

Continuous Gas Analyzer, extractive

ULTRAMAT 6

General information

Overview



The ULTRAMAT 6 single-channel or dual-channel gas analyzers operate according to the NDIR two-beam alternating light principle and measure gases highly selectively whose absorption bands lie in the infrared wavelength range from 2 to 9 μm , such as CO , CO_2 , NO , SO_2 , NH_3 , H_2O as well as CH_4 and other hydrocarbons.

Single-channel analyzers measure up to 2 gas components, dual-channel analyzers up to 4 gas components simultaneously.

Benefits

- High selectivity with double-layer detector and optical coupler
 - Reliable measurements even in complex gas mixtures
- Low detection limits
 - Measurements with low concentrations
- Corrosion-resistant materials in gas path (option)
 - Measurement possible in highly corrosive sample gases
- Analyzer cells can be cleaned as required on site
 - Cost savings due to reuse after contamination
- Electronics and physics: gas-tight isolation, purging is possible, IP65
 - Long service life even in harsh environments
- Heated versions (option)
 - Use also in presence of gases condensing at low temperature
- EEx(p) for zones 1 and 2 (according to ATEX 2G and ATEX 3G)

Application

Areas of application

- Measurement for boiler control in incineration plants
- Emission measurements in incineration plants
- Measurement in the automotive industry (test benches)
- Warning equipment
- Process gas concentrations in chemical plants
- Trace measurements in pure gas processes
- Environmental protection
- TLV (Threshold Limit Value) monitoring at the workplace
- Quality monitoring
- Ex versions for analyzing flammable and non-flammable gases or vapors for use in hazardous areas

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 measured components are also available on request

TÜV version/QAL

TÜV-approved versions are available for measurement of CO , NO and SO_2 according to 13th and 17th BImSchV and TA Luft. Smallest TÜV-approved and permitted measuring ranges:

- 1-component analyzer
 - CO : 0 to 50 mg/m^3
 - NO : 0 to 100 mg/m^3
 - SO_2 : 0 to 75 mg/m^3
- 2-component analyzer (series connection)
 - CO : 0 to 75 mg/m^3
 - NO : 0 to 200 mg/m^3

Furthermore, the TÜV-approved versions of the ULTRAMAT 6 comply with the requirements of EN 14956 and QAL 1 in accordance with EN 14181. Conformity of the analyzers with both standards is TÜV-certified.

The analyzer drift can be determined in accordance with EN 14181 (QAL 3) either manually or 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 ml/min

Design

19" rack unit

- 19" rack unit with 4 HU for installation
 - in hinged frame
 - in cabinets with or without telescopic rails
- Front plate for service purposes can be pivoted down (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)
- Pressure switch in sample gas path for flow monitoring (option)

Field device

- Two-door enclosure with gas-tight separation of analyzer and electronics sections from gas path
- Individually purgeable enclosure halves
- Parts in contact with sample gas can be heated up to 65 °C (option)
- Gas path: hose made of FKM (Viton) or pipe made of titanium or stainless steel (further materials possible as special applications)
- Gas connections for sample gas inlet and outlet: pipe union for pipe diameter 6 mm or 1/4"
- Purging gas connections: pipe diameter 10 mm or 3/8"

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Display and control panel

- Large LCD field for simultaneous display of:
 - Measured value (digital and analog displays)
 - Status bar
 - Measuring ranges
- Contrast of the LCD field adjustable via the menu
- Washable membrane keyboard with five softkeys
- Menu-driven operator control for parameterization, test functions, adjustment
- Operator support in plain text
- Graphic display of concentration trend; programmable time intervals
- Bilingual operating software:
 - German/English, English/Spanish, French/English, Spanish/English, Italian/English

Input and outputs

- One analog output per medium (from 0, 2, 4 to 20 mA; NAMUR parameterizable)
- Two analog inputs freely configurable (e.g. correction of cross-interferences or external pressure sensor)

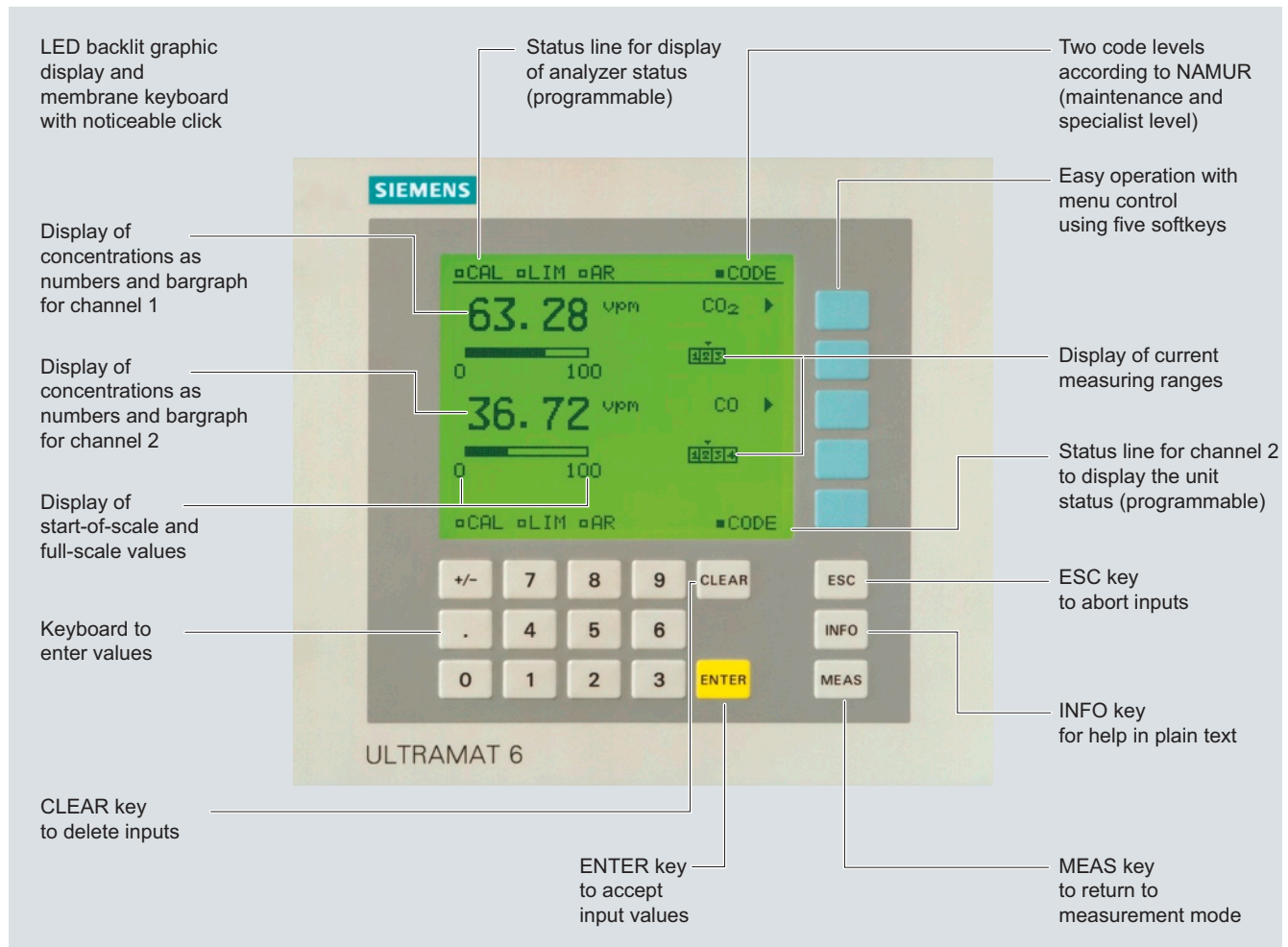
- Six binary inputs freely configurable (e.g. measurement range changeover, processing of external signals from the sample preparation)
- Six relay outputs freely configurable e.g. for fault, maintenance request, limit alarm, external solenoid valves)
- Expansion by eight additional binary inputs and eight additional relay outputs e.g. for autocalibration with up to four test 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 6, membrane keyboard and graphic display

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General information

2

Designs – Parts wetted by sample gas, standard

Gas path		19" rack unit	Field device	Field device Ex
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 ... 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)		
With pipes	Sample chamber:			
	• Body	Aluminum		
	• Lining	Aluminum or tantalum (tantalum only for cell length 20 ... 180 mm)		
	• Window	CaF ₂ , adhesive: E353, O-ring: FKM (e.g. Viton) or FFKM (Kalrez)		

Options

Gas path		19" rack unit	Field device	Field device Ex
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		

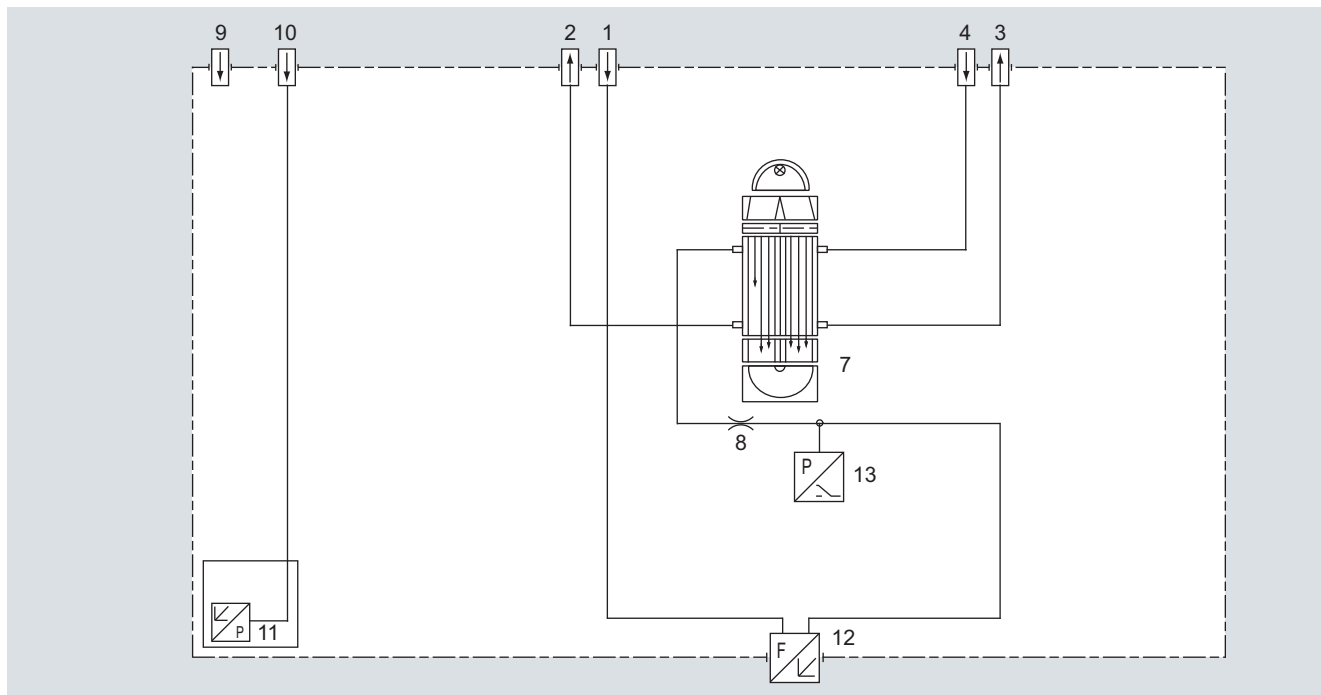
Versions – Parts wetted by sample gas, special applications (examples)

Gas path		19" rack unit	Field device	Field device Ex
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)		

Gas path (19" rack unit)

1	Sample gas inlet channel 1
2	Sample gas outlet channel
3	Reference gas outlet (optional)
4	Reference gas inlet (optional)
5	Sample gas inlet channel 2
6	Sample gas outlet channel
7	IR physical system

- | | |
|----|---|
| 8 | Restrictor |
| 9 | Purge gas inlet |
| 10 | Gas inlet atmospheric pressure sensor |
| 11 | Atmospheric pressure sensor |
| 12 | Flow indicator in sample gas path (option) |
| 13 | Pressure switch in sample gas path (option) |



The diagram illustrates a two-channel hydraulic test rig. At the top, a common manifold line contains valves 9 and 10. This manifold is connected to a reservoir (11) at the bottom. The rig is divided into two channels: Channel 1 and Channel 2. Channel 1 includes valves 1 and 2, and Channel 2 includes valves 5 and 6. Both channels are connected to a common manifold at the top, which also includes valves 9 and 10. The manifold is connected to a reservoir (11) at the bottom. The diagram shows the flow path from the reservoir through the valves and pumps in each channel.

Gas path ULTRAMAT 6, dual-channel unit, 19" unit

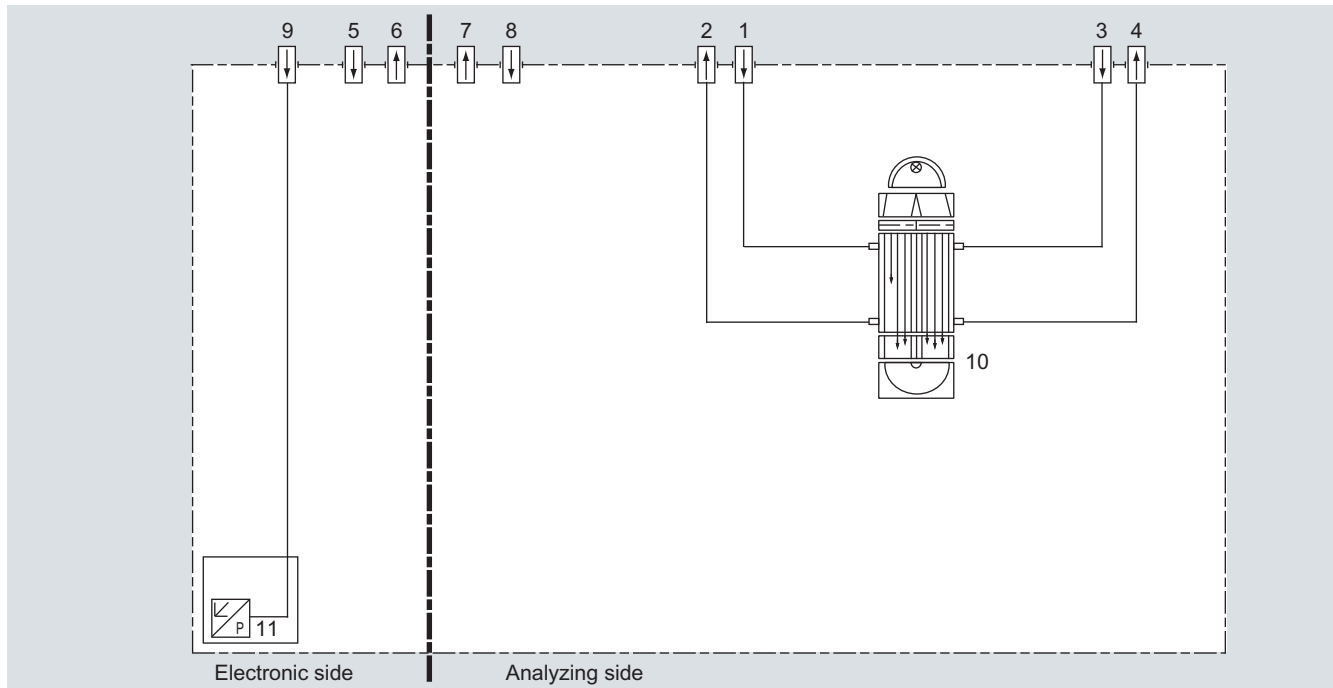
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Gas path (field device)

Legend for the gas path figures

- | | | | |
|---|---------------------------------------|----|---|
| 1 | Sample gas inlet | 7 | Purging gas outlet (analyzer side) |
| 2 | Sample gas outlet | 8 | Purging gas inlet (analyzer side) |
| 3 | Reference gas inlet (option) | 9 | Connection of atmospheric pressure sensor |
| 4 | Reference gas outlet (option) | 10 | IR physical system |
| 5 | Purging gas inlet (electronics side) | 11 | Atmospheric pressure sensor |
| 6 | Purging gas outlet (electronics side) | | |



Gas path ULTRAMAT 6, field unit, with flow-type reference cell (option)

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General information

Function

Principle of operation

The ULTRAMAT 6 gas analyzer 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 in the ULTRAMAT 6 gas analyzers 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.

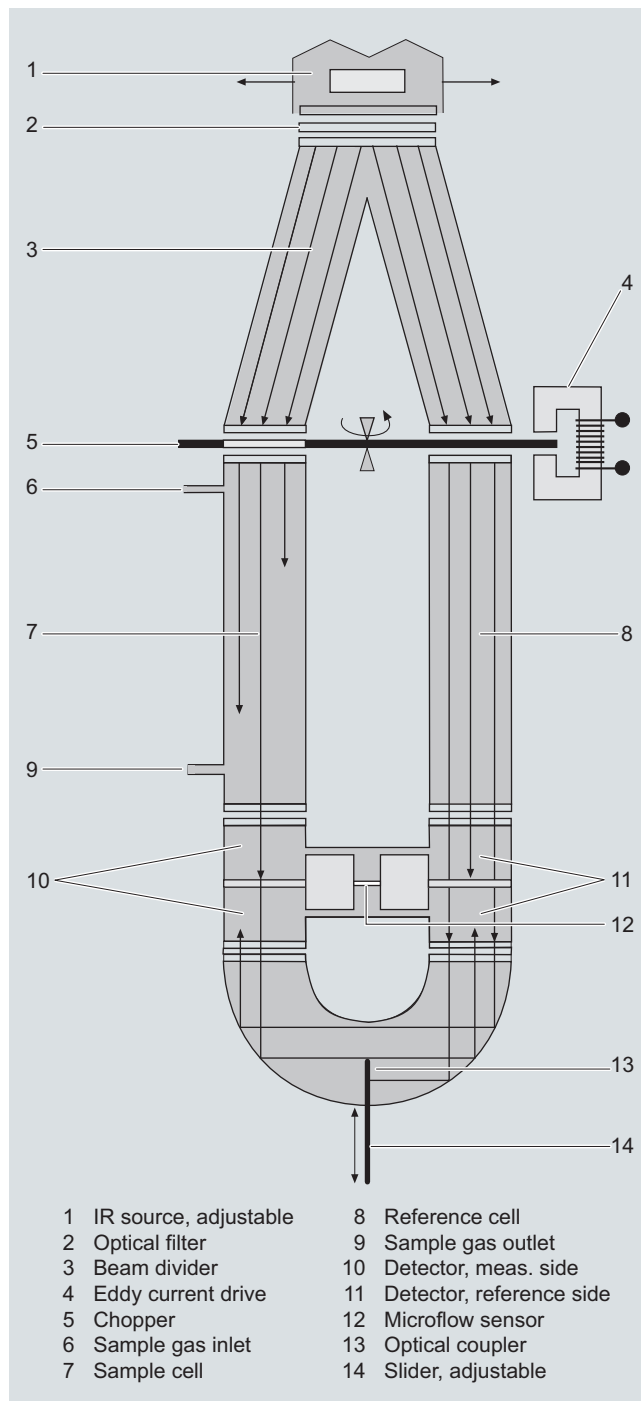
Notes

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 (Clean for O₂).



ULTRAMAT 6, 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.

Continuous Gas Analyzer, extractive

ULTRAMAT 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
- Differential measuring ranges with flow-type reference cell
- 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)
- Internal pressure sensor for correction of variations in atmospheric pressure in the range 700 to 1 200 hPa absolute
- External pressure sensor can be connected for correction of variations in the process gas pressure in the range 700 to 1 500 hPa absolute (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
- Easy device replacement since electric connections can be simply disconnected from the device
- Sample chambers for use in presence of highly corrosive sample gases (e.g. tantalum layer or Hastelloy C22)

Additional features, dual-channel version

- Separate design of physical unit, electronics, inputs/outputs and power supply for each channel
- Display and operation via common LCD panel and keyboard
- Measurement channels 1 and 2 can be converted to series connection (linking of gas connections from channel 1 to channel 2 on rear)

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19" rack unit

Technical specifications

General information

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 span	Dependent on the application
Measuring range with suppressed zero point	Any zero point within 0 ... 100 vol.% can be implemented; smallest possible span 20 %
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 50081-1, EN 50082-2

Influence of interfering gases must be considered separately

Design, enclosure

Weight	Approx. 15 kg (with one IR channel) Approx. 21 kg (with two IR channels)
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), 47 ... 63 Hz or 200 ... 240 V AC (nominal range of use 180 ... 264 V), 47 ... 63 Hz
Power consumption	1-channel unit: Approx. 40 VA 2-channel unit: Approx. 70 VA
Fuse values	
• 100 ... 120 V	1 T/250 (7MB2121) 1.6 T/250 (7MB2123)
• 200 ... 240 V	0.63 T/250 (7MB2121) 1 T/250 (7MB2123)

Gas inlet conditions

Permissible sample gas pressure	
• With hoses	
- Without pressure switch	600 ... 1 500 hPa (absolute)
- With pressure switch	700 ... 1 300 hPa (absolute)
• With pipes (without pressure switch)	600 ... 1 500 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 % RH (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)	Approximately 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

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 ± 10 %
Environmental conditions	Application-specific measuring influences possible if ambient air contains measured components or cross interference-sensitive gases

Electrical inputs and outputs

Analog output	0/2/4 ... 20 mA, isolated; 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 accompanying gas influence correction (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 with 8 additional binary inputs and relay outputs, also with PROFIBUS PA or PROFIBUS DP

Climatic conditions

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

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit

Selection and ordering data

Order No.

ULTRAMAT 6 gas analyzer

D) 7MB2121-

- AA

Cannot be combined

Single-channel 19" rack unit for installation in cabinets

Gas connections for sample gas and reference gas

Pipe with 6 mm outer diameter

Pipe with 1/4" outer diameter

Measured component	Possible with measuring range identification
CO	11 ... 30
CO highly selective (with optical filter)	12 ... 30
CO (TÜV; see Table "TÜV single component", page 2/53)	
CO ₂	10 ... 30
CH ₄	13 ... 30
C ₂ H ₂	15 ... 30
C ₂ H ₄	15 ... 30
C ₂ H ₆	14 ... 30
C ₃ H ₆	14 ... 30
C ₃ H ₈	13 ... 30
C ₄ H ₆	15 ... 30
C ₄ H ₁₀	14 ... 30
C ₆ H ₁₄	14 ... 30
SO ₂ (TÜV; see Table "TÜV single component", page 2/53)	13 ... 30
NO (TÜV; see Table "TÜV single component", page 2/53)	14 ... 20, 22
NH ₃ (dry)	14 ... 30
H ₂ O	17 ... 20, 22
N ₂ O	13 ... 30

Smallest measuring range	Largest measuring range	Measuring range identification
0 ... 5 vpm	0 ... 100 vpm	10
0 ... 10 vpm	0 ... 200 vpm	11
0 ... 20 vpm	0 ... 400 vpm	12
0 ... 50 vpm	0 ... 1 000 vpm	13
0 ... 100 vpm	0 ... 1 000 vpm	14
0 ... 300 vpm	0 ... 3 000 vpm	15
0 ... 500 vpm	0 ... 5 000 vpm	16
0 ... 1 000 vpm	0 ... 10 000 vpm	17
0 ... 3 000 vpm	0 ... 10 000 vpm	18
0 ... 3 000 vpm	0 ... 30 000 vpm	19
0 ... 5 000 vpm	0 ... 15 000 vpm	20
0 ... 5 000 vpm	0 ... 50 000 vpm	21
0 ... 1 %	0 ... 3 %	22
0 ... 1 %	0 ... 10 %	23
0 ... 3 %	0 ... 10 %	24
0 ... 3 %	0 ... 30 %	25
0 ... 5 %	0 ... 15 %	26
0 ... 5 %	0 ... 50 %	27
0 ... 10 %	0 ... 30 %	28
0 ... 10 %	0 ... 100 %	29
0 ... 30 %	0 ... 100 %	30

Internal gas paths	Sample chamber ¹⁾ (lining)	Reference chamber (flow-type)
Hose made of FKM (Viton)	Aluminum	Non-flow-type
	Aluminum	Flow-type
Pipe made of titanium	Tantalum	Non-flow-type
	Tantalum	Flow-type
Stainless steel pipe (mat. no. 1.4571)	Aluminum	Non-flow-type
	Tantalum	Non-flow-type
With sample gas monitoring		
Hose made of FKM (Viton)	Aluminum	Non-flow-type
	Aluminum	Flow-type

0

1

A

B

X

C

D

E

F

G

H

J

K

L

M

N

P

Q

R

S

A

B

C

D

E

F

G

H

J

K

L

M

N

P

Q

R

S

T

U

V

W

0

1

A21

A20

Q

R

0

1

A20, A21

A20, A21, Y02

Y02

A20, A21

A20, A21

2

3

A20, A21

Footnotes: see next page

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19" rack unit

Selection and ordering data

ULTRAMAT 6 gas analyzer

Single-channel 19" rack unit for installation in cabinets

Add-on electronics

Without

AUTOCAL function

- With 8 additional binary inputs/outputs
- With serial interface for the automotive industry (AK)
- With 8 binary inputs/outputs, PROFIBUS PA interface
- With 8 binary inputs/outputs, PROFIBUS DP interface

Power supply

100 ... 120 V AC, 47 ... 63 Hz

200 ... 240 V AC, 47 ... 63 Hz

Operating software and documentation

German

English

French

Spanish

Italian

Order No.

D) **7MB2121-**  **- AA**  Cannot be combined

0

1

3

6

7

0

1

0

1

2

3

4

3 → E20

Additional versions

Order code

Add "-Z" to Order No. and specify Order code

Flow-type reference cell with reduced flow, 6 mm

Flow-type reference cell with reduced flow, 1/4"

Telescopic rails (2 units)

Set of Torx screwdrivers

TAG labels (specific inscription based on customer information)

Kalrez gaskets in sample gas path

FM/CSA certificate – Class I Div 2

Clean for O₂ service (specially cleaned gas path)

Measuring range indication in plain text, if different from the standard setting

Special setting (only in conjunction with an application no., e.g. extended measuring range)

Extended special setting (only in conjunction with an application no., e.g. determination of cross-interferences)

TÜV version acc. to 13th and 17th BImSchV

A20

A21

A31

A32

B03

B04

E20

Y02

Y11

Y12

Y13

Y17

Retrofitting sets

Order No.

RS 485/Ethernet converter

A5E00852383

RS 485/RS 232 converter

C79451-Z1589-U1

RS 485/USB converter

A5E00852382

AUTOCAL function with serial interface for the automotive industry (AK)

C79451-A3480-D512

AUTOCAL function with 8 binary inputs/outputs

C79451-A3480-D511

AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA

A5E00057307

AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP

A5E00057312

D) Subject to export regulations AL: 91999, ECCN: N

¹⁾ Only for cell length 20 to 180 mm

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit

Selection and ordering data**Order No.****ULTRAMAT 6 gas analyzer**D) **7MB2123-**

Cannot be combined

Two-channel 19" rack unit for installation in cabinets
for measuring 2 IR componentsGas connections for sample gas and reference gas

Pipe with 6 mm outer diameter

Pipe with 1/4" outer diameter

Channel 1Possible with measuring
range identification

Measured component	
CO	11 ... 30
CO highly selective (with optical filter)	12 ... 30
CO (TÜV; see Table "TÜV single component", page 2/53)	
CO ₂	10 ... 30
CH ₄	13 ... 30
C ₂ H ₂	15 ... 30
C ₂ H ₄	15 ... 30
C ₂ H ₆	14 ... 30
C ₃ H ₆	14 ... 30
C ₃ H ₈	13 ... 30
C ₄ H ₆	15 ... 30
C ₄ H ₁₀	14 ... 30
C ₆ H ₁₄	14 ... 30
SO ₂ (TÜV; see Table "TÜV single component", page 2/53)	13 ... 30
NO (TÜV; see Table "TÜV single component", page 2/53)	14 ... 20, 22
NH ₃ (dry)	14 ... 30
H ₂ O	17 ... 20, 22
N ₂ O	13 ... 30

<u>Smallest measuring range</u>	<u>Largest measuring range</u>	<u>Measuring range identification</u>
0 ... 5 vpm	0 ... 100 vpm	10
0 ... 10 vpm	0 ... 200 vpm	11
0 ... 20 vpm	0 ... 400 vpm	12
0 ... 50 vpm	0 ... 1 000 vpm	13
0 ... 100 vpm	0 ... 1 000 vpm	14
0 ... 300 vpm	0 ... 3 000 vpm	15
0 ... 500 vpm	0 ... 5 000 vpm	16
0 ... 1 000 vpm	0 ... 10 000 vpm	17
0 ... 3 000 vpm	0 ... 10 000 vpm	18
0 ... 3 000 vpm	0 ... 30 000 vpm	19
0 ... 5 000 vpm	0 ... 15 000 vpm	20
0 ... 5 000 vpm	0 ... 50 000 vpm	21
0 ... 1 %	0 ... 3 %	22
0 ... 1 %	0 ... 10 %	23
0 ... 3 %	0 ... 10 %	24
0 ... 3 %	0 ... 30 %	25
0 ... 5 %	0 ... 15 %	26
0 ... 5 %	0 ... 50 %	27
0 ... 10 %	0 ... 30 %	28
0 ... 10 %	0 ... 100 %	29
0 ... 30 %	0 ... 100 %	30

<u>Internal gas paths</u>	<u>Sample chamber¹⁾ (lining)</u>	<u>Reference chamber (flow-type)</u>
Hose made of FKM (Viton)	Aluminum	Non-flow-type
	Aluminum	Flow-type
Pipe made of titanium	Tantalum	Non-flow-type
	Tantalum	Flow-type
Stainless steel pipe (mat. no. 1.4571)	Aluminum	Non-flow-type
	Tantalum	Non-flow-type

With sample gas monitoring

Hose made of FKM (Viton)	Aluminum	Non-flow-type
	Aluminum	Flow-type

¹⁾ Only for cell length 20 to 180 mm

0 → A21, A41
1 → A20, A40

Q
R

0 → A20, A21, A40, A41
1
4 → A20, A21, A40, A41, Y02
5 → Y02
6 → A20, A21, A40, A41
8 → A20, A21, A40, A41

2 → A20, A21, A40, A41
3

2

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit

2

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

D) 7MB2123-

Cannot be combined

Two-channel 19" rack unit for installation in cabinets
for measuring 2 IR componentsAdd-on electronics

Without

AUTOCAL function

- With 8 additional binary inputs/outputs each for channel 1
- With 8 additional binary inputs/outputs each for channel 2
- With 8 additional binary inputs/outputs each for channel 1 and channel 2
- With serial interface for the automotive industry (AK)
- With 8 additional binary inputs/outputs each for channel 1 and channel 2 and PROFIBUS PA interface
- With 8 additional binary inputs/outputs each for channel 1 and channel 2 and PROFIBUS DP interface

Power supply

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

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

Channel 2Measured componentPossible with measuring
range identification

CO	11 ... 30
CO highly selective (with optical filter)	12 ... 30
CO (TÜV; see Table "TÜV single component", page 2/53)	
CO ₂	10 ... 30
CH ₄	13 ... 30
C ₂ H ₂	15 ... 30
C ₂ H ₄	15 ... 30
C ₂ H ₆	14 ... 30
C ₃ H ₆	14 ... 30
C ₃ H ₈	13 ... 30
C ₄ H ₆	15 ... 30
C ₄ H ₁₀	14 ... 30
C ₆ H ₁₄	14 ... 30
SO ₂ (TÜV; see Table "TÜV single component", page 2/53)	13 ... 30
NO (TÜV; see Table "TÜV single component", page 2/53)	14 ... 20, 22
NH ₃ (dry)	14 ... 30
H ₂ O	17 ... 20, 22
N ₂ O	13 ... 30

<u>Smallest measuring range</u>	<u>Largest measuring range</u>	<u>Measuring range identification</u>
0 ... 5 vpm	0 ... 100 vpm	10
0 ... 10 vpm	0 ... 200 vpm	11
0 ... 20 vpm	0 ... 400 vpm	12
0 ... 50 vpm	0 ... 1 000 vpm	13
0 ... 100 vpm	0 ... 1 000 vpm	14
0 ... 300 vpm	0 ... 3 000 vpm	15
0 ... 500 vpm	0 ... 5 000 vpm	16
0 ... 1 000 vpm	0 ... 10 000 vpm	17
0 ... 3 000 vpm	0 ... 10 000 vpm	18
0 ... 3 000 vpm	0 ... 30 000 vpm	19
0 ... 5 000 vpm	0 ... 15 000 vpm	20
0 ... 5 000 vpm	0 ... 50 000 vpm	21
0 ... 1 %	0 ... 3 %	22
0 ... 1 %	0 ... 10 %	23
0 ... 3 %	0 ... 10 %	24
0 ... 3 %	0 ... 30 %	25
0 ... 5 %	0 ... 15 %	26
0 ... 5 %	0 ... 50 %	27
0 ... 10 %	0 ... 30 %	28
0 ... 10 %	0 ... 100 %	29
0 ... 30 %	0 ... 100 %	30

Operating software and documentation

German
English
French
Spanish
Italian

0

1

2

3

5

6

7

0

1

A

B

X

C

D

E

F

G

H

J

K

L

M

N

P

Q

R

S

A

B

C

D

E

F

G

H

J

K

L

M

N

P

Q

R

S

T

U

V

W

0

1

2

3

4

5 → E20

Q
R

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

Continuous Gas Analyzer, extractive

ULTRAMAT 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 (channel 1)	A20	
Flow-type reference cell with reduced flow, 1/4" (channel 1)	A21	
Flow-type reference cell with reduced flow, 6 mm (channel 2)	A40	
Flow-type reference cell with reduced flow, 1/4" (channel 2)	A41	
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, 6 mm, complete with screwed gland, for reference gas side	A23	
• Titanium connection pipe, 1/4", complete with screwed gland, for sample gas side	A24	
• Titanium connection pipe, 1/4", complete with screwed gland, for reference gas side	A25	
• 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), 6 mm, complete with screwed gland, for reference gas side	A28	
• Stainless steel connection pipe (mat. no. 1.4571), 1/4", complete with screwed gland, for sample gas side	A29	
• Stainless steel connection pipe (mat. no. 1.4571), 1/4", complete with screwed gland, for reference gas side	A30	
Telescopic rails (2 units)	A31	
Set of Torx screwdrivers	A32	
TAG labels (specific inscription based on customer information)	B03	
Kalrez gaskets in sample gas path (channel 1)	B04	
Kalrez gaskets in sample gas path (channel 2)	B05	
FM/CSA certificate – Class I Div 2	E20	
Clean for O ₂ service (specially cleaned gas path; channels 1 + 2)	Y02	
Measuring range indication in plain text, if different from the standard setting	Y11	
Special setting (only in conjunction with an application no., e.g. extended measuring range)	Y12	
Extended special setting (only in conjunction with an application no., e.g. determination of cross-interferences)	Y13	
TÜV version acc. to 13th and 17th BImSchV (1st channel)	Y17	
TÜV version acc. to 13th and 17th BImSchV (2nd channel)	Y18	
<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 interface for the automotive industry (AK)	C79451-A3480-D33	
AUTOCAL function with 8 binary inputs/outputs for channel 1 or channel 2	C79451-A3480-D511	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA for channel 1 or channel 2	A5E00057307	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP for channel 1 or channel 2	A5E00057312	

2

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit

Selection and ordering data

Order No.

ULTRAMAT 6 gas analyzer

D) 7MB2124- - - - - Cannot be combined

Single-channel or dual-channel 19" rack unit for installation in cabinets for measuring 2 or 3 IR components

Gas connections for sample gas and reference gas

Pipe with 6 mm outer diameter

0

0 → A21, A41

Pipe with 1/4" outer diameter

1

1 → A20, A40

Measured component	Smallest measuring range	Largest measuring range
--------------------	--------------------------	-------------------------

CO	0 ... 100 vpm	0 ... 1 000 vpm	A A
NO	0 ... 100 vpm	0 ... 1 000 vpm	
CO	0 ... 300 vpm	0 ... 3 000 vpm	A B
NO	0 ... 300 vpm	0 ... 3 000 vpm	
CO	0 ... 1 000 vpm	0 ... 1 0000 vpm	A C
NO	0 ... 1 000 vpm	0 ... 1 0000 vpm	

For CO/NO (TÜV; Table "TÜV, 2 components in series", page 2/53)

CO ₂	0 ... 100 vpm	0 ... 1 000 vpm	B A
CO	0 ... 100 vpm	0 ... 1 000 vpm	
CO ₂	0 ... 300 vpm	0 ... 3 000 vpm	B B
CO	0 ... 300 vpm	0 ... 3 000 vpm	
CO ₂	0 ... 1 000 vpm	0 ... 10 000 vpm	B C
CO	0 ... 1 000 vpm	0 ... 10 000 vpm	
CO ₂	0 ... 3 000 vpm	0 ... 30 000 vpm	B D
CO	0 ... 3 000 vpm	0 ... 30 000 vpm	
CO ₂	0 ... 1 %	0 ... 10 %	B E
CO	0 ... 1 %	0 ... 10 %	
CO ₂	0 ... 3 %	0 ... 30 %	B F
CO	0 ... 3 %	0 ... 30 %	
CO ₂	0 ... 10 %	0 ... 100 %	B G
CO	0 ... 10 %	0 ... 100 %	
CO ₂	0 ... 10 %	0 ... 100 %	C G
CH ₄	0 ... 10 %	0 ... 100 %	
CO ₂	0 ... 300 vpm	0 ... 3 000 vpm	D B
NO	0 ... 300 vpm	0 ... 3 000 vpm	

Internal gas paths	Sample chamber ¹⁾ (lining)	Reference chamber (flow-type)
--------------------	--	----------------------------------

Hose made of FKM (Viton)	Aluminum	Non-flow-type	0	0 0 → A20, A21, A40, A41
	Aluminum	Flow-type	1	

Pipe made of titanium	Tantalum	Non-flow-type	4	4 → A20, A21, A40, A41, Y02
	Tantalum	Flow-type	5	

Stainless steel pipe (mat. no. 1.4571)	Aluminum	Non-flow-type	6	6 → A20, A21, A40, A41
	Tantalum	Non-flow-type	8	

With sample gas monitoring

Hose made of FKM (Viton)	Aluminum	Non-flow-type	2	2 2 → A20, A21, A40, A41
	Aluminum	Flow-type	3	

Add-on electronics

Without

AUTOCAL function

- With 8 additional binary inputs/outputs each for channel 1
- With 8 additional binary inputs/outputs each for channel 1 and channel 2
- With serial interface for the automotive industry (AK), channel 1
- With serial interface for the automotive industry (AK), channel 1 and channel 2
- With 8 additional binary inputs/outputs for channel 1 and PROFIBUS PA interface
- With 8 additional binary inputs/outputs each for channel 1 and channel 2 and PROFIBUS PA interface
- With 8 additional binary inputs/outputs for channel 1 and PROFIBUS DP interface
- With 8 additional binary inputs/outputs each for channel 1 and channel 2 and PROFIBUS DP interface

1) Only for cell length 20 to 180 mm

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit

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

Single-channel or dual-channel 19" rack unit for installation in cabinets for measuring 2 or 3 IR components

D) 7MB2124- - - - - Cannot be combined

Power supply

100 ... 120 V AC, 47 ... 63 Hz

200 ... 240 V AC, 47 ... 63 Hz

Channel 2Measured componentPossible with measuring range identification

Without channel 2

CO	11 ... 30
CO highly selective (with optical filter)	12 ... 30
CO (TÜV; see Table "TÜV single component", page 2/53)	
CO ₂	10 ... 30
CH ₄	13 ... 30
C ₂ H ₂	15 ... 30
C ₂ H ₄	15 ... 30
C ₂ H ₆	14 ... 30
C ₃ H ₆	14 ... 30
C ₃ H ₈	13 ... 30
C ₄ H ₆	15 ... 30
C ₄ H ₁₀	14 ... 30
C ₆ H ₁₄	14 ... 30
SO ₂ (TÜV; see Table "TÜV single component", page 2/53)	13 ... 30
NO (TÜV; see Table "TÜV single component", page 2/53)	14 ... 20, 22
NH ₃ (dry)	14 ... 30
H ₂ O	17 ... 20, 22
N ₂ O	13 ... 30

Smallest measuring rangeLargest measuring rangeMeasuring range identification

Without channel 2

0 ... 5 vpm	0 ... 100 vpm	10
0 ... 10 vpm	0 ... 200 vpm	11
0 ... 20 vpm	0 ... 400 vpm	12
0 ... 50 vpm	0 ... 1 000 vpm	13
0 ... 100 vpm	0 ... 1 000 vpm	14
0 ... 300 vpm	0 ... 3 000 vpm	15
0 ... 500 vpm	0 ... 5 000 vpm	16
0 ... 1 000 vpm	0 ... 10 000 vpm	17
0 ... 3 000 vpm	0 ... 10 000 vpm	18
0 ... 3 000 vpm	0 ... 30 000 vpm	19
0 ... 5 000 vpm	0 ... 15 000 vpm	20
0 ... 5 000 vpm	0 ... 50 000 vpm	21
0 ... 1 %	0 ... 3 %	22
0 ... 1 %	0 ... 10 %	23
0 ... 3 %	0 ... 10 %	24
0 ... 3 %	0 ... 30 %	25
0 ... 5 %	0 ... 15 %	26
0 ... 5 %	0 ... 50 %	27
0 ... 10 %	0 ... 30 %	28
0 ... 10 %	0 ... 100 %	29
0 ... 30 %	0 ... 100 %	30

Operating software and documentation

German
English
French
Spanish
Italian

0
1W
A
B
X
C
D
E
F
G
H
J
K
L
M
N
P
Q
R
S

W

Q
R

X

X → A40, A41, B05

0
1
2
3
4

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

2

Continuous Gas Analyzer, extractive

ULTRAMAT 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 (channel 1)	A20	
Flow-type reference cell with reduced flow, ¼" (channel 1)	A21	
Flow-type reference cell with reduced flow, 6 mm (channel 2)	A40	
Flow-type reference cell with reduced flow, ¼" (channel 2)	A41	
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, 6 mm, complete with screwed gland, for reference gas side	A23	
• Titanium connection pipe, ¼", complete with screwed gland, for sample gas side	A24	
• Titanium connection pipe, ¼", complete with screwed gland, for reference gas side	A25	
• 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), 6 mm, complete with screwed gland, for reference gas side	A28	
• Stainless steel connection pipe (mat. no. 1.4571), ¼", complete with screwed gland, for sample gas side	A29	
• Stainless steel connection pipe (mat. no. 1.4571), ¼", complete with screwed gland, for reference gas side	A30	
Telescopic rails (2 units)	A31	
Set of Torx screwdrivers	A32	
TAG labels (specific inscription based on customer information)	B03	
Kalrez gaskets in sample gas path (channel 1)	B04	
Kalrez gaskets in sample gas path (channel 2)	B05	
FM/CSA certificate – Class I Div 2	E20	
Clean for O ₂ service (specially cleaned gas path; channels 1 + 2)	Y02	
Measuring range indication in plain text, if different from the standard setting	Y11	
Special setting (only in conjunction with an application no., e.g. extended measuring range)	Y12	
Extended special setting (only in conjunction with an application no., e.g. determination of cross-interferences)	Y13	
TÜV version acc. to 13th and 17th BImSchV (channel 1)	Y17	
TÜV version acc. to 13th and 17th BImSchV (channel 2)	Y18	
<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 interface for the automotive industry (AK)	C79451-A3480-D33	
AUTOCAL function with 8 binary inputs/outputs for channel 1 or channel 2	C79451-A3480-D511	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA for channel 1 or channel 2	A5E00057307	
AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP for channel 1 or channel 2	A5E00057312	

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit

TÜV single component

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 ...	Smallest 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 6, TÜV

Component: CO

Measuring range: 0 to 50 / 1 000 mg/m³with hoses, non-flow-type reference compartment
without automatic adjustment (AUTOCAL)

230 V AC; German

7MB2121-0XD00-1AA0-Z +Y17

TÜV, 2 components in series

Component	CO (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 ...
AA	75 mg/m ³	1 000 mg/m ³	200 mg/m ³	2 000 mg/m ³
AB	300 mg/m ³	3 000 mg/m ³	300 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 6, TÜV, 2-component unit

Components: CO/NO + SO₂Measuring range: CO: 0 to 75 / 1 000 mg/m³, NO: 0 to 200 / 2 000 mg/m³, SO₂: 0 to 75 / 1 500 mg/m³with hoses, non-flow-type reference compartment
without automatic adjustment (AUTOCAL)

230 V AC; German

7MB2124-0AA00-1NC0-Z +Y17+Y18**Note:** for 3 components take both tables into consideration.Ordering information measured component N₂OCertification in accordance with AM0028 and AM0034 (Kyoto Protocol) for measuring N₂O,
measuring range 0 ... 300 ppm / 3 000 ppm.

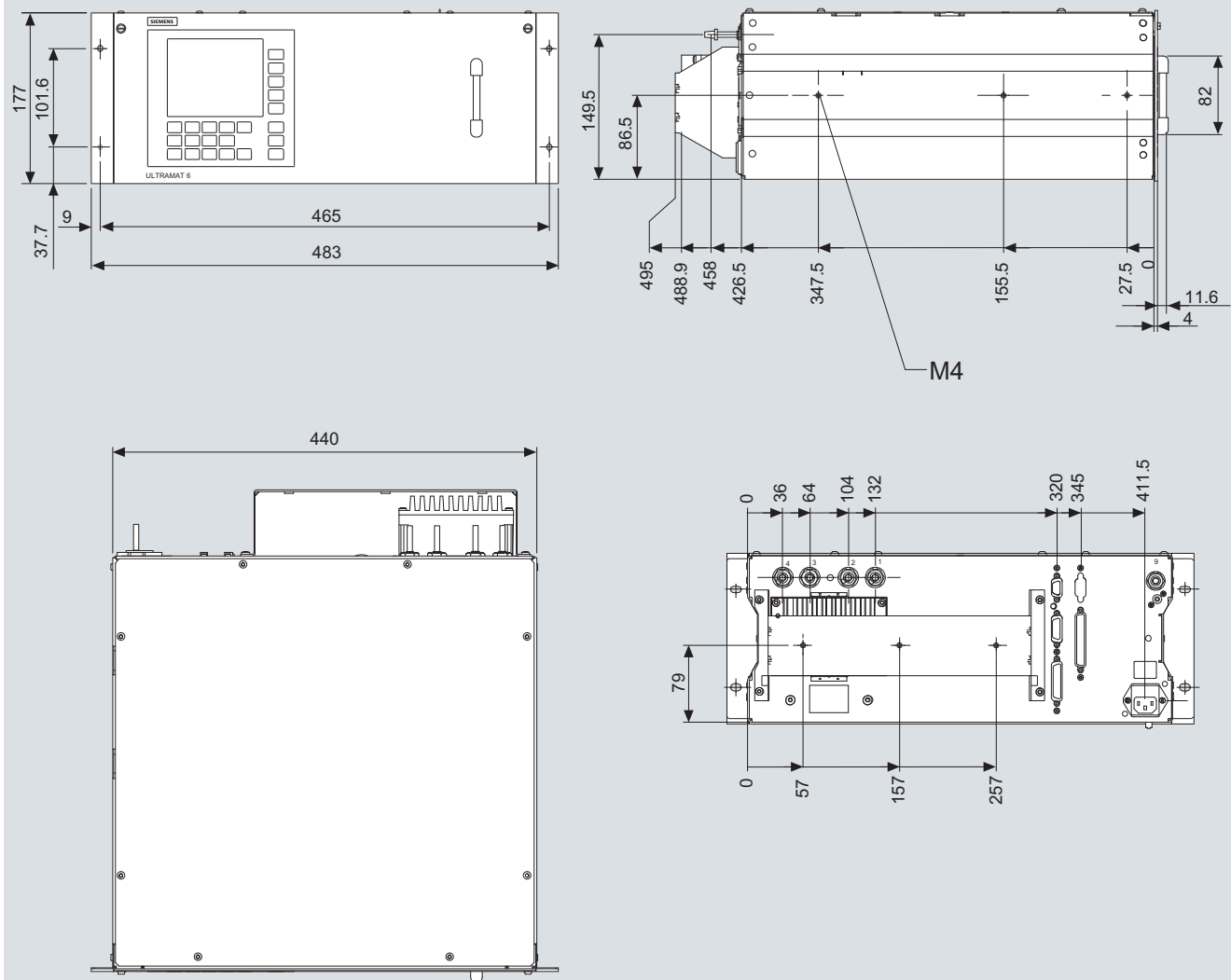
Version: Standard device

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit

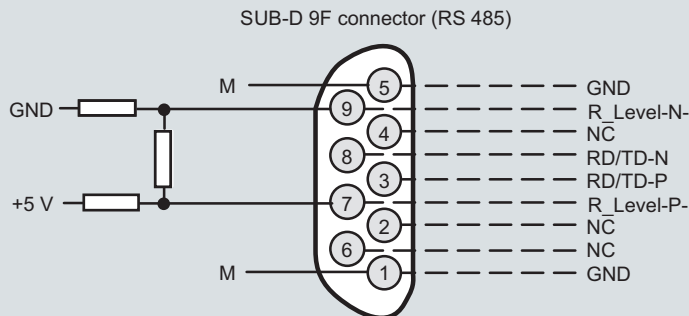
Dimensional drawings



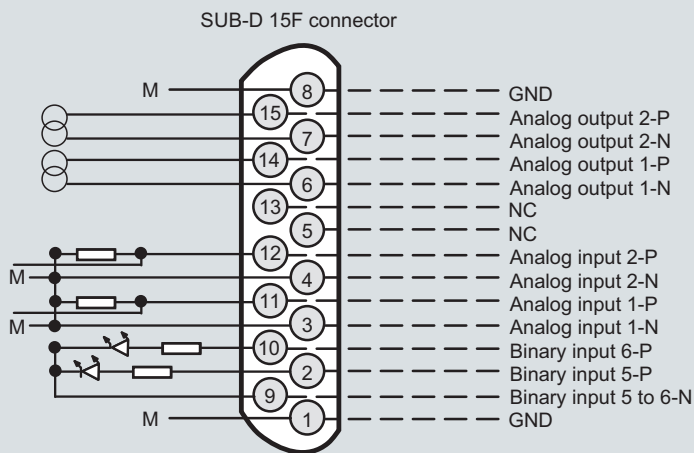
ULTRAMAT 6, 19" unit, dimensions in mm (example: 1-channel version)

Schematics

Pin assignment (electrical and gas connections)



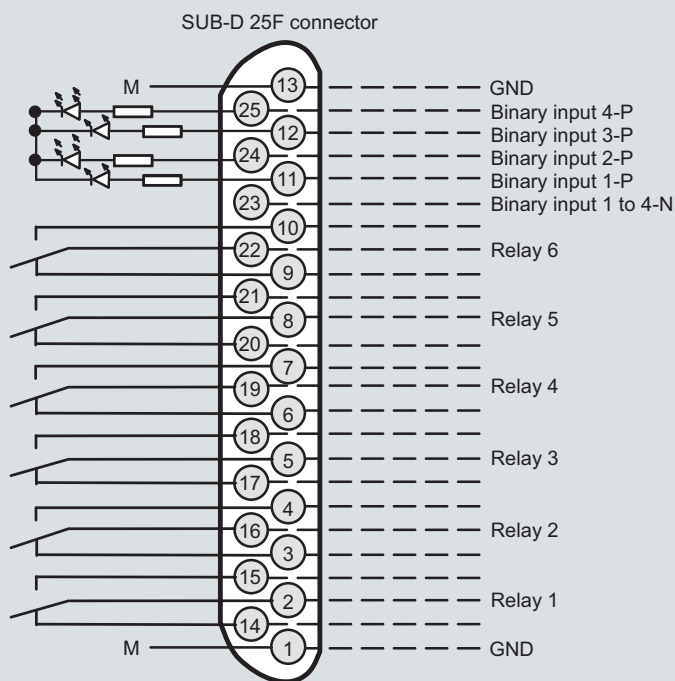
It is possible to connect bus terminating resistors to pins 7 and 9.



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

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)

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.

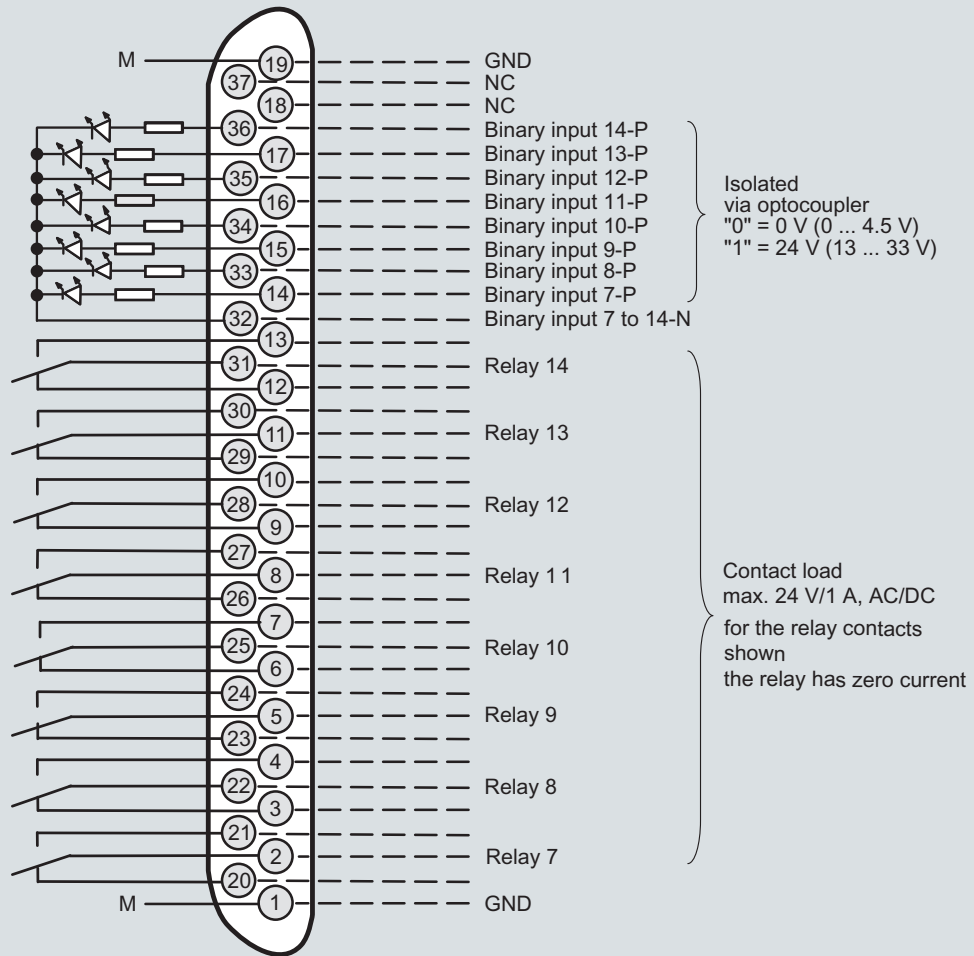
Continuous Gas Analyzer, extractive

ULTRAMAT 6

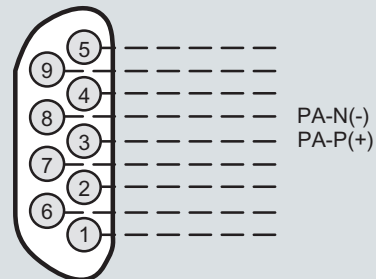
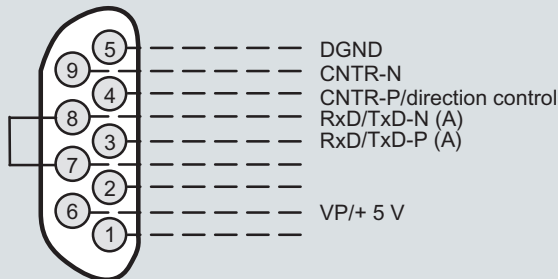
19" rack unit

2

Connector SUB-D 37F (option)

Connector SUB-D 9F
PROFIBUS DP

optional

Connector SUB-D 9M
PROFIBUS PA**Note:**

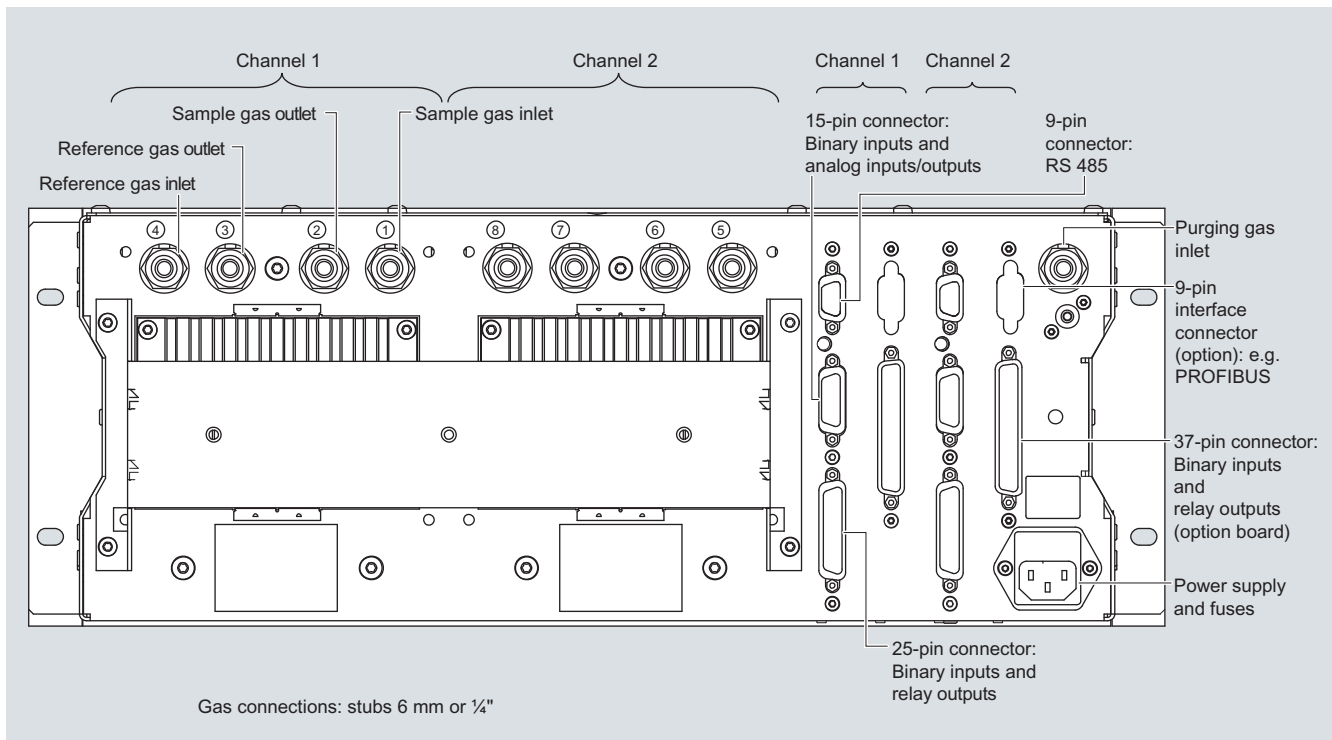
All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

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

Continuous Gas Analyzer, extractive

ULTRAMAT 6

19" rack unit



ULTRAMAT 6, 19" unit, gas and electrical connections (example: 2-channel version)

2

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

Technical specifications

General information

Measuring ranges	4, internally and externally switchable; autoranging is also possible
Smallest possible measuring range	Dependent on the application, e.g. CO: 0 ... 10 ppm, CO ₂ : 0 ... 5 ppm
Largest possible measuring range	Dependent on the application
Measuring range with suppressed zero point	Any zero point within 0 ... 100 vol.% can be implemented; smallest possible span 20 %
Heated version	65 °C
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 50081-1, EN 50082-2
Influence of interfering gases must be considered separately	

Design, enclosure

Weight	Approx. 32 kg
Degree of protection	IP65 in accordance with EN 60529, restricted breathing enclosure to EN 50021

Electrical characteristics

Power supply	100 ... 120 V AC (nominal range of use 90 ... 132 V), 47 ... 63 Hz or 200 ... 240 V AC (nominal range of use 180 ... 264 V), 47 ... 63 Hz
Power consumption	Approx. 35 VA; approx. 330 VA with heated version
EMC (Electromagnetic Compatibility)	In accordance with standard requirements of NAMUR NE21 (08/98)
Electrical safety	In accordance with EN 61010-1
• Heated units	Overvoltage category II
• Unheated units	Overvoltage category III
Fuse values (unheated unit)	
• 100 ... 120 V	F3: 1 T/250; F4: 1 T/250
• 200 ... 240 V	F3: 0.63 T/250; F4: 0.63 T/250
Fuse values (heated unit)	
• 100 ... 120 V	F1: 1 T/250; F2: 4 T/250 F3: 4 T/250; F4: 4 T/250
• 200 ... 240 V	F1: 0.63 T/250; F2: 2.5 T/250 F3: 2.5 T/250; F4: 2.5 T/250

Gas inlet conditions

Permissible sample gas pressure	
• With hoses (without pressure switch)	600 ... 1 500 hPa (absolute)
• With pipes (without pressure switch)	600 ... 1 500 hPa (absolute)
- Ex (leakage compensation)	600 ... 1 160 hPa (absolute)
- Ex (continuous purging)	600 ... 1 500 hPa (absolute)
Purging gas pressure	
• Permanent	< 165 hPa above ambient pressure
• For short periods	250 hPa above ambient pressure
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, for heated version min. 0 ... max. 80 °C
Sample gas humidity	< 90 % RH (RH: relative humidity) or dependent on measuring task

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

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

2

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	When pressure compensation has been switched on: < 0.15 % of setpoint/1 % atmospheric pressure change
Sample gas flow	Negligible
Power supply	< 0.1 % of the current measuring range with rated voltage ± 10 %
Environmental conditions	Application-specific measuring influences possible if ambient air contains measured component or cross interference-sensitive gases

Electrical inputs and outputs

Analog output	0/2/4 ... 20 mA, isolated; 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 accompanying gas influence correction (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 with 8 additional binary inputs and relay outputs, also with PROFIBUS PA or PROFIBUS DP

Climatic conditions

Permissible ambient temperature	-30 ... +70 °C during storage and transportation; 5 ... 45 °C during operation
Permissible humidity	< 90 % RH (RH: relative humidity) within average annual value, during storage and transportation (dew point must not be under-shot)

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

Selection and ordering data

Order No.

ULTRAMAT 6 gas analyzer

D) 7MB2111- - A

Cannot be combined

For installation in the field, single-channel, 1 component

Gas connections

Ferrule screw connection for pipe, outer diameter 6 mm

Ferrule screw connection for pipe, outer diameter 1/4"

Measured component

Possible with measuring range identification

CO	11 ... 30	A
CO highly selective (with optical filter)	12 ... 30	B
CO (TÜV; see Table "TÜV, single component", page 2/65)		X
CO ₂	10 ... 30	C
CH ₄	13 ... 30	D
C ₂ H ₂	15 ... 30	E
C ₂ H ₄	15 ... 30	F
C ₂ H ₆	14 ... 30	G
C ₃ H ₆	14 ... 30	H
C ₃ H ₈	13 ... 30	J
C ₄ H ₆	15 ... 30	K
C ₄ H ₁₀	14 ... 30	L
C ₆ H ₁₄	14 ... 30	M
SO ₂ (TÜV; see Table "TÜV, single component", page 2/65)	13 ... 30	N
NO (TÜV; see Table "TÜV, single component", page 2/65)	14 ... 20, 22	P
NH ₃ (dry)	14 ... 30	Q
H ₂ O	17 ... 20; 22 (17 to 24, 26; heated)	R
N ₂ O	13 ... 30	S

Smallest measuring range	Largest measuring range	Measuring range identification
0 ... 5 vpm	0 ... 100 vpm	10
0 ... 10 vpm	0 ... 200 vpm	11
0 ... 20 vpm	0 ... 400 vpm	12
0 ... 50 vpm	0 ... 1 000 vpm	13
0 ... 100 vpm	0 ... 1 000 vpm	14
0 ... 300 vpm	0 ... 3 000 vpm	15
0 ... 500 vpm	0 ... 5 000 vpm	16
0 ... 1 000 vpm	0 ... 10 000 vpm	17
0 ... 3 000 vpm	0 ... 10 000 vpm	19
0 ... 3 000 vpm	0 ... 30 000 vpm	19
0 ... 5 000 vpm	0 ... 15 000 vpm	20
0 ... 5 000 vpm	0 ... 50 000 vpm	21
0 ... 1 %	0 ... 3 %	22
0 ... 1 %	0 ... 10 %	23
0 ... 3 %	0 ... 10 %	24
0 ... 3 %	0 ... 30 %	25
0 ... 5 %	0 ... 15 %	26
0 ... 5 %	0 ... 50 %	27
0 ... 10 %	0 ... 30 %	28
0 ... 10 %	0 ... 100 %	29
0 ... 30 %	0 ... 100 %	30

D) Subject to export regulations AL: 91999, ECCN: N

0 → A29
1 → A28

Q
R

Cannot be combined

Cannot be combined

- 1) Only for cell length 20 to 180 mm
- 2) Only in connection with an approved purging unit

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

Selection and ordering data

Additional versions

Order code

Add "-Z" to Order No. and specify order codes.

Flow-type reference cell with reduced flow, 6 mm

A28

Flow-type reference cell with reduced flow, 1/4"

A29

Set of Torx screwdrivers

A32

TAG labels (specific inscription based on customer information)

B03

Kalrez gaskets in sample gas path

B04

Ex versions

Possible combinations: see Table "Ex configurations – principle selection criteria", page 6/16

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

E11

ATEX II 3G certificate; flammable gases

E12

CSA certificate – Class I Div 2

E20

ATEX II 3D certificate; potentially explosive dust atmospheres

- In non-hazardous gas zone

E40

- In Ex zone acc. to ATEX II 3G, non-flammable gases

E41

- In Ex zone acc. to ATEX II 3G, flammable gases¹⁾

E42

Clean for O₂ service (specially cleaned gas path)

Y02

Measuring range indication in plain text, if different from the standard setting

Y11

Special setting (only in conjunction with an application no., e.g. extended measuring range)

Y12

Extended special setting

Y13

(only in conjunction with an application no., e.g. determination of cross-interferences)

TÜV version acc. to 13th and 17th BImSchV

Y17

Additional units for Ex versions

Order No.

Category ATEX II 2G (Zone 1)

BARTEC EEx p control unit, 230 V, "leakage compensation"

7MB8000-2BA

BARTEC EEx p control unit, 115 V, "leakage compensation"

7MB8000-2BB

BARTEC EEx p control unit, 230 V, "continuous purging"

7MB8000-2CA

BARTEC EEx p control unit, 115 V, "continuous purging"

7MB8000-2CB

Ex isolation amplifier

7MB8000-3AA

Ex isolating relay, 230 V

7MB8000-4AA

Ex isolating relay, 110 V

7MB8000-4AB

Differential pressure switch for corrosive and non-corrosive gases

F) **7MB8000-5AA**

Stainless steel flame arrestor

7MB8000-6BA

Hastelloy flame arrestor

7MB8000-6BB

Category ATEX II 3G (Zone 2)

BARTEC EEx p control unit, 230 V, "continuous purging"

7MB8000-2CA

BARTEC EEx p control unit, 115 V, "continuous purging"

7MB8000-2CB

FM/CSA (Class I Div. 2)

Ex purging unit MiniPurge FM

7MB8000-1AA

Retrofitting sets

Order No.

RS 485/Ethernet converter

A5E00852383

RS 485/RS 232 converter

C79451-Z1589-U1

RS 485/USB converter

A5E00852382

AUTOCAL function with 8 binary inputs/outputs

A5E00064223

AUTOCAL function with 8 binary inputs/outputs and PROFIBUS PA

A5E00057315

AUTOCAL function with 8 binary inputs/outputs and PROFIBUS DP

A5E00057318

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

A5E00057317

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

¹⁾ Only in connection with an approved purging unit

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

2

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

D) 7MB2112-

-

A

Cannot be combined

For installation in the field, single-channel, 2 components

Gas connections

Ferrule screw connection for pipe, outer diameter 6 mm

Ferrule screw connection for pipe, outer diameter 1/4"

Measured component	Smallest measuring range	Largest measuring range
CO	0 ... 100 vpm	0 ... 1 000 vpm
NO	0 ... 100 vpm	0 ... 1 000 vpm
CO	0 ... 300 vpm	0 ... 3 000 vpm
NO	0 ... 300 vpm	0 ... 3 000 vpm
CO	0 ... 1 000 vpm	0 ... 10 000 vpm
NO	0 ... 1 000 vpm	0 ... 10 000 vpm
For CO/NO (TÜV; see Table "TÜV, 2 components in series", page 2/65)		
CO ₂	0 ... 100 vpm	0 ... 1 000 vpm
CO	0 ... 100 vpm	0 ... 1 000 vpm
CO ₂	0 ... 300 vpm	0 ... 3 000 vpm
CO	0 ... 300 vpm	0 ... 3 000 vpm
CO ₂	0 ... 1 000 vpm	0 ... 10 000 vpm
CO	0 ... 1 000 vpm	0 ... 10 000 vpm
CO ₂	0 ... 3 000 vpm	0 ... 30 000 vpm
CO	0 ... 3 000 vpm	0 ... 30 000 vpm
CO ₂	0 ... 1 %	0 ... 10 %
CO	0 ... 1 %	0 ... 10 %
CO ₂	0 ... 3 %	0 ... 30 %
CO	0 ... 3 %	0 ... 30 %
CO ₂	0 ... 10 %	0 ... 100 %
CO	0 ... 10 %	0 ... 100 %
CO ₂	0 ... 10 %	0 ... 100 %
CH ₄	0 ... 10 %	0 ... 100 %
CO ₂	0 ... 100 vpm	0 ... 1 000 vpm
NO	0 ... 100 vpm	0 ... 1 000 vpm
CO ₂	0 ... 300 vpm	0 ... 3 000 vpm
NO	0 ... 300 vpm	0 ... 3 000 vpm

Internal gas paths

	Sample chamber (lining)	Reference chamber (flow-type)
Hose made of FKM (Viton)	Aluminum	Non-flow-type
	Aluminum	Flow-type
Pipe made of titanium	Tantalum ¹⁾	Non-flow-type
	Tantalum ¹⁾	Flow-type
Stainless steel pipe (mat. no. 1.4571)	Aluminum	Non-flow-type
	Tantalum ¹⁾	Non-flow-type

Add-on electronics

Without

AUTOCAL function

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

Power supply

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

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

ATEX II 2G versions (Zone 1), incl. certificate

- 100 ... 120 V AC, 48 ... 63 Hz, according to ATEX II 2G²⁾ (operating mode: leakage compensation)
- 200 ... 240 V AC, 48 ... 63 Hz, according to ATEX II 2G²⁾ (operating mode: leakage compensation)
- 100 ... 120 V AC, 48 ... 63 Hz, according to ATEX II 2G²⁾ (operating mode: continuous purging)
- 200 ... 240 V AC, 48 ... 63 Hz, according to ATEX II 2G²⁾ (operating mode: continuous purging)

Heating of internal gas paths and analyzer unit

Without

With (max. 65 °C)

0

1

A A

A B

A C

B A

B B

B C

B D

B E

B F

B G

C G

D A

D B

0

1

0 → A29

1 → A28

0

1

0 → A28, A29

2

3

6

8

2 → A28, A29, Y02

3 → Y02

6 → A28, A29

8 → A28, A29

0

1

6

7

8

0

1

2

3

6

7

A

B

6

7

8

0

1

2

3

6

7

A

B

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

TÜV, single component

(only with additional suffix Z (Y17, Y18))

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 ...	Smallest 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 6, TÜV (1-component unit)

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; without heating, German

7MB2111-0XD00-1AA0-Z +Y17

TÜV, 2 components in series

Component	CO (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 ...
AA	75 mg/m ³	1 000 mg/m ³	200 mg/m ³	2 000 mg/m ³
AB	300 mg/m ³	3 000 mg/m ³	300 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 6, TÜV (2 components in series)

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 compartment

without automatic adjustment (AUTOCAL)

230 V AC; without heating, German

7MB2112-0AA00-1AA0-Z +Y17**Note:** for 3 components take both tables into consideration.Ordering information measured component N₂OCertification in accordance with AM0028 and AM0034 (Kyoto Protocol) for measuring N₂O, measuring range 0 to 300 ppm / 3 000 ppm.

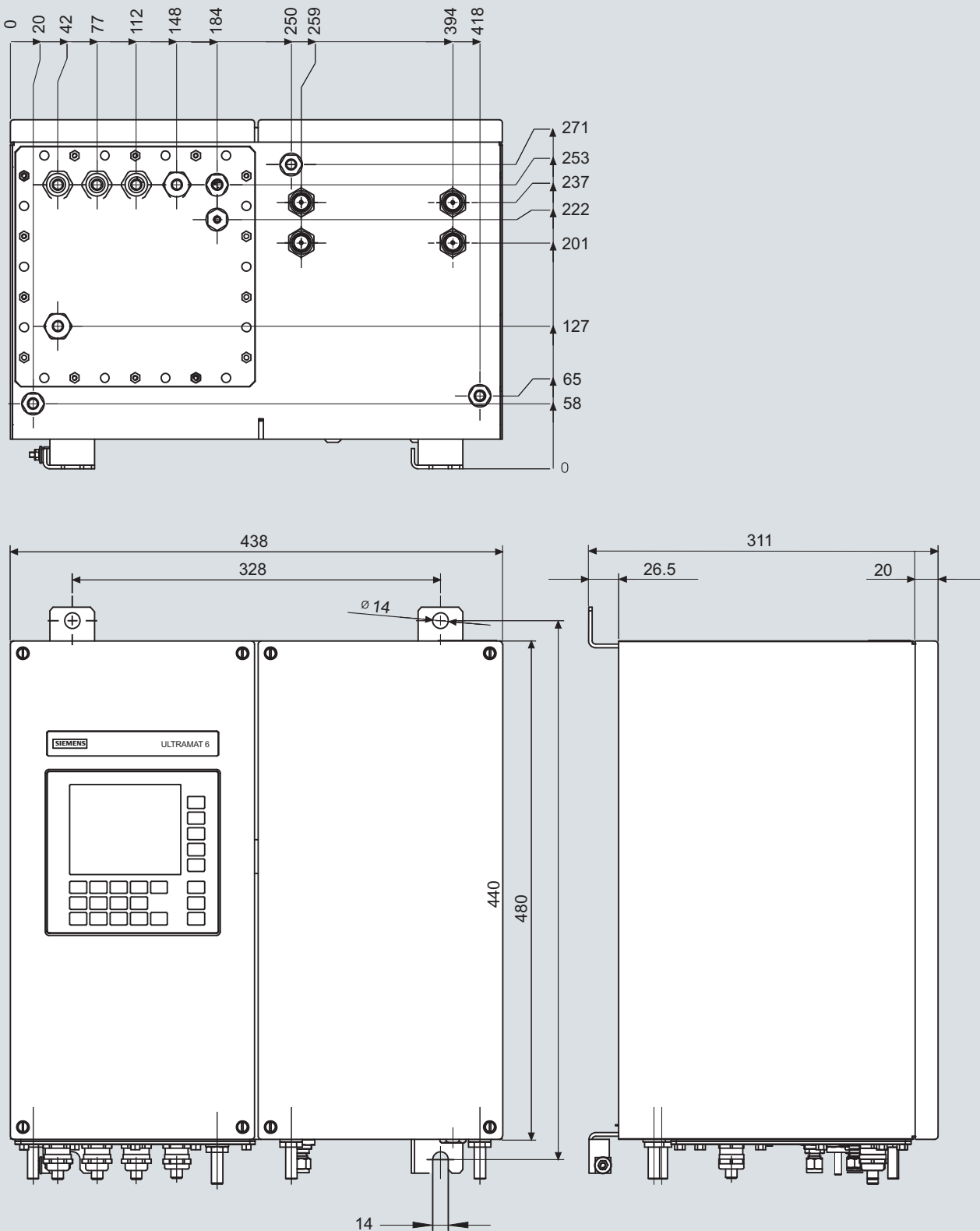
Version: Standard device

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

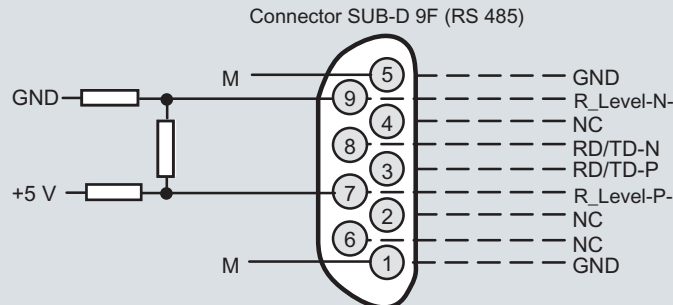
Dimensional drawings



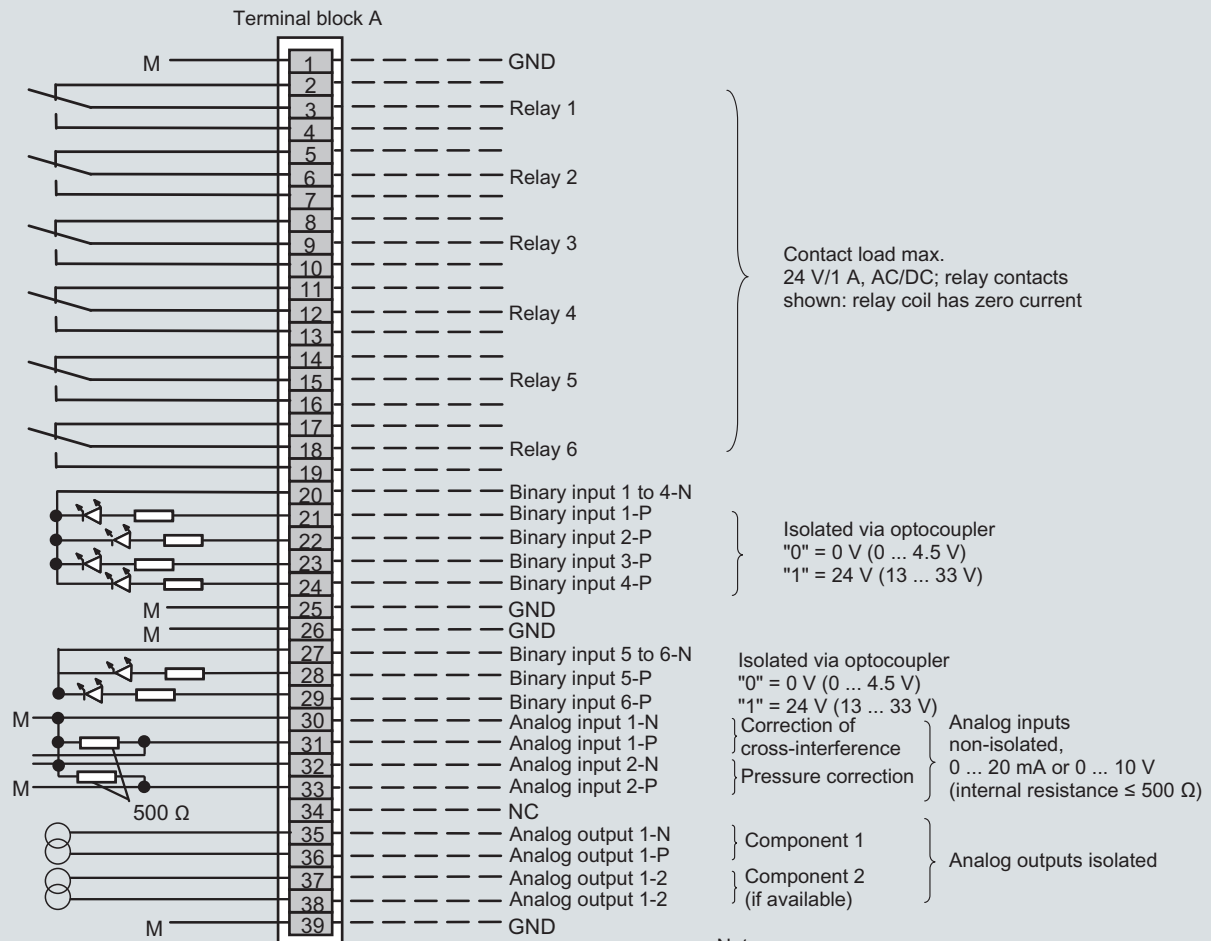
ULTRAMAT 6, field unit, dimensions in mm

Schematics

Pin assignment (electrical and gas connections)



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



Note:

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

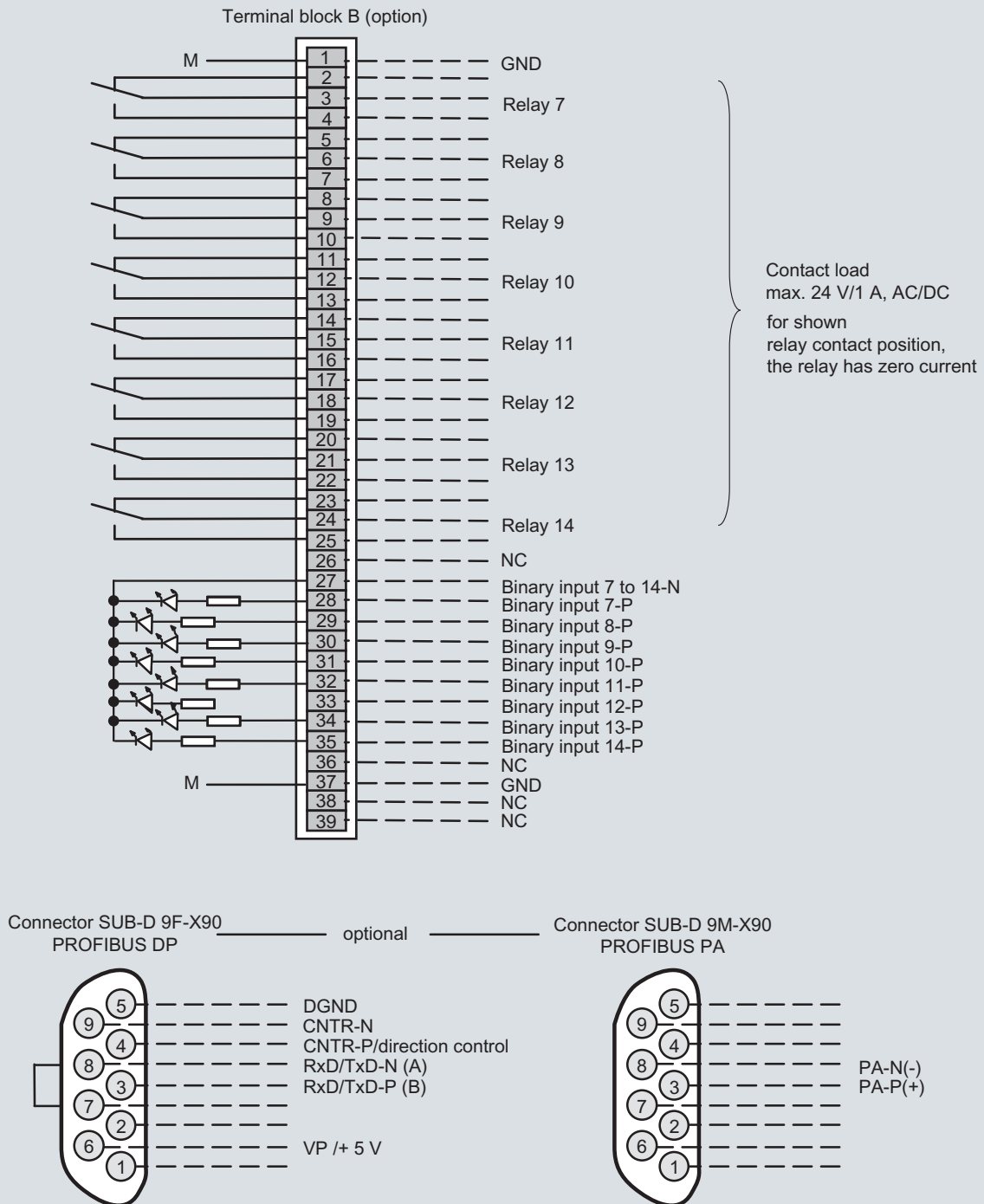
ULTRAMAT 6, field device, pin and terminal assignment

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

2



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

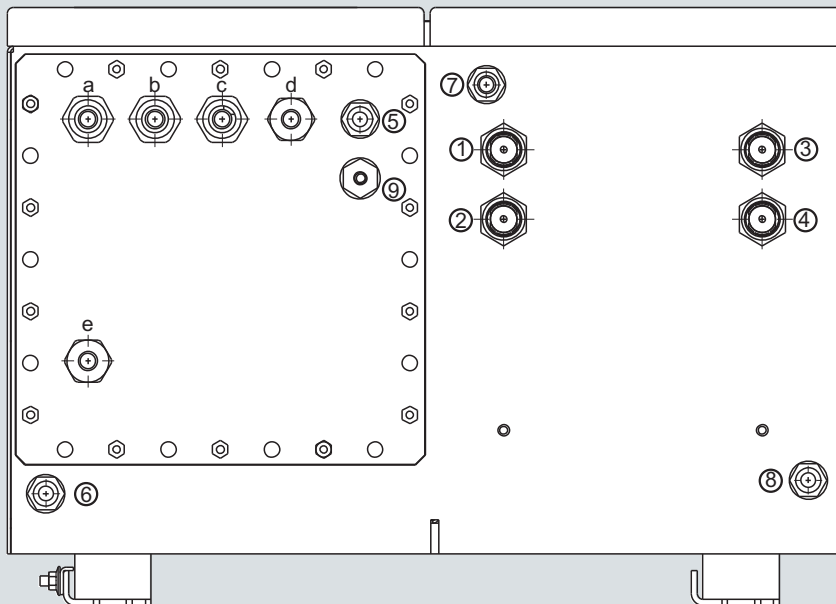
ULTRAMAT 6, field device, pin and terminal assignment of the AUTOCAL board and PROFIBUS connectors

Continuous Gas Analyzer, extractive

ULTRAMAT 6

Field device

2



Gas connections

- | | | |
|-----|--|--|
| ① | Sample gas inlet | } Clamping
gland for pipe
Ø 6 mm or 1/4" |
| ② | Sample gas outlet | |
| ③ | Reference gas inlet (option) | |
| ④ | Reference gas outlet (option) | |
| ⑤-⑧ | Purging gas inlets/outlets, stubs Ø 10 mm or 3/8" | |
| ⑨ | Connection atmospheric pressure sensor, stubs Ø 1/4" | |

Electrical connections

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

ULTRAMAT 6, field device, gas connections 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 6

Suggestions for spare parts

Selection and ordering data

Description	7MB-2121	7MB-2123	7MB-2124	7MB-2111	7MB-2112	7MB-2111/2 Ex	2 years (quantity)	5 years (quantity)		Order No.
Analyzer unit										
O-ring for cover (window)	x	x	x	x	x	x	2	4	D)	C79121-Z100-A24
Cover (cell length 20 ... 180 mm)	x	x	x	x	x	x	2	2		C79451-A3462-B151
Cover (cell length 0.2 ... 6 mm)	x	x	x	x	x	x	2	2		C79451-A3462-B152
O-rings, set	x	x	x	x	x	x		1	D)	C79451-A3462-D501
Sample gas path										
O-ring (hose clip)				x	x	x	2	4	D)	C71121-Z100-A159
Pressure switch	x	x	x				1	2		C79302-Z1210-A2
Flow indicator	x	x	x				1	2		C79402-Z560-T1
Hose clip	x	x	x	x	x	x		1		C79451-A3478-C9
Heating cartridge (heated unit)				x	x	x		1		W75083-A1004-F120
Electronics										
Temperature fuse (heated unit)				x	x			1		W75054-T1001-A150
Fuse (device fuse)						x	1	2		A5E00061505
Temperature controller - electronics, 230 V AC				x	x	x		1		A5E00118527
Temperature controller - electronics, 115 V AC				x	x	x		1		A5E00118530
Fan, 24 V DC (heated unit)				x	x	x		1		A5E00302916
Front plate with keyboard	x	x	x				1	1		C79165-A3042-B504
Temperature sensor				x	x	x		1		C79165-A3044-B176
Adapter plate, LCD/keyboard	x	x	x	x	x		1	1		C79451-A3474-B605
Motherboard, with firmware: see spare parts list	x	x	x	x	x	x		1		
LC display	x	x	x	x	x		1	1		W75025-B5001-B1
Connector filter	x	x	x	x	x			1	F)	W75041-E5602-K2
Fuse, T 0.63 A/250 V	x		x	x	x	x	2	3		W79054-L1010-T630
Fuse, T 1 A/250 V	x	x	x	x	x	x	2	3		W79054-L1011-T100
Fuse, T 1.6 A/250 V		x	x				2	3		W79054-L1011-T160
Fuse, T 2.5 A/250 V				x	x	x	2	3	D)	W79054-L1011-T250

D) Subject to export regulations AL: 91999, ECCN: N

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

If the ULTRAMAT 6 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.