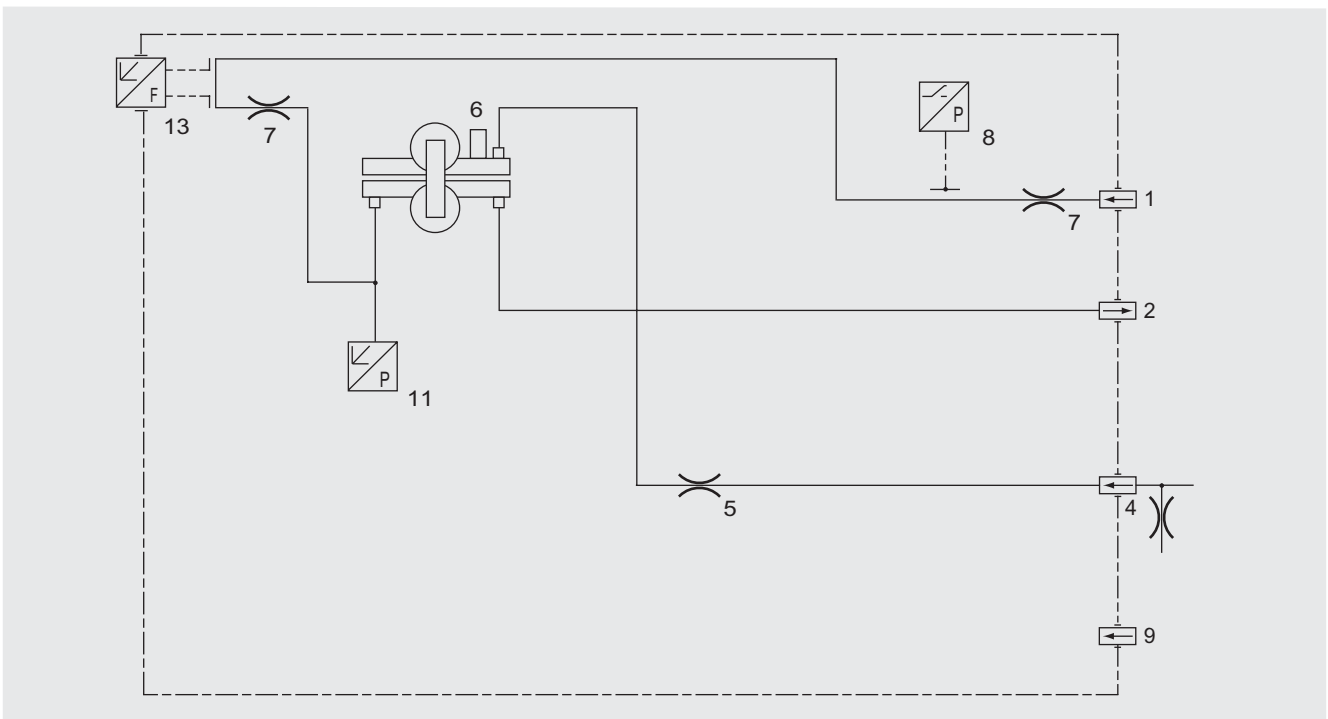
Continuous Gas Analyzers, extractive OXYMAT 6

General

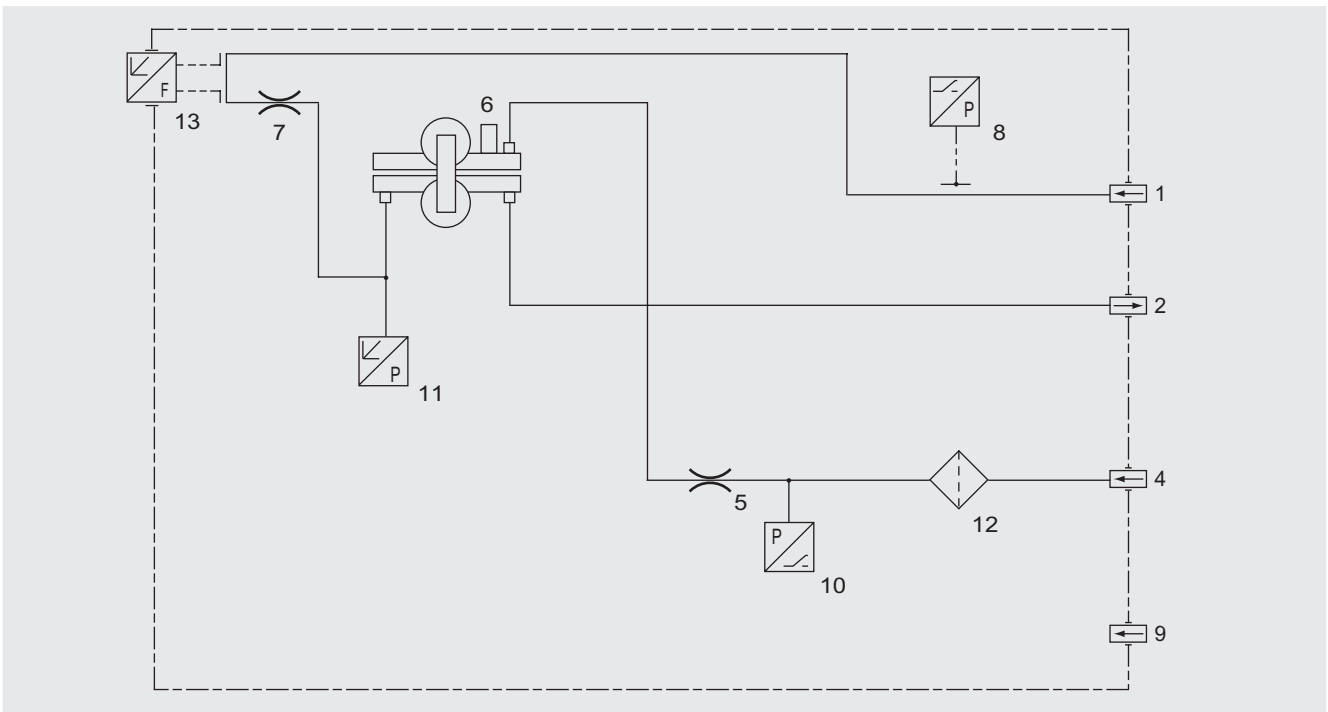
Gas path (19" unit)

Key to gas path figures

- | | |
|--|---|
| 1 Sample gas inlet | 8 Pressure switch in sample gas path (option) |
| 2 Sample gas outlet | 9 Purging gas |
| 3 Not used | 10 Pressure switch in reference gas path (option) |
| 4 Reference gas inlet with outlet restrictor | 11 Pressure sensor |
| 5 Restrictor in reference gas inlet | 12 Filter |
| 6 O ₂ bench | 13 Flowmeter in sample gas path (option) |
| 7 Restrictor in sample gas path | |



Gas path, reference gas connection 2000 to 4000 hPa

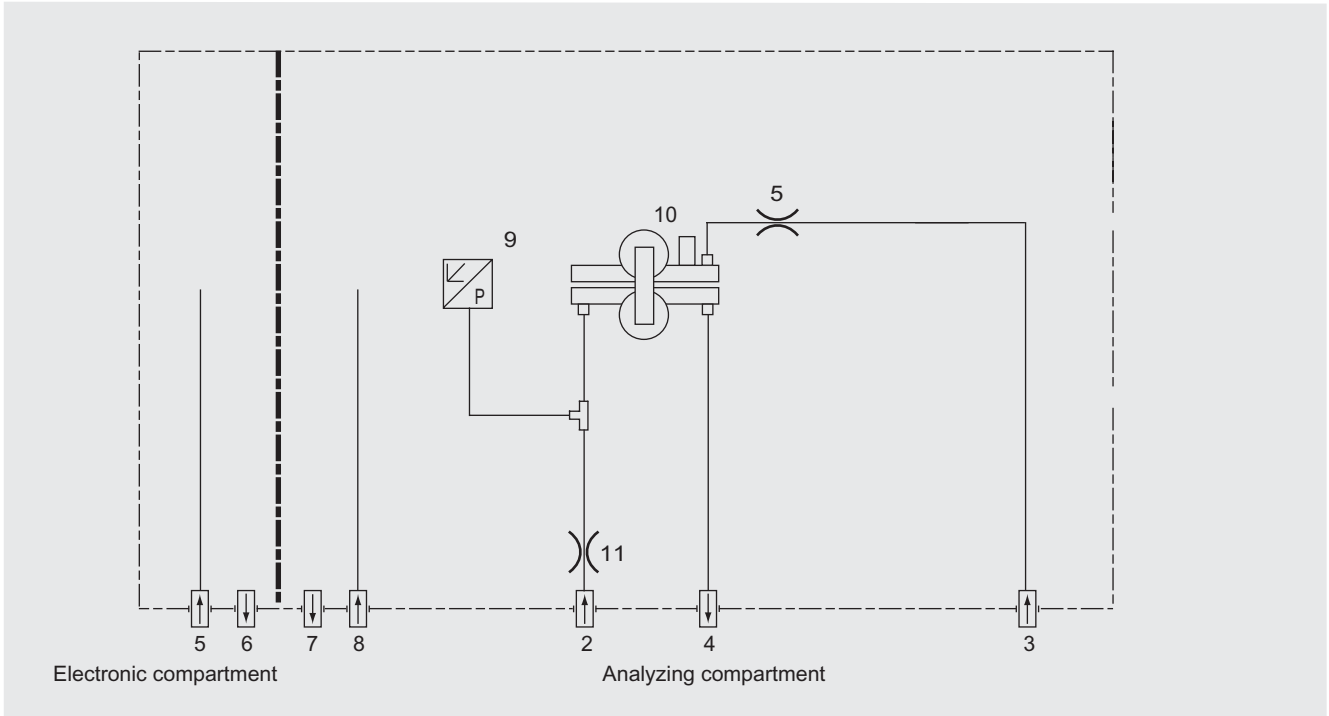


Gas path, reference gas connection 100 hPa

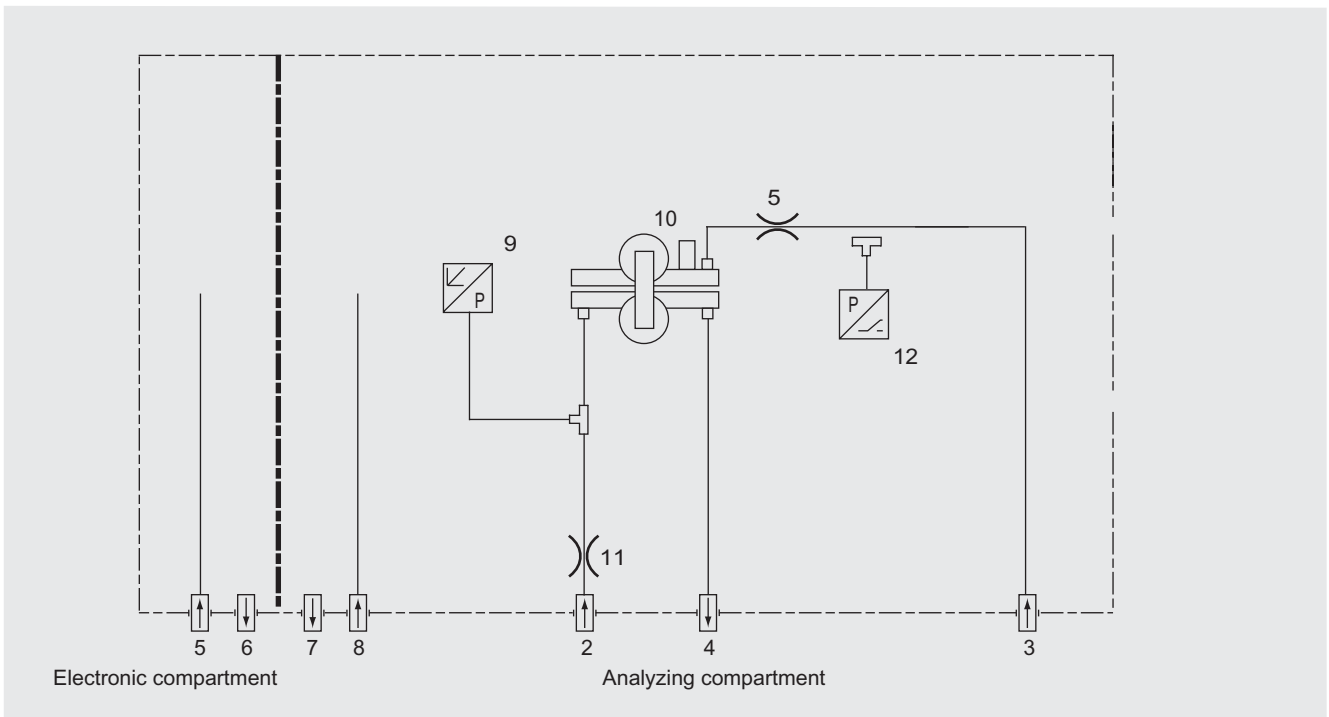
Gas path (field unit)

Key to gas path figures

- | | |
|---|--|
| 1 Not used | 7 Purging gas outlet (analyzing compartment) |
| 2 Sample gas inlet | 8 Purging gas inlet (analyzing compartment) |
| 3 Reference gas inlet | 9 Pressure switch |
| 4 Sample gas outlet | 10 O ₂ bench |
| 5 Purging gas inlet (electronic compartment) | 11 Restrictor in sample gas path |
| 6 Purging gas outlet (electronic compartment) | 12 Pressure switch in reference gas path |



Gas path, reference gas connection 100 hPa



Gas path, reference gas connection 2000 to 4000 hPa

Continuous Gas Analyzers, extractive

OXYMAT 6

General

Function

Mode of operation

In contrast to almost all other gases, oxygen is paramagnetic. This property is utilized as the measuring principle by the OXYMAT 6 gas analyzers.

Oxygen molecules in an inhomogeneous magnetic field are drawn in the direction of increased field strength due to their paramagnetism. When two gases with different oxygen concentrations meet in a magnetic field, a pressure difference is produced between them.

In the case of OXYMAT 6, one gas (1) is a reference gas (N_2 , O_2 or air), the other is the sample gas (5). The reference gas is introduced into the sample cell (6) through two channels (3). One of these reference gas streams meets the sample gas within the area of a magnetic field (7). Because the two channels are connected, the pressure, which is proportional to the oxygen concentration, causes a cross flow. This flow is converted into an electric signal by a microflow sensor (4).

The microflow sensor consists of two nickel grids heated to approx. 120 °C which form a Wheatstone bridge together with two supplementary resistors. The pulsating flow results in a change in the resistance of the Ni grids. This results in a bridge offset which depends on the oxygen concentration in the sample gas.

Because the microflow sensor is located in the reference gas stream, the measurement is not influenced by the thermal conductivity, the specific heat or the internal friction of the sample gas. This also provides a high degree of corrosion resistance because the flow sensor is not exposed to the direct influence of the sample gas.

By using a magnetic field with alternating strength (8), the effect of the background flow in the microflow sensor is not detected, and the measurement is thus independent of the instrument orientation.

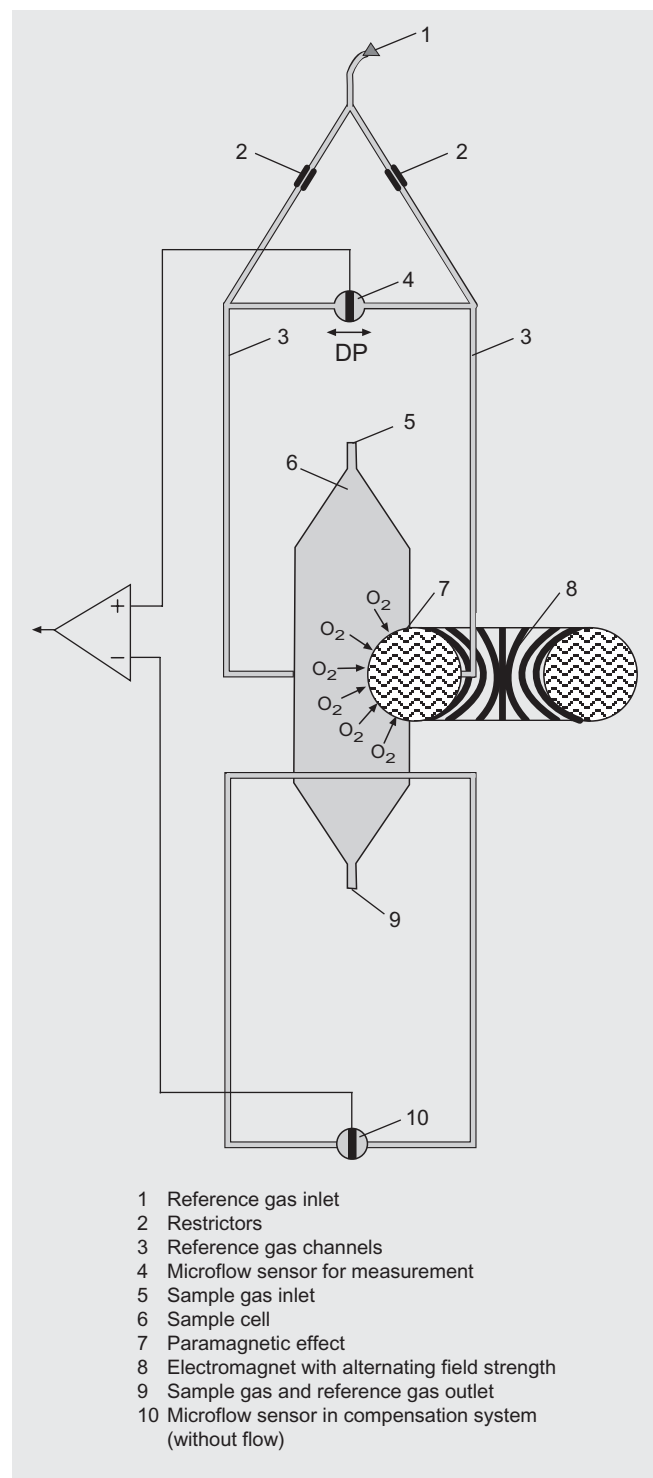
The sample cell is directly in the sample path and has a small volume. The microflow sensor thus responds quickly, resulting in a very short response time for the OXYMAT 6.

Vibrations frequently occur at the place of installation and may falsify the measured signal (noise). A further microflow sensor (10) through which no gas passes acts as a vibration sensor. Its signal is applied to the measured signal as compensation.

If the density of the sample gas deviates by more than 50% from that of the reference gas, the compensation microflow sensor (10) is flushed with reference gas just like the measuring sensor (4).

Note

The sample gas needs to be free of dust. Condensate in the cells must be avoided. That is why the most measuring tasks require an appropriate gas preparation.



OXYMAT 6, mode of operation

Essential characteristics

- Four freely-parameterizable measuring ranges, all measuring ranges linear
- Measuring ranges with physical zero offset possible
- Measuring range identification
- Electrically isolated signal output selectable as 0/2/4 to 20 mA (also inverted)
- Autoranging or manual range switching possible; remote switching is also possible
- Storage of measured values possible during adjustments
- Time constants selectable within wide limits (static/dynamic noise suppression); i.e. the response time of the analyzer can be matched to the respective application
- Short response time
- Low long-term drift
- Measuring-point selection for up to 6 measuring points (programmable)
- Measuring point identification
- Internal pressure sensor for correction of pressure variations in sample gas (range 500 to 2000 hPa absolute)
- External pressure sensor can be connected for correction of variations in sample gas pressure up to 3000 hPa absolute (option)
- Monitoring of sample gas flow (option for tubed version)
- Monitoring of sample gas and/or reference gas (option)
- Monitoring of reference gas with reference gas connection 2000 to 4000 hPa (option)
- Automatic range calibration can be parameterized
- Operation based on NAMUR Recommendation
- Two-stage access code to prevent unintentional and unauthorized inputs
- Simple handling using a numerical membrane keypad including operator prompting
- Customer-specific analyzer options such as e.g.:
 - Customer acceptance
 - Tag labels
 - Drift recording
 - Clean for O₂-Service
 - Kalrez gaskets
- Analyzer section with flow-type compensation circuit: a flow is passed through the compensation branch (option) to reduce the vibration dependency in the case of highly different densities of the sample and reference gases (option)
- Sample cell for use in presence of highly corrosive sample gases.

Continuous Gas Analyzers, extractive

OXYMAT 6

General

Reference gases

Measuring range	Recommended reference gas	Refer. gas connection pressure	Remarks
0 to . . . % v/v O ₂	N ₂	2000 to 4000 hPa above sample gas pressure (max. 5000 hPa absolute)	The reference gas flow is set automatically to 5 to 10 ml/min (up to 20 ml/min when also flowing through compensation branch)
. . . to 100% v/v O ₂ (suppressed zero with full-scale value 100% v/v O ₂)	O ₂		
Around 21% v/v O ₂ (suppressed zero with 21% v/v O ₂ within the span)	Air	100 hPa with respect to sample gas pressure which may vary by max. 50 hPa around the atmospheric pressure	

Table 1 Reference gases for OXYMAT 6

Correction of zero error / Cross interferences

Residual gas (concentration 100% v/v)	Zero deviation in % v/v O ₂ absolute	Residual gas (concentration 100% v/v)	Zero deviation in % v/v O ₂ absolute
Organic gases		Inert gases	
Acetic acid CH ₃ COOH	-0.64	Argon Ar	-0.25
Acetylene C ₂ H ₂	-0.29	Helium He	+0.33
1,2 butadiene C ₄ H ₆	-0.65	Krypton Kr	-0.55
1,3 butadiene C ₄ H ₆	-0.49	Neon Ne	+0.17
iso-butane C ₄ H ₁₀	-1.30	Xenon Xe	-1.05
n-butane C ₄ H ₁₀	-1.26		
1-butene C ₄ H ₆	-0.96	Anorganic gases	
iso-butene C ₄ H ₈	-1.06	Ammonia NH ₃	-0.20
Cyclo-hexane C ₆ H ₁₂	-1.84	Carbon dioxide CO ₂	-0.30
Dichlorodifluoromethane (R12) CCl ₂ F ₂	-1.32	Carbon monoxide CO	+0.07
Ethane C ₂ H ₆	-0.49	Chlorine Cl ₂	-0.94
Ethylene C ₂ H ₄	-0.22	Dinitrogen monoxide N ₂ O	-0.23
n-heptane C ₇ H ₁₆	-2.4	Hydrogen H ₂	+0.26
n-hexane C ₆ H ₁₄	-2.02	Hydrogen bromide HBr	-0.76
Methane CH ₄	-0.18	Hydrogen chloride HCl	-0.35
Methanol CH ₃ OH	-0.31	Hydrogen fluoride HF	-0.10
n-octane C ₈ H ₁₈	-2.78	Hydrogen iodide HI	-1.19
n-pentane C ₅ H ₁₂	-1.68	Hydrogen sulphide H ₂ S	-0.44
iso-pentane C ₅ H ₁₂	-1.49	Oxygen O ₂	+100
Propane C ₃ H ₈	-0.87	Nitrogen N ₂	0.00
Propylene C ₃ H ₆	-0.64	Nitrogen dioxide NO ₂	+20.00
Trichlorofluoromethane (R11) CCl ₃ F	-1.63	Nitrogen oxide NO	+42.94
Vinyl chloride C ₂ H ₃ Cl	-0.77	Sulphur dioxide SO ₂	-0.20
Vinyl fluoride C ₂ H ₃ F	-0.55	Sulphur hexafluoride SF ₆	-1.05
1,1 vinylidene chloride C ₂ H ₂ Cl ₂	-1.22	Water H ₂ O	-0.03

Table 2 Zero error due to diamagnetism or paramagnetism of residual gases with nitrogen as the reference gas at 60 °C and 1000 hPa absolute (according to IEC 1207/3)

Conversion to other temperatures:

The zero errors mentioned in Table 2 must be multiplied with a correction factor (k):

- with diamagnetic gases: $k = 333 \text{ K} / (\vartheta [^{\circ}\text{C}] + 273 \text{ K})$
- with paramagnetic gases: $k = [333 \text{ K} / (\vartheta [^{\circ}\text{C}] + 273 \text{ K})]^2$

(all diamagnetic gases have a negative zero error).

Continuous Gas Analyzers, extractive

OXYMAT 6

19" unit

2

Technical specifications

General

Measuring ranges	4, switchable internally and externally; autoranging is also possible
Smallest possible measuring span (referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature)	0.5% v/v 2% v/v or 5% v/v O ₂
Largest possible measuring span	100% v/v O ₂ (for a pressure over 2000 hPa: 25% v/v O ₂)
Measuring ranges with suppressed zero	Any zero point is possible between 0 and 100% v/v as long as a suitable reference gas is used (see Table 1 in „Function“)
Position of use	Front panel vertical
Conformity	CE identification EN 50081-1, EN 50082-2

Design, enclosure

Degree of protection	IP20 according to EN 60529
Weight	Approx. 13 kg

Electrical characteristics

Power supply	100 ... 120 V AC (rated range 90 V ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (rated range 180 V ... 264 V), 48 ... 63 Hz
Power consumption	Approx. 35 VA
EMC interference immunity (ElectroMagnetic Compatibility)	According to standard requirements of NAMUR NE21 (08/98), EN 61326, EN 50270 (with gas warning unit)
Electrical safety	According to EN 61010-1, overvoltage category III
Fuse links	100 ... 120 V: 1.0T/250 200 ... 240 V: 0.63T/250

Gas inlet conditions

Permissible sample gas pressure	
• For analyzers with piping	500 ... 3000 hPa absolute
• For analyzers with hoses	
- Without pressure switch	500 ... 1500 hPa absolute
- With pressure switch	500 ... 1300 hPa absolute
Sample gas flow	18 ... 60 l/h (0.3 ... 1 l/min)
Sample gas temperature	0 ... 50 °C
Sample gas humidity	< 90 % relative humidity

Time response

Warm-up period	With ambient temperature < 30 min (maximum accuracy achieved after 2 hours)
Response time (T ₉₀)	min. 1.5 ... 3.5 s depending on version
Damping (electric time constant)	0 ... 100 s, programmable
Dead time (purging time of gas path in analyzer at 1 l/min)	Approx. 0.5 ... 2.5 s, depending on version
Time for internal signal processing	< 1 s

Pressure correction range

Pressure sensor	
• Internal	500 ... 2000 hPa absolute
• External	500 ... 3000 hPa absolute

Measuring response (referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Output signal fluctuation	< 0.75% of smallest possible measuring range specified on rating plate with an electronic time constant of 1 s (corresponds to ± 0.25% with 2σ)
Zero drift	< 0.5%/month of smallest possible measuring span specified on rating plate
Measured-value drift	< 0.5%/month of respective measuring span
Repeatability	< 1%/month of respective measuring span
Minimum detection limit	1% of current measuring range
Linearity error	< 1%/month of respective measuring span

Influencing variables (referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Ambient temperature	< 0.5%/10 K referred to the smallest possible measuring span according to rating plate, with measuring span 0.5%: 1%/10 K
Sample gas pressure (with air (100 hPa) as reference gas, a correction of the atmospheric pressure fluctuations is only possible when the sample gas is vented to ambient air)	Without pressure compensation: < 2% of measuring span/1% change in pressure with pressure compensation: < 0.2% of measuring span/1% change in pressure
Residual gases	Deviation in zero point corresponding to paramagnetic or diamagnetic deviation of residual gas
Sample gas flow	< 1% of smallest possible measuring span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range
Power supply	< 0.1% of output signal span with rated voltage ± 10%

Electric inputs and outputs

Analog output	0/2/4 ... 20 mA, floating; max. load 750 Ω
Relay outputs	6, with changeover contacts, freely selectable, e.g. for range identification; loading capacity: 24 V AC/DC/ 1 A, floating
Analog inputs	2, designed for 0/2/4 ... 20 mA, for external pressure sensor and correction of influence of residual gas (correction of cross interference)
Binary inputs	6, designed for 24 V, floating, freely-selectable, e.g. for range switching
Serial interface	RS 485
Options	Autocal function with 8 binary inputs and 8 relay outputs; also with PROFIBUS PA or PROFIBUS DP

Ambient conditions

Perm. ambient temperature	-30 ... +70 °C during storage and transport, +5 ... +45 °C during operation
Permissible humidity	< 90% relative humidity as annual average, during storage and transport (dew point must not be fallen below)

Continuous Gas Analyzers, extractive

OXYMAT 6

19" unit

2

Selection and Ordering Data

OXYMAT 6 gas analyzer

19" unit for installation in cabinets

Gas connections

Piping with outer diameter 6 mm
Piping with outer diameter 1/4"

Smallest possible span O₂

0.5% reference gas pressure 3000 hPa
0.5% reference gas pressure 100 hPa (external pump)
2% reference gas pressure 3000 hPa
2% reference gas pressure 100 hPa (external pump)
5% reference gas pressure 3000 hPa
5% reference gas pressure 100 hPa (external pump)

Sample cell

without flow-type compensation branch
• made of stainless steel, type No. 1.4571
• made of tantalum
with flow-type compensation branch
• made of stainless steel, type No. 1.4571
• made of tantalum

Internal gas paths

Hose made of FKM (Viton)
Titanium piping
Pipe made of stainless steel, type No. 1.4571

Power supply

100 ... 120 V AC, 48 ... 63 Hz
200 ... 240 V AC, 48 ... 63 Hz

Monitoring (reference gas, sample gas)

Without
Reference gas only
Reference gas and sample gas
(with flowmeter and pressure switch for sample gas)
Sample gas only

Additional electronics

Without
Autocal function
• With additional 8 binary inputs/outputs
• With serial interface for the automotive industry (AK)
• With additional 8 binary inputs/outputs and PROFIBUS PA interface
• With additional 8 binary inputs/outputs and PROFIBUS DP interface

Language

German
English
French
Spanish
Italian

Order No.

7MB2021 - 0 -

cannot be combined

0	A	A → E30
1	B	B → E30, Y02
	C	
	D	D → E30, Y02
	E	
	F	F → E30, Y02
	A	
	B	
	C	C → E30
	D	D → E30
0		
1		1 → Y02
2		
0	A	A → E30
1	B	B → E30
	C	C → E30
	D	D → E30
	A	
	B	
	D	D → E20
	E	
	F	
0		
1		
2		
3		
4		

Further versions

Please add „-Z“ to Order No. and specify Order code

Order code

Interface converter from RS 485 to RS 232	A11	→ E20
Slide rails (2 rails)	A31	
Set of Torx tools	A32	
Kalrez gaskets in sample gas path	B01	
TAG labels (customer-defined inscriptions)	B03	
CSA certificate – Class I Div. 2	E20	→ E30
ATEX II 2G certificate; safety-relevant measurements in non-hazardous gas zone	E30	→ E20
Clean for O ₂ service (specially cleaned gas path)	Y02	
Measuring range in plain text, if different from standard setting	Y11	

Continuous Gas Analyzers, extractive OXYMAT 6

19" unit

2

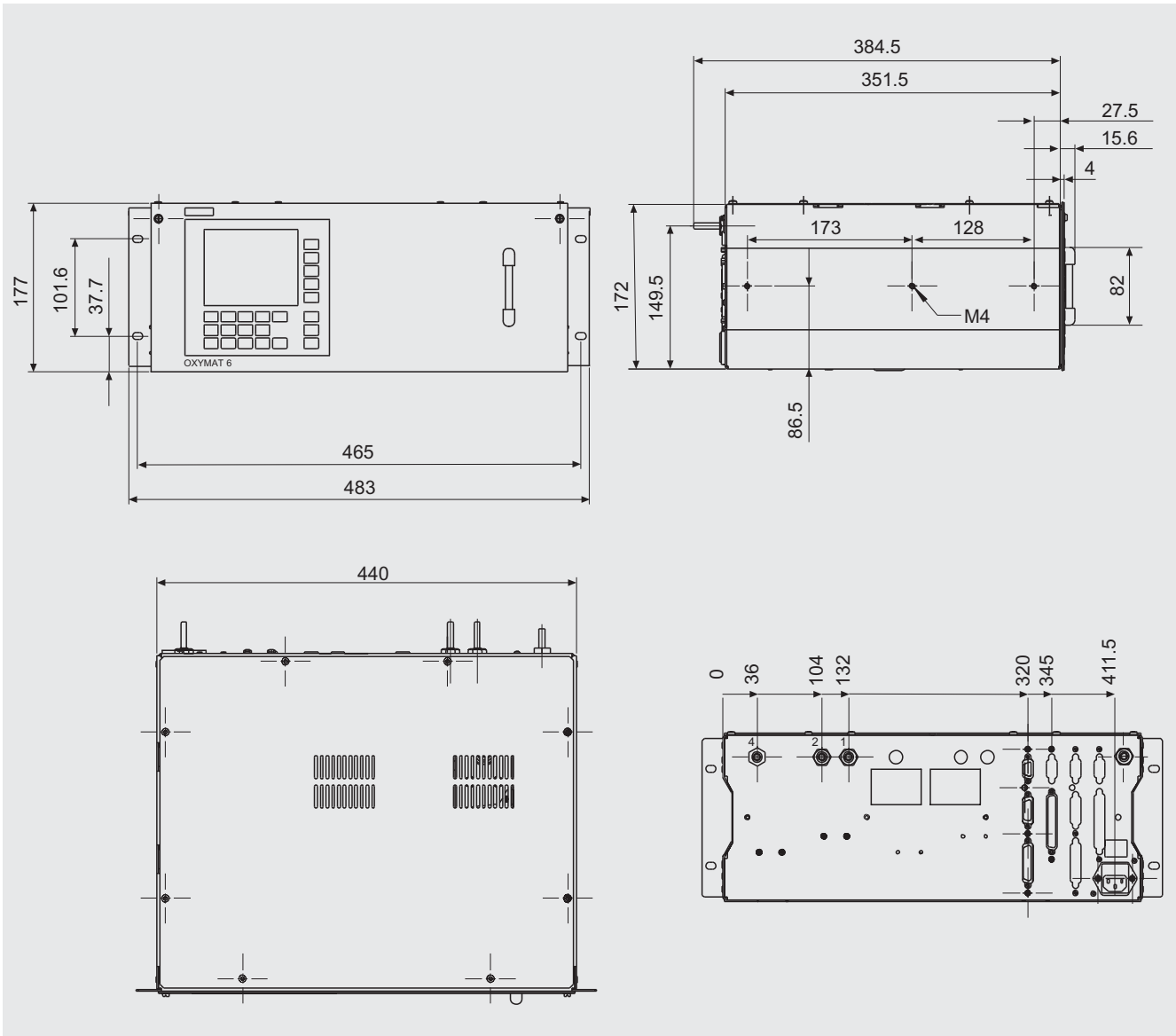
Retrofitting sets

- RS 485/Ethernet converter
- RS 485/RS 232 converter
- Autocal function with serial interface for the automotive industry (AK)
- Autocal function with 8 binary inputs/outputs
- Autocal function with 8 binary inputs/outputs and PROFIBUS PA
- Autocal function with 8 binary inputs/outputs and PROFIBUS DP

Order No.

- C79451-A3364-D61
- C79451-Z1589-U1
- C79451-A3480-D512
- C79451-A3480-D511
- A5E00057307
- A5E00057312

Dimensional drawings



OXYMAT 6, 19" unit, dimensions in mm

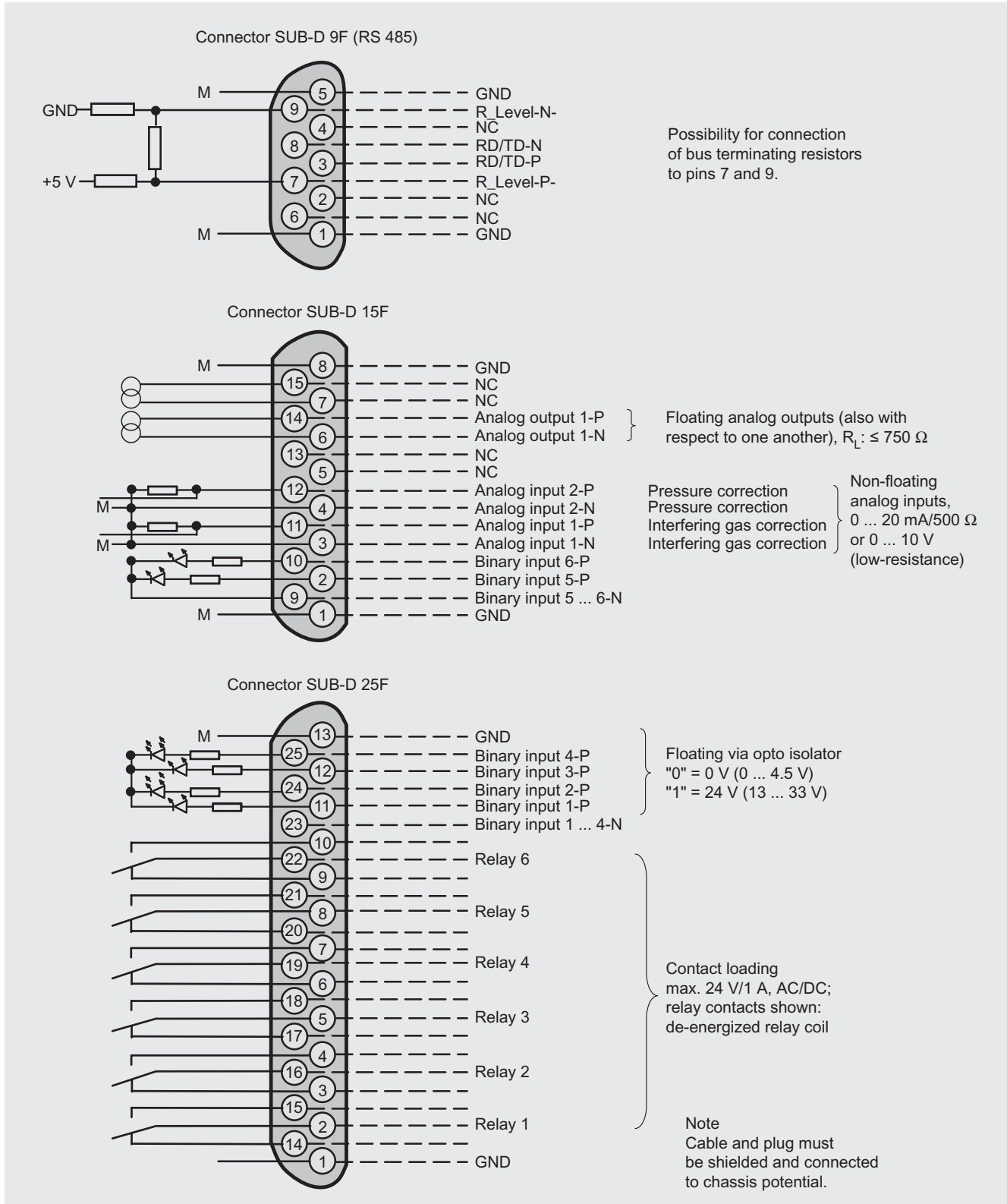
Continuous Gas Analyzers, extractive OXYMAT 6

19" unit

Schematics

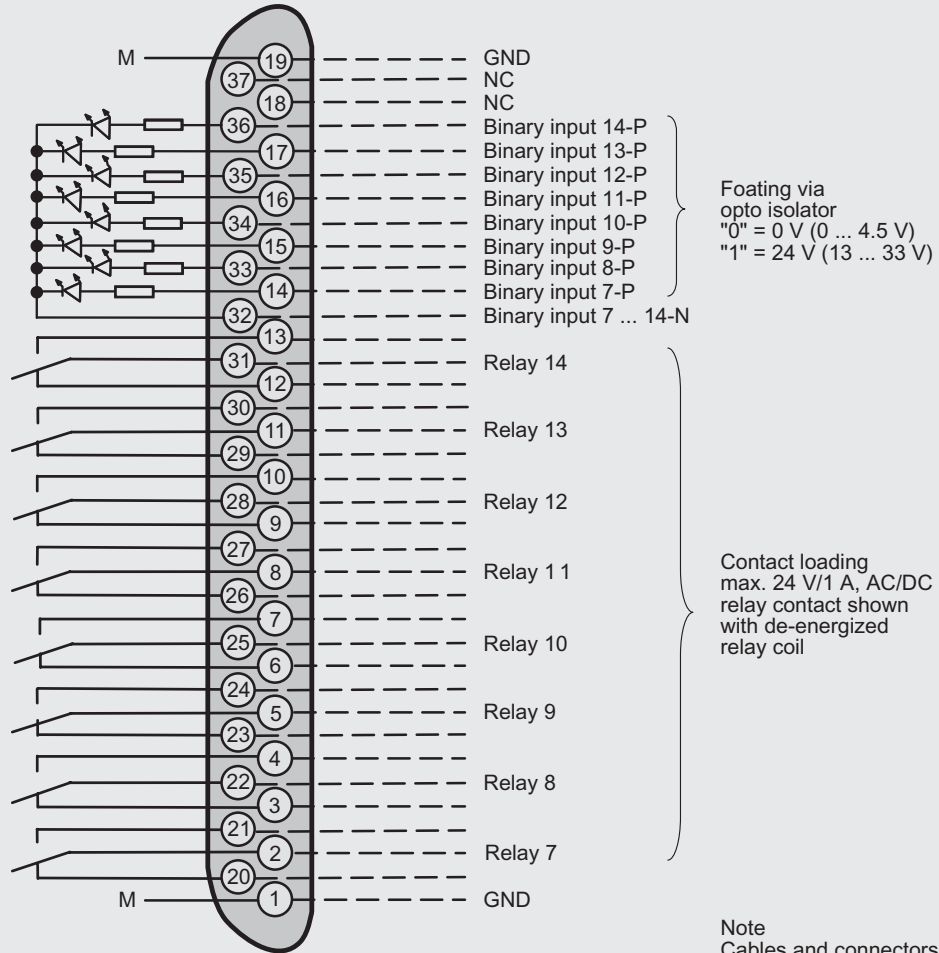
Pin assignment (electrical and gas connections)

2



OXYMAT 6, 19" unit, pin assignment

Connector SUB-D 37F (Option)

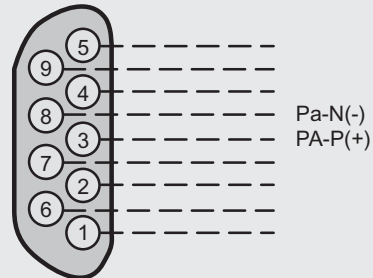
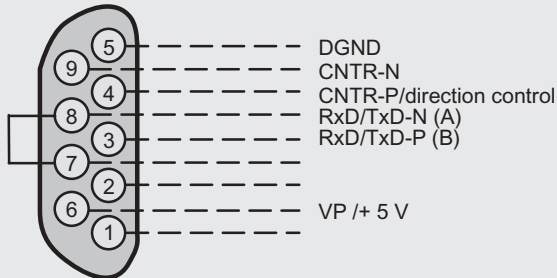


Note
Cables and connectors must be shielded and connected to chassis potential.

Connector SUB-D 9F -X90
PROFIBUS DP

optional

Connector SUB-D 9M -X90
PROFIBUS PA

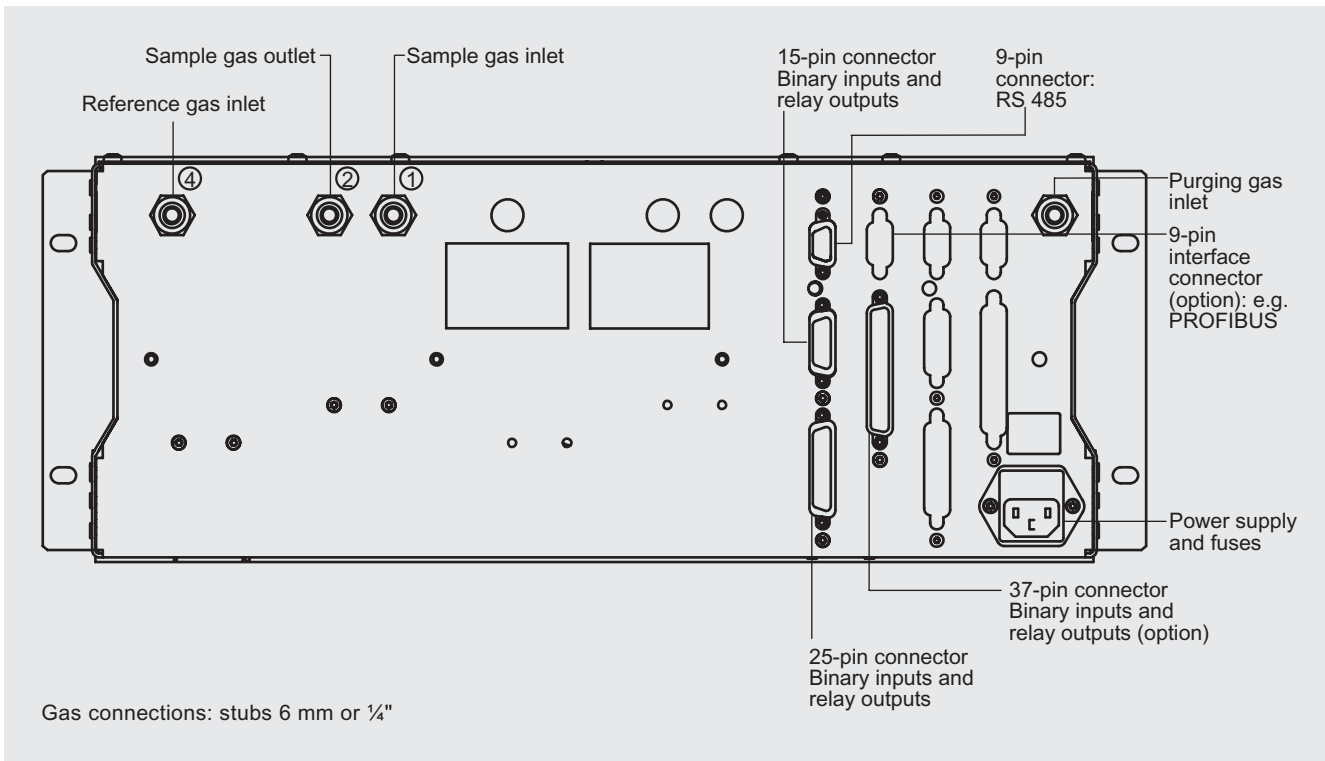


OXYMAT 6, 19" unit, pin assignment of Autocal board and PROFIBUS connectors

Continuous Gas Analyzers, extractive OXYMAT 6

19" unit

2



OXYMAT 6, 19" unit, gas and electrical connections

Technical specifications

General

Measuring ranges	4, switchable internally and externally; autoranging is also possible
Smallest possible measuring span (referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature, smallest possible measuring span with heated version: 0.5% (< 65 °C); 0.5 ... 1% (65 ... 90 °C); 1 ... 2% (90 ... 130 °C))	0.5% v/v 2% v/v or 5% v/v O ₂
Largest possible measuring span	100% v/v O ₂ (for a pressure over 2000 hPa: 25% v/v O ₂)
Measuring ranges with elevated zero	Any zero point is possible between 0 and 100% v/v as long as a suitable reference gas is used (see Table 1 in „Function“)
Position of use	Front panel vertical
Conformity	CE identification EN 50081-1, EN 50082-2

Design, enclosure

Degree of protection	IP65 according to EN 60529, gas restricted breathing according to EN 50021
Weight	Approx. 28 kg

Electrical characteristics

Power supply	100 ... 120 V AC (rated range 90 V ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (rated range 180 V ... 264 V), 48 ... 63 Hz
Power consumption	Approx. 35 VA, approx. 330 VA with heated version
EMC interference immunity (ElectroMagnetic Compatibility)	According to standard requirements of NAMUR NE21 (08/98), EN 61326, EN 50270 (with gas warning unit)
Electrical safety	According to EN 61010-1
• Heated units	Overvoltage category II
• Unheated units	Overvoltage category III
Fuse links (units without heating)	
• 100 ... 120 V	F3: 1T/250; F4: 1T/250
• 200 ... 240 V	F3: 0.63T/250; F4: 0.63T/250
Fuse links (units with heating)	
• 100 ... 120 V	F1: 1T/250; F2: 4T/250 F3: 4T/250; F4: 4T/250
• 200 ... 240 V	F1: 0.63T/250; F2: 2.5T/250 F3: 2.5T/250; F4: 2.5T/250

Gas inlet conditions

Permissible sample gas pressure	
• For analyzers with piping	500 ... 1500 hPa absolute
• For analyzers with hoses	500 ... 3000 hPa absolute
• For analyzers with hoses, Ex version	
- Leakage compensation	500 ... 1160 hPa absolute
- Continuous purging	500 ... 3000 hPa absolute
• Purging gas pressure	
- Permanent	< 165 hPa above environment
- Short time	Max. 250 hPa above environment

Sample gas flow	18 ... 60 l/h (0.3 ... 1 l/min)
Sample gas temperature	0 ... 50 °C (unheated), up to 15 °C over temperature analyzer section (heated)
Sample gas humidity	< 90 % relative humidity
Time response	
Warm-up period	With ambient temperature < 30 min (maximum accuracy achieved after 2 hours)
Response time	T ₉₀ < 1.5 s
Damping (electric time constant)	0 ... 100 s, programmable
Dead time (purging time of gas path in analyzer at 1 l/min)	Approx. 0.5 s
Time for internal signal processing	< 1 s
Pressure correction range	
Pressure sensor	
• Internal	500 ... 2000 hPa absolute
• External	500 ... 3000 hPa absolute
Measuring response (referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Output signal fluctuation	< 0.75% of smallest possible measuring range specified on rating plate with an electronic time constant of 1 s (corresponds to ± 0.25% with 2σ)
Zero drift	< 0.5%/month of smallest possible measuring span specified on rating plate
Measured-value drift	< 0.5%/month of respective measuring span
Repeatability	< 1%/month of respective measuring span
Minimum detection limit	1% of current measuring range
Linearity error	< 1%/month of respective measuring span
Influencing variables (referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Ambient temperature	< 0.5%/10 K referred to the smallest possible measuring span according to rating plate, with measuring span 0.5%: 1%/10 K
Sample gas pressure (with air (100 hPa) as reference gas, a correction of the atmospheric pressure fluctuations is only possible when the sample gas is vented to ambient air)	Without pressure compensation: < 2% of measuring span/1% change in pressure with pressure compensation: < 0.2% of measuring span/1% change in pressure
Residual gases	Deviation in zero point corresponding to paramagnetic or diamagnetic deviation of residual gas
Sample gas flow	< 1% of smallest possible measuring span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range; heated version up to double error
Power supply	< 0.1% of output signal span with rated voltage ± 10%

Continuous Gas Analyzers, extractive

OXYMAT 6

Field unit

Electric inputs and outputs

Analog output	0/2/4 ... 20 mA, floating; max. load 750 Ω
Relay outputs	6, with changeover contacts, freely selectable, e.g. for range identification; loading capacity: 24 V AC/DC/1 A, floating
Analog inputs	2, designed for 0/2/4 ... 20 mA, for external pressure sensor and correction of influence of residual gas (correction of cross interference)
Binary inputs	6, designed for 24 V, floating, freely-selectable, e.g. for range switching
Serial interface	RS 485
Options	Autocal function with 8 binary inputs and 8 relay outputs; also with PROFIBUS PA or PROFIBUS DP

Ambient conditions

Perm. ambient temperature	-30 ... +70 °C during storage and transport, +5 ... +45 °C during operation
Permissible humidity	< 90% relative humidity as annual average, during storage and transport (dew point must not be fallen below)

Continuous Gas Analyzers, extractive OXYMAT 6

Field unit

2

Selection and Ordering Data

Order No.

OXYMAT 6 gas analyzer
for field mounting

7MB2011-0-0-0-0-0-0-0

cannot be combined

Gas connections for sample gas and reference gas

Ferrule screw connection made of stainless steel (type No. 1.4571)

- Piping with outer diameter 6 mm
- Piping with outer diameter 1/4"

Ferrule screw connection made of titanium

- Piping with outer diameter 6 mm
- Piping with outer diameter 1/4"

Piping and gas connections made of Hastelloy C22:
7MB2011-0.... + Order code D01 or D02

0
1

2
3

0 → D02
1 → D01

2 → D01, D02, Y02
3 → D01, D02, Y02

Smallest possible span O₂

0.5% reference gas pressure 3000 hPa

0.5% reference gas pressure 100 hPa (external pump)

2% reference gas pressure 3000 hPa

2% reference gas pressure 100 hPa (external pump)

5% reference gas pressure 3000 hPa

5% reference gas pressure 100 hPa (external pump)

A
B
C
D
E
F

A
B B → Y02
D D → Y02
F F → Y02

Sample cell

without flow-type compensation branch

- made of stainless steel, type No. 1.4571
- made of tantalum

with flow-type compensation branch

- made of stainless steel, type No. 1.4571
- made of tantalum

A
B

C
D

B B → Y02
D D → Y02
F F → Y02

Heating of the internal gas paths and analyzer section

Without

With (65 ... 130 °C)

0
1

Power supply

100 ... 120 V AC, 48 ... 63 Hz

200 ... 240 V AC, 48 ... 63 Hz

100 ... 120 V AC, 48 ... 63 Hz, according to ATEX II 2G¹
(mode of operation: leakage compensation)

200 ... 240 V AC, 48 ... 63 Hz, according to ATEX II 2G¹
(mode of operation: leakage compensation)

100 ... 120 V AC, 48 ... 63 Hz, according to ATEX II 2G¹
(mode of operation: continuous purging)

200 ... 240 V AC, 48 ... 63 Hz, according to ATEX II 2G¹
(mode of operation: continuous purging)

0
1
2
3
6
7

0
1
2 2 2 → E11, E12
3 3 3 → E11, E12
6 6 6 → E11, E12
7 7 7 → E11, E12

Reference gas monitoring

Without

With

A
B

B → A

Additional electronics

Without

Autocal function

- With additional 8 binary inputs and 8 relay outputs
- With additional 8 binary inputs/outputs and PROFIBUS PA interface
- With additional 8 binary inputs/outputs and PROFIBUS PA interface
- With additional 8 binary inputs/outputs and PROFIBUS PA Ex i

A
B
E
F
G

B
E
F
G

Language

German

English

French

Spanish

Italian

0
1
2
3
4

¹ See also next page, „Additional units for explosion-proof versions“.

Continuous Gas Analyzers, extractive

OXYMAT 6

Field unit

Selection and Ordering Data

Further versions

Please add „Z“ to Order No. and specify Order code

Interface converter from RS 485 to RS 232

Order code

cannot be combined

Set of Torx tools

Kalrez gaskets in sample gas path

TAG labels (customer-defined inscriptions)

Gas connections and piping made of Hastelloy C22

- External diameter 6 mm
- External diameter 1/4"

A11

→ E20

A32

B01

B03

D01

→ E20

D02

→ E20

Ex versions

Combination possibilities s. Table Ex configurations in „Ex versions“

ATEX II 3G certificate; restricted breathing, non-flammable gases

ATEX II 3G certificate; flammable gases ¹⁾

CSA certificate – Class I Div. 2

ATEX II G certificate; safety-relevant measurements

- in non-hazardous gas zone
- in Ex zone acc. ATEX II 2G, leakage compensation ¹⁾
- in Ex zone acc. ATEX II 2G, continuous purging ¹⁾
- in Ex-Zone acc. ATEX II 3G, flammable and non-flammable gases
 - extended element with heated units; 110/120 V
 - extended element with heated units; 220/240 V

E11

E12

E20

E30

E31

E32

E33

E38

E39

ATEX II 3D certificate; explosive dust atmosphere

- in non-hazardous gas zone
- in Ex zone acc. ATEX II 3G, and non-flammable gases
- in Ex zone acc. ATEX II 3G, and flammable gases ¹⁾

E40

E41

E42

Clean for O₂ service (specially cleaned gas path)

Y02

Measuring range in plain text, if different from standard setting

Y11

Order No.

Additional units for explosion-proof versions categorie ATEX II 2G (zone 1)

BARTEC EEx p control unit, 230 V, „leakage compensation“

7MB8000-2BA

BARTEC EEx p control unit, 115 V, „leakage compensation“

7MB8000-2BB

BARTEC EEx p control unit, 230 V, „continuous purging“

7MB8000-2CA

BARTEC EEx p control unit, 115 V, „continuous purging“

7MB8000-2CB

Explosion-protected isolation amplifier

7MB8000-3AA

Explosion-protected isolating relay, 230 V

7MB8000-4AA

Explosion-protected isolating relay, 110 V

7MB8000-4AB

Differential pressure switch for corrosive gases

7MB8000-5AA

Differential pressure switch for non-corrosive gases

7MB8000-5AB

Flame arrestor made of stainless steel

7MB8000-6BA

Flame arrestor made of Hastelloy

7MB8000-6BB

Categorie ATEX II 3G (zone 2)

BARTEC EEx p control unit (flammable gases)

7MB8000-1BA

FM/CSA (Class I Div. 2)

Ex purging unit MiniPurge FM

7MB8000-1AA

Retrofitting sets

RS 485/Ethernet converter

C79451-A3364-D61

RS 485/RS 232 converter

C79451-Z1589-U1

Autocal function with 8 binary inputs/outputs

A5E00064223

Autocal function with 8 binary inputs/outputs and PROFIBUS PA

A5E00057315

Autocal function with 8 binary inputs/outputs and PROFIBUS DP

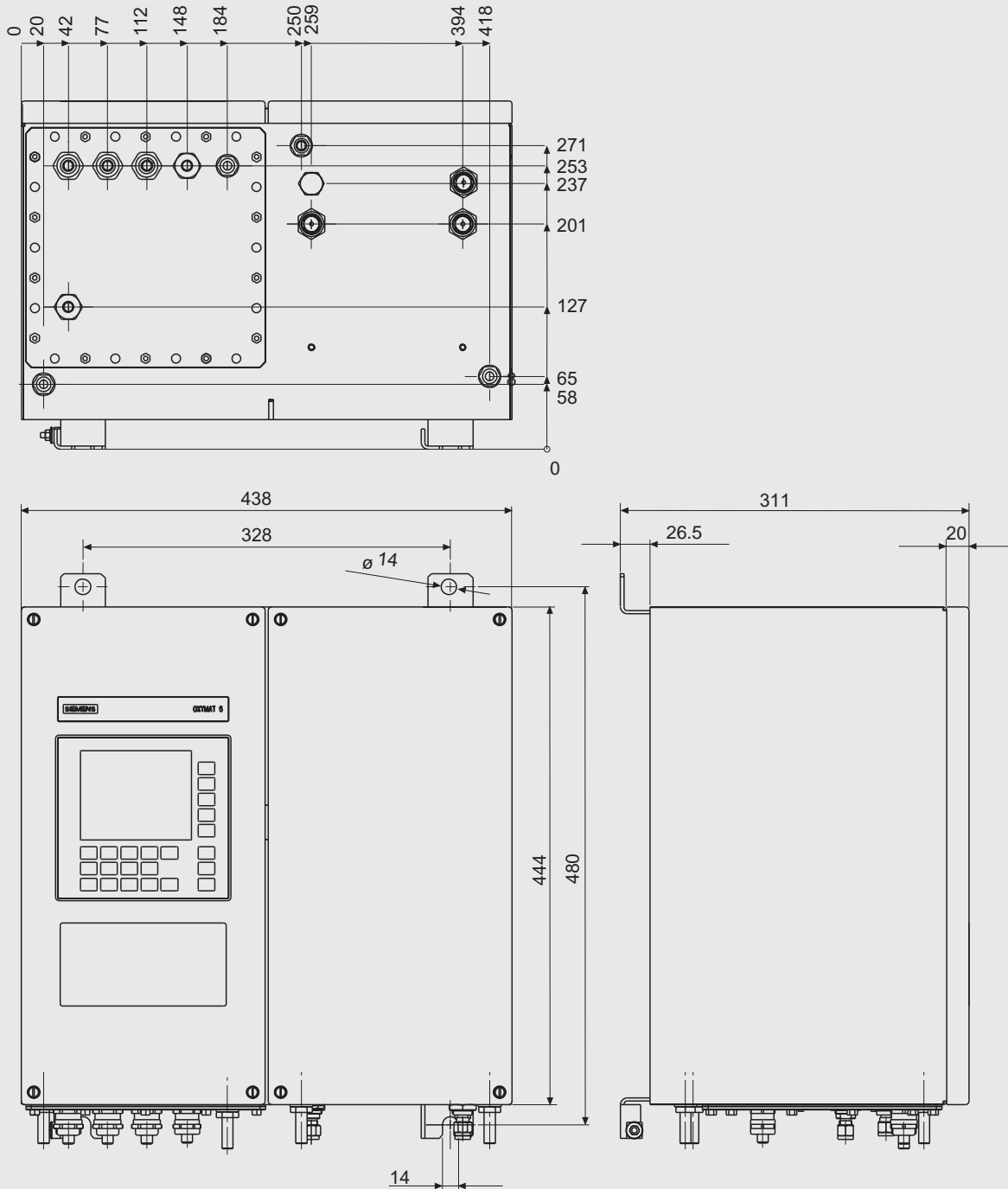
A5E00057318

Autocal function with 8 binary inputs/outputs and PROFIBUS PA Ex i (Firmware 4.1.10 required)

A5E00057317

1) Only in relation with an approved purging unit.

Dimensional drawings



OXYMAT 6, field unit, dimensions in mm

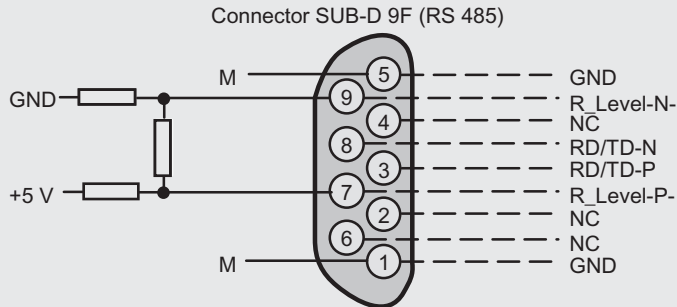
Continuous Gas Analyzers, extractive OXYMAT 6

Field unit

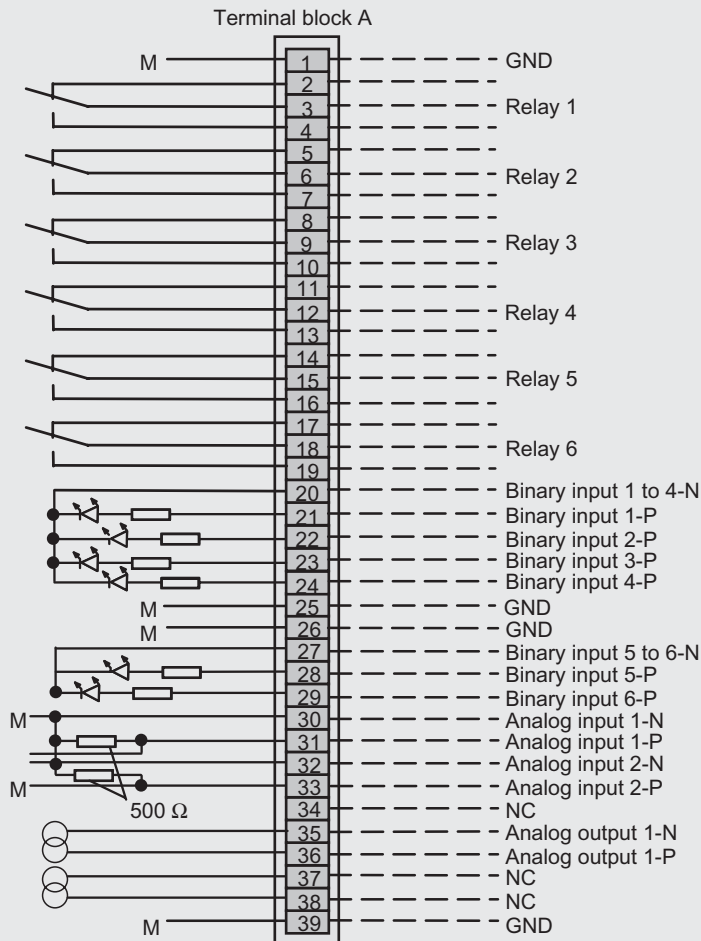
Schematics

Pin assignment (electrical and gas connections)

2



Possibility for connection of bus terminating resistors to pins 7 and 9.



Contact loading
max. 24 V/1 A, AC/DC;
relay contacts shown:
de-energized relay coil

Floating via opto isolator
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)

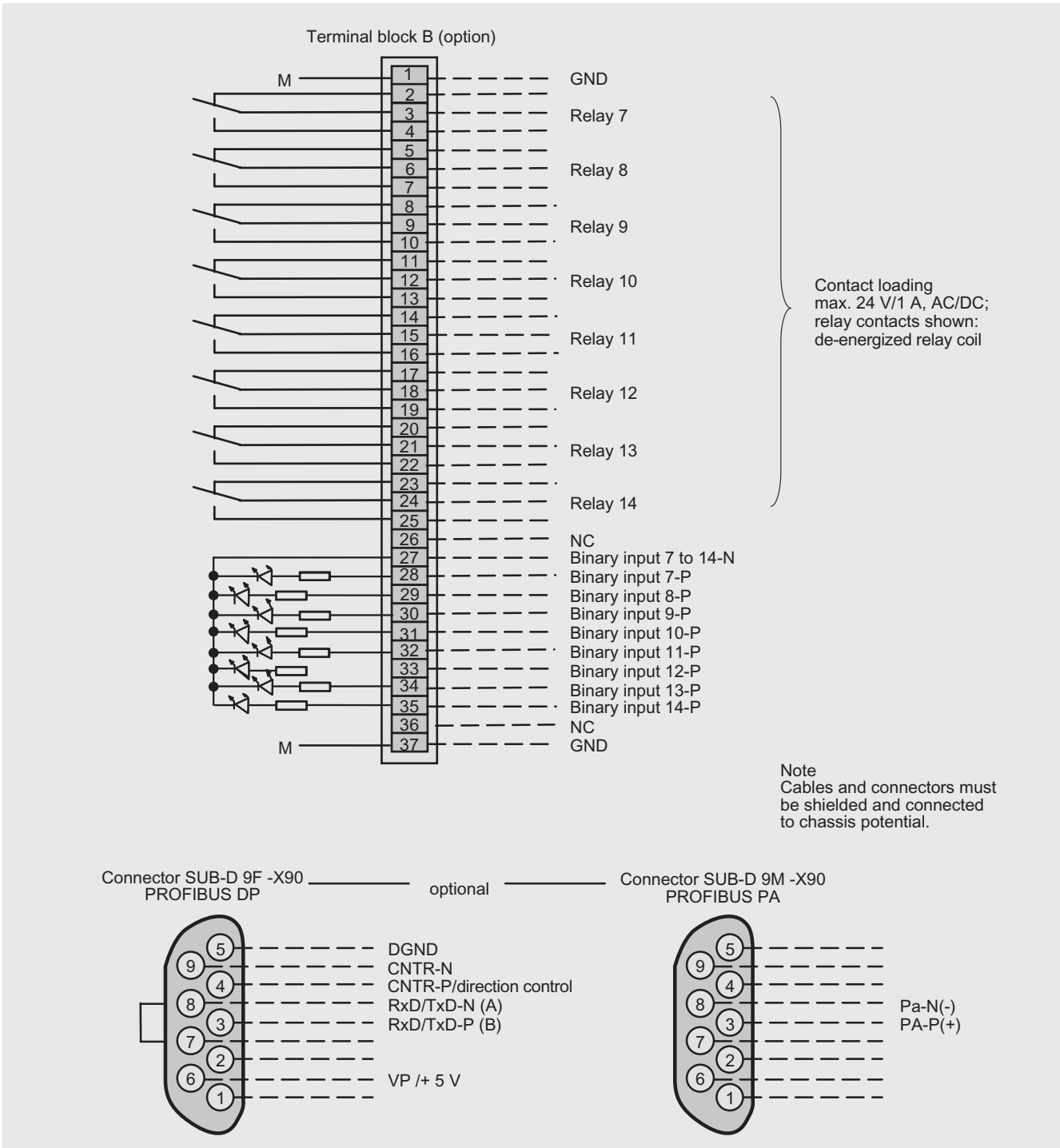
Floating via opto isolator
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)

Interfering gas corr. } Non-floating analog inputs,
Interfering gas corr. } 0 to 20 mA or 0 ... 10 V
Pressure correction } (int. resistance ≤ 500 Ω)
Pressure correction }

Analog outputs
floating

Note
Cables and connectors must
be shielded and connected
to chassis potential.

OXYMAT 6, field unit, connector and terminal assignment

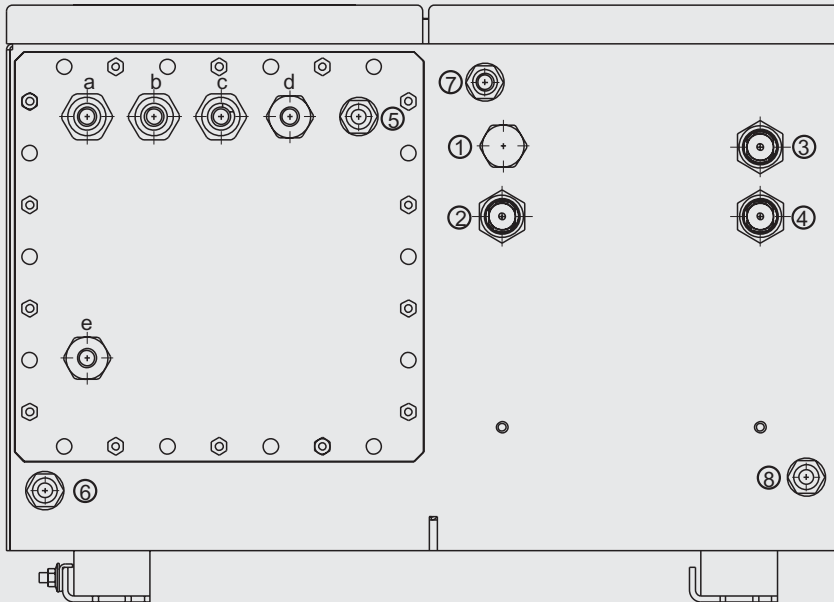


OXYMAT 6, field unit, connector and terminal assignment of the Autocal board and PROFIBUS connectors

Continuous Gas Analyzers, extractive OXYMAT 6

Field unit

2



Gas connections

- | | | |
|-----|----------------------------|---|
| ① | not used | } Clamping gland for pipe
Ø 6 mm or ¼" |
| ② | Sample gas inlet | |
| ③ | Reference gas inlet | |
| ④ | Sample gas outlet | |
| ⑤-⑧ | Purging gas inlets/outlets | stubs Ø 10 mm or ¼" |

Electrical connections

- | | |
|-------|--|
| a - c | Signal cable (Ø 10 ... 14 mm)
(analog + digital): cable gland M20x1.5 |
| d | Interface connection: (Ø 7 ... 12 mm)
cable gland M20x1.5 |
| e | Power supply: (Ø 7 ... 12 mm)
cable gland M20x1.5 |

OXYMAT 6, field unit, gas and electrical connections

Selection and Ordering Data

Manual	Order No.
ULTRAMAT 6 / OXYMAT 6 Gasanalysengerät für IR-absorbierende Gase und Sauerstoff (German)	C79000-G5200-C143
ULTRAMAT 6 / OXYMAT 6 Gas Analyzers for IR-absorbing Gases and Oxygen (English)	C79000-G5276-C143
ULTRAMAT 6 / OXYMAT 6 Analyseurs de gaz pour la mesure de composants infrarouges et d'oxygène (French)	C79000-G5277-C143
ULTRAMAT 6 / OXYMAT 6 Analizadores para gases absorbentes de infrarrojo y oxígeno (Spanish)	C79000-G5278-C143
ULTRAMAT 6 / OXYMAT 6 Analizzatori per i gas assorbenti raggi infrarossi ed ossigeno (Italian)	C79000-G5272-C143

Continuous Gas Analyzers, extractive OXYMAT 6

Proposition of spare parts

Selection and Ordering Data

Description	7MB2021	7MB2011	7MB2011 Ex	2 years (qty)	5 years (qty)	Order No.
Analyzer section						
O-ring (stub)	x	x	x	2	4	C71121-Z100-A159
O-ring	x			1	2	C74121-Z100-A6
O-ring (measuring head)	x	x	x	2	4	C79121-Z100-A32
Spacer	x	x	x	-	1	C79451-A3277-B22
Sample cell, SS, type No. 1.4571, non-flow type compensation circuit	x	x	x	-	1	C79451-A3277-B535
Sample cell, tantalum, non-flow type compensation circuit	x	x	x	-	1	C79451-A3277-B536
Sample cell, SS, type No. 1.4571, flow type compensation circuit	x	x	x	-	1	C79451-A3277-B537
Sample cell, tantalum, flow type compensation circuit	x	x	x	-	1	C79451-A3277-B538
Measuring head, non-flow type compensation circuit	x	x	x	1	1	C79451-A3460-B525
Measuring head, flow type compensation circuit	x	x	x	1	1	C79451-A3460-B526
Magnetic connection plate	x	x	x	-	1	C79451-A3474-B606
Temperature sensor	x	x	x	-	1	C79451-A3480-B25
Heating inset	x	x	x	-	1	W75083-A1004-F120
Sample gas path						
Pressure switch (sample gas)	x			1	2	C79302-Z1210-A2
Flowmeter (version with pump only)	x			1	2	C79402-Z560-T1
Restriction, SS, type No. 1.4571, gas path hose	x			2	2	C79451-A3480-C10
Restriction, titanium, gas path pipe	x	x	x	2	2	C79451-A3480-C37
Reference gas path, 3000 hPa	x	x	x	1	1	C79451-A3480-D518
Capillary tube, 100 hPa, connection kit	x	x	x	1	1	C79451-A3480-D519
Restriction, SS, type No. 1.4571, gas path pipe	x	x	x	1	1	C79451-A3250-C5
Electronics						
Temperature controller - electronic, 230 V AC		x	x	-	1	A5E00118527
Temperature controller - electronic, 115 V AC		x	x	-	1	A5E00118530
Fuse (unit fuse)			x	1	2	A5E00061501
Front panel with keyboard	x			1	1	C79165-A3042-B505
Temperature controller	x	x	x	-	1	C79451-A3474-B56
Motherboard, without firmware	x	x	x	-	1	C79451-A3474-B601
Adapter board, LCD/keyboard	x	x		1	1	C79451-A3474-B605
LC display	x	x		1	1	W75025-B5001-B1
Connector filter	x	x	x	-	1	W75041-E5602-K2
Temperature fuse (only heated version)	x	x		-	1	W75054-T1001-A150
Fuse link, T 0.63/250 V	x	x	x	2	4	W75054-L1010-T630
Fuse link, 1 A, 110/120 V	x	x	x	2	4	W75054-L1011-T100
Fuse link, 2,5 A, 250 V		x	x	2	3	W75054-L1011-T250

If the unit was delivered with specially cleaned gas path for high oxygen content (so-called "Cleaned for O₂ service"), please absolutely specify it for a spare part order. This is the only way to guarantee that the gas path furthermore corresponds to the special requirements for this variant.