OXYMAT 6

General

Overview

19" unit and field unit

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

Benefits

- Paramagnetic alternating pressure principle
  - Small measuring ranges (0-0.5% or 99.5-100% O_2)
  - 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 O_2), e.g. 98-100% O_2 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 certificate)
- 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)
- Pressure switch in sample gas path for flow monitoring (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, Hastelloy C22
- 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
- Operation software in two languages: German/English, English/Spanish, French/English, Spanish/English, Italian/English

Inputs and outputs

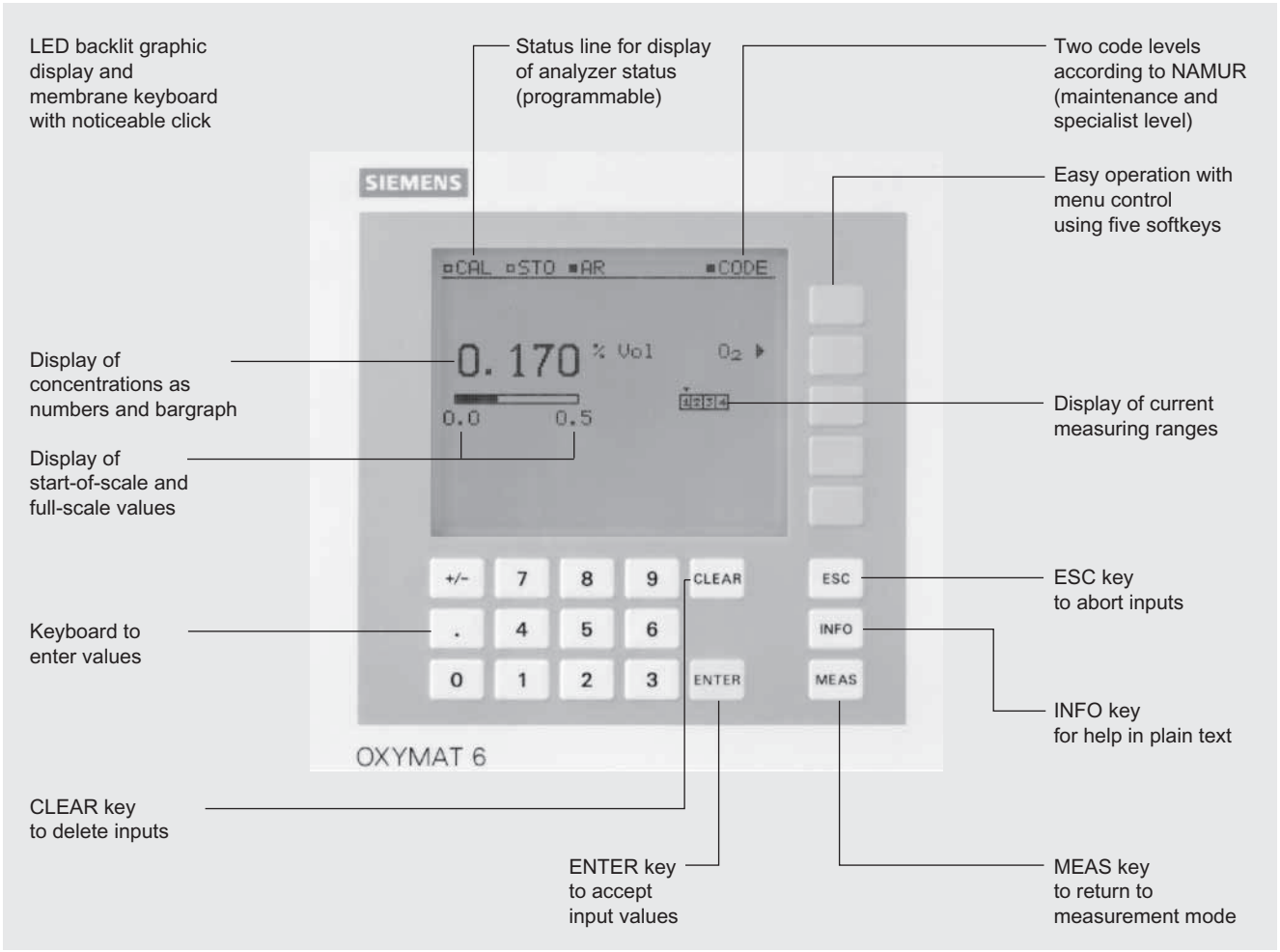
- One analog output for each measured component
- Two analog inputs, programmable (e.g. correction of cross-interferences or external pressure sensor)
- Six binary inputs freely configurable (e.g. for range switching, processing external signals from sample conditioning)
- Six relay outputs freely configurable (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

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 (e.g. 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 (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)	

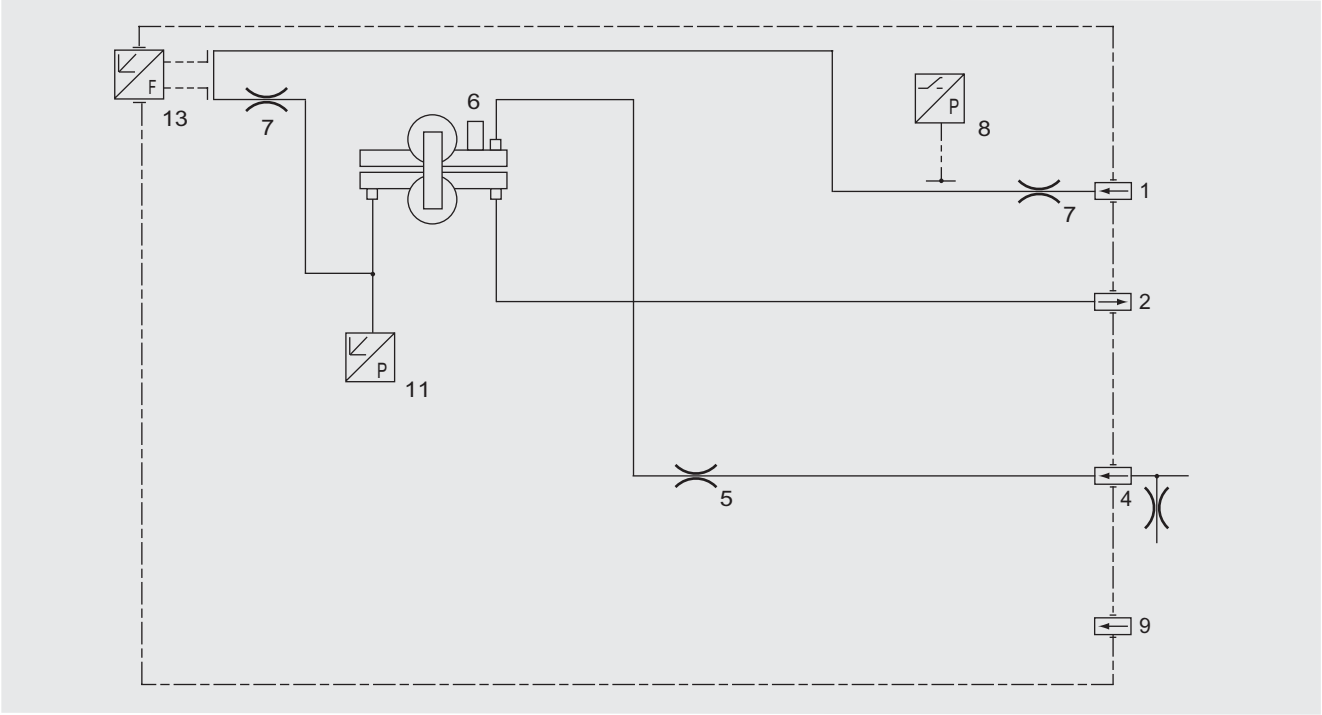
Options

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	—	—

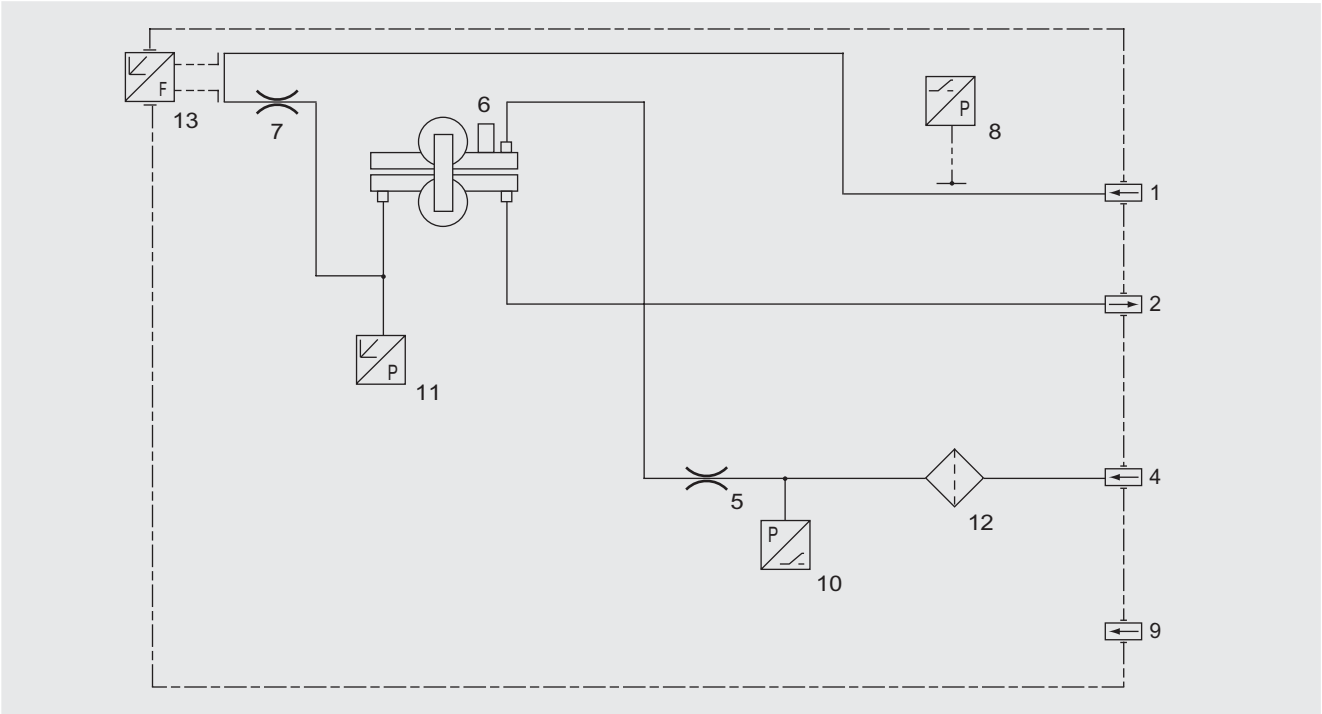
Gas path (19“ unit)

Key to gas path figures

1 Sample gas inlet
2 Sample gas outlet
3 Not used
4 Reference gas inlet with outlet restrictor
5 Restrictor in reference gas inlet
6 O_2 bench
8 Pressure switch in sample gas path (option)
9 Purging gas
10 Pressure switch in reference gas path (option)
11 Pressure sensor
12 Filter
13 Flowmeter in sample gas path (option)



Gas path, reference gas connection 2000 to 4000 hPa



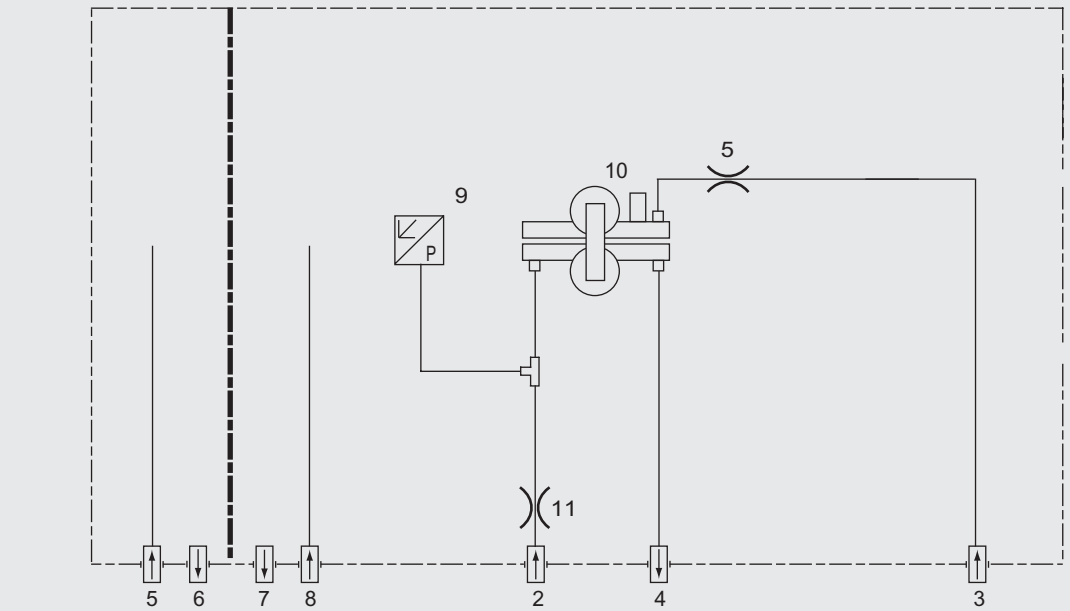
Gas path, reference gas connection100 hPa

General

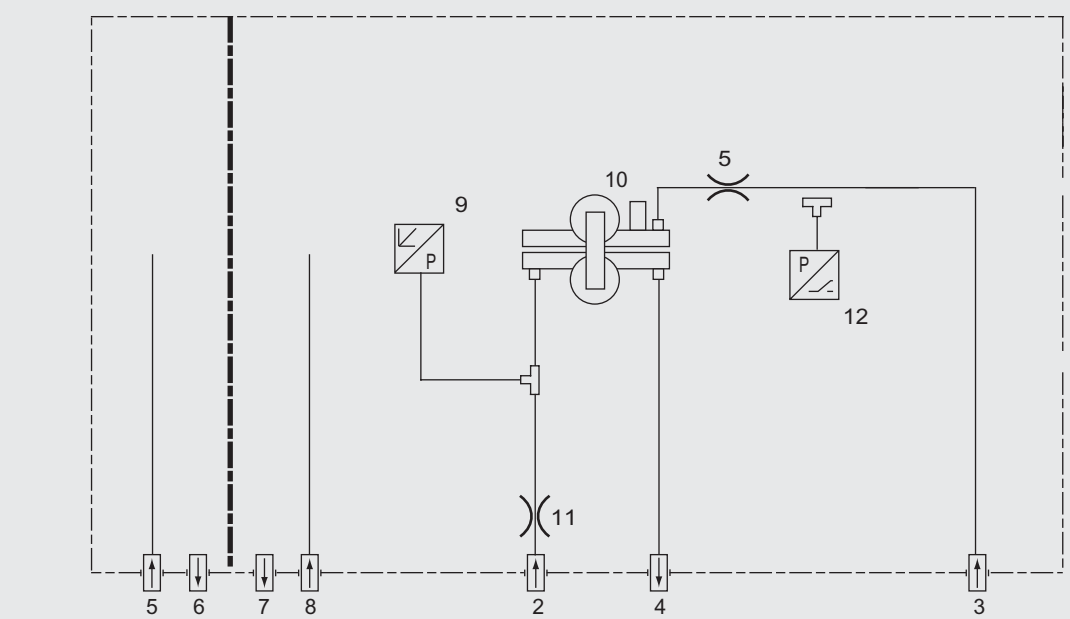
Gas path (field unit)

Key to gas path figures

1 Not used
2 Sample gas inlet
3 Reference gas inlet
4 Sample gas outlet
5 Purging gas inlet (electronic compartment)
6 Purging gas outlet (electronic compartment)
7 Purging gas outlet (analyzing compartment)
8 Purging gas inlet (analyzing compartment)
9 Pressure switch
10 O_2 bench
11 Restrictor in sample gas path
12 Pressure switch in reference gas path



Gas path, reference gas connection 100 hPa



Gas path, reference gas connection 2000 to 4000 hPa

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.

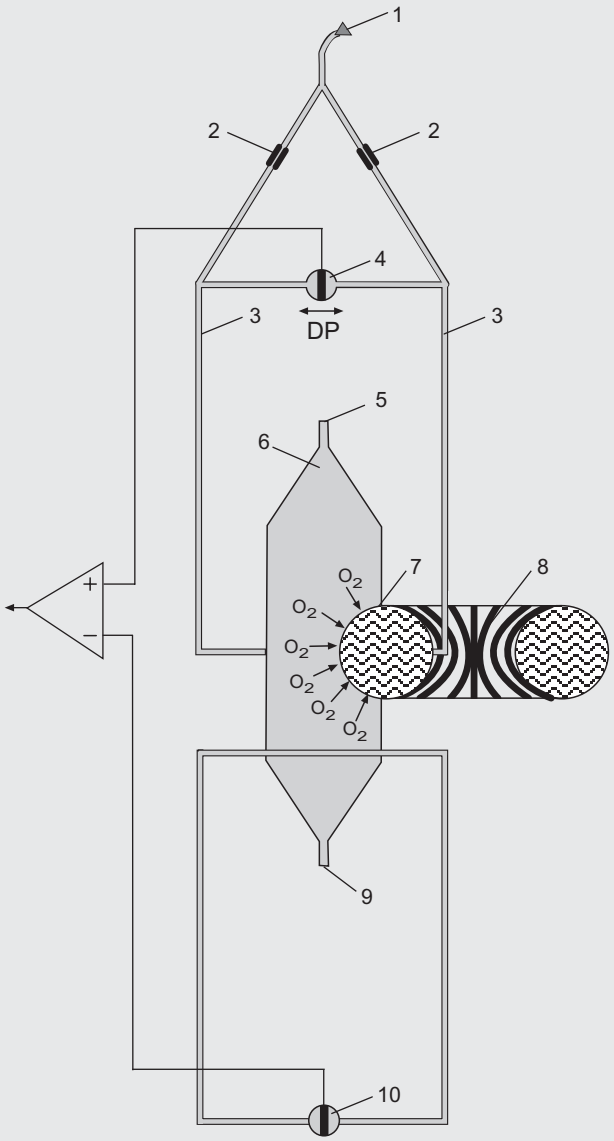
The sample cell is directly in the sample path and has a small volume. The microflow sensor thus responds quickly, resulting in a very short response time for the OXYMAT 6.

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.



1 Reference gas inlet
2 Restrictors
3 Reference gas channels
4 Microflow sensor for measurement
5 Sample gas inlet
6 Sample cell
7 Paramagnetic effect
8 Electromagnet with alternating field strength
9 Sample gas and reference gas outlet
10 Microflow sensor in compensation system (without flow)

OXYMAT 6, mode of operation

OXYMAT 6

General

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 O_2-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
- Sample cell for use in presence of highly corrosive sample gases

Reference gases

Measuring range	Recommended reference gas	Reference gas connection pressure	Remarks
0 to ... % v/v O_2	N_2	2000 ... 4000 hPa above sample gas pressure (max. 5000 hPa absolute)	The reference gas flow is set automatically to 5 ... 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
Organic gases		
Acetic acid	CH_3COOH	-0.64
Acetylene	C_2H_2	-0.29
1,2 butadiene	C_4H_6	-0.65
1,3 butadiene	C_4H_6	-0.49
iso-butane	C_4H_{10}	-1.30
n-butane	C_4H_{10}	-1.26
1-butene	C_4H_6	-0.96
iso-butene	C_4H_8	-1.06
Cyclo-hexane	C_6H_{12}	-1.84
Dichlorodifluoromethane (R12)	CCl_2F_2	-1.32
Ethane	C_2H_6	-0.49
Ethylene	C_2H_4	-0.22
n-heptane	C_7H_{16}	-2.4
n-hexane	C_6H_{14}	-2.02
Methane	CH_4	-0.18
Methanol	CH_3OH	-0.31
n-octane	C_8H_{18}	-2.78
n-pentane	C_5H_{12}	-1.68
iso-pentane	C_5H_{12}	-1.49
Propane	C_3H_8	-0.87
Propylene	C_3H_6	-0.64
Trichlorofluoromethane (R11)	CCl_3F	-1.63
Vinyl chloride	C_2H_3Cl	-0.77
Vinyl fluoride	C_2H_3F	-0.55
1,1 vinylidene chloride	$C_2H_2Cl_2$	-1.22

Residual gas (concentration 100% v/v)		Zero deviation in % v/v O_2 absolute
Inert gases		
Argon	Ar	-0.25
Helium	He	+0.33
Krypton	Kr	-0.55
Neon	Ne	+0.17
Xenon	Xe	-1.05
Anorganic gases		
Ammonia	NH_3	-0.20
Carbon dioxide	CO_2	-0.30
Carbon monoxide	CO	+0.07
Chlorine	Cl_2	-0.94
Dinitrogen monoxide	N_2O	-0.23
Hydrogen	H_2	+0.26
Hydrogen bromide	HBr	-0.76
Hydrogen chloride	HCl	-0.35
Hydrogen fluoride	HF	-0.10
Hydrogen iodide	HI	-1.19
Hydrogen sulphide	H_2S	-0.44
Oxygen	O_2	+100
Nitrogen	N_2	0.00
Nitrogen dioxide	NO_2	+20.00
Nitrogen oxide	NO	+42.94
Sulphur dioxide	SO_2	-0.20
Sulphur hexafluoride	SF_6	-1.05
Water	H_2O	-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 mentionned in Table 2 must be multiplied with a correction factor (k):

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

(all diamagnetic gases have a negative zero error).

19" unit

Technical specifications

General	
	4, internally and externally switchable; automatic measuring range changeover also possible
Measuring ranges	4, internally and externally switchable; automatic measuring range changeover also possible
Smallest possible measuring span (relating to sample gas pressure 1000 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	0.5 vol.%, 2 vol.% or 5 vol.% O_2
Largest possible measuring span	100 vol.% O_2 (for a pressure above 2000 hPa: 25 vol.% O_2)
Measuring ranges with suppressed zero point	Any zero point can be implemented within 0 to 100 vol.%, provided that a suitable reference gas is used (see Table 1 in "Function").
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 50081-1, EN 50082-2
Design, enclosure	
Degree of protection	IP20 according to EN 60529
Weight	Approximately 13 kg
Electrical characteristics	
Auxiliary power	100 ... 120 V AC (rated range 90 ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (rated range 180 ... 264 V), 48 ... 63 Hz
Power consumption	Approx. 35 VA
EMC (**E**lectro**m**agnetic **C**ompatibility)	In accordance with 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 values	100 ... 120 V: 1.0 T/250 200 ... 240 V: 0.63 T/250
Gas inlet conditions	
Permissible sample gas pressure	
• With pipes	500 ... 3000 hPa absolute
• 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% RH (RH: relative humidity)
Reference gas pressure	2000 ... 4000 hPa above sample gas pressure, but max. 5000 hPa
Dynamic response	
Warm-up period	At room temperature < 30 min (the technical specification will be met after 2 hours)
Display delay (T_{90}-time)	Approximately 1.5 ... 3.5 s, depending on version
Damping (electrical time constant)	0 ... 100 s, parameterizable
Dead time (purging time of the gas path in the unit at 1 l/min)	Approximately 0.5 ... 2.5 s, depending on version
Time for device-internal signal processing	< 1 s

Pressure correction range	
Pressure sensor	
Internal	500 ... 2000 hPa absolute
External	500 ... 3000 hPa absolute
Measuring response (relating to sample gas pressure 1013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Output signal fluctuation	< 0.75% of the smallest possible measuring range according to rating plate, with electronic damping constant of 1 s (corresponds to ± 0.25% at 2 σ)
Zero point drift	< 0.5%/month of the smallest possible measuring span according to rating plate
Measured value drift	< 0.5%/month of the current measuring range
Repeat precision	< 1% of the current measuring range
Minimum detectable quantity	1% of the current measuring range
Linearity error	< 0.1% of the current measuring range
Influencing variable (relating to sample gas pressure 1013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Ambient temperature	< 0.5%/10 K relating 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, correction of the atmospheric pressure fluctuations is only possible if the sample gas can vent to ambient air)	When pressure compensation has been switched off: < 2% of the current measuring range/1% pressure change When pressure compensation has been switched on: < 0.2% of the current measuring range/1% pressure change
Carrier gases	Deviation in zero point corresponding to paramagnetic or diamagnetic deviation of carrier gas
Sample gas flow	< 1% of the smallest possible measuring span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range
Auxiliary power	< 0.1% of the current measuring range with rated voltage ± 10%
Electrical inputs and outputs	
Analog output	0/2/4 ... 20 mA, potential-free; load max. 750 Ω
Relay outputs	6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; loading capacity: 24 V AC/DC/1 A, potential-free
Analog inputs	2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and residual gas influence correction (correction of diagonal gas)
Binary inputs	6, designed for 24 V, potential-free, freely parameterizable, e.g. for measurement range changeover
Serial interface	RS 485
Options	AUTOCAL function each with 8 additional binary inputs and relay outputs, also with PROFIBUS PA or PROFIBUS DP
Climatic conditions	
Permissible ambient temperature	-30 ... +70 °C during storage and transportation, +5 ... +45 °C during operation
Permissible humidity	< 90% RH (RH: relative humidity) within average annual value, during storage and transportation (dew point must not be undershot)

Selection and Ordering Data

Order No.

OXYMAT 6 gas analyzer D) **7MB2021-** ■■■■ **0 -** ■■■■
19" unit for installation in cabinets

Cannot be combined

		Cannot be combined
Gas connections		
Pipe with 6 mm outer diameter	0	
Pipe with ¼" outer diameter	1	
Smallest possible measuring span O_2		
0.5% reference gas pressure 3000 hPa	A	A → E30
0.5% reference gas pressure 100 hPa (external pump)	B	B B B → E30, Y02
2% reference gas pressure 3000 hPa	C	
2% reference gas pressure 100 hPa (external pump)	D	D D D → E30, Y02
5% reference gas pressure 3000 hPa	E	
5% reference gas pressure 100 hPa (external pump)	F	F F F → E30, Y02
Sample cell		
Non-flow-type compensation branch		
• Made from stainless steel, Mat. No. 1.4571	A	
• Made from tantalum	B	
Flow-type compensation branch		
• Made from stainless steel, Mat. No. 1.4571	C	C
• Made from tantalum	D	D
Internal gas paths		
Hose made from FKM (Viton)	0	
Pipe made from titanium	1	1 1 → Y02
Pipe made from stainless steel, Mat. No. 1.4571	2	2
Auxiliary power		
100 ... 120 V AC, 48 ... 63 Hz	0	
200 ... 240 V AC, 48 ... 63 Hz	1	
Monitoring (reference gas, sample gas)		
Without	A	A → E30
Reference gas only	B	B
Reference gas and sample gas (with flow indicator and pressure switch for sample gas)	C	C C C → E30
Sample gas only	D	D D → E30
Supplementary electronics		
Without	A	
AUTOCAL function		
• With 8 additional binary inputs/outputs	B	
• With serial interface for the automotive industry (AK)	D	D → E20
• With 8 additional binary inputs/outputs and PROFIBUS PA interface	E	
• With 8 additional binary inputs/outputs and PROFIBUS DP interface	F	
Language		
German	0	
English	1	
French	2	
Spanish	3	
Italian	4	

Further versions	Order code	Cannot be combined
Add "-Z" to Order No. and specify order codes.		
Telescopic rails (2 units)	**A31**	
Set of Torx screwdrivers	**A32**	
Kalrez gaskets in sample gas path	**B01**	
TAG labels (specific lettering based on customer information)	**B03**	
CSA certificate – Class I Div 2	**E20**	→ E30
ATEX II 2G certificate; safety-related measurements in non-hazardous gas zone	**E30**	→ E20
Clean for O_2 service (specially cleaned gas path)	**Y02**	
Measuring range indication in plain text, if different from the standard setting	**Y11**	

D) Subject to AL export regulations: 9I999, ECCN: N

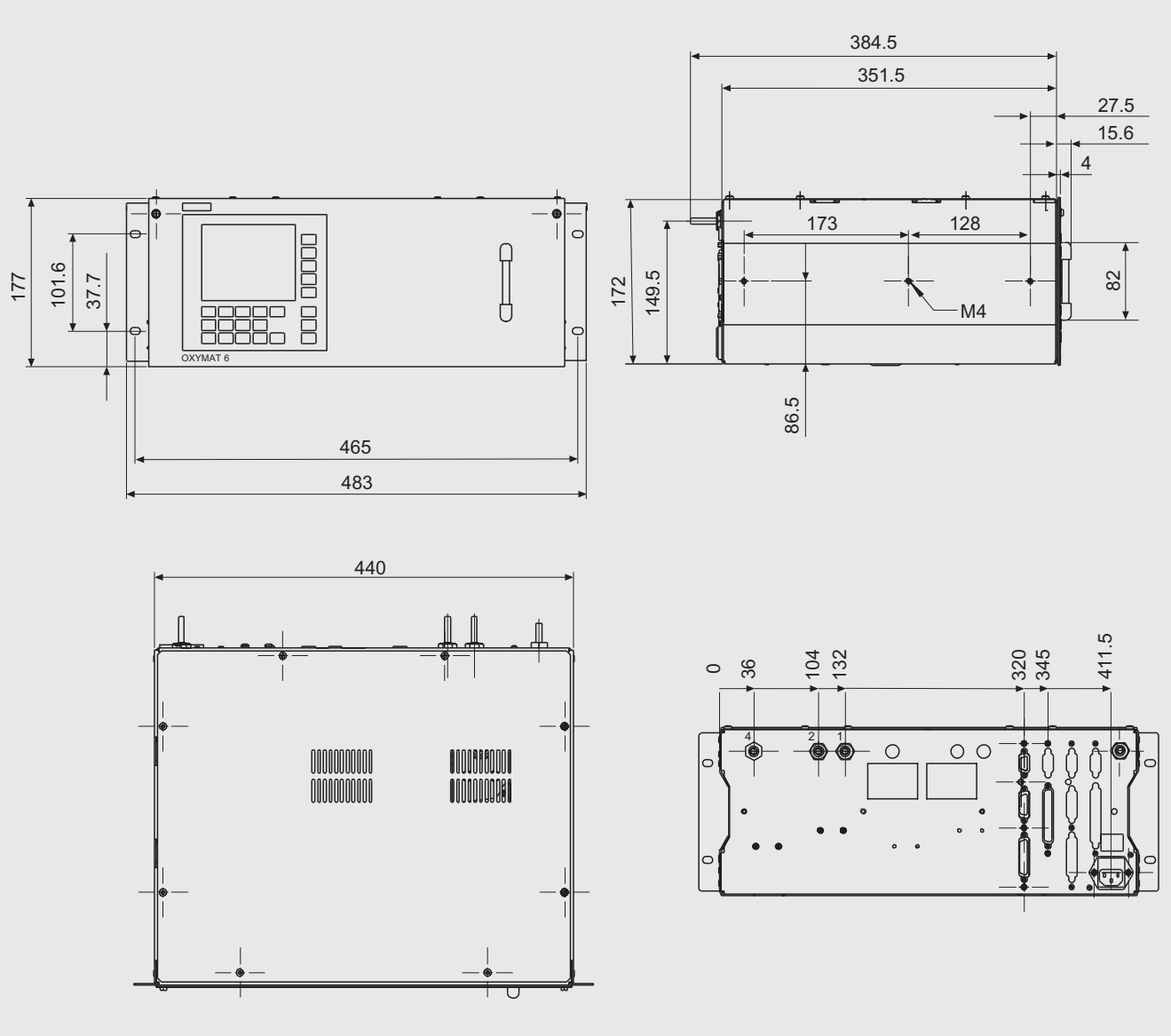
19" unit

Selection and Ordering Data

Retrofitting sets		Order No.
RS 485/Ethernet converter		**A5E00852383**
RS 485/RS 232 converter	D)	**C79451-Z1589-U1**
RS 485/USB converter		**A5E00852382**
AUTOCAL function with serial interface for the automotive industry (AK)	D)	**C79451-A3480-D33**
AUTOCAL function with 8 binary inputs/outputs	D)	**C79451-A3480-D511**
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA	D)	**A5E00057307**
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP	D)	**A5E00057312**

D) Subject to AL export regulations: 9I999, ECCN: N

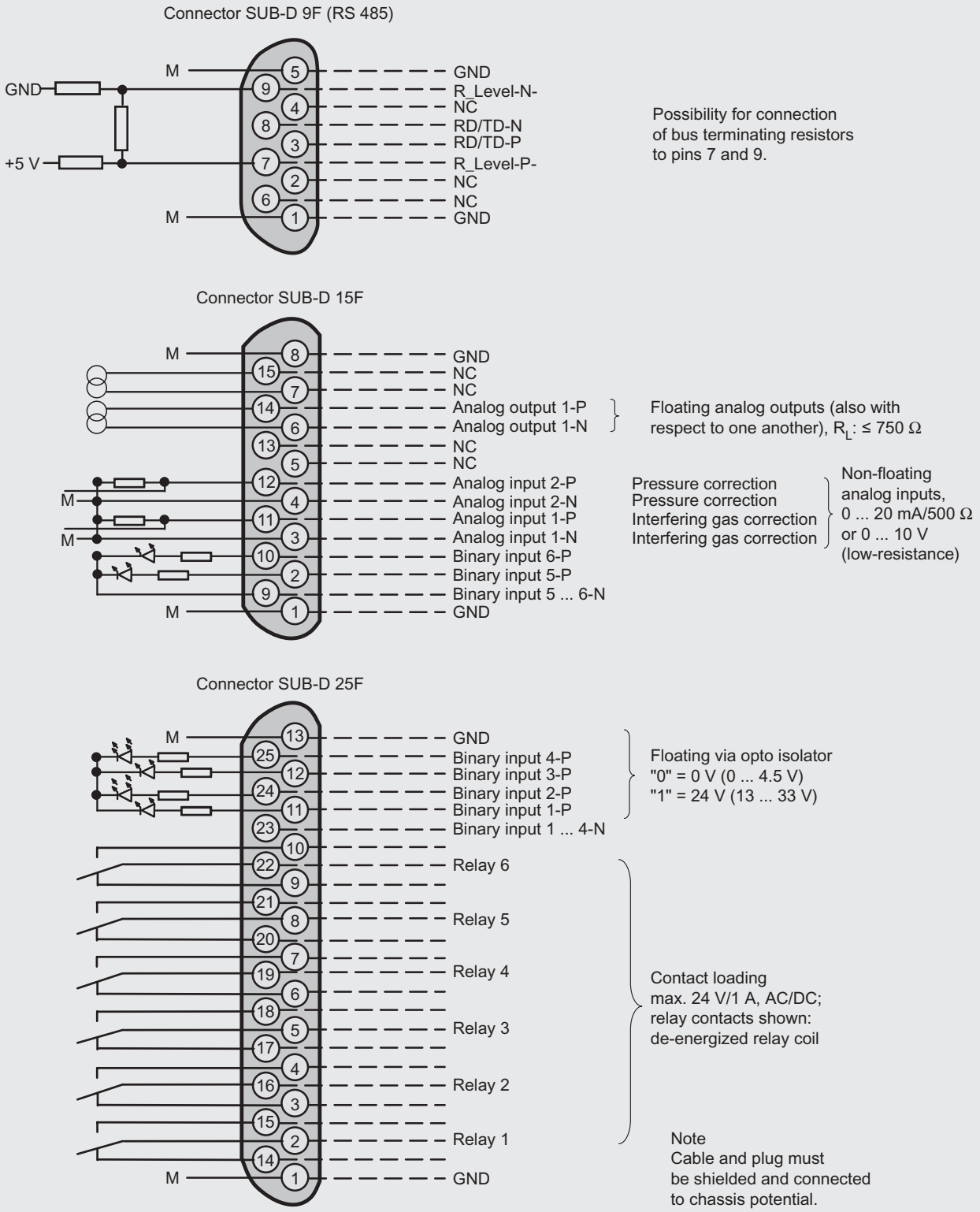
Dimensional drawings



OXYMAT 6, 19“ unit, dimensions in mm

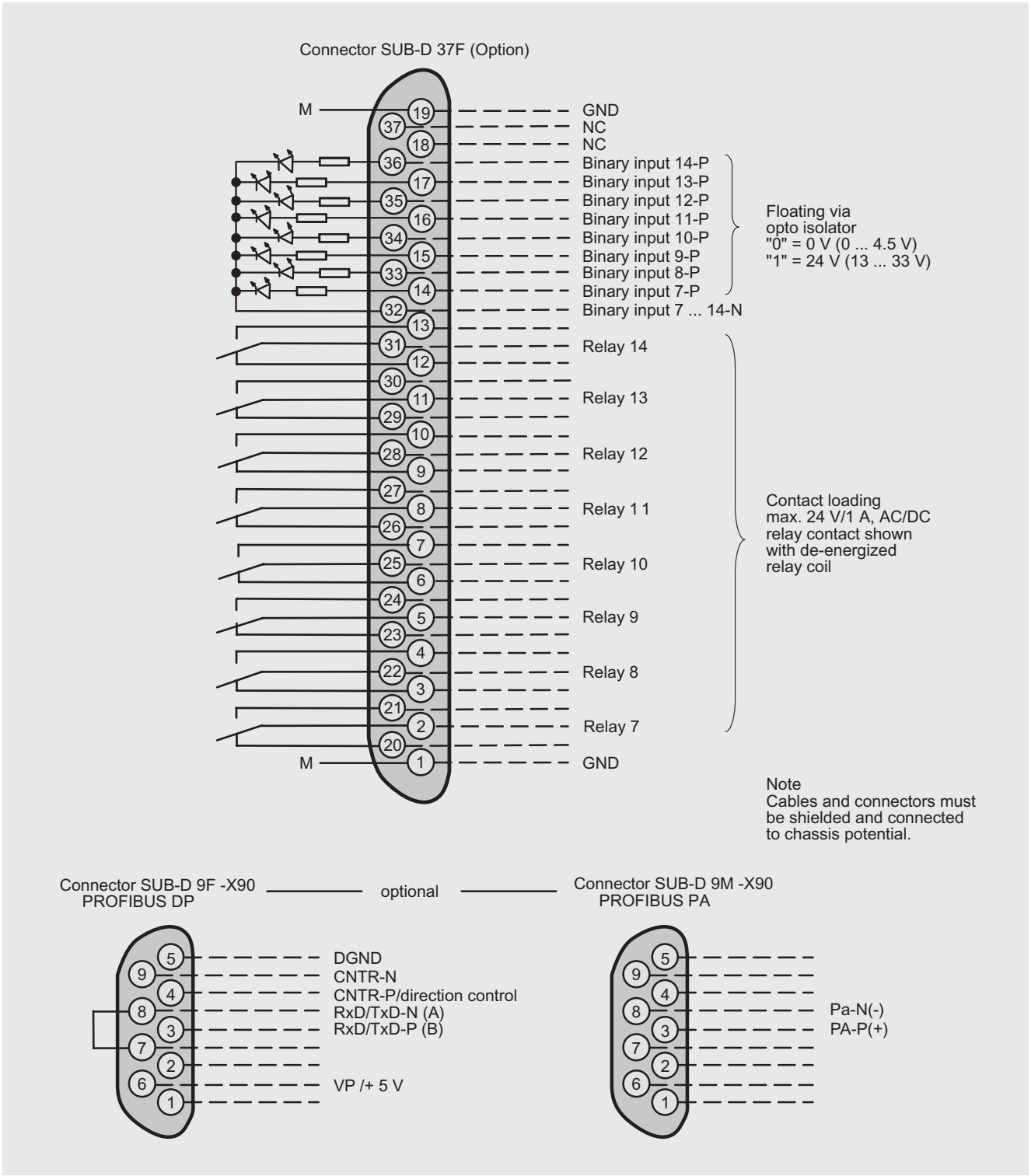
Schematics

Pin assignment (electrical and gas connections)

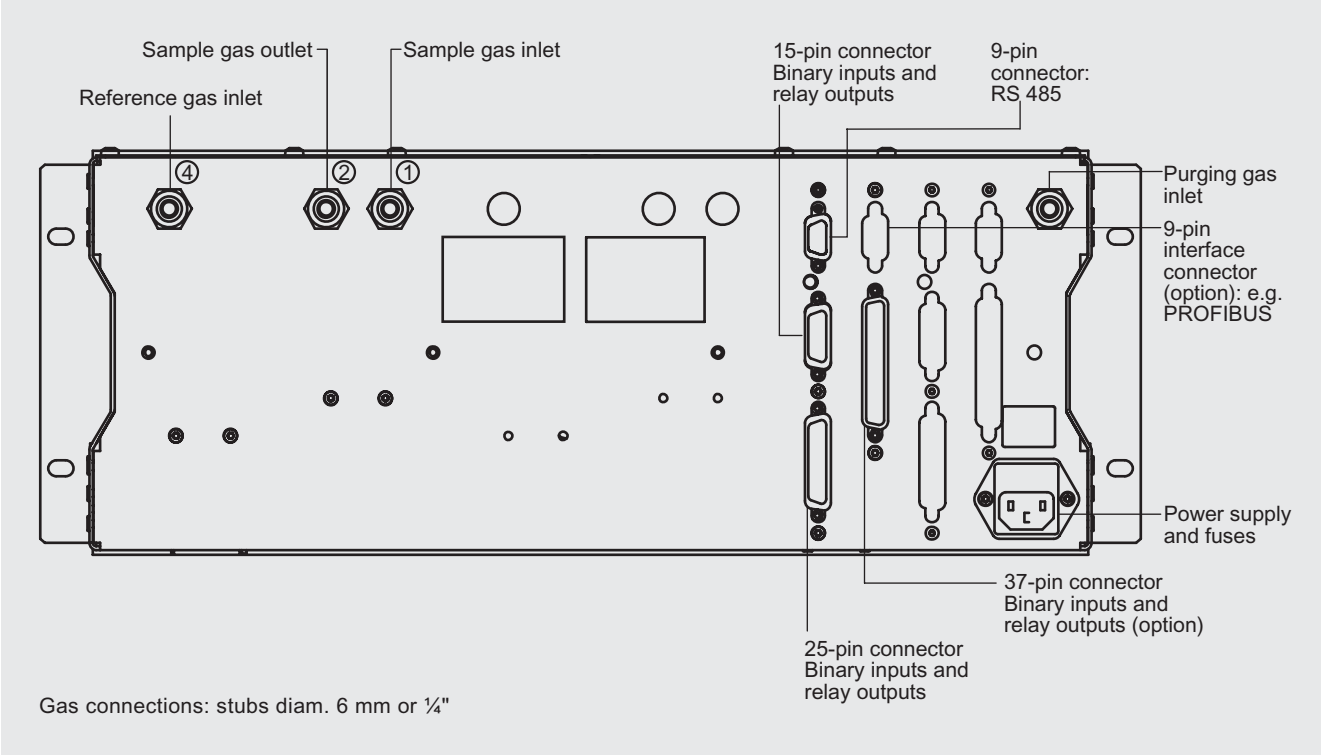


OXYMAT 6, 19“ unit, pin assignment

19" unit



OXYMAT 6, 19“ unit, pin assignment of AUTOCAL board and PROFIBUS connectors



OXYMAT 6, 19“ unit, gas and electrical connections

Field unit

Technical specifications

General	
	4, internally and externally switchable; automatic measuring range changeover also possible
Measuring ranges	4, internally and externally switchable; automatic measuring range changeover also possible
Smallest possible measuring span (relating to sample gas pressure 1000 hPa absolute, 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 vol.%, 2 vol.% or 5 vol.% O_2
Largest possible measuring span	100 vol.% O_2 (for a pressure above 2000 hPa: 25 vol.% O_2)
Measuring ranges with suppressed zero point	Any zero point can be implemented within 0 ... 100 vol.%, provided that a suitable reference gas is used (see Table 1 in "Function").
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 50081-1, EN 50082-2
Design, enclosure	
Degree of protection	IP65 in accordance with EN 60529, restricted breathing enclosure to EN 50021
Weight	Approximately 28 kg
Electrical characteristics	
Auxiliary power	100 ... 120 V AC (rated range 90 ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (rated range 180 ... 264 V), 48 ... 63 Hz
Power consumption	Approximately 35 VA; approximately 330 VA for heated version
EMC (**E**lectro**m**agnetic **C**ompatibility)	In accordance with standard requirements of NAMUR NE21 (08/98), EN 61326, EN 50270 (with gas warning unit)
Electrical safety	In accordance with EN 61010-1
• Heated units	Overvoltage category II
• Unheated units	Overvoltage category III
Fuse values (unheated unit)	
• 100 ... 120 V	F3: 1 T/250; F4: 1 T/250
• 200 ... 240 V	F3: 0.63 T/250; F4: 0.63 T/250
Fuse values (heated unit)	
• 100 ... 120 V	F1: 1 T/250; F2: 4 T/250 F3: 4 T/250; F4: 4 T/250
• 200 ... 240 V	F1: 0.63 T/250; F2: 2.5 T/250 F3: 2.5 T/250; F4: 2.5 T/250
Gas inlet conditions	
Permissible sample gas pressure	
• With hoses	500 ... 1500 hPa absolute
• With pipes	500 ... 3000 hPa absolute
• With pipes, Ex version	
- Leakage compensation	500 ... 1160 hPa absolute
- Continuous purging	500 ... 3000 hPa absolute
Reference gas pressure	2000 ... 4000 hPa above sample gas pressure, but max. 5000 hPa
Purging gas pressure	
• Permanent	< 165 hPa above ambient pressure
• For short periods	Max. 250 hPa above ambient pressure
Sample gas flow	18 ... 60 l/h (0.3 ... 1 l/min)
Sample gas temperature	0 ... 50°C (unheated), 15 °C above temperature analyzer part (heated)
Sample gas humidity	< 90% relative humidity
Dynamic response	
Warm-up period	At room temperature < 30 min (the technical specification will be met after 2 hours)
Display delay (t_{90}-time)	< 1.5 s
Damping (electrical time constant)	0 ... 100 s, parameterizable
Dead time (purging time of the gas path in the unit at 1 l/min)	Approx. 0.5 s
Time for device-internal signal processing	< 1 s
Pressure correction range	
Pressure sensor	
• Internal	500 ... 2000 hPa absolute
• External	500 ... 3000 hPa absolute
Measuring response (relating ... sample gas pressure 1013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Output signal fluctuation	< 0.75% of the smallest possible measuring range according to rating plate, with electronic damping constant of 1 s (corresponds to ± 0.25% at 2 σ)
Zero point drift	< 0.5%/month of the smallest possible measuring span according to rating plate
Measured value drift	< 0.5%/month of the current measuring range
Repeat precision	< 1% of the current measuring range
Minimum detectable quantity	1% of the current measuring range
Linearity error	< 0.1% of the current measuring range
Influencing variables (relating to sample gas pressure 1013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Ambient temperature	< 0.5%/10 K relating 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, correction of the atmospheric pressure fluctuations is only possible if the sample gas can vent to ambient air)	When pressure compensation has been switched off: < 2% of the current measuring range/ 1% pressure change When pressure compensation has been switched on: < 0.2% of the current measuring range/ 1% pressure change
Carrier gases	Deviation in zero point corresponding to paramagnetic or diamagnetic deviation of carrier gas
Sample gas flow	< 1% of the 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
Auxiliary power	< 0.1% of the current measuring range with rated voltage ± 10%

Electrical inputs and outputs	
Analog output	0/2/4 ... 20 mA, potential-free; load max. 750 Ω
Relay outputs	6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; loading capacity: 24 V AC/DC/1 A, potential-free
Analog inputs	2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and residual gas influence correction (correction of diagonal gas)
Binary inputs	6, designed for 24 V, potential-free, freely parameterizable, e.g. for measurement range changeover
Serial interface	RS 485
Options	AUTOCAL function each with 8 additional binary inputs and relay outputs, also with PROFIBUS PA or PROFIBUS DP
Climatic conditions	
Permissible ambient temperature	-30 ... +70 °C during storage and transportation, +5 ... +45 °C during operation
Permissible humidity	< 90% relative humidity (maximum accuracy achieved after 2 hours) within average annual value, during storage and transportation (dew point must not be undershot)

OXYMAT 6

Field unit

Selection and Ordering Data

Order No.

OXYMAT 6 gas analyzer for field installation — D) **7MB2011-** ■■■ **0** ■ **-** ■■■■

Cannot be combined

Gas connections for sample gas and reference gas

Ferrule screw connection made from stainless steel (Mat. No. 1.4571)

- Pipe with 6 mm outer diameter — 0 — 0 → D02
- Pipe with ¼" outer diameter — 1 — 1 → D01

Ferrule screw connection made from titanium

- Pipe with 6 mm outer diameter — 2 — 2 → D01, D02, Y02
- Pipe with ¼" outer diameter — 3 — 3 → D01, D02, Y02

Piping and gas connections made from Hastelloy C22: 7MB2011-0.... + order code D01/D02

Smallest possible measuring span O_2

		Cannot be combined
0.5% reference gas pressure 3000 hPa	A	A
0.5% reference gas pressure 100 hPa (external pump)	B	B B B B B → Y02
2% reference gas pressure 3000 hPa	C	
2% reference gas pressure 100 hPa (external pump)	D	D D D D → Y02
5% reference gas pressure 3000 hPa	E	
5% reference gas pressure 100 hPa (external pump)	F	F F F F → Y02

Sample cell

Non-flow-type compensation branch

- Made from stainless steel, Mat. No. 1.4571 — A
- Made from tantalum — B

Flow-type compensation branch

- Made from stainless steel, Mat. No. 1.4571 — C
- Made from tantalum — D

Heating for internal gas paths and analyzer section

		Cannot be combined
Without	0	
With (65 ... 130 °C)	1	1

Auxiliary power

Standard unit and acc. to ATEX II 3G version (Zone 2)

- 100 ... 120 V AC, 48 ... 63 Hz — 0 — 0
- 200 ... 240 V AC, 48 ... 63 Hz — 1 — 1

ATEX II 2G versions (Zone 1)

		Cannot be combined
• 100 ... 120 V AC, 48 ... 63 Hz, according ... ATEX II 2G[1] (operating mode: leakage compensation)	2	2 2 2 → E11, E12
• 200 ... 240 V AC, 48 ... 63 Hz, according ... ATEX II 2G[1] (operating mode: leakage compensation)	3	3 3 3 → E11, E12
• 100 ... 120 V AC, 48 ... 63 Hz, according ... ATEX II 2G[1] (operating mode: continuous purging)	6	6 6 6 → E11, E12
• 200 ... 240 V AC, 48 ... 63 Hz, according ... ATEX II 2G[1] (operating mode: continuous purging)	7	7 7 7 → E11, E12

Reference gas monitoring

		Cannot be combined
Without	A	A
With	B	B

Supplementary electronics

		Cannot be combined
Without	A	
AUTOCAL function		
• With an additional 8 binary inputs and 8 relay outputs	B	
• With 8 additional binary inputs/outputs and PROFIBUS PA interface	E	E
• With 8 additional binary inputs/outputs and PROFIBUS DP interface	F	F
• With 8 additional binary inputs/outputs and PROFIBUS PA Ex-i	G	G

Language

German	0
English	1
French	2
Spanish	3
Italian	4

[1] See also next page, "Additional units for Ex versions".

D) Subject to AL export regulations: 9I999, ECCN: N

Selection and Ordering Data

Further versions		Order code	Cannot be combined
Add "-Z" to Order No. and specify order codes.			
Set of Torx screwdrivers, Allen screwdrivers		**A32**	
Kalrez gaskets in sample gas path		**B01**	
TAG labels (specific lettering based on customer information)		**B03**	
Gas connections and piping made from Hastelloy C22			
• Outer diameter 6 mm		**D01**	→ **E20**
• Outer diameter ¼"		**D02**	→ **E20**
Ex versions			
For combination options, see Ex configurations table in "Ex versions"			
ATEX II 3G certificate; restricted breathing enclosure, non-flammable gases		**E11**	
ATEX II 3G certificate; flammable gases[1])		**E12**	
CSA certificate – Class I Div 2		**E20**	
ATEX II G certificate ; safety-related measurements			
• In non-hazardous gas zone		**E30**	
• In Ex zone acc. to ATEX II 2G, leakage compensation[1)]		**E31**	
• In Ex zone acc. to ATEX II 2G, continuous purging[1)]		**E32**	
• In Ex zone acc. to ATEX II 3G, flammable and non-flammable gases		**E33**	
- Extended element with heated units; 110/120 V		**E38**	
- Extended element with heated units; 220/240 V		**E39**	
ATEX II 3D certificate; potentially explosive dust atmospheres			
• In non-hazardous gas zone		**E40**	
• In Ex zone acc. to ATEX II 3G, non-flammable gases		**E41**	
• In Ex zone acc. to ATEX II 3G, flammable gases[1)]		**E42**	
Clean for O_2 service (specially cleaned gas path)		**Y02**	
Measurement range indication in plain text, if different from the standard setting		**Y11**	
Additional units for Ex versions		Order No.	
Category ATEX II 2G (Zone 1)			
BARTEC EEx p control unit, 230 V, "leakage compensation"	D)	**7MB8000-2BA**	
BARTEC EEx p control unit, 115 V, "leakage compensation"	D)	**7MB8000-2BB**	
BARTEC EEx p control unit, 230 V, "continuous purging"	D)	**7MB8000-2CA**	
BARTEC EEx p control unit, 115 V, "continuous purging"	D)	**7MB8000-2CB**	
Ex isolation amplifier	D)	**7MB8000-3AA**	
Ex isolating relay, 230 V	D)	**7MB8000-4AA**	
Ex isolating relay, 110 V	D)	**7MB8000-4AB**	
Differential pressure switch for corrosive gases	E)	**7MB8000-5AA**	
Differential pressure switch for non-corrosive gases		**7MB8000-5AB**	
Stainless steel flame arrestor	D)	**7MB8000-6BA**	
Hastelloy flame arrestor	D)	**7MB8000-6BB**	
Category ATEX II 3G (Zone 2)			
BARTEC EEx p control unit (flammable gases)	D)	**7MB8000-1BA**	
FM/CSA (Class I Div. 2)			
Ex purging unit MiniPurge FM	D)	**7MB8000-1AA**	
Retrofitting sets			
RS 485/Ethernet converter		**A5E00852382**	
RS 485/RS 232 converter	D)	**C79451-Z1589-U1**	
RS 485/USB converter		**A5E00852383**	
AUTOCAL function with 8 binary inputs/outputs	D)	**A5E00064223**	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA	D)	**A5E00057315**	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP	D)	**A5E00057318**	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA Ex i (firmware 4.1.10 required)	D)	**A5E00057317**	

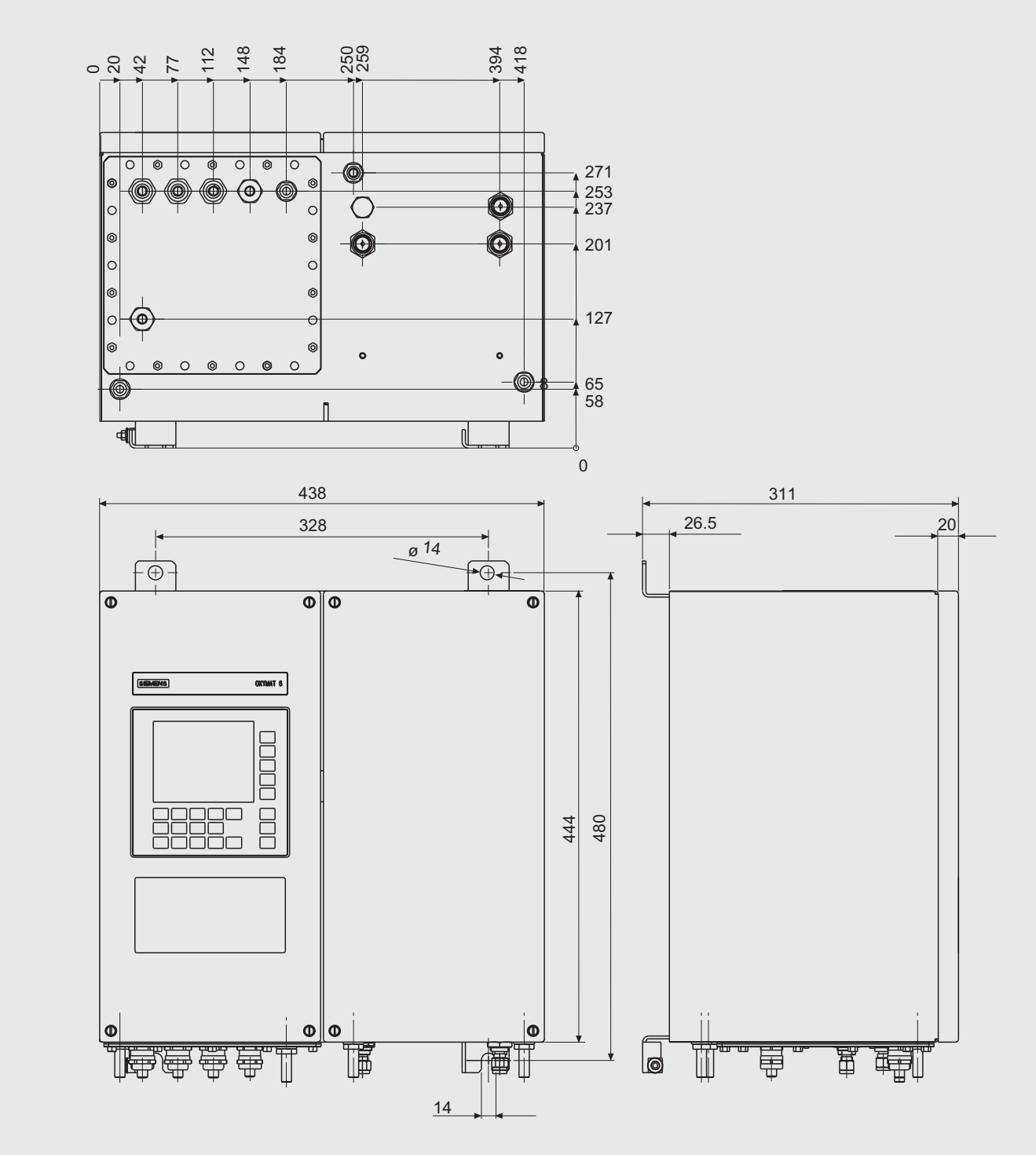
[1)] Only in connection with an approved purging unit.

D) Subject to AL export regulations: 9I999, ECCN: N

E) Subject to AL export regulations: 9I999, ECCN: EAR99H

Field unit

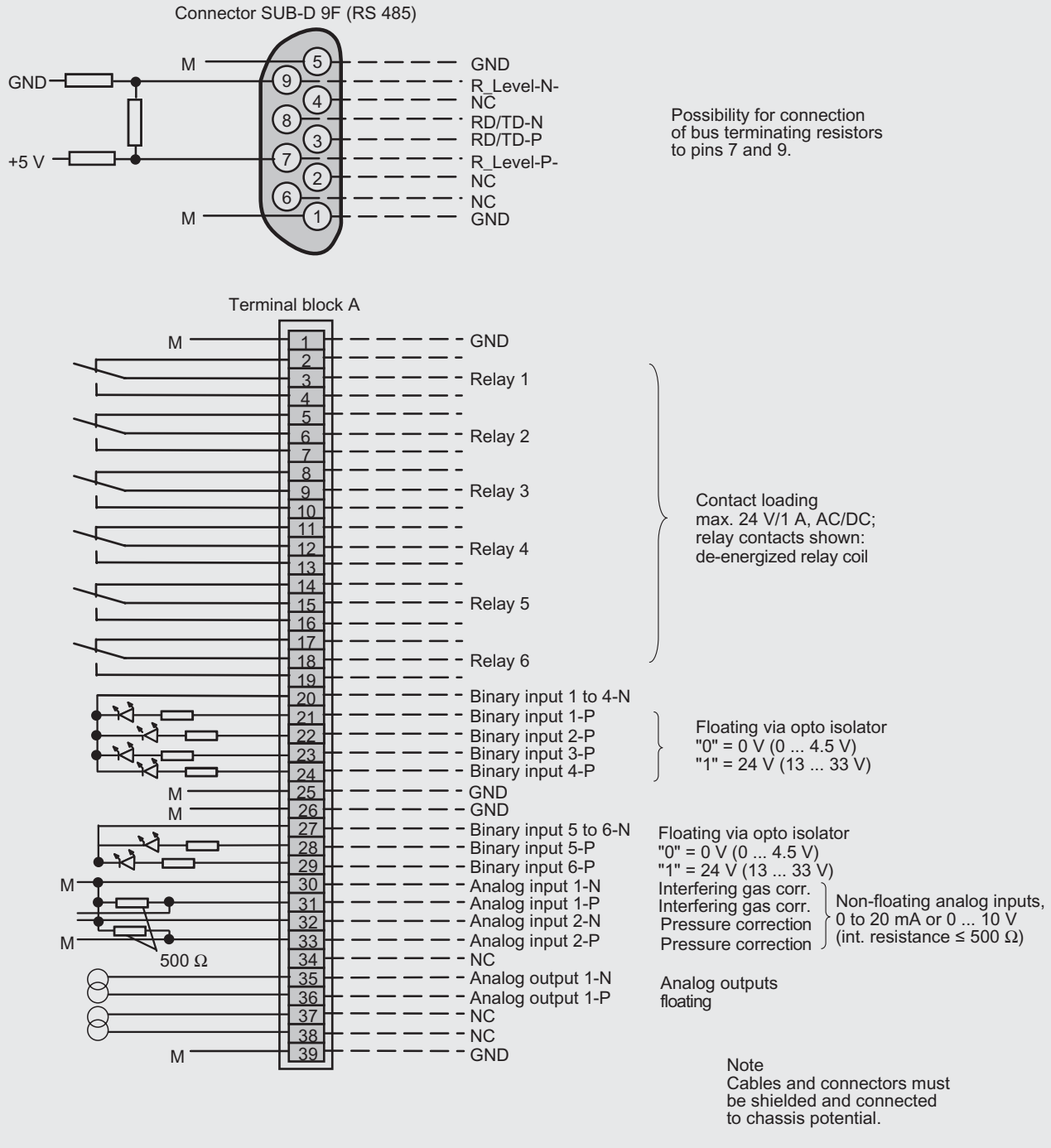
Dimensional drawings



OXYMAT 6, field unit, dimensions in mm

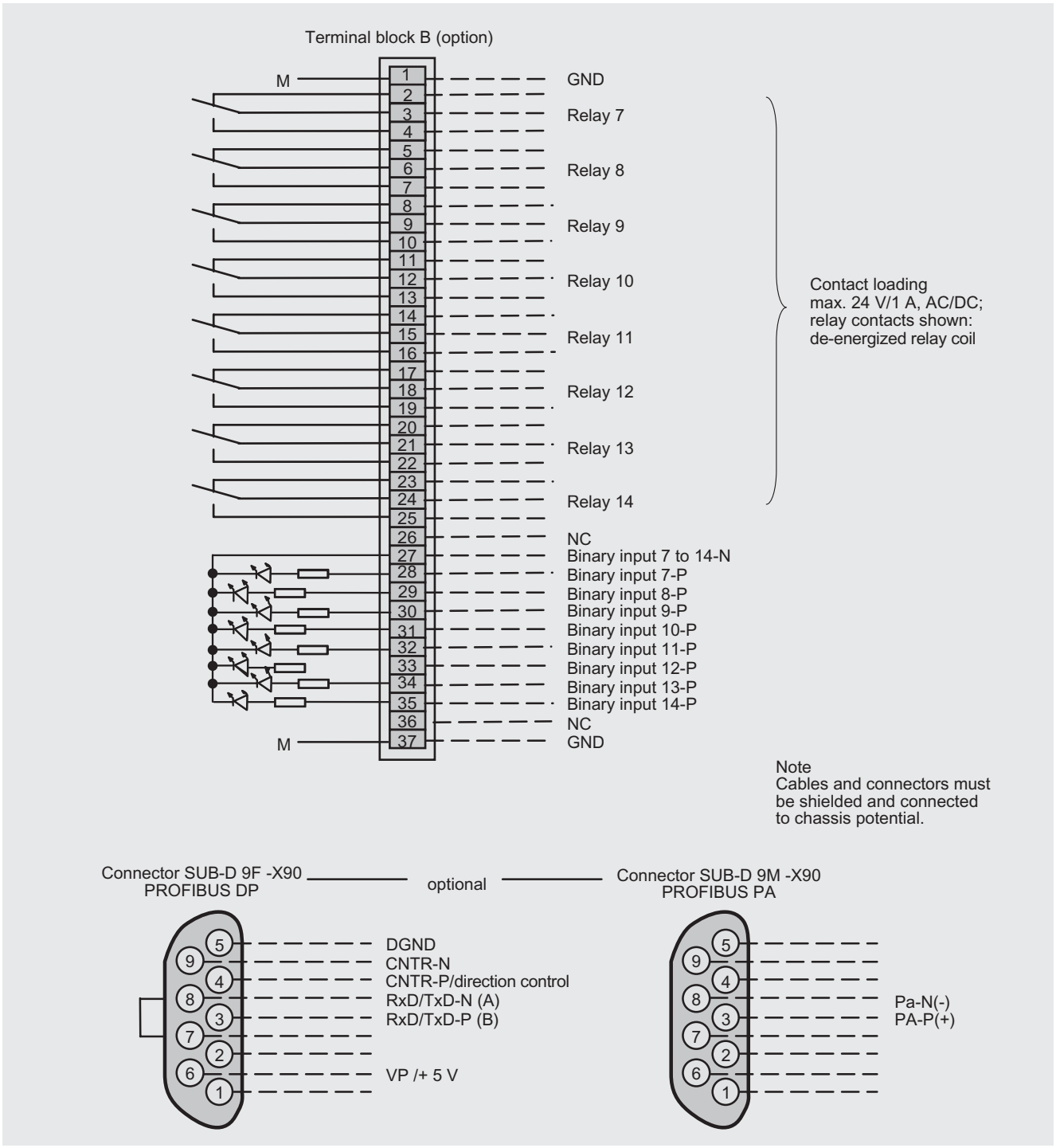
Schematics

Pin assignment (electrical and gas connections)

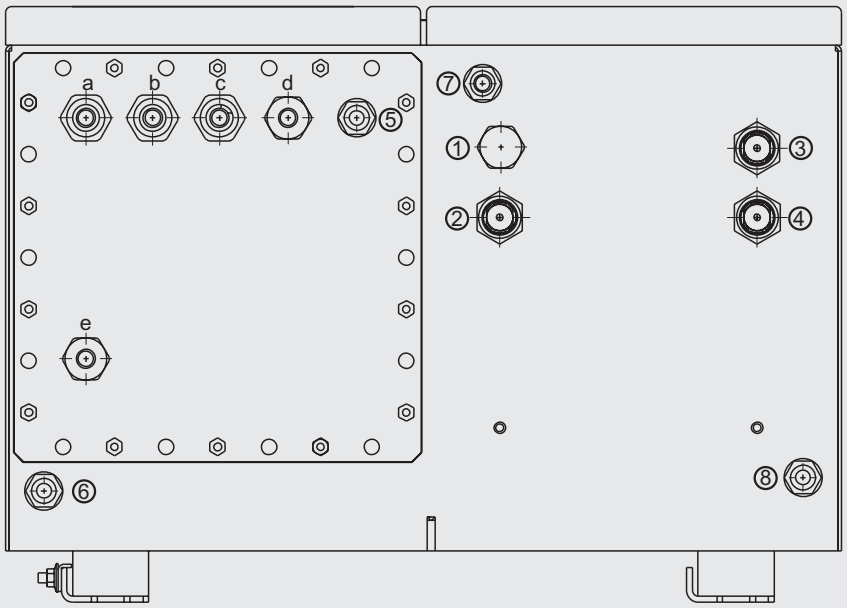


OXYMAT 6, field unit, connector and terminal assignment

Field unit



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



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 3/8 "	

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

Documentation

Selection and Ordering Data

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

D) Subject to AL export regulations: 9I999, ECCN: N

Selection and Ordering Data

Description	7MB2021	7MB2011	7MB2011 Ex	2 years (qty)	5 years (qty)		Order No.
Analyzer part							
O-ring (stub)	x	x	x	2	4	D)	**C71121-Z100-A159**
O-ring	x			1	2	D)	**C74121-Z100-A6**
O-ring (measuring head)	x	x	x	2	4	D)	**C79121-Z100-A32**
Spacer	x	x	x	-	1	D)	**C79451-A3277-B22**
Sample cell, stainless steel, mat. no. 1.4571; non-flow-type compensation branch	x	x	x	-	1	D)	**C79451-A3277-B535**
Sample cell, tantalum, non-flow-type compensation branch	x	x	x	-	1	D)	**C79451-A3277-B536**
Sample cell, stainless steel, mat. no. 1.4571; flow-type compensation branch	x	x	x	-	1	D)	**C79451-A3277-B537**
Sample cell, tantalum, flow-type compensation branch	x	x	x	-	1	D)	**C79451-A3277-B538**
Measuring head, non-flow-type compensation branch	x	x	x	1	1	D)	**C79451-A3460-B525**
Measuring head, flow-type compensation branch	x	x	x	1	1	D)	**C79451-A3460-B526**
Magnet connection plate	x	x	x	-	1		**C79451-A3474-B606**
Temperature sensor	x	x	x	-	1	D)	**C79451-A3480-B25**
Heating cartridge	x	x	x	-	1	D)	**W75083-A1004-F120**
Sample gas path							
Pressure switch (sample gas)	x			1	2	D)	**C79302-Z1210-A2**
Flow meter (version with pump only)	x			1	2	D)	**C79402-Z560-T1**
Restrictor, stainless steel, mat. no. 1.4571; hose gas path	x			2	2	D)	**C79451-A3480-C10**
Restrictor, titanium, pipe gas path	x	x	x	2	2	D)	**C79451-A3480-C37**
Reference gas path, 3000 hPa	x	x	x	1	1	D)	**C79451-A3480-D518**
Capillary tube, 100 hPa, connection set	x	x	x	1	1	D)	**C79451-A3480-D519**
Restrictor, stainless steel, mat. no. 1.4571; pipe gas path	x	x	x	1	1	D)	**C79451-A3520-C5**
Electronics							
Temperature controller - electronic, 230 V AC		x	x	-	1	D)	**A5E00118527**
Temperature controller - electronic, 115 V AC		x	x	-	1	D)	**A5E00118530**
Fusible plug (device fuse)			x	1	2	D)	**A5E00061501**
Front plate with keyboard	x			1	1	D)	**C79165-A3042-B505**
Temperature controller	x	x	x	-	1	D)	**C79451-A3474-B56**
Motherboard, with firmware: see spare parts list	x	x	x	-	1		
Adapter board, LCD/keyboard	x	x		1	1	D)	**C79451-A3474-B605**
LC display	x	x		1	1	D)	**W75025-B5001-B1**
Connector filter	x	x	x	-	1	D)	**W75041-E5602-K2**
Temperature fuse (heated version only)		x		-	1		**W75054-T1001-A150**
Fusible plug, T 0.63/250 V	x	x	x	2	4	D)	**W75054-L1010-T630**
Fusible plug, 1 A, 110/220 V	x	x	x	2	4	D)	**W75054-L1011-T100**
Fusible plug, 2,5 A, 250 V		x	x	2	3	D)	**W75054-L1011-T250**

D) Subject to AL export regulations: 9I999, ECCN: N

If the OXYMAT 6 is supplied with a specially cleaned gas path for high oxygen context ("Cleaned for O_2 service"), please ensure that you specify this when ordering spare parts. This is the only way to guarantee that the gas path will continue to comply with the special requirements for this version.