ULTRAMAT/OXYMAT 6

Overview

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

The ULTRAMAT 6 measurement channel functions according to the NDIR dual-beam differential mode process and highly selectively measures gases whose absorption bands are in the infrared wavelength range between 2 and 9 µm, for example CO, CO_2, NO, SO_2, NH_3, H_2O as well as CH_4 and other hydrocarbons.

The OXYMAT 6 measurement 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% O_2)
  - 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 O_2), e.g. 98 to 100% O_2 for purity monitoring/air separation

Application

- Measurement for boiler control in combustion plants
- Emission measurements in combustion plants
- Process gas concentrations in chemical plants
- Trace measurements in pure gas processes
- Environmental protection
- TLV (Threshold Limit Value) monitoring at the workplace
- Quality monitoring

Special versions

Special applications

Besides the standard combinations, special applications concerning material in the gas path, material in the sample chambers (e.g. titanium, Hastelloy C22) and measured components are available on request.

Performance-tested version / QAL

For measurements of CO, NO, SO_2 and O_2 according to sections 13 and 27 of the German Federal Immission Protection Regulations and TA Luft, performance-tested versions according to EN 15267 of the ULTRAMAT/OXYMAT 6 are available.

Certified measuring range:

- 1-component analyzer
  CO: 0 to 75 mg/m³; 0 to 10 000 mg/m³
  NO: 0 to 100 mg/m³; 0 to 10 000 mg/m³
  SO_2: 0 to 75 mg/m³; 0 to 1 500 mg/m³
- O_2: 0 to 5 vol.%; 0 to 25 vol.%

All larger measuring ranges are also approved.

In addition, performance-tested versions of the ULTRAMAT/OXYMAT 6 meet the requirements set forth in EN 14956 and QAL1 according to EN 14181. Conformity of the analyzers with both standards is TÜV-certified.

Determination of the analyzer drift according to EN 14181 (QAL3) 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 cell

- The flow through the reference cell should be adapted to the sample gas flow
- The gas supply of the reduced flow-type reference cell should have a primary 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 U 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, Cl_2, SO_2, SO_3, etc.)
- Monitoring (option) of sample gas and/or reference gas (both channels)

Display and operator 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 digital 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 demanded, limit alarm, external solenoid valves
- Expandable with eight additional digital inputs and eight additional relay outputs e.g. for autocalibration with up to four calibration gases

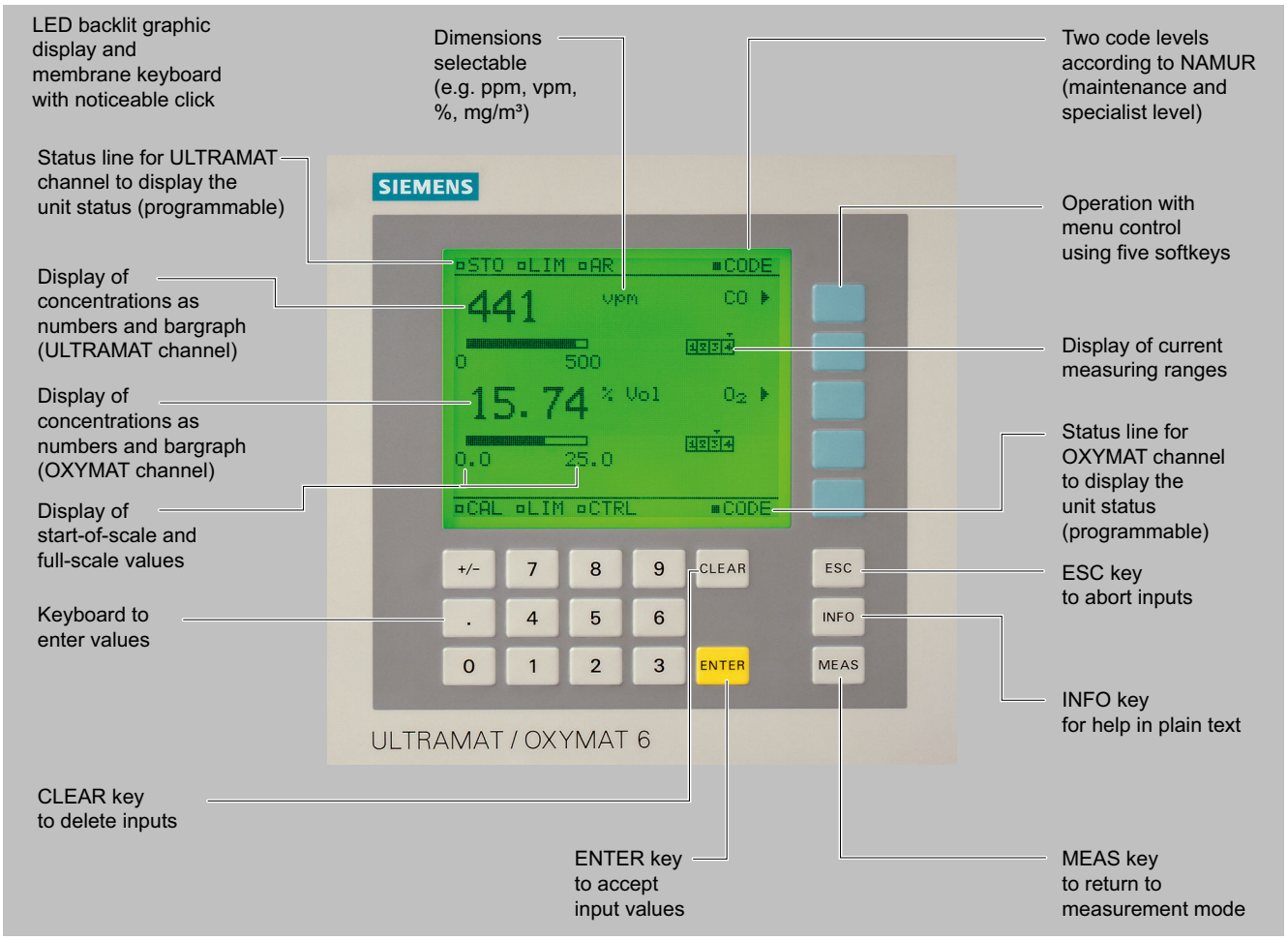
Communication

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

Options

- 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

Design (continued)



ULTRAMAT/OXYMAT 6, membrane keyboard and graphic display

Designs – Parts wetted 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
	• 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)
With pipes	Bushing	Titanium
	Pipe	Titanium O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	Sample chamber:	
	• 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)

Gas path ULTRAMAT channel		19" rack unit
With pipes	Bushing	Stainless steel, mat. No. 1.4571
	Pipe	Stainless steel, mat. No. 1.4571 O-ring: FKM (e.g. Viton) or FFKM (Kalrez)
	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)
Flow indicator	Measuring tube	Duran glass
	Variable area	Duran glass
	Suspension boundary	PTFE (Teflon)
	Angle units	FKM (e.g. Viton)
Pressure switch	Diaphragm	FKM (e.g. Viton)
	Enclosure	PA 6.3T

Design (continued)

Options

Gas path ULTRAMAT channel		19" rack unit
Flow indicator	Measuring tube	Duran glass
	Variable area	Duran glass
	Suspension boundary	PTFE (Teflon)
	Angle units	FKM (e.g. Viton)
Pressure switch	Diaphragm	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)

Designs – Parts wetted 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)

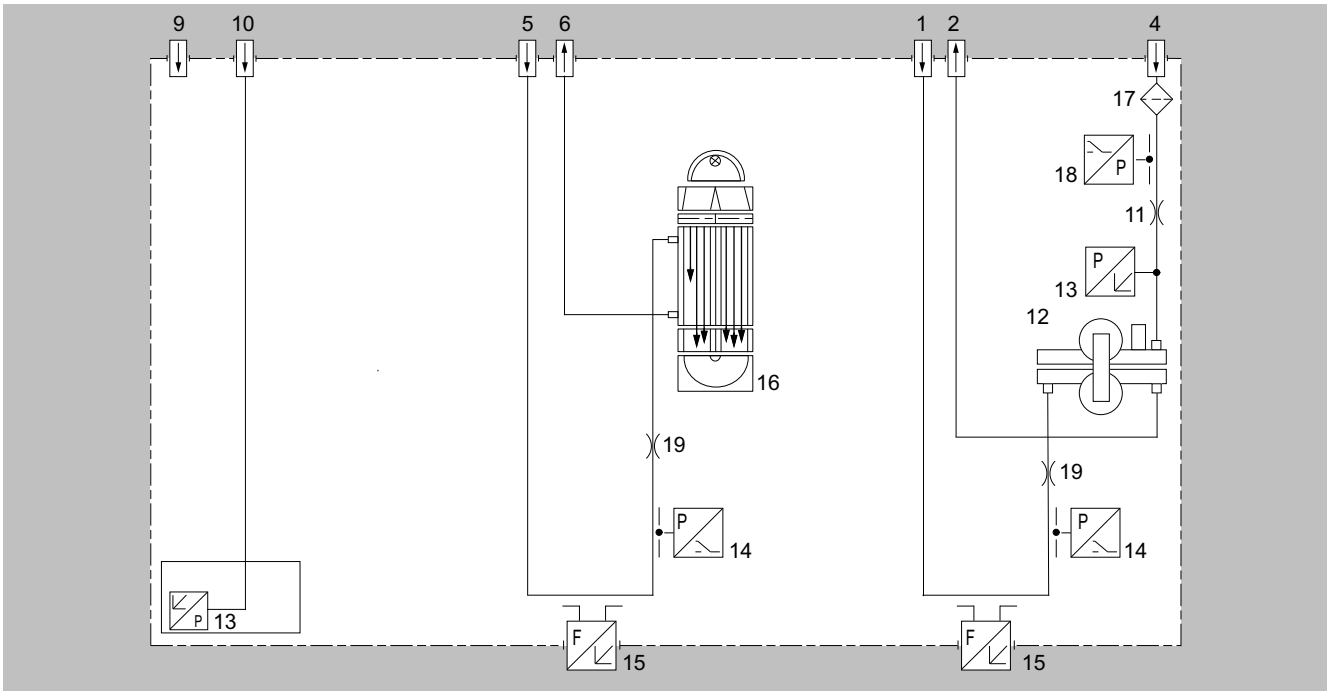
Gas path OXYMAT channel		19" rack unit
With pipes	Bushing	Titanium
	Pipe	Titanium
	Sample chamber	Stainless steel, mat. No. 1.4571 or tantalum
	Restrictor	Titanium
	O-rings	FKM (Viton) or FFKM (Kalrez)
With pipes	Bushing	Stainless steel, mat. No. 1.4571
	Pipe	Stainless steel, mat. No. 1.4571
	Sample 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

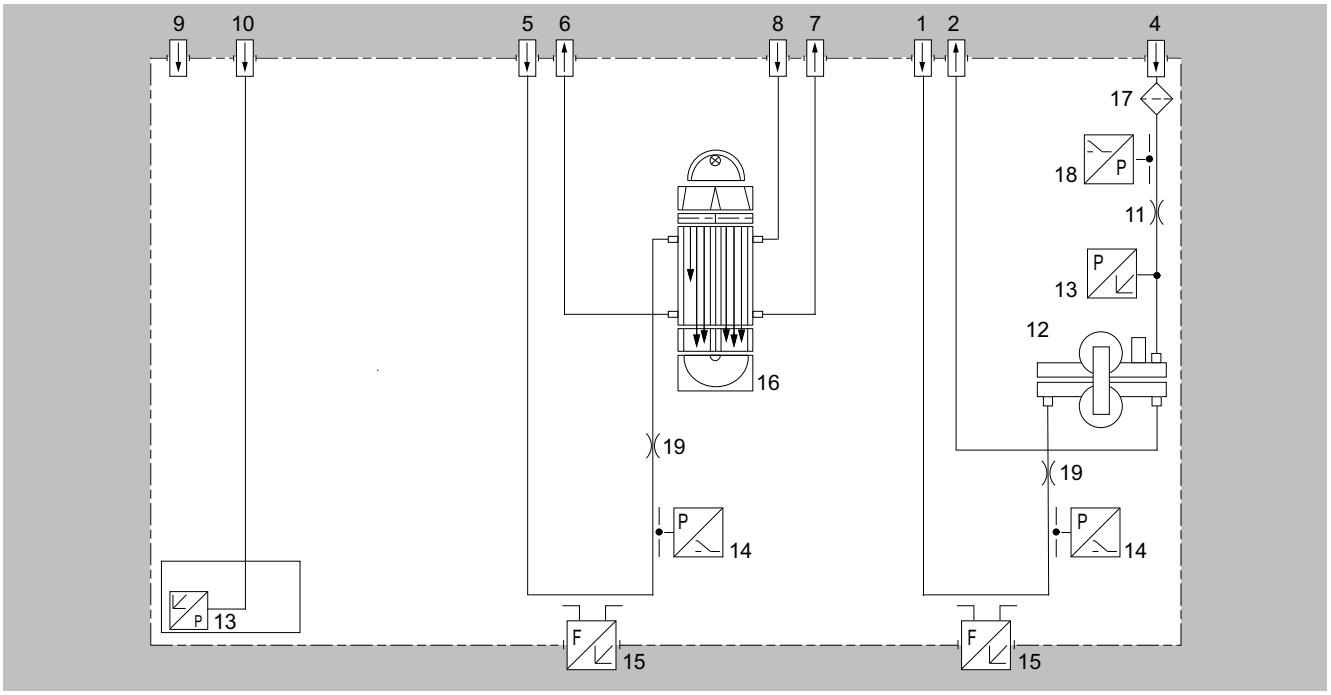
Gas path ULTRAMAT channel and OXYMAT channel		19" rack unit
Flow indicator	Measuring tube	Duran glass
	Variable area	Duran glass
	Suspension boundary	PTFE (Teflon)
	Angle units	FKM (e.g. Viton)
Pressure switch	Diaphragm	FKM (e.g. Viton)
	Enclosure	PA 6.3T

Design (continued)

Gas path



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



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

Design (continued)

Legend for the gas path figures			
1	Sample gas inlet (OXYMAT channel)	11	Restrictor (in reference gas inlet)
2	Sample gas outlet (OXYMAT channel)	12	O_2 physical system
3	Not used	13	Pressure sensor
4	Reference gas inlet	14	Pressure switch in sample gas path (option)
5	Sample gas inlet (ULTRAMAT channel)	15	Flow indicator in sample gas path (option)
6	Sample gas outlet (ULTRAMAT channel)	16	IR physical system
7	Reference gas outlet (ULTRAMAT channel, option)	17	Filter
8	Reference gas inlet (ULTRAMAT channel, option)	18	Pressure switch (reference gas) (option)
9	Purging gas	19	Restrictor in sample gas path (option)
10	Pressure sensor connection (ULTRAMAT channel)		

Mode of operation

ULTRAMAT channel

The ULTRAMAT channel operates according to the infrared two-beam modulated 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 N_2 (a non-infrared-active gas) and reaches the right-hand side of the detector chamber (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 chamber 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 detector chamber layer optically. The infrared absorption in the second detector chamber 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 in the sample chambers must be prevented. 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 unit should not have a large concentration of the gas components to be measured.

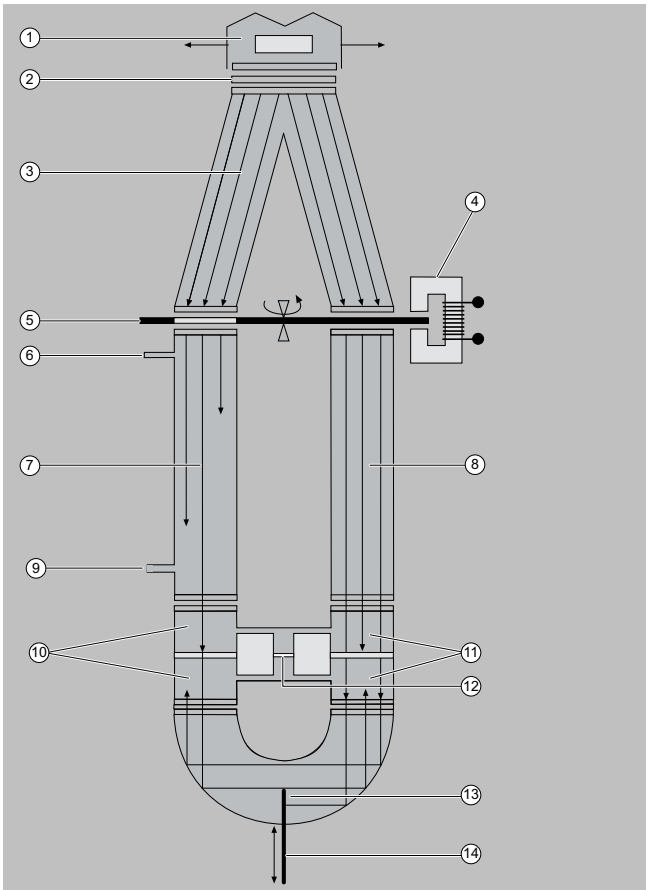
Flow-type reference cells with reduced flow must not be operated with flammable or toxic gases.

Flow-type reference cells with reduced flow and an O_2 content > 70% may only be used together with Y02.

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.

Mode of operation (continued)



ULTRAMAT channel, 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).

Mode of operation (continued)

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 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 sample chamber position as well as the gas analyzer'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.

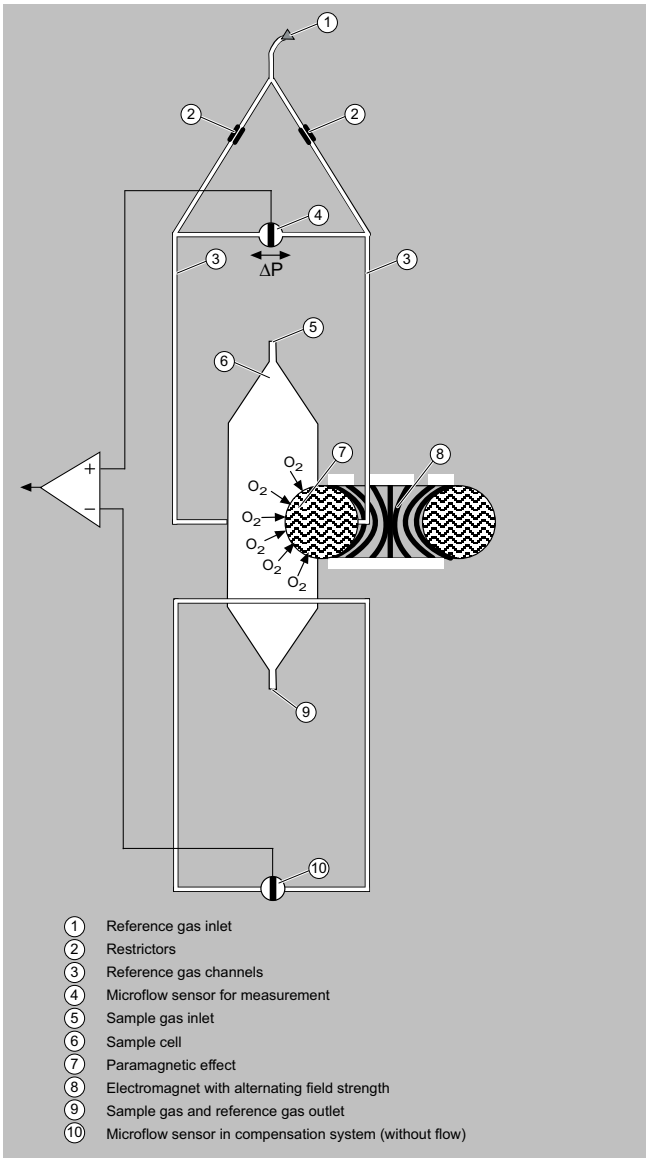
Vibrations frequently occur at the place of installation and may falsify the measured signal (noise). A further microflow sensor (10) through which no gas passes acts as a vibration sensor. Its signal is applied to the measured signal as compensation.

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 in the sample chambers must be prevented. Therefore, gas modified for the measuring tasks is necessary in most application cases.

Mode of operation (continued)



OXYMAT channel, principle of operation

Function

Main features

- 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 measured value output 0/2/4 up to 20 mA per component
- Automatic or manual measurement range switchover selectable; remote switching is also possible
- Storage of measured values possible during calibration
- Wide range of selectable time constants (static/dynamic noise damping); i.e. the response time of the device or component can be adapted to the respective measuring task
- Short response time
- Low long-term drift
- Measuring point switchover for up to 6 measuring points (parameterizable)
- Measuring point identification
- Monitoring of sample gas flow (option)
- Two input levels with separate authorization codes to prevent unintentional and unauthorized operator intervention
- Automatic measuring range calibration parameterizable
- Simple handling using a numerical membrane keyboard and operator prompting
- Operation based on NAMUR recommendation
- Custom-made device designs, such as:
  - Customer acceptance
  - TAG plates
  - Drift recording

ULTRAMAT channel

- Differential measuring ranges with flow-type reference cell
- Internal pressure sensor for correction of atmospheric pressure fluctuations 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 spans (0.5%, 2.0% or 5.0% O_2)
- 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 sample and reference gases with significantly different densities
- Internal pressure sensor for correction of pressure fluctuations 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 for OXYMAT channel

Measuring range	Recommended reference gas	Reference gas connection pressure	Comments
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[1)]	O_2	2 000 ... 4 000 hPa above sample gas pressure (max. 5 000 hPa absolute)	
Approx. 21 vol.% O_2[2)]	Air	100 hPa with respect to sample gas pressure, which may vary by max. 50 hPa around the air pressure	

1) Suppressed zero point with measuring range end value 100 vol.% O_2.
2) Suppressed zero point with 21 vol.% O_2 within the measuring span.

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

Accompanying gas (concentration 100 vol.%)	Zero point deviation in vol.% O_2 absolute	Accompanying gas (concentration 100 vol.%)	Zero point deviation in vol.% O_2 absolute
Organic gases		**Inert gases**	
Ethane C_2H_6	-0.49	Helium He	+0.33
Ethene (ethylene) C_2H_4	-0.22	Neon Ne	+0.17
Ethine (acetylene) C_2H_2	-0.29	Argon Ar	-0.25
1,2-butadiene C_4H_6	-0.65	Krypton Kr	-0.55
1,3-butadiene C_4H_6	-0.49	Xenon Xe	-1.05

Function (continued)

Accompanying gas (concentration 100 vol.%)	Zero point deviation in vol.% O_2 absolute	Accompanying gas (concentration 100 vol.%)	Zero point deviation in vol.% O_2 absolute
N-butane C_4H_{10}	-1.26	**Inorganic gases**	
Isobutane C_4H_{10}	-1.30	Ammonia NH_3	-0.20
1-butene C_4H_8	-0.96	Hydrogen bromide HBr	-0.76
Isobutene C_4H_8	-1.06	Chlorine Cl_2	-0.94
Dichlorodifluoromethane (R12) CCl_2F_2	-1.32	Hydrogen chloride HCl	-0.35
Acetic acid CH_3COOH	-0.64	Dinitrogen monoxide N_2O	-0.23
N-heptane C_7H_{16}	-2.40	Hydrogen fluoride HF	+0.10
N-hexane C_6H_{14}	-2.02	Hydrogen iodide HI	-1.19
Cyclo-hexane C_6H_{12}	-1.84	Carbon dioxide CO_2	-0.30
Methane CH_4	-0.18	Carbon monoxide CO	+0.07
Methanol CH_3OH	-0.31	Nitrogen oxide NO	+42.94
N-octane C_8H_{18}	-2.78	Nitrogen N_2	0.00
N-pentane C_5H_{12}	-1.68	Nitrogen dioxide NO_2	+20.00
Isopentane C_5H_{12}	-1.49	Sulfur dioxide SO_2	-0.20
Propane C_3H_8	-0.87	Sulfur hexafluoride SF_6	-1.05
Propylene C_3H_6	-0.64	Hydrogen sulfide H_2S	-0.44
Trichlorofluoromethane (R11) CCl_3F	-1.63	Water H_2O	-0.03
Vinyl chloride C_2H_3Cl	-0.77	Hydrogen H_2	+0.26
Vinyl fluoride C_2H_3F	-0.55		
1,1 vinylidene chloride $C_2H_2Cl_2$	-1.22		

Zero-point error due to diamagnetism or paramagnetism of some accompanying gases with reference to nitrogen at 60 °C and 1 000 hPa absolute (according to IEC 61207/3)

Conversion to other temperatures:

The zero point deviations listed in the table must be multiplied by an adjustment 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 point deviation.

Selection and ordering data

ULTRAMAT/OXYMAT 6 gas analyzer 19" rack unit for installation in cabinets Combined measurement of IR-absorbing gas and O_2			Article No. 7MB2023-	●	●	●	●	●	-	●	●	●	●
Click on the Article No. for online configuration in the PIA Life Cycle Portal.													
Unavailable combinations are shown in PIA Life Cycle Portal as "not permitted".													
Gas connections for sample gas and reference gas													
Pipe with 6 mm outer diameter				0									
Pipe with ¼" outer diameter				1									
Smallest possible measuring span O_2													
0.5% reference gas pressure 3 000 hPa					A								
0.5% reference gas pressure 100 hPa (external pump)					B								
2% reference gas pressure 3 000 hPa					C								
2% reference gas pressure 100 hPa (external pump)					D								
5% reference gas pressure 3 000 hPa					E								
5% reference gas pressure 100 hPa (external pump)					F								
Sample chamber (OXYMAT channel)													
Non-flow-type compensation branch													
• Made of stainless steel, mat. No. 1.4571						A							
• Made of tantalum						B							
Flow-type compensation branch													
• Made of stainless steel, mat. No. 1.4571						C							
• Made of tantalum						D							
Internal gas paths (both channels)	**Sample chamber[1] (lining) (ULTRAMAT channel)**	**Reference chamber (flow-type) (ULTRAMAT channel)**											
Hose made of FKM (Viton)	Aluminum	Non-flow-type					0						
Hose made of FKM (Viton)	Aluminum	Flow-type					1						
Hose made of FKM (Viton) with sample gas monitoring (both channels)	Aluminum	Non-flow-type					2						
Hose made of FKM (Viton) with sample gas monitoring (both channels)	Aluminum	Flow-type					3						
Pipe made of titanium	Tantalum	Non-flow-type					4						
Pipe made of titanium	Tantalum	Flow-type					5						
Stainless steel pipe (mat. No. 1.4571)	Aluminum	Non-flow-type					6						
Stainless steel pipe (mat. No. 1.4571)	Tantalum	Non-flow-type					8						
Add-on electronics													
Without								0					
AUTOCAL function with 8 additional digital inputs and outputs for OXYMAT channel								1					
AUTOCAL function with 8 additional digital inputs and outputs for ULTRAMAT channel								2					
AUTOCAL function with 8 additional digital inputs/outputs each for ULTRAMAT channel and OXYMAT channel								3					
AUTOCAL function with 8 additional digital inputs/outputs and PROFIBUS PA interface for ULTRAMAT channel and OXYMAT channel								6					
AUTOCAL function with 8 additional digital inputs/outputs and PROFIBUS DP interface for ULTRAMAT channel and OXYMAT channel								7					
Auxiliary power													
100 ... 120 V AC, 48 ... 63 Hz										0			
200 ... 240 V AC, 48 ... 63 Hz										1			
Footnotes, see next page													
ULTRAMAT channel measured component		**Possible with measuring range identification**											
CO		11[2], 12 ... 30										A	
CO highly selective (with optical filter)[3]		12[2], 13 ... 30										B	
CO_2		10[2], 11 ... 30										C	
CH_4		13[2], 14 ... 30										D	
C_2H_2		15[2], 16 ... 30										E	
C_2H_4		15[2], 16 ... 30										F	
C_2H_6		14[2], 15 ... 30										G	
C_3H_6		14[2], 15 ... 30										H	
C_3H_8		13[2], 14 ... 30										J	
C_4H_6		15[2], 16 ... 30										K	
C_4H_{10}		14[2], 15 ... 30										L	

Selection and ordering data (continued)

ULTRAMAT/OXYMAT 6 gas analyzer 19" rack unit for installation in cabinets Combined measurement of IR-absorbing gas and O_2			Article No. 7MB2023- ● ● ● ● ● - ● ● ● ●
C_6H_{14}		14[2], 15 ... 30	M
SO_2[5]		12[2], 14 ... 30	N
NO[5]		14[2], 15 ... 30	P
NH_3 (dry)		14[2], 15 ... 30	Q
H_2O		17[2], 18 ... 22	R
N_2O		13[2], 14 ... 30	S
CO[4]			X
Smallest measuring range	**Largest measuring range**	**Measuring range identification**	
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
Language of the operating software			
German			0
English			1
French			2
Spanish			3
Italian			4

1) Only for cell lengths 20 to 180 mm
2) Can be ordered as special application (no. 3100 with order code Y12).
3) QAL1: See table "Performance tested according to EN 15267 (single component)" under "More information".
4) QAL1: See table "Based on QAL1 according to SIRA/MCERTS (single component)" under "More information".
5) QAL1: See tables "Based on QAL1 according to SIRA/MCERTS (single component)" and "Performance-tested according to EN 15267 (single component)" under "More information".

Options	Order code
Add "-**Z**" to article number and then add order code	
Settings	
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 screw connection, for sample gas side	**A22**

Options	Order code
• Titanium connection pipe, ¼", complete with screw connection, for sample gas side	**A24**
• Stainless steel connection pipe (mat. No. 1.4571), 6 mm, complete with screw connection, for sample gas side	**A27**
• Stainless steel connection pipe (mat. No. 1.4571), ¼", complete with screw connection, 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**

Selection and ordering data (continued)

Options	Order code
Tag plates (customized inscription)	**B03**
Kalrez gaskets in sample gas path (IR side)	**B04**
SIL Declaration of Conformity (SIL 2) Functional Safety according to IEC 61508 and IEC 61511	**C20**
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 default setting	**Y11**
Special setting (only in conjunction with an application no., e.g. extended measuring range, ULTRAMAT channel only)	**Y12**
Extended special setting (only in conjunction with an application no., e.g. determination of cross-interference, only ULTRAMAT channel)	**Y13**
QAL1 according to SIRA/MCERTS (ULTRAMAT channel only)	***Y17 (cannot be combined with E20)***
Performance-tested according to EN 15267 (channel 1)	**Y27**
Performance-tested according to EN 15267 (channel 2)	**Y28**

[1] Cannot be combined with non-flow-type reference cell.
[2] Standard setting, in % or ppm (vpm): Smallest measuring range, 25% of largest measuring range, 50% of largest measuring range, largest measuring range

Accessories	Article No.
RS 485/Ethernet converter	**A5E52327218**
RS 485/RS 232 converter	**A5E52327214**
RS 485/USB converter	**A5E52327216**
AUTOCAL function with 8 digital inputs/outputs for ULTRAMAT channel or OXYMAT channel	**C79451-A3480-D511**
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA for ULTRAMAT channel or OXYMAT channel	**A5E00057307**
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS DP each for ULTRAMAT channel or OXYMAT channel	**A5E00057312**
Set of Torx screwdrivers	**A5E34821625**

ULTRAMAT/OXYMAT 6 gas analyzer 19" rack unit for installation in cabinets Combined measurement of IR-absorbing gas and O_2			**Article No. 7MB2024-**	●	●	●	●	●	-	●	●	●	●
Click on the Article No. for online configuration in the PIA Life Cycle Portal.													
Gas connections for sample gas and reference gas													
Pipe with 6 mm outer diameter				0									
Pipe with ¼" outer diameter				1									
Smallest possible measuring span O_2													
0.5% reference gas pressure 3 000 hPa					A								
0.5% reference gas pressure 100 hPa (external pump)					B								
2% reference gas pressure 3 000 hPa					C								
2% reference gas pressure 100 hPa (external pump)					D								
5% reference gas pressure 3 000 hPa					E								
5% reference gas pressure 100 hPa (external pump)					F								
Sample chamber (OXYMAT channel)													
Non-flow-type compensation branch													
• Made of stainless steel, mat. No. 1.4571						A							
• Made of tantalum						B							
• Made of Hastelloy						E							
Flow-type compensation branch													
• Made of stainless steel, mat. No. 1.4571						C							
• Made of tantalum						D							
• Made of Hastelloy						F							
Internal gas paths (both channels)	**Sample chamber[1] (lining) (ULTRAMAT channel)**	**Reference chamber (flow-type) (ULTRAMAT channel)**											
Hose made of FKM (Viton)	Aluminum	Non-flow-type					0						
Hose made of FKM (Viton)	Aluminum	Flow-type					1						
Hose made of FKM (Viton) with sample gas monitoring (both channels)	Aluminum	Non-flow-type					2						
Hose made of FKM (Viton) with sample gas monitoring (both channels)	Aluminum	Flow-type					3						
Pipe made of titanium	Tantalum	Non-flow-type					4						
Pipe made of titanium	Tantalum	Flow-type					5						
Stainless steel pipe (mat. No. 1.4571)	Aluminum	Non-flow-type					6						
Stainless steel pipe (mat. No. 1.4571)	Tantalum	Non-flow-type					8						

Selection and ordering data (continued)

ULTRAMAT/OXYMAT 6 gas analyzer 19" rack unit for installation in cabinets Combined measurement of IR-absorbing gas and O_2			Article No. 7MB2024-	●	●	●	●	●	-	●	●	●	●
Add-on electronics													
Without								0					
AUTOCAL function													
AUTOCAL function with 8 additional digital inputs/outputs each for ULTRAMAT channel and OXYMAT channel								1					
AUTOCAL function with 8 additional digital inputs/outputs and PROFIBUS PA interface for ULTRAMAT channel and OXYMAT channel								6					
AUTOCAL function with 8 additional digital inputs/outputs and PROFIBUS DP interface for ULTRAMAT channel and OXYMAT channel								7					
Auxiliary power													
100 ... 120 V AC, 48 ... 63 Hz										0			
200 ... 240 V AC, 48 ... 63 Hz										1			
ULTRAMAT channel measured component	**Smallest measuring range**	**Largest measuring range**											
CO and NO[2]	0 ... 1 000 vpm	0 ... 10 000 vpm									A	C	
CO and NO[2]	0 ... 100 vpm (CO) 0 ... 300 vpm (NO)	0 ... 1 000 vpm									A	H	
CO and NO[2]	0 ... 300 vpm (CO) 0 ... 500 vpm (NO)	0 ... 3 000 vpm									A	J	
CO and NO[2]	0 ... 1 000 vpm	0 ... 10 000 vpm									A	C	
CO_2 and CO	0 ... 100 vpm	0 ... 1 000 vpm									B	A	
CO_2 and CO	0 ... 300 vpm	0 ... 3 000 vpm									B	B	
CO_2 and CO	0 ... 1 000 vpm	0 ... 10 000 vpm									B	C	
CO_2 and CO	0 ... 3 000 vpm	0 ... 30 000 vpm									B	D	
CO_2 and CO	0 ... 1%	0 ... 10%									B	E	
CO_2 and CO	0 ... 3%	0 ... 30%									B	F	
CO_2 and CO	0 ... 10%	0 ... 100%									B	G	
CO_2 and CO	0 ... 100 vpm (CO_2) 0 ... 300 vpm (CO)	0 ... 1 000 vpm									B	H	
CO_2 and CO	0 ... 300 vpm (CO_2) 0 ... 500 vpm (CO)	0 ... 3 000 vpm									B	J	
CO_2 and CH_4	0 ... 10%	0 ... 100%									C	G	
CO_2 and CH_4	0 ... 300 vpm (CO_2) 0 ... 500 vpm (CH_4)	0 ... 3 000 vpm									C	J	
CO_2 and NO	0 ... 300 vpm (CO_2) 0 ... 500 vpm (NO)	0 ... 3 000 vpm									D	J	
Language of the operating software													
German													0
English													1
French													2
Spanish													3
Italian													4

1) Only for cell lengths 20 to 180 mm
2) QAL1; see table "Based on QAL1 according to SIRA/MCERTS (2 components in series)" under "More information".

Options	Order code
Add "-**Z**" to article number and then add order code	
Settings	
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 screw connection, for sample gas side	**A22**
• Titanium connection pipe, ¼", complete with screw connection, for sample gas side	**A24**
• Stainless steel connection pipe (mat. No. 1.4571), 6 mm, complete with screw connection, for sample gas side	**A27**
• Stainless steel connection pipe (mat. No. 1.4571), ¼", complete with screw connection, 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**

Selection and ordering data (continued)

Options	Order code
Tag plates (customized inscription)	**B03**
Kalrez gaskets in sample gas path (IR side)	**B04**
SIL Declaration of Conformity (SIL 2) Functional Safety according to IEC 61508 and IEC 61511	**C20**
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 default setting	**Y11**
Special setting (only in conjunction with an application no., e.g. extended measuring range, ULTRAMAT channel only)	**Y12**
Extended special setting (only in conjunction with an application no., e.g. determination of cross-interference, only ULTRAMAT channel)	**Y13**
QAL1 according to SIRA/MCERTS (ULTRAMAT channel only)	***Y17 (cannot be combined with E20)***[1]

1) Cannot be combined with non-flow-type reference cell.
2) Standard setting, in % or ppm (vpm): Smallest measuring range, 25% of largest measuring range, 50% of largest measuring range, largest measuring range

Accessories	Article No.
RS 485/Ethernet converter	**A5E52327218**
RS 485/RS 232 converter	**A5E52327214**
RS 485/USB converter	**A5E52327216**
AUTOCAL function with 8 digital inputs/outputs for ULTRAMAT channel or OXYMAT channel	**C79451-A3480-D511**
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA for ULTRAMAT channel or OXYMAT channel	**A5E00057307**
AUTOCAL function with 8 digital inputs/outputs and PROFIBUS DP each for ULTRAMAT channel or OXYMAT channel	**A5E00057312**
Set of Torx screwdrivers	**A5E34821625**

Note

See table QAL1 and order examples under "More information".

Technical specifications

ULTRAMAT/OXYMAT 6, 19" rack unit	
General information	
Service position	Front wall, vertical
Conformity	CE mark in accordance with EN 50081-1 and 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
Auxiliary power	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 ratings	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, floating; max. load 750 Ω
Relay outputs	6, with changeover contacts, freely configurable, e.g. for measuring range identification; load rating: 24 V AC/DC/1 A, floating, 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)
Digital inputs	6, designed for 24 V, floating, freely configurable, e.g. for measurement range switchover
Serial interface	RS 485
Options	AUTOCAL function each with 8 additional digital 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 (must not fall below dew point)

ULTRAMAT channel	
Measuring ranges	4, internally and externally switchable; automatic measurement range switchover 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 measuring span 20%
Characteristic curve	Linearized
Influence of interference 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 ... max. 50 °C, but above the dew point
Sample gas humidity	< 90% (relative humidity), or dependent on measuring task, non-condensing

Technical specifications (continued)

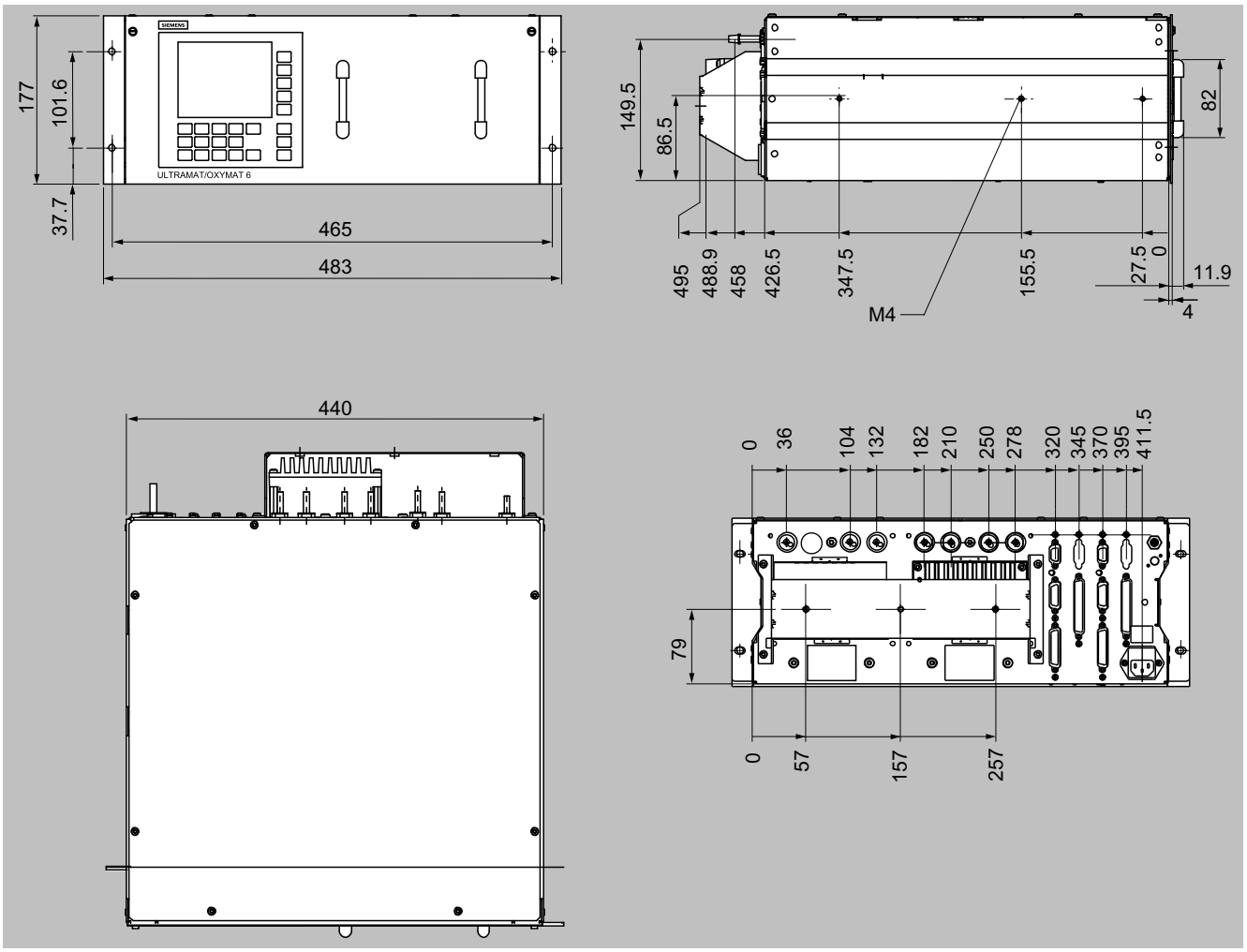
ULTRAMAT channel	
Time response	
Warm-up period	At room temperature < 30 min (the technical specification will be met after 2 hours)
Delayed display (T_{90} time)	Dependent on length of analyzer chamber, sample gas line and configurable damping
Damping (electrical time constant)	0 ... 100 s, configurable
Dead time (purging time of the gas path in the device at 1 l/min)	Approx. 0.5 ... 5 s, depending on the 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	Based on 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 nameplate
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 measuring range end value
Influencing variables	Based on 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	• With enabled pressure compensation: < 0.15% of the measuring span/1% change in atmospheric pressure • With disabled pressure compensation: < 1.5% of the measuring span/1% change in atmospheric pressure
Sample gas flow	Negligible
Auxiliary power	< 0.1% of the current measuring range with nominal voltage ± 10%
Environmental conditions	Application-specific measuring influences possible if ambient air contains measured component or cross interference-sensitive gases

OXYMAT channel	
Measuring ranges	4, internally and externally switchable; automatic measurement range switchover is also possible
Smallest possible measuring 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	
• With pipes	500 ... 3 000 hPa absolute
• With hoses	
- Without pressure switch	500 ... 1 500 hPa absolute
- With pressure switch	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)

Technical specifications (continued)

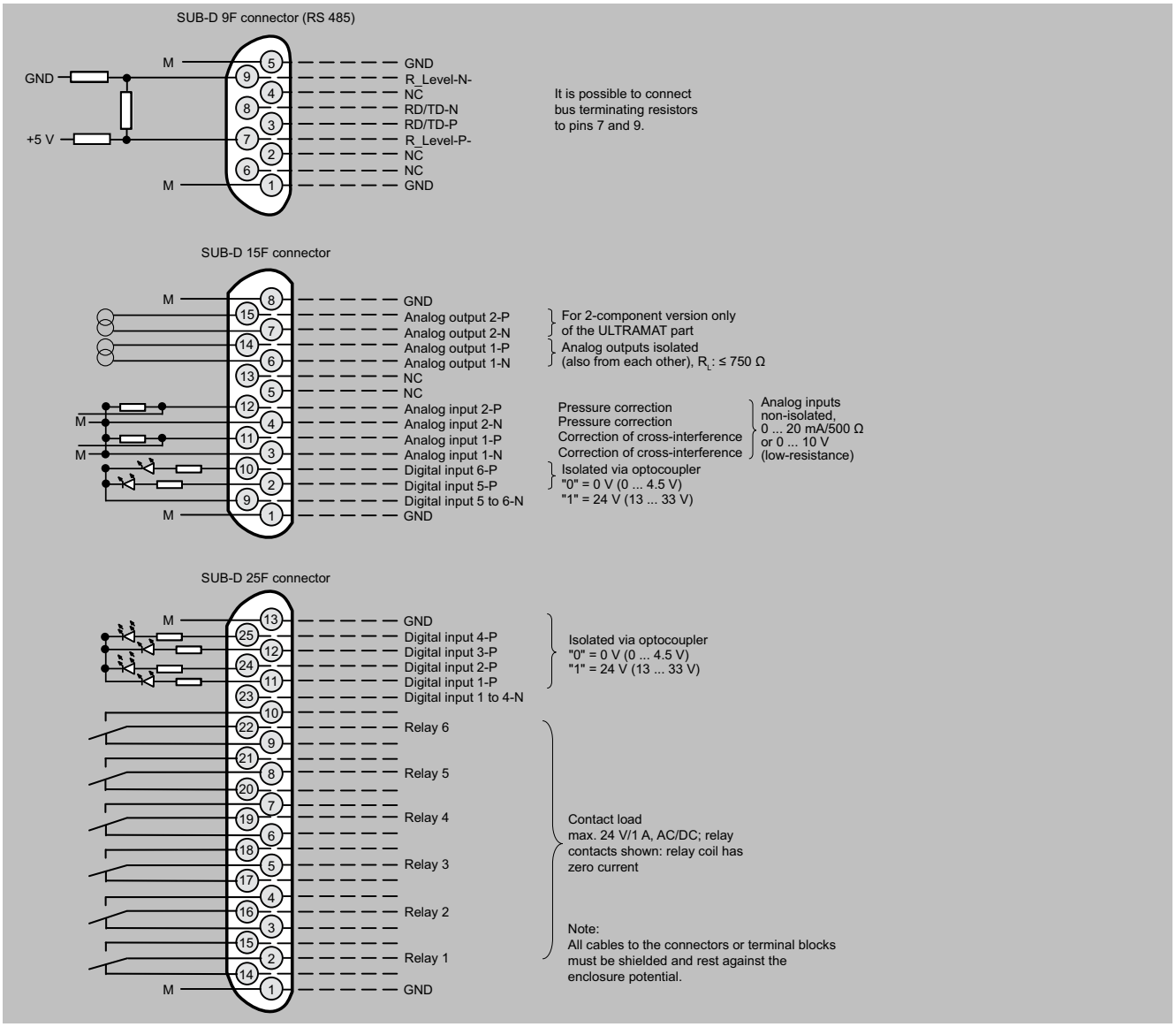
OXYMAT channel	
Reference gas pressure (high-pressure version)	2 000 ... 4 000 hPa above sample gas pressure, but max. 5 000 hPa
Reference gas pressure (low-pressure version)	Min. 100 hPa above sample gas pressure
Time response	
Warm-up period	At room temperature < 30 min (the technical specification will be met after 2 hours)
Delayed display (t_{90} time)	Min. 1.5 ... 3.5 s, depending on the version
Damping (electrical time constant)	0 ... 100 s, configurable
Dead time (purging time of the gas path in the device at 1 l/min)	Approx. 0.5 ... 2.5 s, depending on the version
Time for device-internal signal processing	< 1 s
Pressure correction range	
Pressure sensor	
• Internal	500 ... 2 000 hPa absolute
• External	500 ... 3 000 hPa absolute
Measuring response	Based on 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 nameplate, with electronic damping constant of 1 s (corresponds to ± 0.25% at 2σ)
Zero point drift	< 0.5%/month of the smallest possible measuring span according to nameplate
Measured-value drift	≤ 0.5%/month of the current measuring range
Repeatability	≤ 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	Based on sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature
Ambient temperature	• < 0.5%/10 K referred to smallest possible measuring span according to nameplate • 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)	• With disabled pressure compensation: < 2% of the current measuring range/1% change in atmospheric pressure • With enabled pressure compensation: < 0.2% of the current measuring range/1% change in atmospheric pressure
Accompanying gases	Zero point deviation corresponding to paramagnetic or diamagnetic deviation of accompanying gas
Sample gas flow	< 1% of the smallest possible measuring span according to nameplate 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 nominal voltage ± 10%

Dimensional drawings



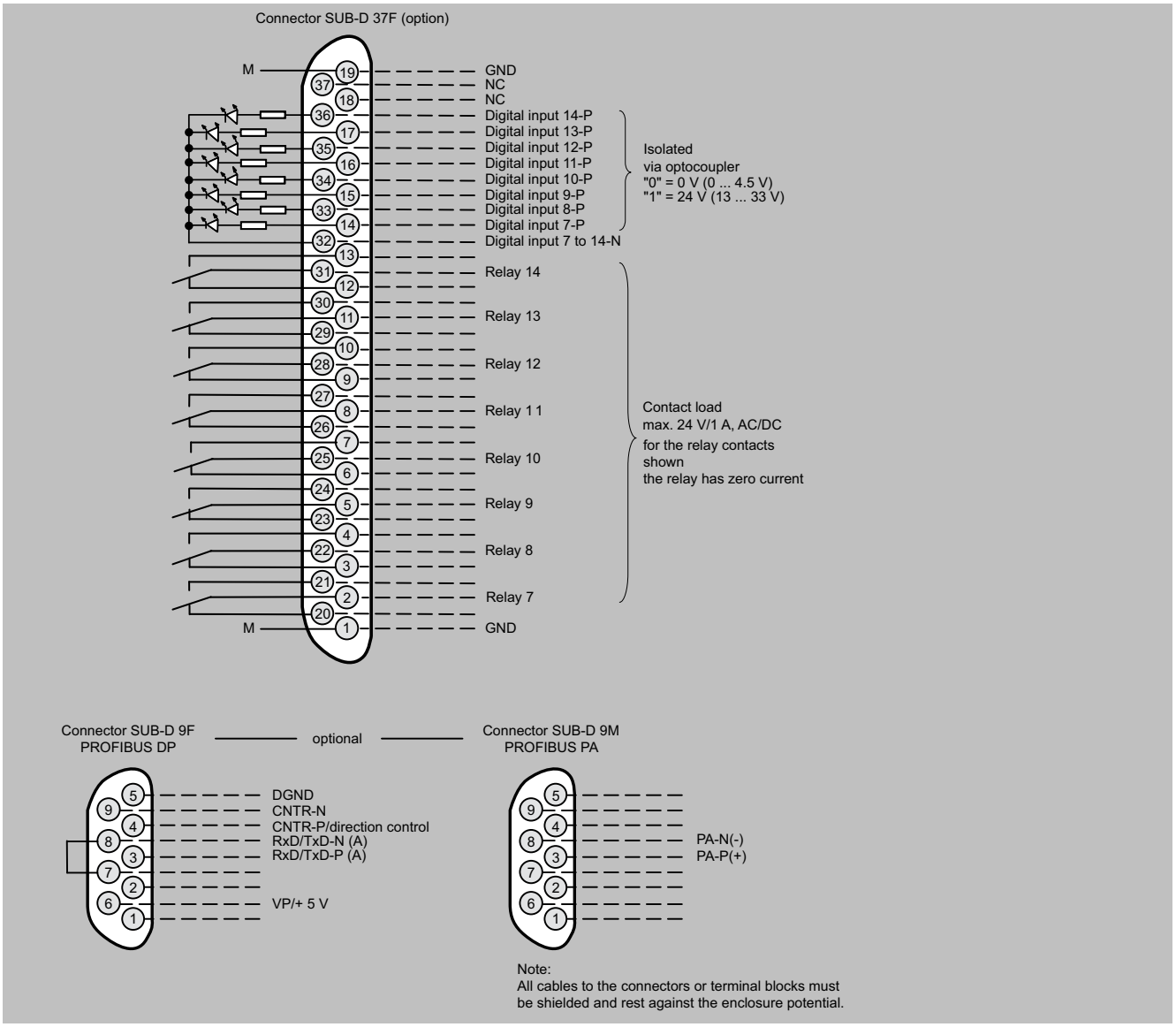
ULTRAMAT/OXYMAT 6, 19" rack unit, dimensions in mm

Circuit diagrams



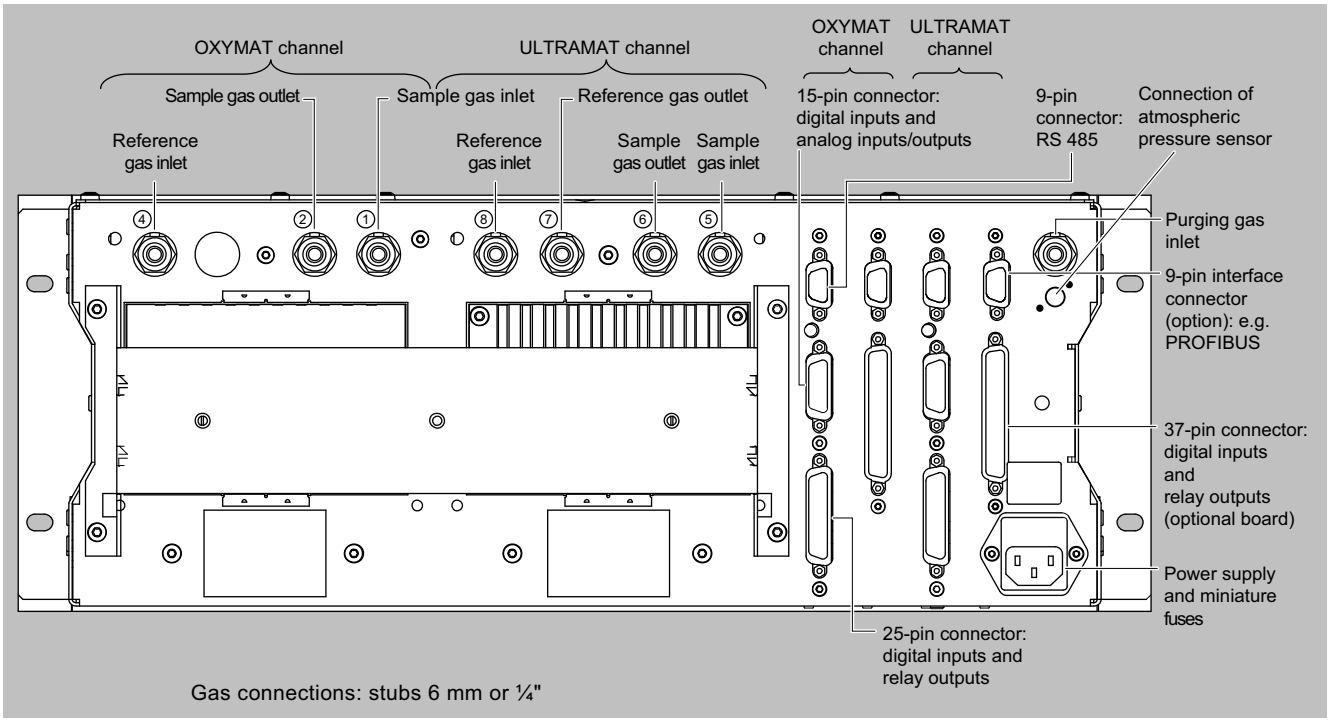
ULTRAMAT/OXYMAT 6, 19" rack unit, pin assignment

Circuit diagrams (continued)



ULTRAMAT/OXYMAT 6, 19" rack unit, pin assignment of the AUTOCAL board and PROFIBUS plugs

Circuit diagrams (continued)



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

More information

Based on QAL1 according to SIRA/MCERTS (single component)

Only in conjunction with order code Y17

Component	CO (QAL1)		SO_2 (QAL1)		NO (QAL1)	
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 ...**	**Smallest measuring range from 0 to ...**	**Largest measuring range from 0 to ...**
C	-	-	75 mg/m³	1 500 mg/m³	-	-
D	50 mg/m³	1 000 mg/m³	300 mg/m³	3 000 mg/m³	-	-
E	-	-	500 mg/m³	5 000 mg/m³	100 mg/m³	2 000 mg/m³
F	300 mg/m³	3 000 mg/m³	1 000 mg/m³	10 000 mg/m³	300 mg/m³	3 000 mg/m³
G	500 mg/m³	5 000 mg/m³	-	-	500 mg/m³	5 000 mg/m³
H	1 000 mg/m³	10 000 mg/m³	3 000 mg/m³	30 000 mg/m³	1 000 mg/m³	10 000 mg/m³
K	3 000 mg/m³	30 000 mg/m³	10 g/m³	100 g/m³	3 000 mg/m³	30 000 mg/m³

Performance-tested according to EN 15267 (single component)

Only in conjunction with order code Y27/Y28

Component	CO (QAL1)		SO_2 (QAL1)		NO (QAL1)	
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 ...**	**Smallest measuring range from 0 to ...**	**Largest measuring range from 0 to ...**
C	-	-	75 mg/m³	1 500 mg/m³	-	-
D	75 mg/m³	1 250 mg/m³	-	-	-	-
E	125 g/m³	1 250 mg/m³	-	-	100 mg/m³	2 000 mg/m³
F	300 mg/m³	3 000 mg/m³	-	-	300 mg/m³	3 000 mg/m³
G	500 mg/m³	5 000 mg/m³	-	-	500 mg/m³	5 000 mg/m³
H	1 000 mg/m³	10 000 mg/m³	-	-	1 000 mg/m³	10 000 mg/m³
J	3 000 mg/m³	10 000 mg/m³	-	-	3 000 mg/m³	10 000 mg/m³

Ordering example

ULTRAMAT/OXYMAT 6, performance-tested according to EN 15267
IR channel
Component: CO
Measuring range: 0 to 75 / 1 250 mg/m³
With hoses, non-flow-type reference cell
With automatic calibration (AUTOCAL)
230 V AC; German
7MB2023-0EA03-1BD0-Z Y27+Y28

Based on QAL1 according to SIRA/MCERTS (2 components in series)

Component	CO (QAL1)		NO (QAL1)	
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 ...**
AH	75 mg/m³	1 000 mg/m³	200 mg/m³	2 000 mg/m³
AJ	300 mg/m³	3 000 mg/m³	500 mg/m³	3 000 mg/m³
AC	1 000 mg/m³	10 000 mg/m³	1 000 mg/m³	10 000 mg/m³

Ordering example

ULTRAMAT/OXYMAT 6, QAL1
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

Selection and ordering data

Description	7MB2023	7MB2024	2 years (unit)	5 years (unit)	Article No.
Analyzer unit					
ULTRAMAT channel					
• O-Ring for cover (window, rear)	x	x	2	2	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	C79451-A3462-D501
OXYMAT channel					
• O-Ring	x	x	1	2	C74121-Z100-A6
• O-Ring (measuring head)	x	x	2	4	C79121-Z100-A32
• O-Ring	x	x	2	4	C71121-Z100-A159
• Sample chamber, stainless steel, mat. no. 1.4571, non-flow-type compensation branch	x	x	-	1	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
ULTRAMAT channel					
• Hose gland	x	x	-	1	C79451-A3478-C9
OXYMAT channel					
• 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	C79165-A3042-B506
Adapter plate, LCD/keyboard	x	x	1	1	C79451-A3474-B605
LC display	x	x	1	1	A5E31474846
Plug-in filter	x	x	-	1	W75041-E5602-K2
Fusible element, T 0.63 A/250 V	x	x	2	3	W79054-L1010-T630
Fusible element, T 1 A/250 V	x	x	2	3	W79054-L1011-T100
Fusible element, T 2.5 A/250 V	x	x	2	3	W79054-L1011-T250
ULTRAMAT channel					
• Motherboard, with firmware: see spare parts list	x	x	-	1	
OXYMAT channel					
• Motherboard, with firmware: see spare parts list	x	x	-	1	

If the device was supplied with a specially cleaned gas path for high oxygen context (so-called "Clean for O_2 service"), please specify when ordering spare parts. This is the only way to ensure that the gas path will continue to comply with the special requirements of this version.

More information

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