

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

General information

Overview



The ULTRAMAT/OXYMAT 6 gas analyzer is a practical combination of the ULTRAMAT 6 and OXYMAT 6 analyzers in a single enclosure.

The ULTRAMAT 6 channel operates according to the NDIR two-beam alternating light principle and measures one or two gases highly selectively whose absorption bands lie in the infrared wavelength range from 2 to 9 μm , such as CO, CO₂, NO, SO₂, NH₃, H₂O as well as CH₄ and other hydrocarbons.

The OXYMAT 6 channel is based on the paramagnetic alternating pressure method and is used to measure oxygen in gases.

Benefits

- Corrosion-resistant materials in gas path (option)
 - Measurement possible in highly corrosive sample gases
- Sample chambers can be cleaned as required on site
 - Cost savings due to reuse after contamination
- Open interface architecture (RS 485, RS 232, PROFIBUS)
- SIPROM GA network for maintenance and servicing information (option)

ULTRAMAT channel

- High selectivity with double-layer detector and optical coupler
 - Reliable measurements even in complex gas mixtures
- Low detection limits
 - Measurements with low concentrations

OXYMAT channel

- Paramagnetic alternating pressure principle
 - Small measuring ranges (0 to 0.5 % or 99.5 to 100 % O₂)
 - Absolute linearity
- Detector element has no contact with the sample gas
 - Can be used to measure corrosive gases
 - Long service life
- Physically suppressed zero through suitable selection of reference gas (air or O₂), e.g. 98 to 100 % O₂ for purity monitoring/air separation

Application

Fields of application

- Measurement for boiler control in incineration plants
- Emission measurements in incineration plants
- Measurement in the automotive industry (test benches)
- Process gas concentrations in chemical plants
- Trace measurements in pure gas processes
- Environmental protection
- TLV (Threshold Limit Value) monitoring at places of work
- Quality monitoring

Special versions

- Special applications
Besides the standard combinations, special applications concerning material in the gas path, material in the sample cells (e.g. Titan, Hastelloy C22) and sample components are also available on request.
- TÜV version/QAL
TÜV-approved versions of the ULTRAMAT/OXYMAT 6 are available for measurement of CO, NO, SO₂ and O₂ according to 13th and 17th BImSchV and TA Luft.
Smallest TÜV-approved and permitted measuring ranges:
 - 1-component analyzer
 - CO: 0 to 50 mg/m³
 - NO: 0 to 100 mg/m³
 - SO₂: 0 to 75 mg/m³
 - 2-component analyzer (series connection)
 - CO: 0 to 75 mg/m³
 - NO: 0 to 200 mg/m³

All larger measuring ranges are also approved.

Furthermore, the TÜV-approved versions of the ULTRAMAT/OXYMAT 6 comply with the requirements of EN 14956 and QAL 1 according to EN 14181. Conformity of the devices with both standards is TÜV-certified.

Determination of the analyzer drift according to EN 14181 (QAL 3) can be carried out manually or also with a PC using the SIPROM GA maintenance and servicing software. In addition, selected manufacturers of emission evaluation computers offer the possibility for downloading the drift data via the analyzer's serial interface and to automatically record and process it in the evaluation computer.

- Flow-type reference compartment
 - The flow through the reference compartment should be adapted to the sample gas flow
 - The gas supply of the reduced flow-type reference compartment should have an upstream pressure of 3 000 to 5 000 hPa (abs.). Then a restrictor will automatically adjust the flow to approximately 8 hPa

Design

19" rack unit

- 19" rack unit with 4 HU for installation
 - in hinged frame
 - in cabinets with or without telescopic rails
- Front plate can be swung down for servicing purposes (laptop connection)
- Internal gas paths: hose made of FKM (Viton) or pipe made of titanium or stainless steel
- Gas connections for sample gas inlet and outlet: pipe diameter 6 mm or 1/4"
- Flow indicator for sample gas on front plate (option)
- Sample chamber (OXYMAT channel) – with or without flow-type compensation branch – made of stainless steel (mat. no. 1.4571) or of tantalum for highly corrosive sample gases (e.g. HCl, Cl₂, SO₂, SO₃, etc.)
- Monitoring (option) of sample gas and/or reference gas (both channels)

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General information

Display and control panel

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

Inputs and outputs (per channel)

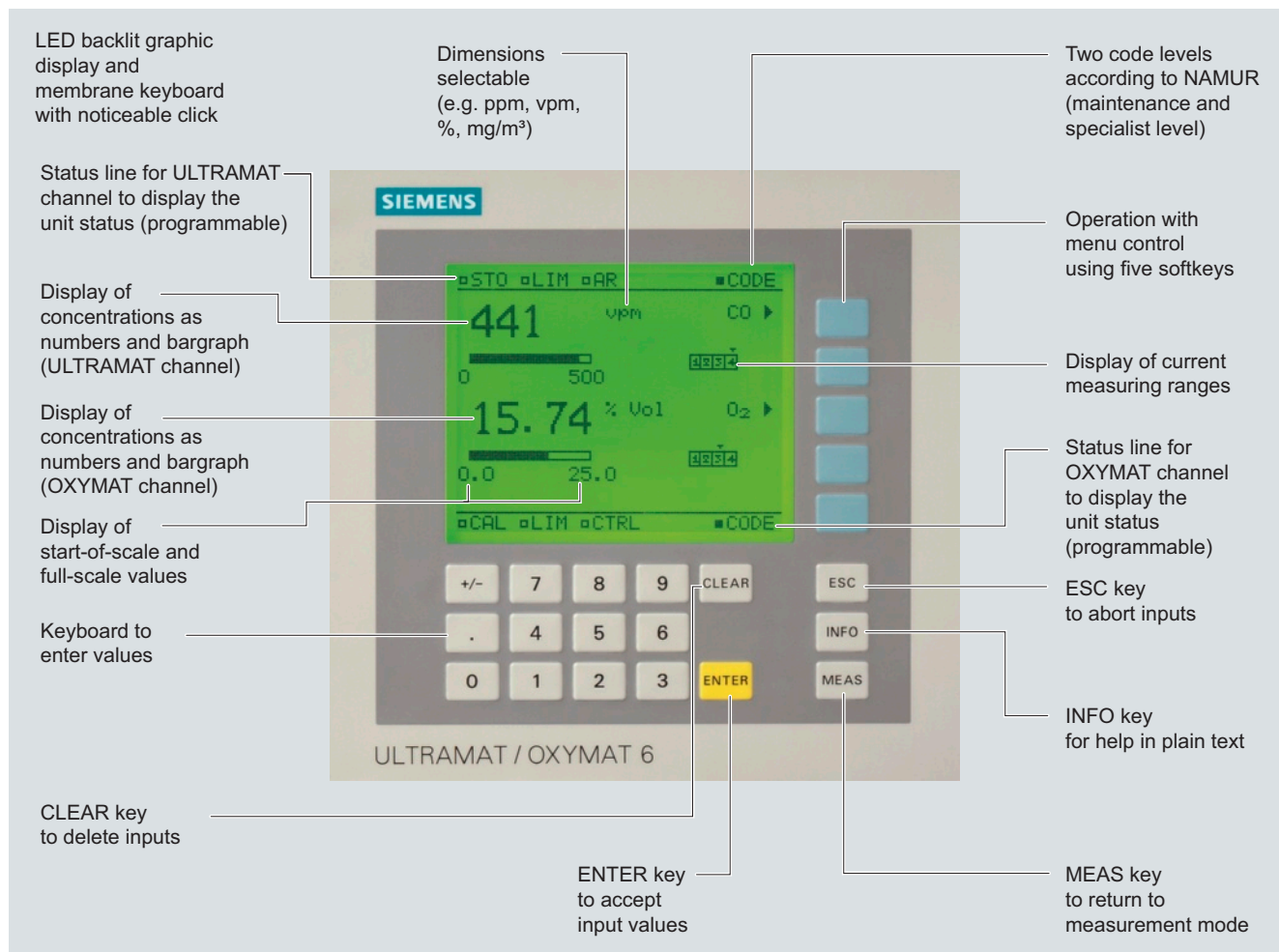
- One analog output for each measured component
- Two analog inputs freely configurable (e.g. correction of cross-interference or external pressure sensor)
- Six binary inputs freely configurable (e.g. for measurement range switchover, processing of external signals from sample preparation)
- Six relay outputs freely configurable e.g. for fault, maintenance request, limit alarm, external solenoid valves
- Expansion by eight additional binary inputs and eight additional relay outputs e.g. for autocalibration with up to four calibration gases

Communication

RS 485 present in the basic unit (connection at the rear; for the rack unit also behind the front plate).

Options

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



ULTRAMAT/OXYMAT 6, membrane keyboard and graphic display

Designs – Parts touched by sample gas, standard

Gas path ULTRAMAT channel		19" rack unit
With hoses	Bushing	Stainless steel, mat. no. 1.4571
	Hose	FKM (e.g. Viton)
	Sample chamber:	
	• Body	Aluminum
	• Lining	Aluminum
With pipes	• Fitting	Stainless steel, mat. no. 1.4571, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	• Window	CaF ₂ , adhesive: E353, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	Bushing	Titanium
	Pipe	Titanium, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	Sample chamber:	
With pipes	• Body	Aluminum
	• Lining	Tantalum (only for cell length 20 mm to 180 mm)
	• Window	CaF ₂ , adhesive: E353, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	Bushing	Stainless steel, mat. no. 1.4571
	Pipe	Stainless steel, mat. no. 1.4571, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
Flow indicator	Sample chamber:	
	• Body	Aluminum
	• Lining	Aluminum or tantalum (Ta: only for cell length 20 mm to 180 mm)
	• Window	CaF ₂ , adhesive: E353, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	Measurement pipe	Duran glass
Pressure switch	Variable area	Duran glass
	Suspension boundary	PTFE (Teflon)
	Angle pieces	FKM (e.g. Viton)
	Membrane	FKM (e.g. Viton)
Enclosure	Enclosure	PA 6.3T

Options

Gas path ULTRAMAT channel		19" rack unit
Flow indicator	Measurement pipe	Duran glass
	Variable area	Duran glass
	Suspension boundary	PTFE (Teflon)
	Angle pieces	FKM (e.g. Viton)
Pressure switch	Membrane	FKM (e.g. Viton)
	Enclosure	PA 6.3T

Versions – Parts wetted by sample gas, special applications (examples)

Gas path ULTRAMAT channel		19" rack unit
With pipes	Bushing	e.g. Hastelloy C22
	Pipe	e.g. Hastelloy C22, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	Sample chamber:	
	• Body	e.g. Hastelloy C22
	• Window	CaF ₂ , without adhesive O-ring: FKM (e.g. Viton) or FFKM (Kalrez)

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General information

Designs – Parts touched by sample gas, standard

Gas path OXYMAT channel		19" rack unit
With hoses	Bushing	Stainless steel, mat. no. 1.4571
	Hose	FKM (e.g. Viton)
	Sample chamber	Stainless steel, mat. no. 1.4571 or tantalum
	Fittings for sample chamber	Stainless steel, mat. no. 1.4571
	Restrictor	PTFE (e.g. Teflon)
	O-rings	FKM (e.g. Viton)
With pipes	Bushing	Titanium
	Pipe	Titanium
	Sample chamber	Stainless steel, mat. no. 1.4571 or Tantalum
	Restrictor	Titanium
	O-rings	FKM (Viton) or FFKM (Kalrez)
With pipes	Bushing	Stainless steel, mat. no. 1.4571
	Pipe	Stainless steel, mat. no. 1.4571
	Sample chamber	Stainless steel, mat. no. 1.4571 or Tantalum
	Restrictor	Stainless steel, mat. no. 1.4571
	O-rings	FKM (Viton) or FFKM (Kalrez)
With pipes	Bushing	Hastelloy C 22
	Pipe	Hastelloy C 22
	Sample chamber	Stainless steel, mat. no. 1.4571 or Tantalum
	Restrictor	Hastelloy C 22
	O-rings	FKM (e.g. Viton) or FFKM (e.g. Kalrez)

Options

Gas path ULTRAMAT channel and OXYMAT channel		19" rack unit
Flow indicator	Measurement pipe	Duran glass
	Variable area	Duran glass
	Suspension boundary	PTFE (Teflon)
	Angle pieces	FKM (e.g. Viton)
Pressure switch	Membrane	FKM (e.g. Viton)
	Enclosure	PA 6.3T

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

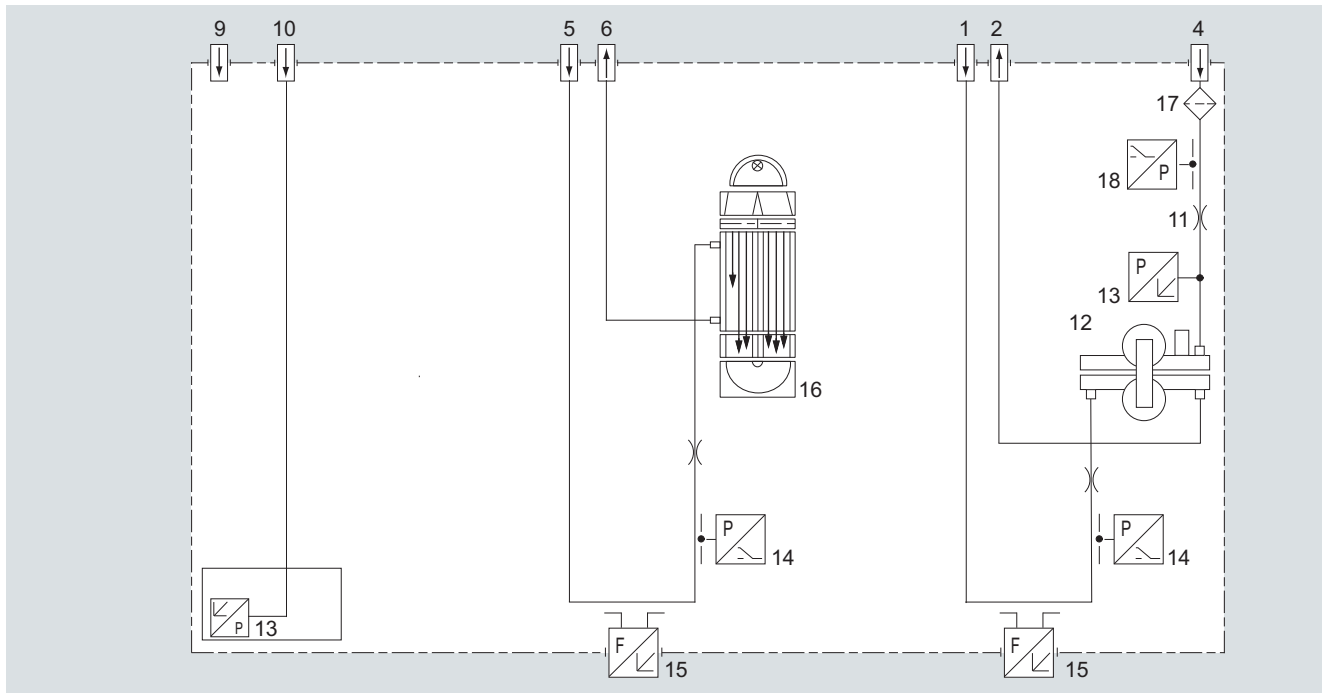
General information

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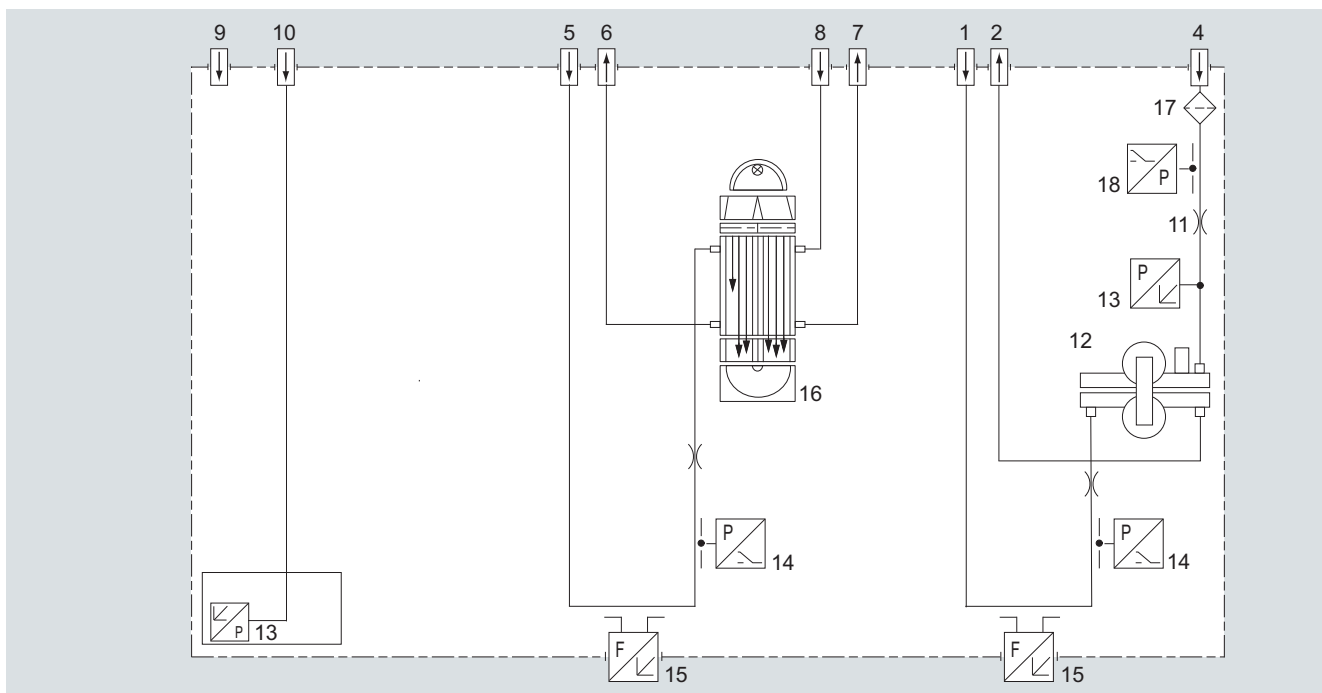
Gas path

Legend for the gas path figures

- | | | | |
|---|---|----|--|
| 1 | Sample gas inlet (OXYMAT channel) | 10 | Connection of pressure sensor (ULTRAMAT channel) |
| 2 | Sample gas outlet (OXYMAT channel) | 11 | Restrictor (in reference gas inlet) |
| 3 | Not used | 12 | O ₂ physical system |
| 4 | Reference gas inlet | 13 | Pressure sensor |
| 5 | Sample gas inlet (ULTRAMAT channel) | 14 | Pressure switch in sample gas path (option) |
| 6 | Sample gas outlet (ULTRAMAT channel) | 15 | Flow indicator in sample gas path (option) |
| 7 | Reference gas outlet (ULTRAMAT channel, option) | 16 | IR physical system |
| 8 | Reference gas inlet (ULTRAMAT channel, option) | 17 | Filter |
| 9 | Purging gas | 18 | Pressure switch (reference gas) (option) |



ULTRAMAT/OXYMAT 6, gas path (example) IR channel without flow-type reference side



ULTRAMAT/OXYMAT 6, gas path (example) IR channel with flow-type reference side

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

General information

Function

Principle of operation, ULTRAMAT channel

The ULTRAMAT channel operates according to the infrared two-beam alternating light principle with double-layer detector and optical coupler.

The measuring principle is based on the molecule-specific absorption of bands of infrared radiation. The absorbed wavelengths are characteristic to the individual gases, but may partially overlap. This results in cross-sensitivities which are reduced to a minimum by the following measures:

- Gas-filled filter cell (beam divider)
- Double-layer detector with optical coupler
- Optical filters if necessary

The figure shows the measuring principle. An IR source (1) which is heated to approx. 700 °C and which can be shifted to balance the system is divided by the beam divider (3) into two equal beams (sample and reference beams). The beam divider also acts as a filter cell.

The reference beam passes through a reference cell (8) filled with N₂ (a non-infrared-active gas) and reaches the right-hand side of the detector (11) practically unattenuated. The sample beam passes through the sample chamber (7) through which the sample gas flows and reaches the left-hand side of the detector (10) attenuated to a lesser or greater extent depending on the concentration of the sample gas. The detector is filled with a defined concentration of the gas component to be measured.

The detector is designed as a double-layer detector. The center of the absorption band is preferentially absorbed in the upper detector layer, the edges of the band are absorbed to approximately the same extent in the upper and lower layers. The upper and lower detector layers are connected together via the microflow sensor (12). This coupling means that the spectral sensitivity has a very narrow band.

The optical coupler (13) lengthens the lower receiver cell layer optically. The infrared absorption in the second detector layer is varied by changing the slider position (14). It is thus possible to individually minimize the influence of interfering components.

A chopper (5) rotates between the beam divider and the sample chamber and interrupts the two beams alternately and periodically. If absorption takes place in the sample chamber, a pulsating flow is generated between the two detector levels which is converted by the microflow sensor (12) into an electric signal.

The microflow sensor consists of two nickel-plated grids heated to approximately 120 °C, which, along with two supplementary resistors, form a Wheatstone bridge. The pulsating flow together with the dense arrangement of the Ni grids causes a change in resistance. This leads to an offset in the bridge, which is dependent on the concentration of the sample gas.

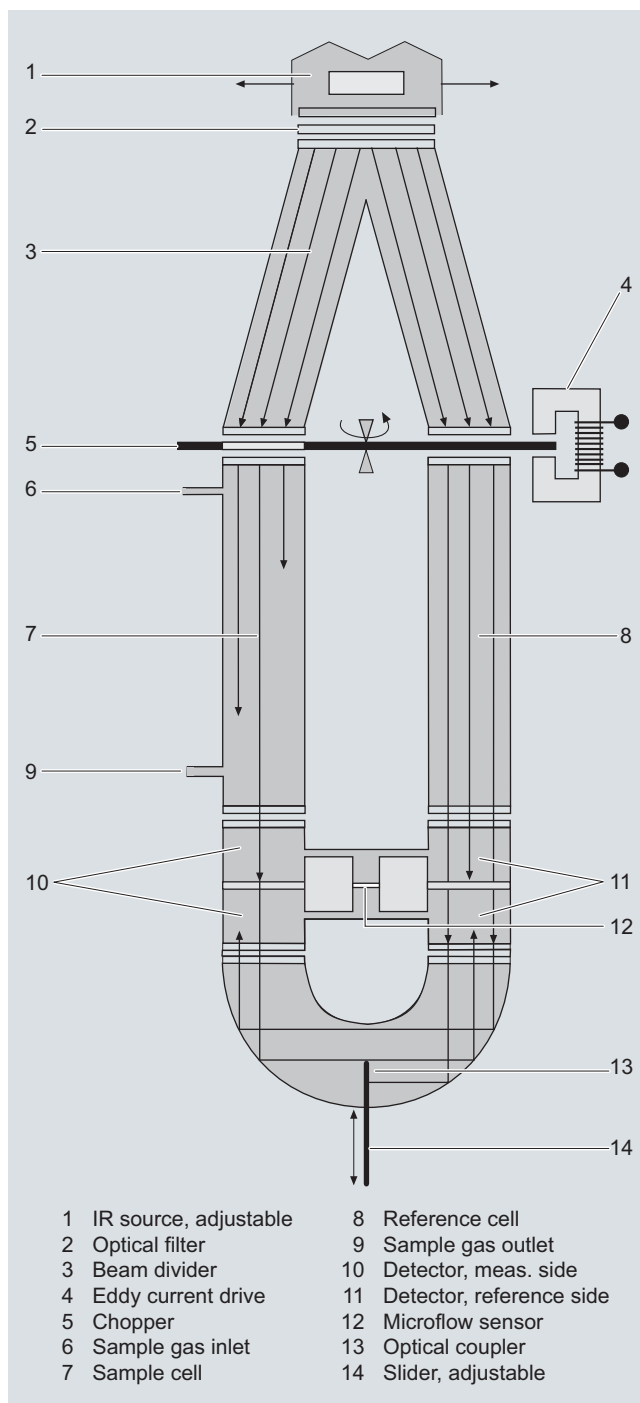
Note

The sample gases must be fed into the analyzers free of dust. Condensation should be prevented from occurring in the sample chambers. Therefore, the use of gas modified for the measuring task is necessary in most application cases.

As far as possible, the ambient air of the analyzer should not have a large concentration of the gas components to be measured.

Flow-type reference sides with reduced flow must not be operated with flammable or toxic gases.

Flow-type reference sides with reduced flow and an O₂ content > 70 % may only be used together with Y02.



ULTRAMAT channel, principle of operation

Channels with electronically suppressed zero point only differ from the standard version in the measuring range parameterization.

Physically suppressed zeros can be provided as a special application.

Principle of operation, OXYMAT channel

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

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 contents meet in a magnetic field, a pressure difference is produced between them.

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 chamber (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 content, causes a cross flow. This flow is converted into an electric signal by a microflow sensor (4).

The microflow sensor consists of two nickel-plated grids heated to approximately $120\text{ }^\circ\text{C}$, which, along with two supplementary resistors, form a Wheatstone bridge. The pulsating flow results in a change in the resistance of the Ni grids. This leads to an offset in the bridge which is dependent on the oxygen concentration of 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 microflow 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's operating position.

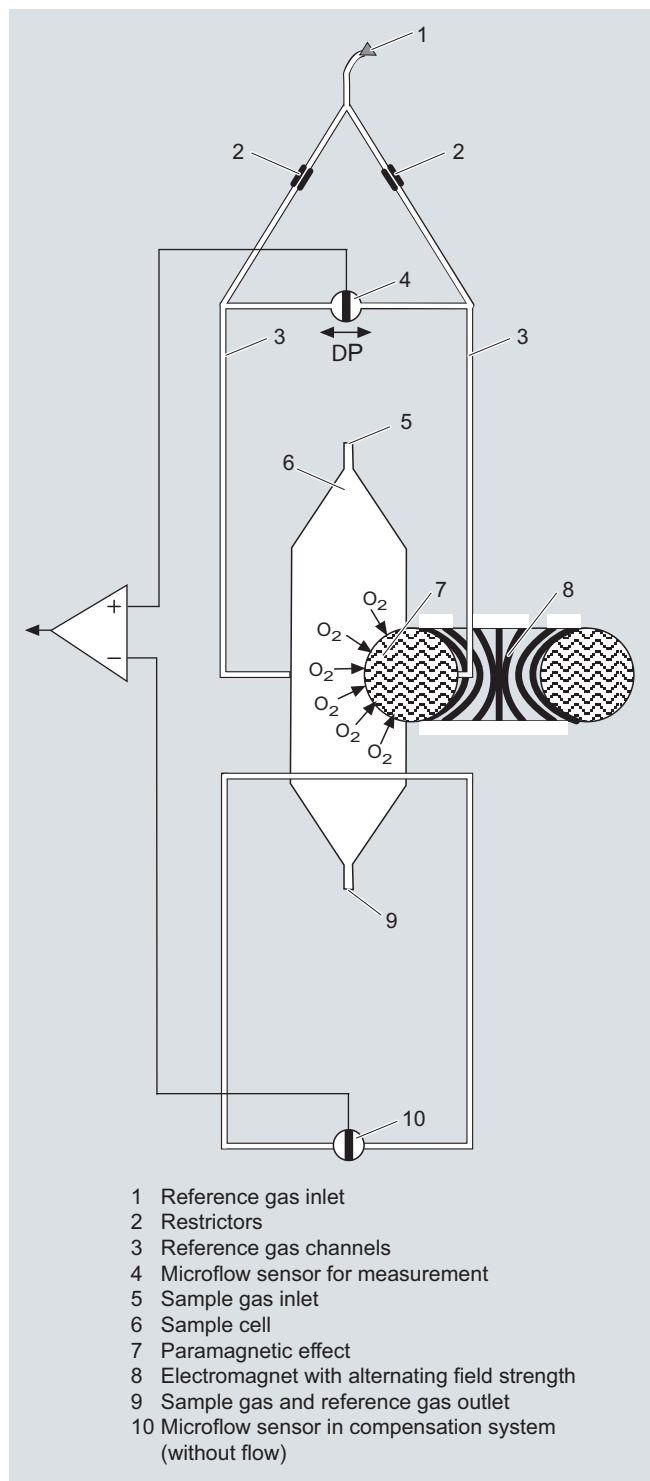
The sample chamber is directly in the sample path and has a small volume, and the microflow sensor is a low-lag sensor. This results in a very short response time.

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) (option).

Note

The sample gases must be fed into the analyzers free of dust. Condensation should be prevented from occurring in the sample chambers. Therefore, gas modified for the measuring tasks is necessary in most application cases.



- 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 channel, principle of operation

Continuous Gas Analyzer, extractive

ULTRAMAT/OXYMAT 6

General information

Essential characteristics

- Dimension of measured value freely selectable (e.g. vpm, mg/m³)
- Four freely-parameterizable measuring ranges per component
- Measuring ranges with suppressed zero point possible
- Measuring range identification
- Galvanically isolated signal output 0/2/4 to 20 mA per component
- Automatic or manual measuring range switchover selectable; 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 or component can be matched to the respective measuring task
- Short response time
- Low long-term drift
- Measuring point switchover for up to 6 measuring points (programmable)
- Measuring point identification
- Monitoring of sample gas flow (option)
- Two control levels with separate authorization codes to prevent unintentional and unauthorized inputs
- Automatic, parameterizable measuring range calibration
- Simple handling using a numerical membrane keyboard and operator prompting
- Operation based on NAMUR recommendation
- Customer-specific analyzer options such as:
 - Customer acceptance
 - TAG labels
 - Drift recording

ULTRAMAT channel

- Differential measuring ranges with flow-type reference cell
- Internal pressure sensor for correction of variations in atmospheric pressure in the range 700 to 1 200 hPa absolute
- External pressure sensor - only with piping as the gas path - can be connected for correction of variations in the process gas pressure in the range 700 to 1 500 hPa absolute (option)
- Sample chambers for use in presence of highly corrosive sample gases (e.g. tantalum layer or Hastelloy C22)

OXYMAT channel

- Monitoring of sample gas and/or reference gas (option)
- Different smallest measuring ranges (0.5 %, 2.0 % or 5.0 % O₂)
- Analyzer unit with flow-type compensation circuit (option): a flow is passed through the compensation branch to reduce the vibration dependency in the case of highly different densities of the sample and reference gases
- Internal pressure sensor for correction of pressure variations in sample gas (range 500 to 2 000 hPa absolute)
- External pressure sensor - only with piping as the gas path - can be connected for correction of variations in the sample gas pressure up to 3 000 hPa absolute (option)
- Monitoring of reference gas with reference gas connection 3 000 to 5 000 hPa (option), absolute
- Sample chamber for use in presence of highly corrosive sample gases

Reference gases

Measuring range	Recommended reference gas	Reference gas connection pressure	Remarks
0 to ... vol.% O ₂	N ₂	2 000 ... 4 000 hPa above sample gas pressure (max. 5 000 hPa absolute)	The reference gas flow is set automatically to 5 ... 10 ml/min (up to 20 ml/min with flow-type compensation branch)
... to 100 vol.% O ₂ (suppressed zero point with full-scale value 100 vol.% O ₂)	O ₂		
Around 21 vol.% O ₂ (suppressed zero point with 21 vol.% O ₂ within the measuring 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 channel

Correction of zero error / cross-sensitivities (OXYMAT channel)

Accompanying gas (concentration 100 vol.%)	Deviation from zero point in vol.% O ₂ absolute	Accompanying gas (concentration 100 vol.%)	Deviation from zero point in vol.% O ₂ absolute
Organic gases		Inert gases	
Ethane C ₂ H ₆	-0.49	Helium He	+0.33
Ethene (ethylene) C ₂ H ₄	-0.22	Neon Ne	+0.17
Ethine (acetylene) C ₂ H ₂	-0.29	Argon Ar	-0.25
1.2 butadiene C ₄ H ₆	-0.65	Krypton Kr	-0.55
1.3 butadiene C ₄ H ₆	-0.49	Xenon Xe	-1.05
n-butane C ₄ H ₁₀	-1.26		
iso-butane C ₄ H ₁₀	-1.30	Inorganic gases	
1-butene C ₄ H ₈	-0.96	Ammonia NH ₃	-0.20
iso-butene C ₄ H ₈	-1.06	Hydrogen bromide HBr	-0.76
Dichlorodifluoromethane (R12) CCl ₂ F ₂	-1.32	Chlorine Cl ₂	-0.94
Acetic acid CH ₃ COOH	-0.64	Hydrogen chloride HCl	-0.35
n-heptane C ₇ H ₁₆	-2.40	Dinitrogen monoxide N ₂ O	-0.23
n-hexane C ₆ H ₁₄	-2.02	Hydrogen fluoride HF	+0.10
Cyclo-hexane C ₆ H ₁₂	-1.84	Hydrogen iodide HI	-1.19
Methane CH ₄	-0.18	Carbon dioxide CO ₂	-0.30
Methanol CH ₃ OH	-0.31	Carbon monoxide CO	+0.07
n-octane C ₈ H ₁₈	-2.78	Nitrogen oxide NO	+42.94
n-pentane C ₅ H ₁₂	-1.68	Nitrogen N ₂	0.00
iso-pentane C ₅ H ₁₂	-1.49	Nitrogen dioxide NO ₂	+20.00
Propane C ₃ H ₈	-0.87	Sulfur dioxide SO ₂	-0.20
Propylene C ₃ H ₆	-0.64	Sulfur hexafluoride SF ₆	-1.05
Trichlorofluoromethane (R11) CCl ₃ F	-1.63	Hydrogen sulfide H ₂ S	-0.44
Vinyl chloride C ₂ H ₃ Cl	-0.77	Water H ₂ O	-0.03
Vinyl fluoride C ₂ H ₃ F	-0.55	Hydrogen H ₂	+0.26
1.1 vinylidene chloride C ₂ H ₂ Cl ₂	-1.22		

Table 2: Zero point error due to diamagnetism or paramagnetism of some accompanying gases with reference to nitrogen at 60 °C und 1 000 hPa absolute (according to IEC 1207/3)

Conversion to other temperatures:

The deviations from the zero point listed in Table 2 must be multiplied by a correction factor (k):

- with diamagnetic gases: $k = 333 \text{ K} / (9 \text{ [}^\circ\text{C]} + 273 \text{ K})$
- with paramagnetic gases: $k = [333 \text{ K} / (9 \text{ [}^\circ\text{C]} + 273 \text{ K})]^2$

(all diamagnetic gases have a negative deviation from zero point)

Continuous Gas Analyzer, extractive

ULTRAMAT/OXYMAT 6

19" rack unit

Technical specifications

ULTRAMAT/OXYMAT 6, 19" rack unit

General information	
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 50081-1, EN 50082-2

Design, enclosure	
Weight	Approx. 21 kg
Degree of protection	IP20 according to EN 60529

Electrical characteristics	
EMC (Electromagnetic Compatibility)	In accordance with standard requirements of NAMUR NE21 (08/98)
Electrical safety	According to EN 61010-1, overvoltage category III
Power supply	100 ... 120 V AC (nominal range of use 90 ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (nominal range of use 180 ... 264 V), 48 ... 63 Hz
Power consumption	Approx. 70 VA
Fuse values	120 ... 120 V: F1/F2 = T 1.6 A 200 ... 240 V: F1/F2 = T 1 A

Electrical inputs and outputs (per channel)	
Analog output	0/2/4 ... 20 mA, isolated; max. load 750 Ω
Relay outputs	6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; load: 24 V AC/DC/1 A, isolated, non-sparking
Analog inputs	2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and correction of influence of accompanying gas (correction of cross-interference)
Binary inputs	6, designed for 24 V, isolated, freely parameterizable, e.g. for measuring range switchover
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, during storage and transportation (dew point must not be undershot)

Technical data, ULTRAMAT channel

Measuring ranges	
	4, internally and externally switchable; autoranging is also possible
Smallest possible measuring range	Dependent on the application, e.g. CO: 0 ... 10 vpm CO ₂ : 0 ... 5 vpm
Largest possible measuring range	Dependent on the application
Measuring ranges with suppressed zero point	Any zero point within 0 ... 100 vol.% can be implemented; smallest possible span 20 %
Characteristic	Linearized
Influence of interfering gases must be considered separately	

Gas inlet conditions	
Permissible sample gas pressure	
• Without pressure switch	700 ... 1 500 hPa (absolute)
• With integrated pressure switch	700 ... 1 300 hPa (absolute)
Sample gas flow	18 ... 90 l/h (0.3 ... 1.5 l/min)
Sample gas temperature	Min. 0 to max. 50 °C, but above the dew point
Sample gas humidity	< 90 % (relative humidity), or dependent on measuring task, non-condensing

Dynamic response	
Warm-up period	At room temperature < 30 min (the technical specification will be met after 2 hours)
Delayed display (T ₉₀ -time)	Dependent on length of analyzer chamber, sample gas line and parameterizable damping
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 ... 5 s, depending on version
Time for device-internal signal processing	< 1 s

Pressure correction range	
Pressure sensor	
• Internal	700 ... 1 200 hPa absolute
• External	700 ... 1 500 hPa absolute

Measuring response (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Output signal fluctuation	< ± 1 % of the smallest possible measuring range according to rating plate
Zero point drift	< ± 1 % of the current measuring range/week
Measured-value drift	< ± 1 % of the current measuring range/week
Repeatability	≤ 1 % of the current measuring range
Detection limit	1 % of the smallest possible measuring range
Linearity error	< 0.5 % of the full-scale value

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19" rack unit

Influencing variables (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Ambient temperature	< 1 % of current measuring range/10 K (with constant receiver cell temperature)
Sample gas pressure	<ul style="list-style-type: none"> When pressure compensation has been switched on: < 0.15 % of the span/1 % change in atmospheric pressure When pressure compensation has been switched off: < 1.5 % of the span/1 % change in atmospheric pressure
Sample gas flow	Negligible
Power supply	< 0.1 % of the current measuring range with rated voltage \pm 10 %
Environmental conditions	Application-specific measuring influences possible if ambient air contains measured component or cross interference-sensitive gases

Technical data, OXYMAT channel

Measuring ranges	4, internally and externally switchable; automatic measuring range switchover also possible
Smallest possible span (relating to sample gas pressure 1 000 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 range	100 vol.% O ₂
Measuring ranges with suppressed zero point	Any zero point within 0 ... 100 vol.% can be implemented, provided that a suitable reference gas is used

Gas inlet conditions

Permissible sample gas pressure	500 ... 3 000 hPa absolute
<ul style="list-style-type: none"> With pipes With hoses 	500 ... 3 000 hPa absolute
<ul style="list-style-type: none"> Without pressure switch With pressure switch 	500 ... 1 500 hPa absolute 500 ... 1 300 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 (relative humidity)
Reference gas pressure (high-pressure version)	2 000 ... 4 000 hPa above sample gas pressure, but max. 5 000 hPa
Reference gas pressure (low-pressure version)	Min. 100 hPa above sample gas pressure

Dynamic response

Warm-up period	At room temperature < 30 min (the technical specification will be met after 2 hours)
Delayed display (T ₉₀ time)	Min. 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)	Approx. 0.5 ... 2.5 s, depending on version
Time for device-internal signal processing	< 1 s

Pressure correction range

Pressure sensor	500 ... 2 000 hPa absolute
<ul style="list-style-type: none"> Internal External 	500 ... 3 000 hPa absolute

Measuring response (relating to sample gas pressure 1 013 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 \pm 0.25 % at 2 σ)
Zero point drift	< 0.5 %/month of the smallest possible measuring span according to rating plate
Measured-value drift	\leq 0.5 %/month of the current measuring range
Repeatability	\leq 1 %/month of the current measuring range
Detection limit	1 % of the current measuring range
Linearity error	1 % of the current measuring range

Influencing variables (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

Ambient temperature	<ul style="list-style-type: none"> < 0.5 %/10 K referred to smallest possible 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)	<ul style="list-style-type: none"> When pressure compensation has been switched off: < 2 % of the current measuring range/1 % atmospheric pressure change When pressure compensation has been switched on: < 0.2 % of the current measuring range/1 % atmospheric pressure change
Accompanying gases	Deviation from zero point corresponding to paramagnetic or diamagnetic deviation of accompanying gas
Sample gas flow	< 1 % of the smallest possible 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 the current measuring range with rated voltage \pm 10 %

2

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

19" rack unit

2

Selection and ordering data

Order No.

ULTRAMAT/OXYMAT 6 gas analyzer 19" rack unit for installation in cabinets Combined measurement of IR-absorbing gas and O ₂			D) 7MB2023-	Cannot be combined
<u>Gas connections for sample gas and reference gas</u> Pipe with 6 mm outer diameter Pipe with ¼" outer diameter			0 1	0 → A21 1 → A20
<u>Smallest possible span O₂</u> 0.5 % reference gas pressure 3 000 hPa 0.5 % reference gas pressure 100 hPa (external pump) 2 % reference gas pressure 3 000 hPa 2 % reference gas pressure 100 hPa (external pump) 5 % reference gas pressure 3 000 hPa 5 % reference gas pressure 100 hPa (external pump)			A B C D E F	B → A26, Y02 D → A26, Y02 F → A26, Y02
<u>Sample chamber (OXYMAT channel)</u> Non-flow-type compensation branch • Made of stainless steel, mat. no. 1.4571 • Made of tantalum Flow-type compensation branch • Made of stainless steel, mat. no. 1.4571 • Made of tantalum			A B C D	C D
<u>Internal gas paths</u>	<u>Sample chamber¹⁾ (lining) (ULTRAMAT channel)</u>	<u>Reference chamber (flow-type) (ULTRAMAT channel)</u>		
(both channels)	(ULTRAMAT channel)	(ULTRAMAT channel)		
Hose made of FKM (Viton)	Aluminum Aluminum	Non-flow-type Flow-type	0 1	0 → A20, A21 1
Pipe made of titanium	Tantalum Tantalum	Non-flow-type Flow-type	4 5	4 → A20, A21, Y02 5 → Y02
Stainless steel pipe (mat. no. 1.4571)	Aluminum Tantalum	Non-flow-type Non-flow-type	6 8	6 → A20, A21 8 → A20, A21
<u>With sample gas monitoring (both channels)</u>				
Hose made of FKM (Viton)	Aluminum Aluminum	Non-flow-type Flow-type	2 3	2 → A20, A21 3
<u>Add-on electronics</u> Without AUTOCAL function • With 8 additional binary inputs and outputs for OXYMAT channel • With 8 additional binary inputs and outputs for ULTRAMAT channel • With 8 additional binary inputs and 8 additional binary outputs for ULTRAMAT channel and OXYMAT channel • With serial interface for the automotive industry (AK) • With 8 additional binary inputs/outputs and PROFIBUS PA interface for ULTRAMAT channel and OXYMAT channel • With 8 additional binary inputs/outputs and PROFIBUS DP interface for ULTRAMAT channel and OXYMAT channel			0 1 2 3 5 6 7	5 → Y02
<u>Power supply</u> 100 ... 120 V AC, 48 ... 63 Hz 200 ... 240 V AC, 48 ... 63 Hz			0 1	
Footnotes, see next page				

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

19" rack unit

2

Selection and ordering data			Order No.	
ULTRAMAT/OXYMAT 6 gas analyzer			D) 7MB2023-	Cannot be combined
19" rack unit for installation in cabinets Combined measurement of IR-absorbing gas and O ₂				
<u>ULTRAMAT channel</u>	<u>Possible with measuring range identification</u>			
<u>Measured component</u>				
CO		11 ²⁾ , 12 ... 30	A	
CO highly selective (with optical filter)		12 ²⁾ , 13 ... 30	B	
CO (TÜV; see Table "TÜV, single component (IR channel)", page 2/88)			X	
CO ₂		10 ²⁾ , 11 ... 30	C	
CH ₄		13 ²⁾ , 14 ... 30	D	
C ₂ H ₂		15 ²⁾ , 16 ... 30	E	
C ₂ H ₄		15 ²⁾ , 16 ... 30	F	
C ₂ H ₆		14 ²⁾ , 15 ... 30	G	
C ₃ H ₆		14 ²⁾ , 15 ... 30	H	
C ₃ H ₈		13 ²⁾ , 14 ... 30	J	
C ₄ H ₆		15 ²⁾ , 16 ... 30	K	
C ₄ H ₁₀		14 ²⁾ , 15 ... 30	L	
C ₆ H ₁₄		14 ²⁾ , 15 ... 30	M	
SO ₂ (TÜV; see Table "TÜV, single component (IR channel)", page 2/88)		13 ²⁾ , 14 ... 30	N	
NO (TÜV; see Table "TÜV, single component (IR channel)", page 2/88)		14 ²⁾ , 15 ... 20, 22	P	
NH ₃ (dry)		14 ²⁾ , 15 ... 30	Q	Q
H ₂ O		17 ²⁾ , 18 ... 20, 22	R	R
N ₂ O		13 ²⁾ , 14 ... 30	S	
<u>Smallest measuring range</u>	<u>Largest measuring range</u>	<u>Measuring range identification</u>		
0 ... 5 vpm	0 ... 100 vpm	10	A	
0 ... 10 vpm	0 ... 200 vpm	11	B	
0 ... 20 vpm	0 ... 400 vpm	12	C	
0 ... 50 vpm	0 ... 1 000 vpm	13	D	
0 ... 100 vpm	0 ... 1 000 vpm	14	E	
0 ... 300 vpm	0 ... 3 000 vpm	15	F	
0 ... 500 vpm	0 ... 5 000 vpm	16	G	
0 ... 1 000 vpm	0 ... 10 000 vpm	17	H	
0 ... 3 000 vpm	0 ... 10 000 vpm	18	J	
0 ... 3 000 vpm	0 ... 30 000 vpm	19	K	
0 ... 5 000 vpm	0 ... 15 000 vpm	20	L	
0 ... 5 000 vpm	0 ... 50 000 vpm	21	M	
0 ... 1 %	0 ... 3 %	22	N	
0 ... 1 %	0 ... 10 %	23	P	
0 ... 3 %	0 ... 10 %	24	Q	
0 ... 3 %	0 ... 30 %	25	R	
0 ... 5 %	0 ... 15 %	26	S	
0 ... 5 %	0 ... 50 %	27	T	
0 ... 10 %	0 ... 30 %	28	U	
0 ... 10 %	0 ... 100 %	29	V	
0 ... 30 %	0 ... 100 %	30	W	
<u>Operating software and documentation</u>				
German			0	
English			1	
French			2	
Spanish			3	
Italian			4	

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

1) Only for cell length 20 to 180 mm

2) Can be ordered as special application (no. 3100 with order code Y12)

Continuous Gas Analyzer, extractive

ULTRAMAT/OXYMAT 6

19" rack unit

Selection and ordering data

<i>Additional versions</i>	Order code	Cannot be combined
Add "-Z" to Order No. and specify order codes.		
Flow-type reference cell with reduced flow, 6 mm (ULTRAMAT channel) ¹⁾	A20	
Flow-type reference cell with reduced flow, ¼" (ULTRAMAT channel) ¹⁾	A21	
Reference gas monitoring (pressure switch ... 3 000 hPa), for OXYMAT channel only	A26	
Connection pipes (can only be combined with the appropriate gas connection diameter and internal gas path materials)		
• Titanium connection pipe, 6 mm, complete with screwed gland, for sample gas side	A22	
• Titanium connection pipe, ¼", complete with screwed gland, for sample gas side	A24	
• Stainless steel connection pipe (mat. no. 1.4571), 6 mm, complete with screwed gland, for sample gas side	A27	
• Stainless steel connection pipe (mat. no. 1.4571), ¼", complete with screwed gland, for sample gas side	A29	
Telescopic rails (2 units)	A31	
Set of Torx screwdrivers	A32	
Kalrez gaskets in sample gas path (O ₂ side)	B01	
TAG labels (specific inscription based on customer information)	B03	
Kalrez gaskets in sample gas path (IR side)	B04	
FM/CSA certificate – Class I Div 2	E20	
Clean for O ₂ service (specially cleaned gas path) (ULTRAMAT channel and OXYMAT channel)	Y02	
Measuring range indication in plain text ²⁾ , if different from the standard setting	Y11	
Special setting (only in conjunction with an application no., e.g. extended measuring range, only ULTRAMAT channel)	Y12	
Extended special setting (only in conjunction with an application no., e.g. determination of interference influences, only ULTRAMAT channel)	Y13	
TÜV version acc. to 13th and 17th BImSchV (only ULTRAMAT channel)	Y17	E20
<i>Retrofitting sets</i>	Order No.	
RS 485/Ethernet converter	A5E00852383	
RS 485/RS 232 converter	C79451-Z1589-U1	
RS 485/USB converter	A5E00852382	
AUTOCAL function with serial interfaces for the automotive industry (AK)	C79451-A3480-D33	
AUTOCAL function with 8 binary inputs/outputs for ULTRAMAT channel or OXYMAT channel	C79451-A3480-D511	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA for ULTRAMAT channel or OXYMAT channel	A5E00057307	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP for ULTRAMAT channel or OXYMAT channel	A5E00057312	

¹⁾ Cannot be combined with non-flow-type reference cell.

²⁾ Standard setting: $\left. \begin{array}{l} \text{Smallest measuring range} \\ 25\% \text{ of largest measuring range} \\ 50\% \text{ of largest measuring range} \\ \text{Largest measuring range} \end{array} \right\} \begin{array}{l} \text{in \% or} \\ \text{ppm (vpm)} \end{array}$

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

19" rack unit

2

Selection and ordering data			Order No.	
ULTRAMAT/OXYMAT 6 gas analyzer 19" rack unit for installation in cabinets Combined measurement of IR-absorbing gas and O ₂			7MB2024- - - - - Cannot be combined	
<u>Gas connections for sample gas and reference gas</u>				
Pipe with 6 mm outer diameter			0	0 → A21
Pipe with ¼" outer diameter			1	1 → A20
<u>Smallest possible span O₂</u>				
0.5 % reference gas pressure 3 000 hPa			A	B → A26, Y02
0.5 % reference gas pressure 100 hPa (external pump)			B	D → A26, Y02
2 % reference gas pressure 3 000 hPa			C	
2 % reference gas pressure 100 hPa (external pump)			D	F → A26, Y02
5 % reference gas pressure 3 000 hPa			E	
5 % reference gas pressure 100 hPa (external pump)			F	
<u>Sample chamber (OXYMAT channel)</u>				
Non-flow-type compensation branch				
• Made of stainless steel, mat. no. 1.4571			A	C
• Made of tantalum			B	
Flow-type compensation branch				
- Made of stainless steel, mat. no. 1.4571			C	D
- Made of tantalum			D	
<u>Internal gas paths</u>	<u>Sample chamber¹⁾ (lining)</u> (ULTRAMAT channel)	<u>Reference chamber (flow-type)</u> (ULTRAMAT channel)		
Hose made of FKM (Viton)	Aluminum Aluminum	Non-flow-type Flow-type	0 1	0 → A20, A21
Pipe made of titanium	Tantalum	Non-flow-type	4	4 → A20, A21, Y02
	Tantalum	Flow-type	5	5 → Y02
Stainless steel pipe (mat. no. 1.4571)	Aluminum	Non-flow-type	6	6 → A20, A21
	Tantalum	Non-flow-type	8	8 → A20, A21
<u>With sample gas monitoring (both channels)</u>				
Hose made of FKM (Viton)	Aluminum	Non-flow-type	2	2 → A20, A21
	Aluminum	Flow-type	3	
<u>Add-on electronics</u>				
Without			0	
AUTOCAL function				
• With 8 additional binary inputs and outputs for ULTRAMAT channel and OXYMAT channel			1	5 → Y02
• With serial interface for the automotive industry (AK)			5	
• With 8 additional binary inputs/outputs and PROFIBUS PA interface for ULTRAMAT channel and OXYMAT channel			6	
• With 8 additional binary inputs/outputs and PROFIBUS DP interface for ULTRAMAT channel and OXYMAT channel			7	
<u>Power supply</u>				
100 ... 120 V AC, 48 ... 63 Hz			0	
200 ... 240 V AC, 48 ... 63 Hz			1	

Footnote, see next page

Continuous Gas Analyzer, extractive

ULTRAMAT/OXYMAT 6

19" rack unit

Selection and ordering data**Order No.****ULTRAMAT/OXYMAT 6 gas analyzer**

19" rack unit for installation in cabinets

Combined measurement of IR-absorbing gas and O₂

7MB2024-

- - - - -

Cannot be combined

ULTRAMAT channel	Measured component	Smallest measuring range	Largest measuring range	
CO/NO	CO	0 ... 100 vpm	0 ... 1 000 vpm	AH
	NO	0 ... 300 vpm	0 ... 1 000 vpm	
CO/NO	CO	0 ... 300 vpm	0 ... 3 000 vpm	AJ
	NO	0 ... 500 vpm	0 ... 3 000 vpm	
CO/NO	CO	0 ... 1 000 vpm	0 ... 10 000 vpm	AC
	NO	0 ... 1 000 vpm	0 ... 10 000 vpm	
For CO/NO (TÜV; see Table "TÜV, two components in series", page 2/88)				
CO ₂ /CO	CO ₂	0 ... 100 vpm	0 ... 1 000 vpm	BA
	CO	0 ... 100 vpm	0 ... 1 000 vpm	
CO ₂ /CO	CO ₂	0 ... 300 vpm	0 ... 3 000 vpm	BB
	CO	0 ... 300 vpm	0 ... 3 000 vpm	
CO ₂ /CO	CO ₂	0 ... 1 000 vpm	0 ... 10 000 vpm	BC
	CO	0 ... 1 000 vpm	0 ... 10 000 vpm	
CO ₂ /CO	CO ₂	0 ... 3 000 vpm	0 ... 30 000 vpm	BD
	CO	0 ... 3 000 vpm	0 ... 30 000 vpm	
CO ₂ /CO	CO ₂	0 ... 1 %	0 ... 10 %	BE
	CO	0 ... 1 %	0 ... 10 %	
CO ₂ /CO	CO ₂	0 ... 3 %	0 ... 30 %	BF
	CO	0 ... 3 %	0 ... 30 %	
CO ₂ /CO	CO ₂	0 ... 10 %	0 ... 100 %	BG
	CO	0 ... 10 %	0 ... 100 %	
CO ₂ /CH ₄	CO ₂	0 ... 10 %	0 ... 100 %	CG
	CH ₄	0 ... 10 %	0 ... 100 %	
CO ₂ /NO	CO ₂	0 ... 300 vpm	0 ... 3 000 vpm	DJ
	NO	0 ... 500 vpm	0 ... 3 000 vpm	
Operating software and documentation				
German				0
English				1
French				2
Spanish				3
Italian				4

1) Only for cell length 20 to 180 mm

Selection and ordering data

<i>Additional versions</i>	Order code	Cannot be combined
Add "-Z" to Order No. and specify order codes.		
Flow-type reference cell with reduced flow, 6 mm (ULTRAMAT channel) ¹⁾	A20	
Flow-type reference cell with reduced flow, ¼" (ULTRAMAT channel) ¹⁾	A21	
Reference gas monitoring (pressure switch ... 3 000 hPa), for OXYMAT channel only	A26	
Connection pipes (can only be combined with the appropriate gas connection diameter and internal gas path materials)		
• Titanium connection pipe, 6 mm, complete with screwed gland, for sample gas side	A22	
• Titanium connection pipe, ¼", complete with screwed gland, for sample gas side	A24	
• Stainless steel connection pipe (mat. no. 1.4571), 6 mm, complete with screwed gland, for sample gas side	A27	
• Stainless steel connection pipe (mat. no. 1.4571), ¼", complete with screwed gland, for sample gas side	A29	
Telescopic rails (2 units)	A31	
Set of Torx screwdrivers	A32	
Kalrez gaskets in sample gas path (O ₂ side)	B01	
TAG labels (specific inscription based on customer information)	B03	
Kalrez gaskets in sample gas path (IR side)	B04	
FM/CSA certificate – Class I Div 2	E20	
Clean for O ₂ service (specially cleaned gas path) (ULTRAMAT channel and OXYMAT channel)	Y02	
Measuring range indication in plain text ²⁾ , if different from the standard setting	Y11	
Special setting (only in conjunction with an application no., e.g. extended measuring range, only ULTRAMAT channel)	Y12	
Extended special setting (only in conjunction with an application no., e.g. determination of interference influences, only ULTRAMAT channel)	Y13	
TÜV version acc. to 13th and 17th BImSchV (only ULTRAMAT channel)	Y17	→ E20
<i>Retrofitting sets</i>	Order No.	
RS 485/Ethernet converter	A5E00852383	
RS 485/RS 232 converter	C79451-Z1589-U1	
RS 485/USB converter	A5E00852382	
AUTOCAL function with serial interfaces for the automotive industry (AK)	C79451-A3480-D33	
AUTOCAL function with 8 binary inputs/outputs for ULTRAMAT channel or OXYMAT channel	C79451-A3480-D511	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA for ULTRAMAT channel or OXYMAT channel	A5E00057307	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP for ULTRAMAT channel or OXYMAT channel	A5E00057312	

¹⁾ Cannot be combined with non-flow-type reference cell.

²⁾ Standard setting:

Smallest measuring range	}	in % or ppm (vpm)
25 % of largest measuring range		
Largest measuring range		

Continuous Gas Analyzer, extractive

ULTRAMAT/OXYMAT 6

19" rack unit

TÜV, single component (IR channel)

Component	CO (TÜV)		SO ₂ (TÜV)		NO (TÜV)	
	Measuring range identification	Smallest measuring range from 0 to ...	Largest measuring range from 0 to ...	Smallest measuring range from 0 to ...	Largest measuring range from 0 to ...	Largest measuring range from 0 to ...
C			75 mg/m ³	1 500 mg/m ³		
D	50 mg/m ³	1 000 mg/m ³	300 mg/m ³	3 000 mg/m ³		
E			500 mg/m ³	5 000 mg/m ³	100 mg/m ³	2 000 mg/m ³
F	300 mg/m ³	3 000 mg/m ³	1 000 mg/m ³	10 000 mg/m ³	300 mg/m ³	3 000 mg/m ³
G	500 mg/m ³	5 000 mg/m ³			500 mg/m ³	5 000 mg/m ³
H	1 000 mg/m ³	10 000 mg/m ³	3 000 mg/m ³	30 000 mg/m ³	1 000 mg/m ³	10 000 mg/m ³
K	3 000 mg/m ³	30 000 mg/m ³	10 g/m ³	100 g/m ³	3 000 mg/m ³	30 000 mg/m ³
P	10 g/m ³	100 g/m ³	30 g/m ³	300 g/m ³	10 g/m ³	100 g/m ³
R	30 g/m ³	300 g/m ³	100 g/m ³	1 000 g/m ³	30 g/m ³	300 g/m ³
V	100 g/m ³	1 160 g/m ³	300 g/m ³	2 630 g/m ³	100 g/m ³	1 250 g/m ³

Example for ordering

ULTRAMAT/OXYMAT 6, TÜV

IR channel

Component: CO

Measuring range: 0 to 50 / 1 000 mg/m³

with hoses, non-flow-type reference compartment

without automatic adjustment (AUTOCAL)

230 V AC; German

7MB2023-0EA00-1XD0-Z +Y17

TÜV, two components in series

Component	CO (TÜV)		NO (TÜV)	
	Measuring range identification	Smallest measuring range from 0 to ...	Largest measuring range from 0 to ...	Largest measuring range from 0 to ...
AH	75 mg/m ³	1 000 mg/m ³	200 mg/m ³	2 000 mg/m ³
AJ	300 mg/m ³	3 000 mg/m ³	500 mg/m ³	3 000 mg/m ³
AC	1 000 mg/m ³	10 000 mg/m ³	1 000 mg/m ³	10 000 mg/m ³

Example for ordering

ULTRAMAT/OXYMAT 6, TÜV

IR channel

Components: CO/NO

Measuring range CO: 0 to 75 / 1 000 mg/m³, NO: 0 to 200 / 2 000 mg/m³

with hoses, non-flow-type reference cell

without automatic adjustment (AUTOCAL)

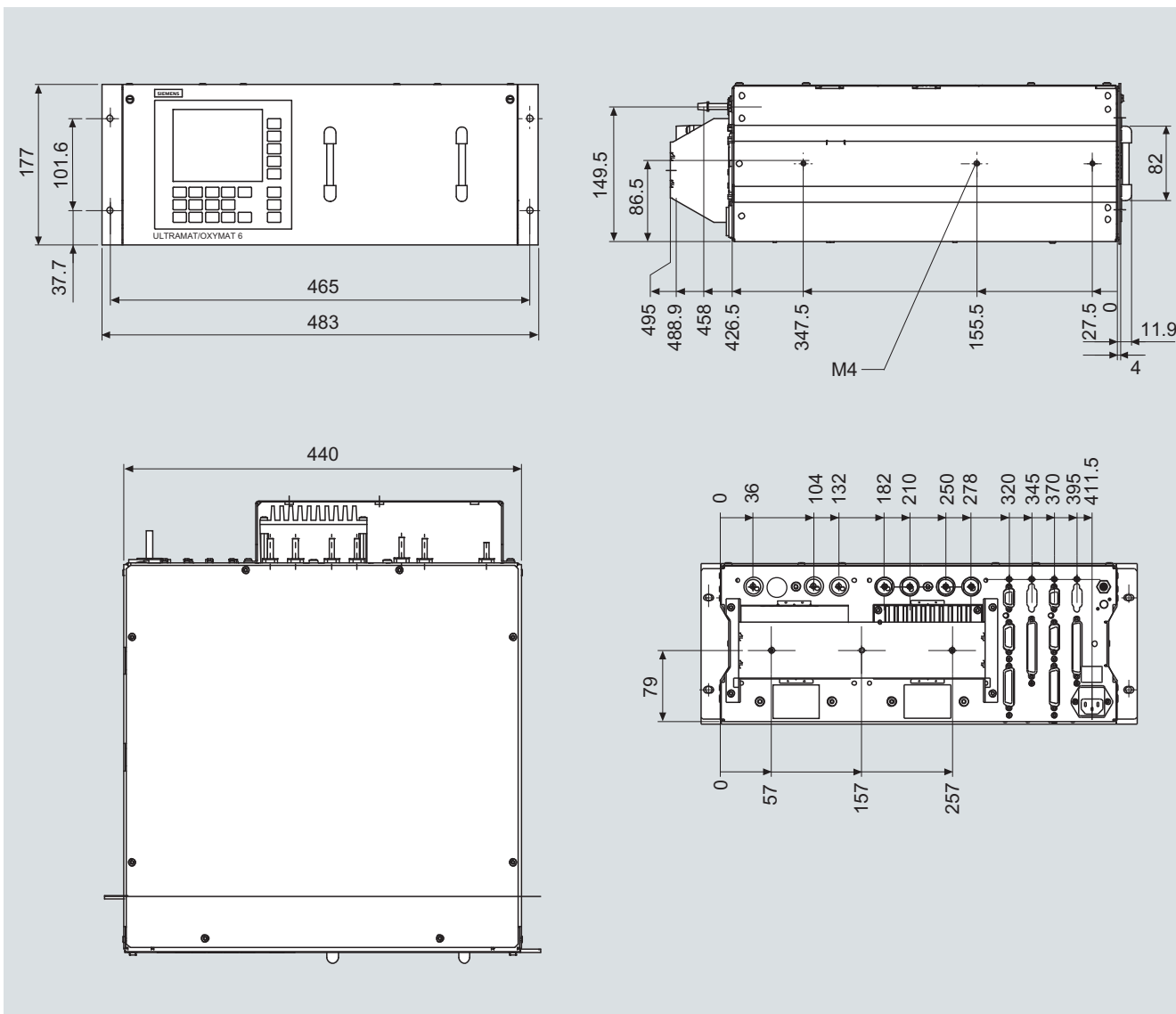
230 V AC; German

7MB2024-0EA00-1AH0-Z +Y17

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

19" rack unit

Dimensional drawings



ULTRAMAT/OXYMAT 6, 19" unit, dimensions in mm

2

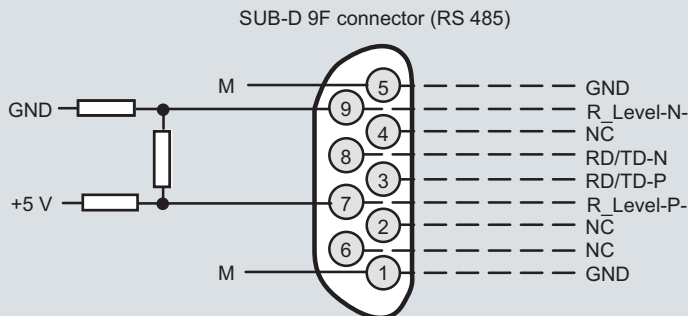
Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

19" rack unit

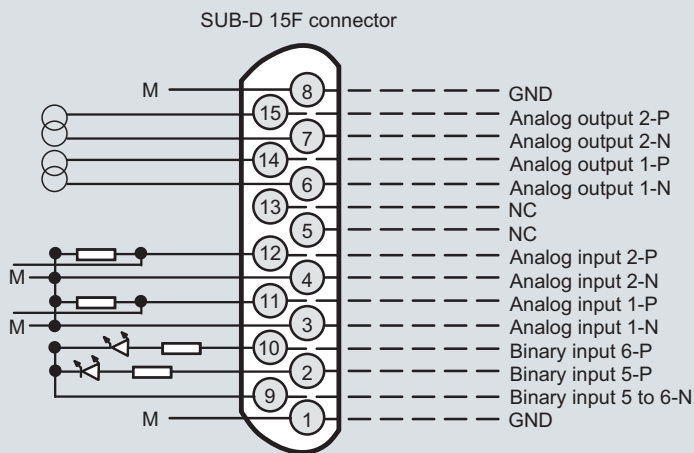
Schematics

Pin assignment (electrical and gas connections)

2

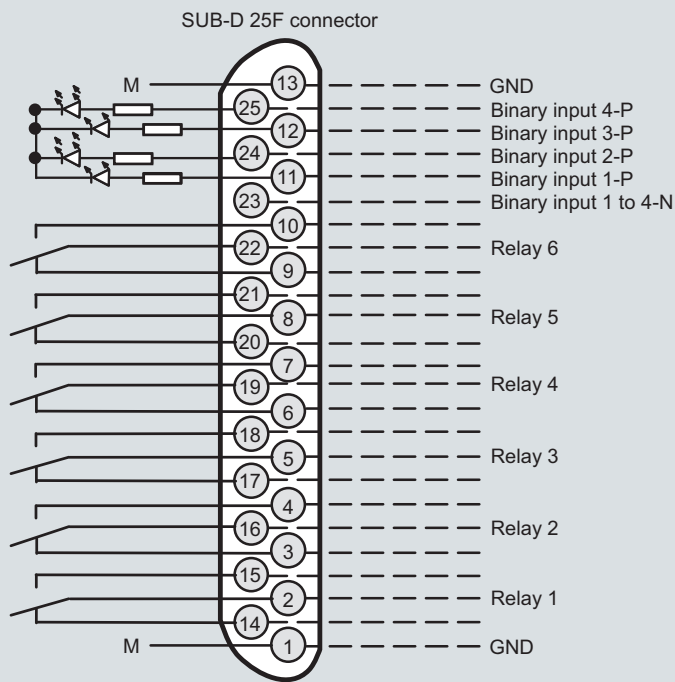


It is possible to connect bus terminating resistors to pins 7 and 9.



For 2-component version only of the ULTRAMAT part
Analog outputs isolated (also from each other), $R_L \leq 750 \Omega$

Pressure correction
Pressure correction
Correction of cross-interference
Correction of cross-interference
Analog inputs non-isolated, 0 ... 20 mA/500 Ω or 0 ... 10 V (low-resistance)
Isolated via optocoupler
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)



Isolated via optocoupler
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)

Contact load
max. 24 V/1 A, AC/DC; relay contacts shown: relay coil has zero current

Note:
All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

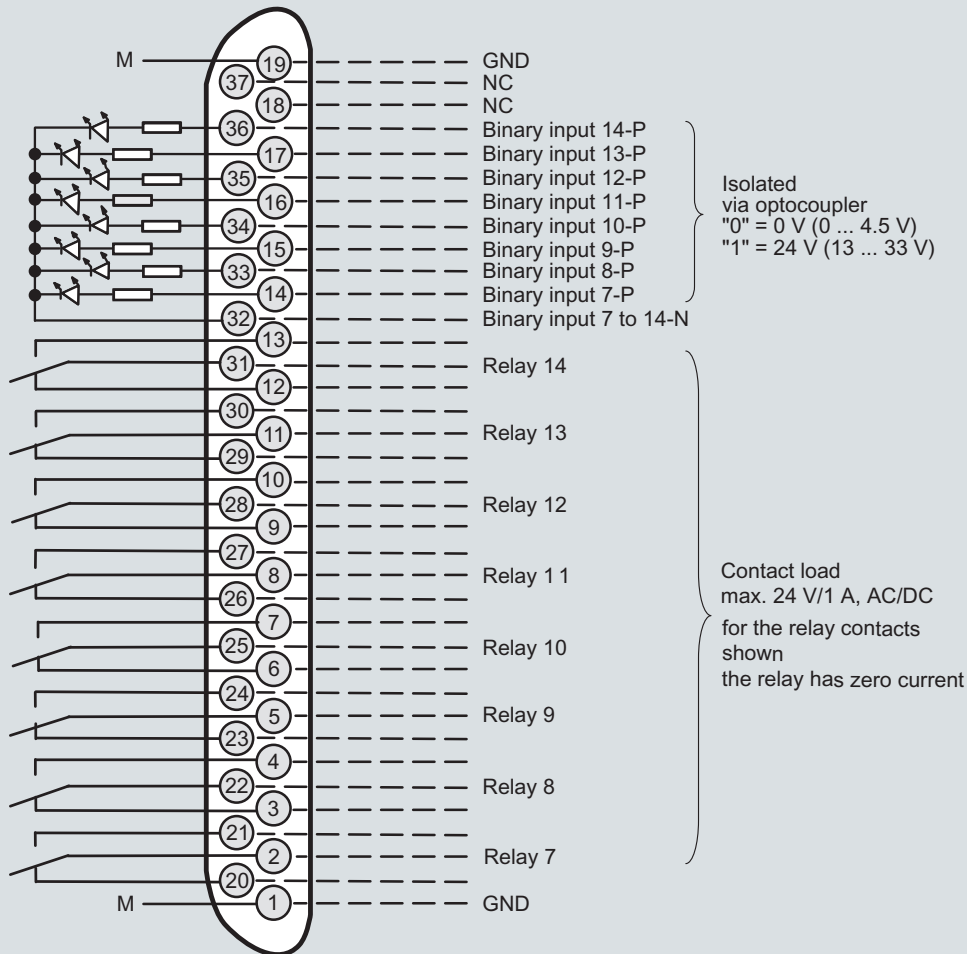
ULTRAMAT/OXYMAT 6, 19" unit, pin assignment

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

19" rack unit

2

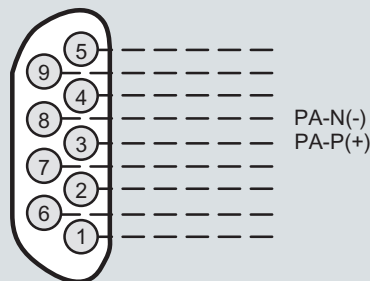
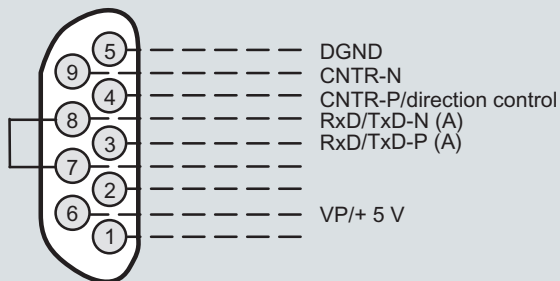
Connector SUB-D 37F (option)



Connector SUB-D 9F
PROFIBUS DP

optional

Connector SUB-D 9M
PROFIBUS PA



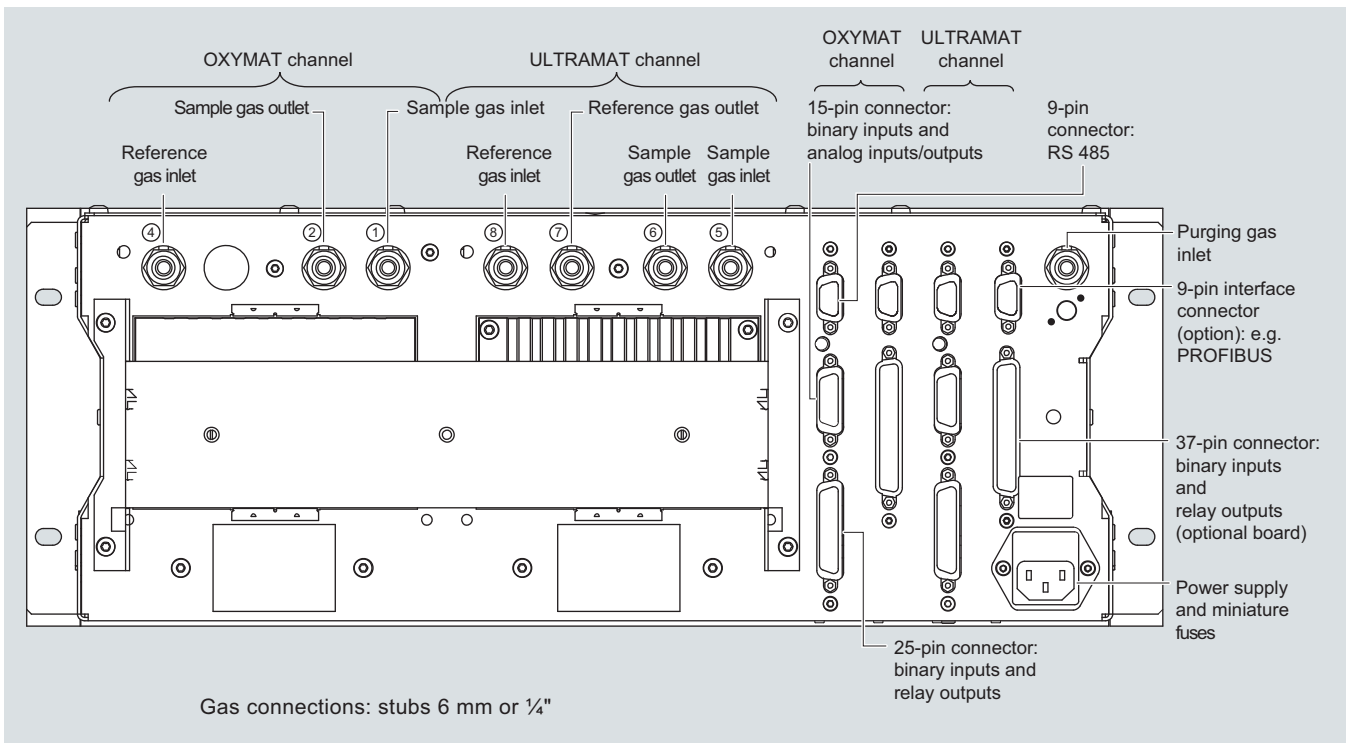
Note:
All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

ULTRAMAT/OXYMAT 6, 19" unit, pin assignment of AUTOCAL board and PROFIBUS connectors

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

19" rack unit

2



ULTRAMAT/OXYMAT 6, 19" unit, gas and electrical connections

Documentation

Selection and ordering data

Operating instructions	Order No.
ULTRAMAT 6 / OXYMAT 6	
Gas analyzer for IR-absorbing gases and oxygen	
• German	C79000-G5200-C143
• English	C79000-G5276-C143
• French	C79000-G5277-C143
• Spanish	C79000-G5278-C143
• Italian	C79000-G5272-C143

Continuous Gas Analyzer, extractive ULTRAMAT/OXYMAT 6

Suggestions for spare parts

Selection and ordering data

Description	7MB2023	7MB2024	2 years (quantity)	5 years (quantity)		Order No.
Analyzer unit						
<u>Analyzer unit, ULTRAMAT channel</u>						
• O-ring for cover (window, rear)	x	x	2	2	D)	C79121-Z100-A24
• Cover (cell length 20 ... 180 mm)	x	x	2	2		C79451-A3462-B151
• Cover (cell length 0.2 ... 6 mm)	x	x	2	2		C79451-A3462-B152
• O-rings, set (ULTRAMAT)	x	x	—	1	D)	C79451-A3462-D501
<u>Analyzer unit, OXYMAT channel</u>						
• O-ring	x	x	1	2	D)	C74121-Z100-A6
• O-ring (measuring head)	x	x	2	4	D)	C79121-Z100-A32
• O-ring	x	x	2	4	D)	C71121-Z100-A159
• Sample chamber, stainless steel, mat. no. 1.4571; non-flow-type compensation branch	x	x	—	1	D)	C79451-A3277-B535
• Sample chamber, tantalum, non-flow-type compensation branch	x	x	—	1		C79451-A3277-B536
• Sample chamber, stainless steel, mat. no. 1.4571; flow-type compensation branch	x	x	—	1		C79451-A3277-B537
• Sample chamber, tantalum, flow-type compensation branch	x	x	—	1		C79451-A3277-B538
• Measuring head, non-flow-type compensation branch	x	x	1	1		C79451-A3460-B525
• Measuring head, flow-type compensation branch	x	x	1	1		C79451-A3460-B526
Sample gas path						
Pressure switch	x	x	1	2		C79302-Z1210-A2
Restrictor, stainless steel, mat. no. 1.4571; hose gas path	x	x	2	2		C79451-A3480-C10
Flow indicator	x	x	1	2		C79402-Z560-T1
<u>Sample gas path, ULTRAMAT channel</u>						
• Hose clip	x	x	—	1		C79451-A3478-C9
<u>Sample gas path, OXYMAT channel</u>						
• Restrictor, titanium, pipe gas path	x	x	2	2		C79451-A3480-C37
• Reference gas path, 3000 hPa	x	x	1	1		C79451-A3480-D518
• Capillary, 100 hPa, connection set	x	x	1	1		C79451-A3480-D519
• Restrictor, stainless steel, mat. no. 1.4571; pipe gas path	x	x	1	1		C79451-A3520-C5
Electronics						
Front plate with keyboard	x	x	1	1	D)	C79165-A3042-B506
Adapter plate, LCD/keyboard	x	x	1	1		C79451-A3474-B605
LC display	x	x	1	1		W75025-B5001-B1
Connector filter	x	x	—	1	F)	W75041-E5602-K2
Fuse, T 0.63A/250 V	x	x	2	3		W79054-L1010-T630
Fuse, T 1 A/250 V	x	x	2	3		W79054-L1011-T100
Fuse, T 2.5 A/250 V	x	x	2	3	D)	W79054-L1011-T250
<u>Electronics, ULTRAMAT channel</u>						
• Motherboard, with firmware: see spare parts list	x	x	—	1		
<u>Electronics, OXYMAT channel</u>						
• Motherboard, with firmware: see spare parts list	x	x	—	1		

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

F) Subject to export regulations AL: N, ECCN: EAR99H

If the device was supplied with a specially cleaned gas path for high oxygen context ("Clean for O₂ 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.