

ULTRAMAT 6

NDIR Gas Analyzers, Single-channel or Dual-channel Versions



2	General
2	Application
3	Design
4	Mode of operation
5	Versions
6	Communication
8	19" unit
8	Connections, assembly
9	Gas paths
10	Electrical connection
12	Technical data
13	Dimensions
14	Ordering data
22	Ordering data, additional versions for TÜV units
23	Field unit
23	Connections, assembly
24	Gas paths
25	Electrical connection
27	Technical data
28	Dimensions
29	Ordering data
34	Ordering data, additional versions for TÜV units
35	Explosion-proof design
37	BARTEC EEx p control unit
40	Ex purging unit MiniPurge FM
41	Spare parts
41	Documentation
42	Conditions of sale and delivery
	Export regulations
42	Contact addresses

ULTRAMAT 6

General

Application

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, CO₂, NO, SO₂, NH₃, H₂O, CH₄ and other hydrocarbons.

Single-channel analyzers measure up to 2 gas components. Dual-channel analyzers measure up to 4 gas components simultaneously (4 components as special application).

Special applications

Besides the standard combinations special applications concerning material of the gas path, material of sample cell and sample components are also available on request.

Special materials of the sample cell 316SS/titanium on request.

4-component analyzers are also available as special application.

Application examples

- Measurements for boiler control in combustion plants
- Measurements in safety-relevant areas
- Measurement of pollutant for emission monitoring according to TA-Luft, 13. and 17. BImSchV
- Measurements in the automotive industry (test benches)
- Warning equipment
- Emission measurements in incineration plants
- Process gas concentrations in chemical plants
- Trace measurements in pure gas processes for quality monitoring
- Version to analyze flammable and non-flammable gases or vapors for use in hazardous areas (zone 1 and zone 2). (Use in hazardous areas of zone 0 is not permissible.)

Special characteristics

- Four freely-programmable measuring ranges
- Measuring ranges with suppressed zero possible
- Measuring range identification
- One electrically isolated signal output 0/2/4 to 20 mA per component
- Autoranging or manual range switching possible; remote switching is also possible
- Differential measuring ranges with flow-type reference cell
- Storage of measured values possible during calibration
- Time constants selectable within wide limits (static/dynamic noise suppression); i.e. the response time of the analyzer or the component can be matched to the respective application.
- Simple handling using menu-based operation
- Fast response time
- Low long-term drift

- Measuring-point selection for up to 6 measuring points (programmable)
- Measuring point identification
- Two-stage access code to prevent unintentional and unauthorized inputs
- Internal pressure sensor for correction of variations in atmospheric pressure in the range 600 to 1200 hPa absolute
- External pressure sensor can be connected for correction of variations in the process gas pressure in the range 600 to 1500 hPa absolute
- Automatic range calibration can be parameterized
- Operation based on NAMUR Recommendation
- Monitoring of sample gas (flow and pressure)
- Customer-specific analyzer options such as e.g.:
 - Customer acceptance
 - Tag labels
 - Drift recording
- Sample cell for use in presence of highly corrosive sample gases.

Additional characteristics, 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
- Channels 1 and 2 can be converted to connection in series (linking of gas connections from channel 1 to channel 2 on rear).

Special characteristics of 19" unit

- 19" unit with 4 HU for installation
 - in swing frame
 - in cabinets, with or without slide rails
- Front panel for service can be hinged down (laptop connection)
- Internal gas paths: hose made of Viton or pipe made of titanium
- Gas connections for sample gas input and output: pipe diameter 6 mm or 1/4"
- Flowmeter for sample gas on front plate (option).

Special characteristics of field unit

- Two-door housing with gas-tight separation of analyzer and electronics sections
- Each half of the enclosure can be purged separately
- Parts wetted by the sample gas can be heated up to 65 °C (option)
- Gas path: hose made of Viton or pipe made of titanium
- Gas connections for sample gas input and output: pipe gland for pipe diameter 6 mm or 1/4"
- Purging gas connections: pipe diameter 10 mm or 3/8"
- Simple analyzer exchange since electric connections are easy to remove.

Display and control panel

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

Inputs and outputs

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

Communication

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

Options

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

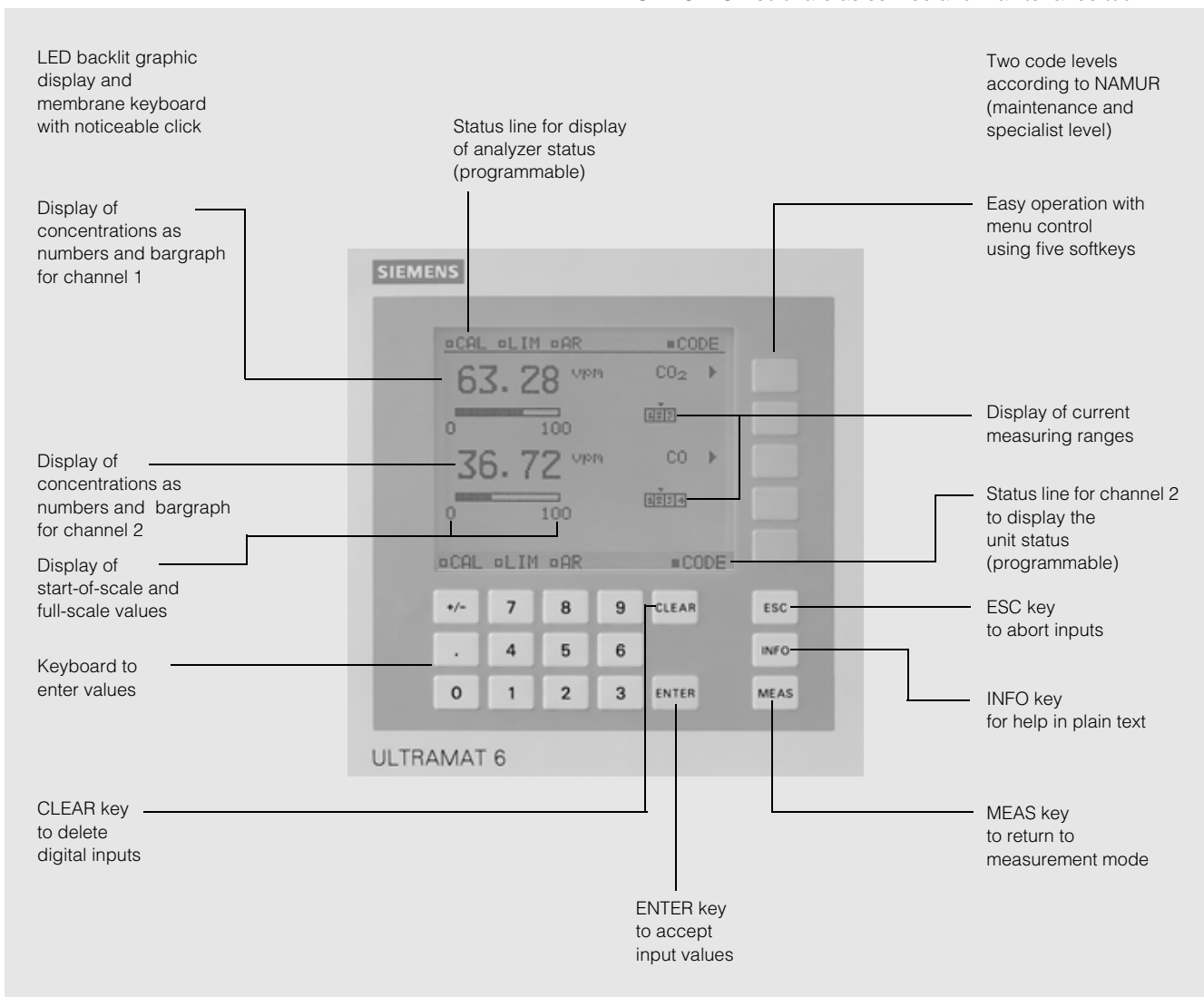


Fig. 1 ULTRAMAT 6, membrane keyboard and graphic display

ULTRAMAT 6

General

Mode 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.

Fig. 2 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 cell (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 cell and interrupts the two beams alternately and periodically. If absorption takes place in the sample cell, 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 grids heated to approx. 120 °C which, together with two further resistors, form a Wheatstone bridge. The pulsating flow together with the very close arrangement of the Ni grids leads to 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 have to enter the analyzer dustfree. Avoid condensate in the sample cells. Therefore an appropriate gas preparation is required in the most applications.

The ambient air of the analyzer should be, in a large extent, free of high concentration of the component to be measured.

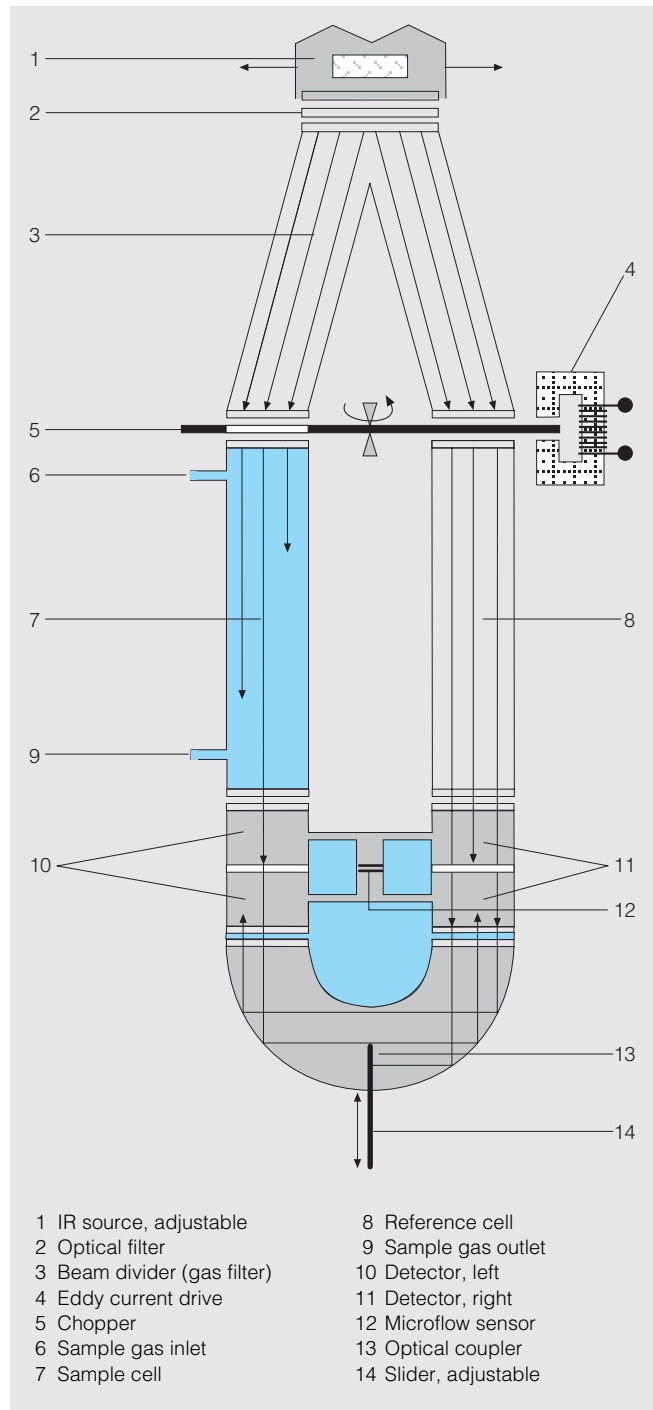


Fig. 2 ULTRAMAT 6, mode of operation

Standard

Gas path		19" unit	Field unit	Explosion-protected field unit
with hoses	Nipple Hose Hose coupling Sample cell: •Body •Cell lining •Stub analyzer cell •Window		Titanium Viton Polyamide 6 Aluminium Aluminium Titanium, O-ring: Viton or Kalrez CaF ₂ , adhesive: E353, O-ring: Viton or Kalrez	—
with pipes	Nipple Pipe Sample cell: •Body •Cell lining •Window		Titanium Titanium, O-ring: Viton or Kalrez Aluminium Tantalum CaF ₂ , adhesive: E353, O-ring: Viton or Kalrez	

Special applications (examples)

Gas path		19" unit	Field unit	Explosion-protected field unit
with pipes	Nipple Pipe Sample cell: •Body •Cell lining •Window		Titan Titanium, O-ring: Viton or Kalrez Titanium Tantalum CaF ₂ , without adhesive O-ring: Viton or Kalrez	
with pipes	Nipple Pipe Sample cell: •Body •Cell lining •Window		SS, type No. 1.4571 (316SS) 1.4571, O-ring: Viton or Kalrez SS, type No. 1.4571 Tantalum CaF ₂ , without adhesive O-ring: Viton or Kalrez	

Further versions on request

Options

Gas path		19" unit	Field unit	Explosion-protected field unit
Flowmeter	Metering pipe Float Float limit Elbows	Duran glass Duran glass PTFE (Teflon) Viton	—	—
Pressure switch	Diaphragm Enclosure	Viton PA 6.3T	—	—

ULTRAMAT 6

General

Communication

Communication

The gas analyzers of series 6, ULTRAMAT 6, ULTRAMAT/OXYMAT 6, OXYMAT 6, OXYMAT 61 and CALOMAT 6, as well as the ULTRAMAT 23 offer the following communications facilities:

- Serial **RS 485** interface present as standard with internal communications bus (ELAN) which permits communication between the analyzers and – with multi-channel analyzers – from one channel to the other via the serial interface even without a PC for e.g. information on the process gas pressure and compensation of the influences of interfering gases.
- **SIPROM GA**, a software tool especially for servicing and maintenance tasks. All functions of the analyzers, whether an individual device or where several are networked together, can be remote controlled and monitored using SIPROM GA.
- **PROFIBUS-DP/PA** is the leading field bus on the market. All Siemens gas analyzers are suitable for PROFIBUS when equipped with an optional plug-in card (retrofitting also possible) and satisfy the binding "Device profile for analyzers" defined by the **PNO** (PROFIBUS user organization). Central access to the analyzers in the system is possible using the **SIMATIC PDM** operator input software.

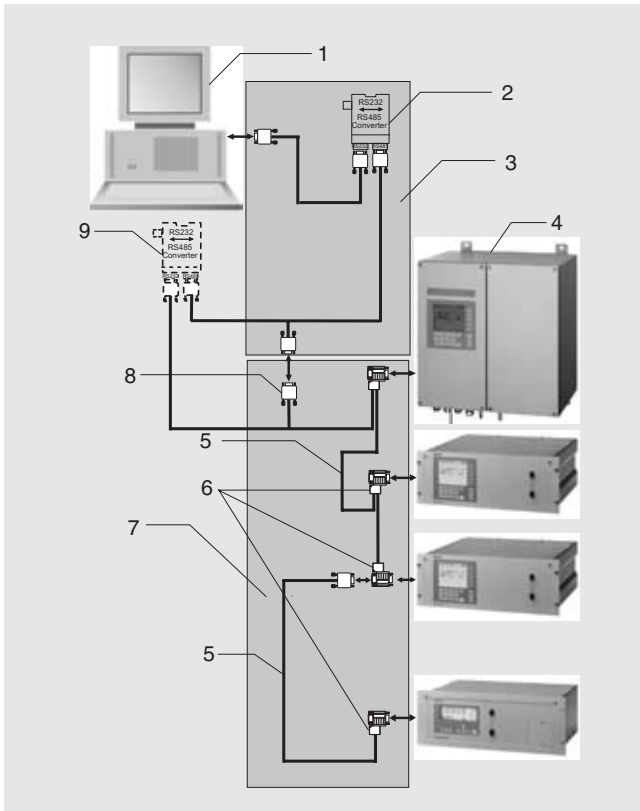


Fig. 3 Typical design of an RS 485 network

Item	Designation
1	Computer
2	RS 485/RS 232 converter with RS 232/RS 485 cable
3	RS 485 bus connector with jumper
4	Analyzers
5	RS 485 cable
6	RS 485 bus connector
7	RS 485 network
8	9-pin DSUB plug
9	Option: RS 485 repeater

Interface parameters

Level	RS 485
Baud rate	9600
Data bits	8
Stop bit	1
Start bit	1
Parity	None
No echo mode	

Ordering information

Interface description (German)
 RS 485/RS 232 converter
 RS 485/Ethernet converter
 SIMATIC cable/bus cable
 SIMATIC bus connector
 9-pin DSUB plug
 Repeater
 (see also Catalog CA 01 or IK PI)

Order No.

A5E000 54148
C79451-Z1589-U1
C79451-A3364-D61
6XV1 830-0EH10
6ES7 972-0BB11-0XA0
6ES7 972-0BB11-0XA0
6ES7 972-0AA01-0XA0

SIPROM GA

Application: communications software for remote maintenance and servicing of Siemens process gas analyzers; max. 12 analyzers with up to 4 components each. Networking of several gateways is possible when using the RS 485/Ethernet converter. The number of operable analyzers is increased correspondingly.

Functions: display and saving of all analyzer data, remote operation of all analyzer functions, parameter and configuration settings; comprehensive diagnostics information, remote calibration; online help; cyclic saving of measured values and status on hard disk and exporting to commercially available application programs, downloading of new software.

Hardware requirements: PC/laptop; recommended with Pentium II 6 MB RAM, free COM port: RS 232 or RS 485, CD drive.

Software requirements: Windows 95 or NT 4 (SP6), Windows 2000 or Windows X-P.

Ordering information

SIPROM GA software
 German/English selectable during installation, comprising 1 CD, with installation instructions, software product certificate and registration form

Firmware retrofitting sets for older analyzers:

ULTRAMAT 23
 (prior to SW version 2.06)
 All languages

ULTRAMAT 6
 (prior to SW version 4.1)
 • German
 • English
 • French
 • Spanish
 • Italian

OXYMAT 6
 (prior to SW version 4.1)
 • German
 • English
 • French
 • Spanish
 • Italian

Order No.

S79610-B4014-A1

C79451-A3494-S501

C79451-A3478-S501
C79451-A3478-S502
C79451-A3478-S503
C79451-A3478-S504
C79451-A3478-S505

C79451-A3480-S501
C79451-A3480-S502
C79451-A3480-S503
C79451-A3480-S504
C79451-A3480-S505

PROFIBUS-DP/PA

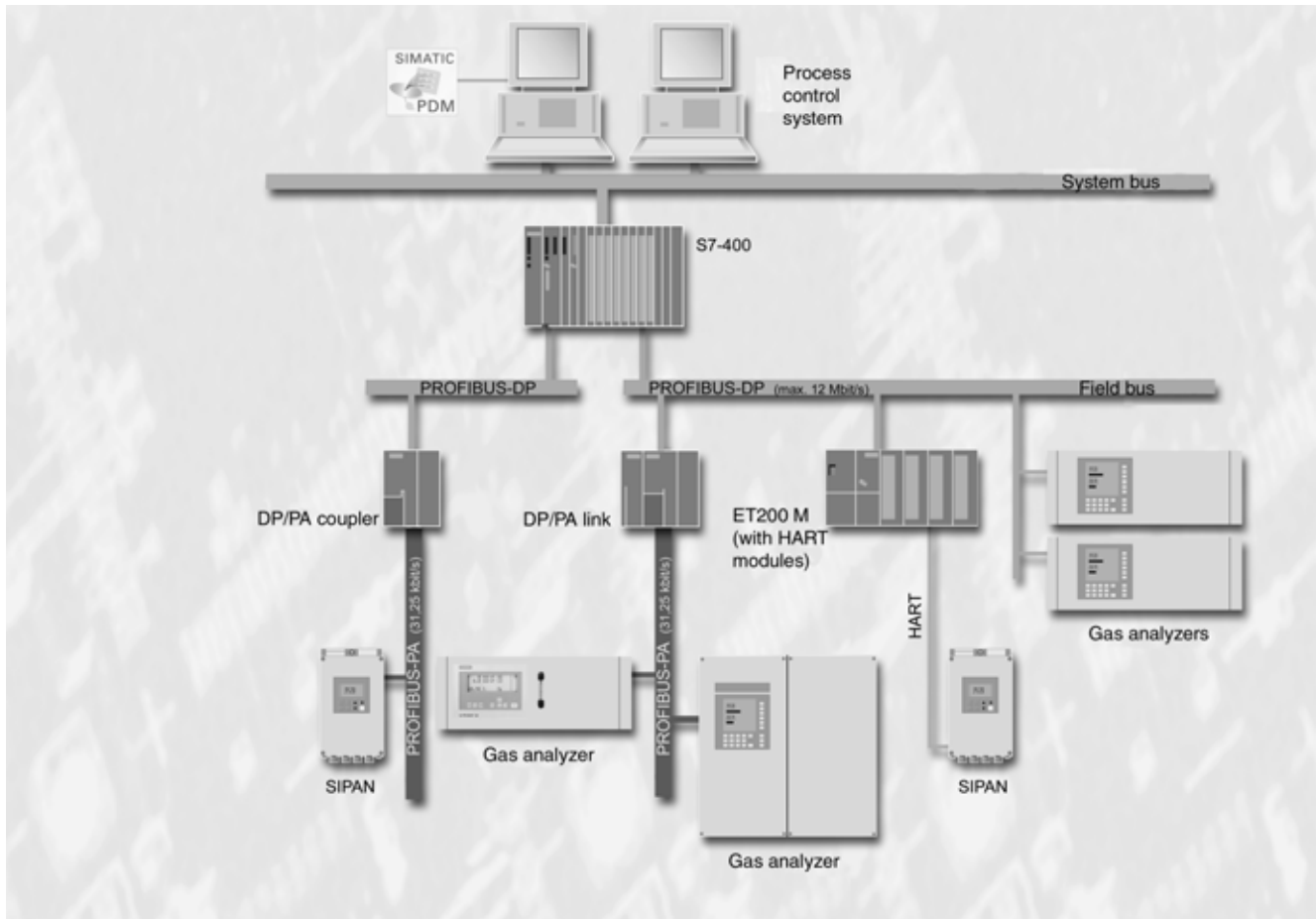


Fig. 4 Basic structure of a PROFIBUS system

The term "Field bus" describes a digital communications system with which distributed field devices in a plant are networked together via one single cable, and connected at the same time to programmable controllers or to a process control system. PROFIBUS is the leading field bus on the market. The **PROFIBUS-DP** version is widely used for production automation because of its high transmission rate for relatively small data quantities per device, whereas **PROFIBUS-PA** particularly takes into account the features required for process engineering, e.g. large data quantities and application in potentially explosive atmospheres.

User benefits can be found in the extremely high potentials for cost savings in all areas of the plant, covering configuring and commissioning, operation and maintenance, and up to later plant extensions.

Operation of the gas analyzers from a control system or separate PC is possible using the SIMATIC PDM (Process Device Manager) operator input tool which is software executing under Windows 95/98/NT and which can also be incorporated into the SIMATIC PCS 7 process control system. This permits clear display of both the incorporation of devices into the system and the complex parameter structure of the analyzers, permitting operation to be carried out simply by clicking.

The PROFIBUS user organization (PNO) is an independent international institution, and represents the interests of many vendors and users. In addition to services such as consultation, training

and device certification, its prime task is the further development, standardization and promotion of the PROFIBUS technology. The definition of a binding functionality for a device class in a profile is a prerequisite for the uniform response of devices from different vendors, the so-called interoperability. The **profile for analyzers** was defined as binding at the end of 1999, thus guaranteeing the interaction of all PROFIBUS-based devices in a plant.

This profile defines the functionality of the analyzers in a block model: e.g. the **physical block** describes the measuring procedure, analyzer and vendor names, serial number and operating state (operation, maintenance). Various **functional blocks** contain the execution of specific functions such as the processing of measured values or alarms. The **transducer blocks** describe the functionality of the actual measuring procedure and its control, e.g. preprocessing of a measured value, correction of cross-interferences, characteristics, measuring ranges as well as switching and control procedures. Protocols define the data transmission between the stations on the bus. A differentiation is made between **cyclic and acyclic services**. Cyclic services are used to transmit time-critical data such as measured values and statuses. The acyclic services permit the scanning or modification of device parameters during operation.

All gas analyzers of Series 6, ULTRAMAT 6 and OXYMAT 6, as well as OXYMAT 61, CALOMAT 6 and ULTRAMAT 23, are suitable for PROFIBUS when fitted with the optional plug-in card (retrofitting also possible, see Ordering information).

ULTRAMAT 6

19" unit

Connections, assembly

Gas and electrical connections

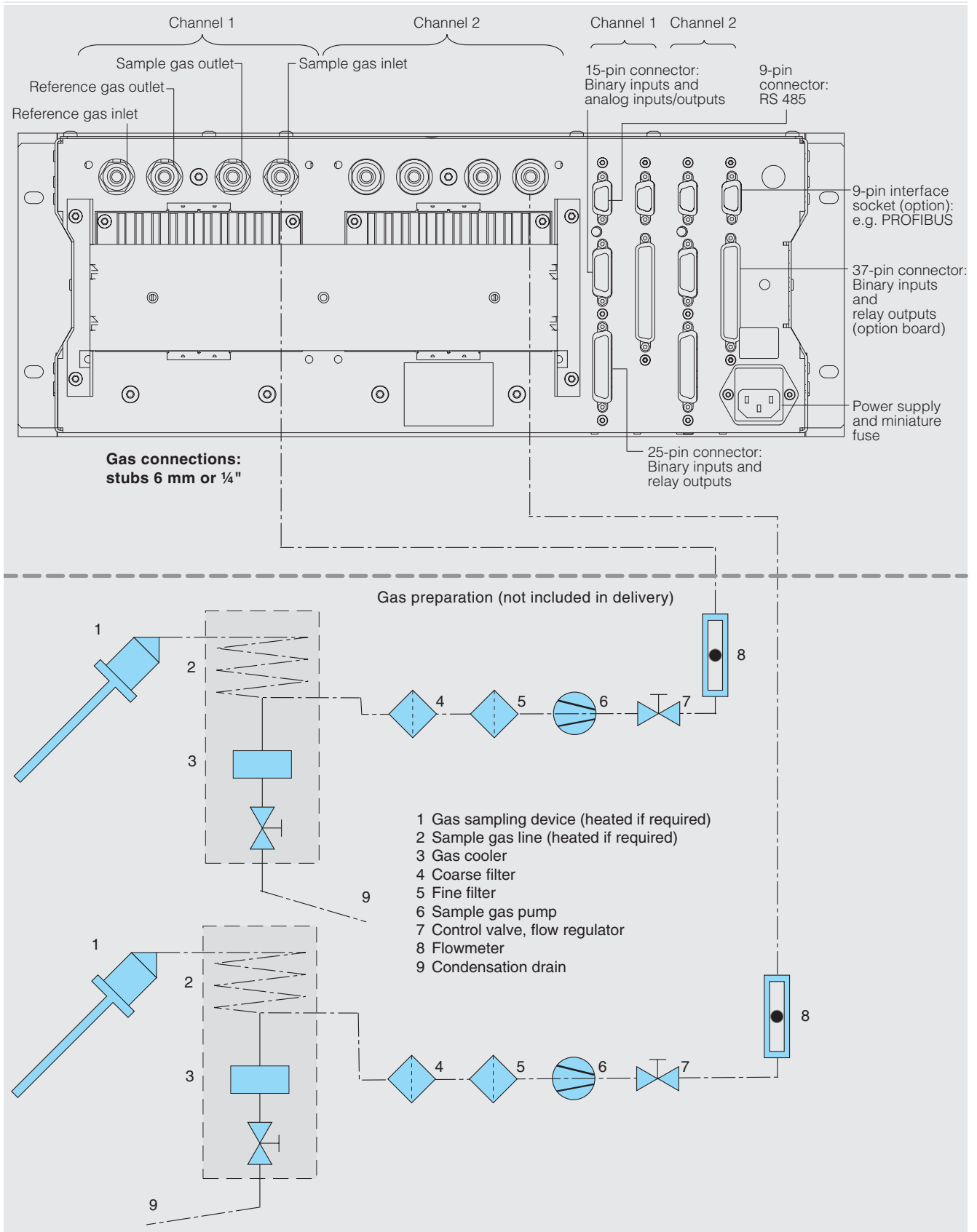


Fig. 5 ULTRAMAT 6, 19" unit, gas and electrical connections shown at top, installation preparation with two separate gas sampling devices (external sample preparation, example) shown at bottom

Internal gas paths, gas flow diagrams, basic layout

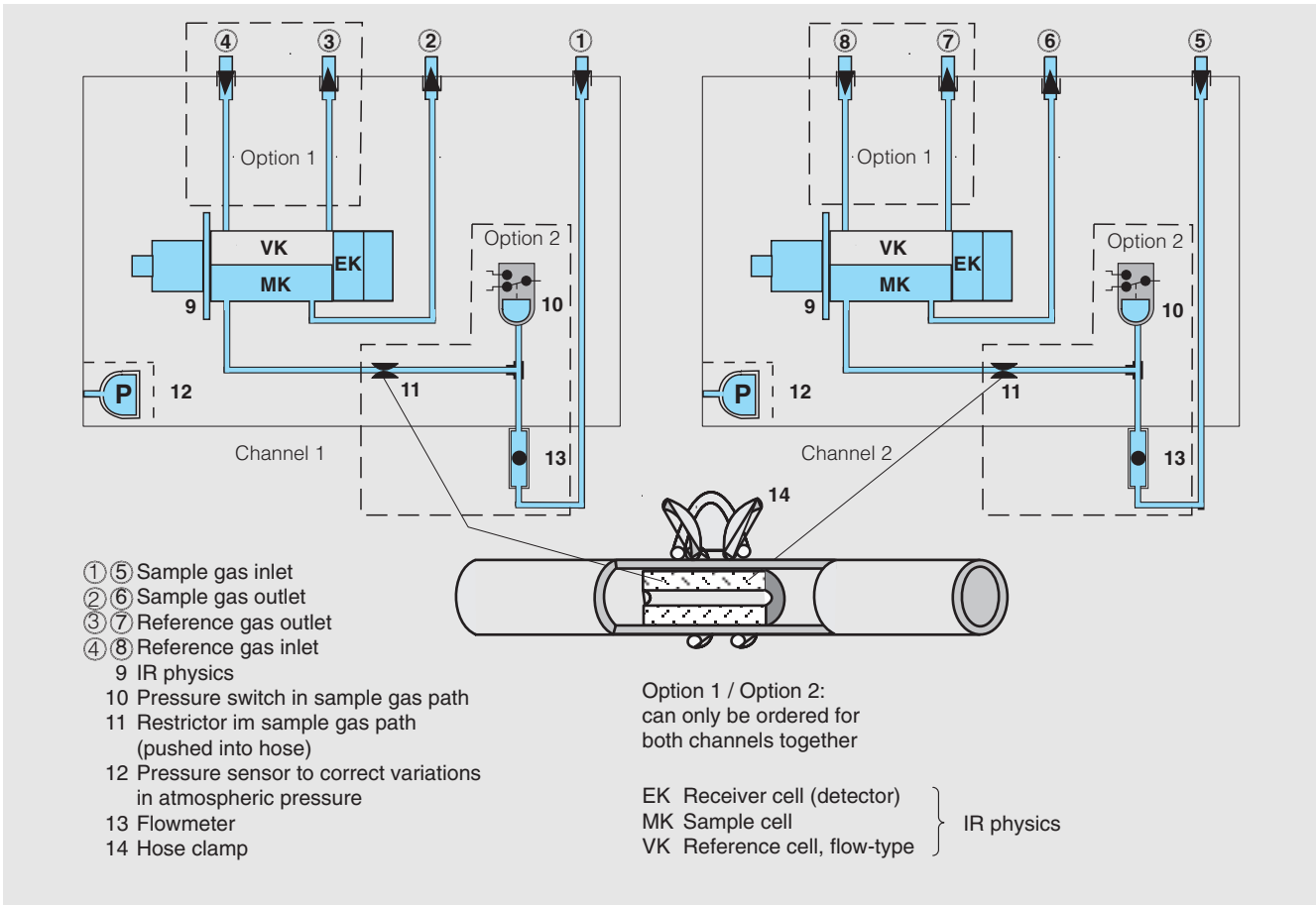


Fig. 6 Gas path ULTRAMAT 6E-2P with sample gas monitoring (option 2) and flow-type reference cell (option 1)

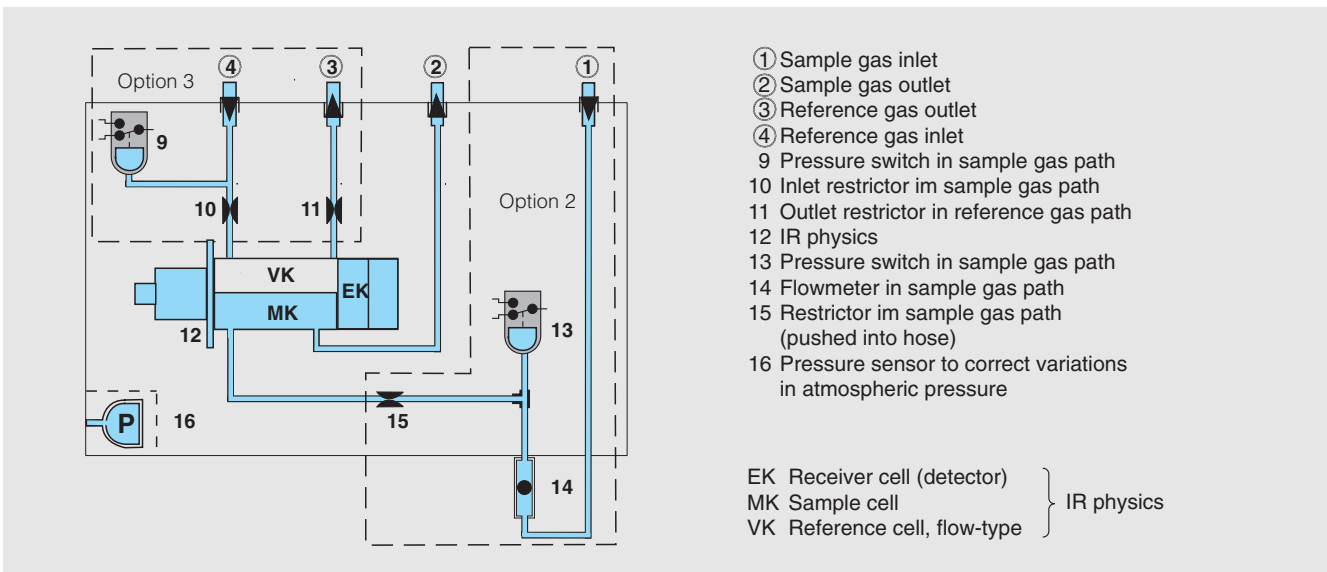


Fig. 7 Gas path ULTRAMAT 6E with sample gas monitoring (option 2) and reduced flow-type reference cell (option 3)

ULTRAMAT 6

19" unit

Electrical connection

Pin assignment

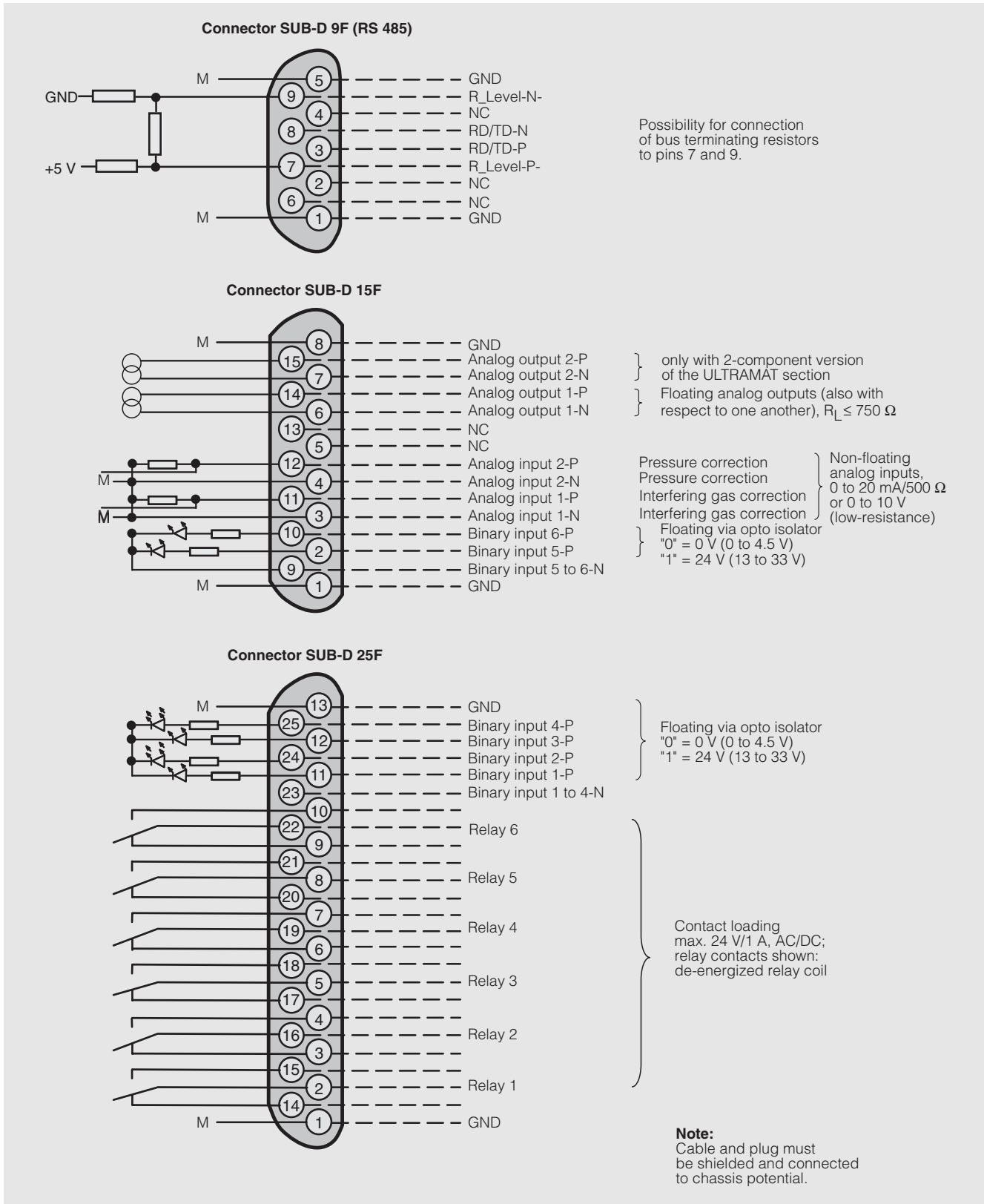


Fig. 8 ULTRAMAT 6, 19" unit, pin assignment

Pin assignment (continued)

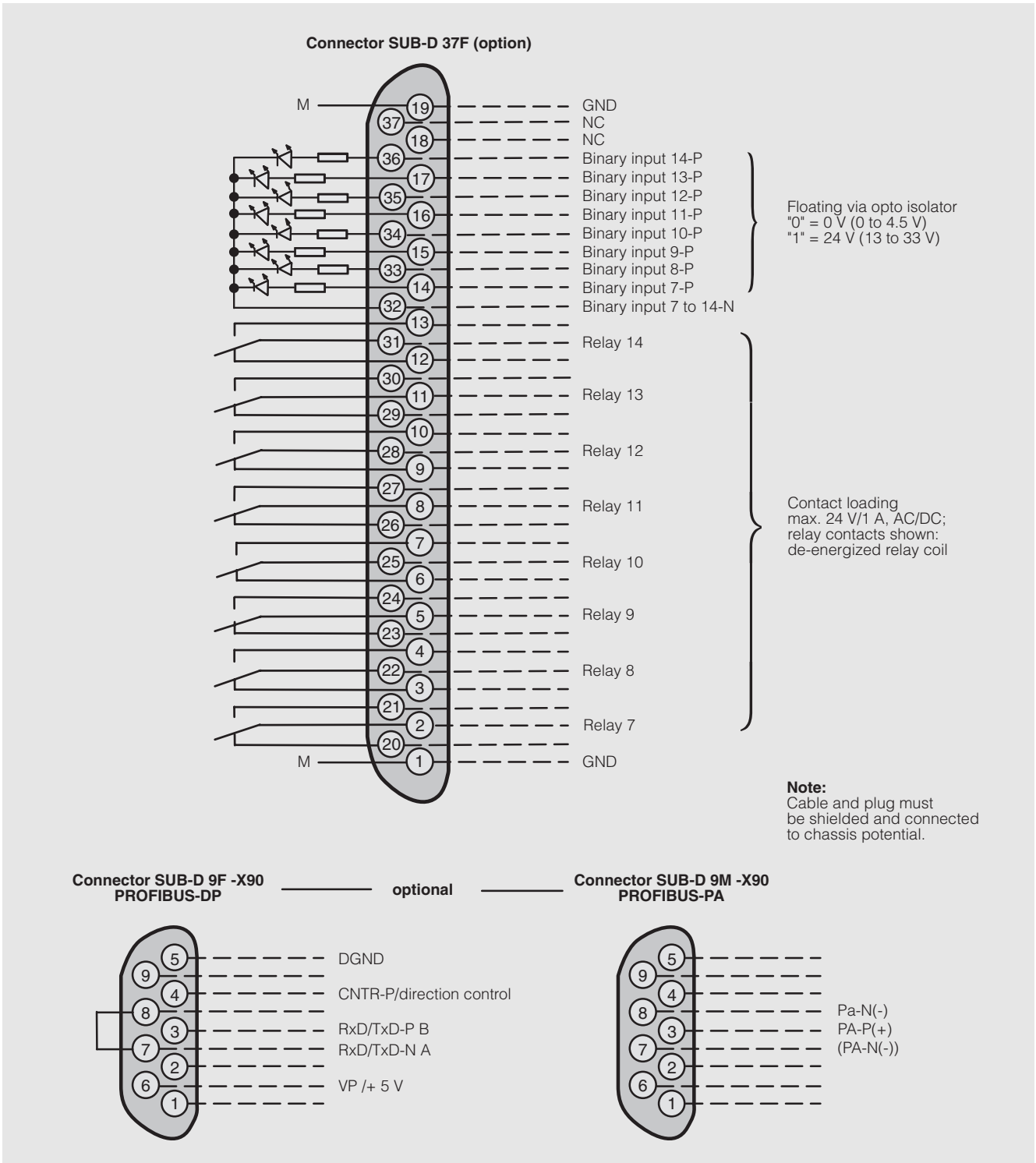


Fig. 9 ULTRAMAT 6, 19" unit, pin assignment of Autocal board and PROFIBUS connectors

ULTRAMAT 6

19" unit

Technical data

Technical data

General

Measuring ranges	4, switchable internally and remotely; autoranging is also possible
Smallest possible measuring range	depending on application, e.g. CO: 0 to 10 vpm CO ₂ : 0 to 5 vpm
Largest possible measuring span	Depending on application
Characteristic	Linearized
Position of use	Front panel vertical
Conformity	CE identification EN 50081-1, EN 50082-2

Design, enclosure

Dimensions	see Fig. 10
Weight	Approx. 15 kg (with 1 IR-channel), Approx. 21 kg (with 2 IR-channels)
Degree of protection	IP 20 according to EN 60529

Electrical characteristics

EMC interference immunity (ElectroMagnetic Compatibility)	According to standard requirements of NAMUR NE21 (08/98)
Electrical safety	According to EN 61010-1 overvoltage category III
Power supply	100 to 120 V AC (rated range 90 V to 132 V), 48 to 63 Hz or 200 to 240 V AC (rated range 180 V to 264 V), 48 to 63 Hz
Power consumption	1-channel unit: approx. 40 VA 2-channel unit: approx. 70 VA
Fuses	
• 100...120 V	1T/250 (7MB2121) 1.6T/250 (7MB2123)
• 200...240 V	0.63T/250 (7MB2121) 1T/250 (7MB2123)

Gas inlet conditions

Perm. sample gas pressure	
• for analyzers with hoses	
- without pressure switch	600 to 1500 hPa (absolute)
- with pressure switch	600 to 1300 hPa (absolute)
• for analyzers with pipes (without pressure switch)	600 to 1500 hPa (absolute)
Sample gas flow	18 to 90 l/h (0.3 to 1.5 l/min)
Sample gas temperature	0 to 50 °C
Sample gas humidity	< 90 % RH ¹⁾ or depending on application; non condensing

Time response

Warm-up period	With amb. temperature < 30 min ²⁾
Response time (T ₉₀ time)	Dependent on length of analyzer cell, sample gas line and damping
Damping (electric time constant)	0 to 100 s, programmable
Dead time (purging time of gas path in analyzer at 1 l/min)	Approx. 0.5 to 5 s depending on version
Time for internal signal processing	< 1 s

Pressure correction range

Pressure sensor	
• internal	600 to 1200 hPa absolute
• external	600 to 1500 hPa absolute

Measuring response ²⁾

Output signal fluctuation	± 0.1 % to ± 1 % of smallest possible measuring range specified on rating plate depending on application with the unit electronic time constant (corresponds to ± 0.33 % with 2 σ)
Zero drift	< 1 % of measuring range/week
Measured-value drift	< 1 % of measuring range/week
Repeatability	≤ 1 % of respective measuring range
Linearity error	< 0.5 % of full-scale value

Influencing variables ³⁾

Ambient temperature	< 1 % of measuring range/10 K
Sample gas pressure	With pressure compensation: < 0.15 % of span/1 % change in atmospheric pressure Without pressure compensation: < 1.5 % of span/1 % change in atmospheric pressure
Sample gas flow	Negligible
Power supply	< 0.1 % of output signal span with rated voltage ± 10 %
Ambient conditions	Application-dependent influencing of measurement if ambient air contains measured component or cross-sensitive gases

Electric inputs and outputs

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

Ambient conditions

Perm. ambient temperature	-30 to +70 °C during storage and transport, +5 to +45 °C during operation
Permissible humidity	< 90 % RH ¹⁾ as annual average, during storage and transport ⁴⁾

¹⁾ RH: relative humidity.

²⁾ Maximum accuracy achieved after 2 hours.

³⁾ Referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature.

⁴⁾ Dew point must not be fallen below.

Dimensions

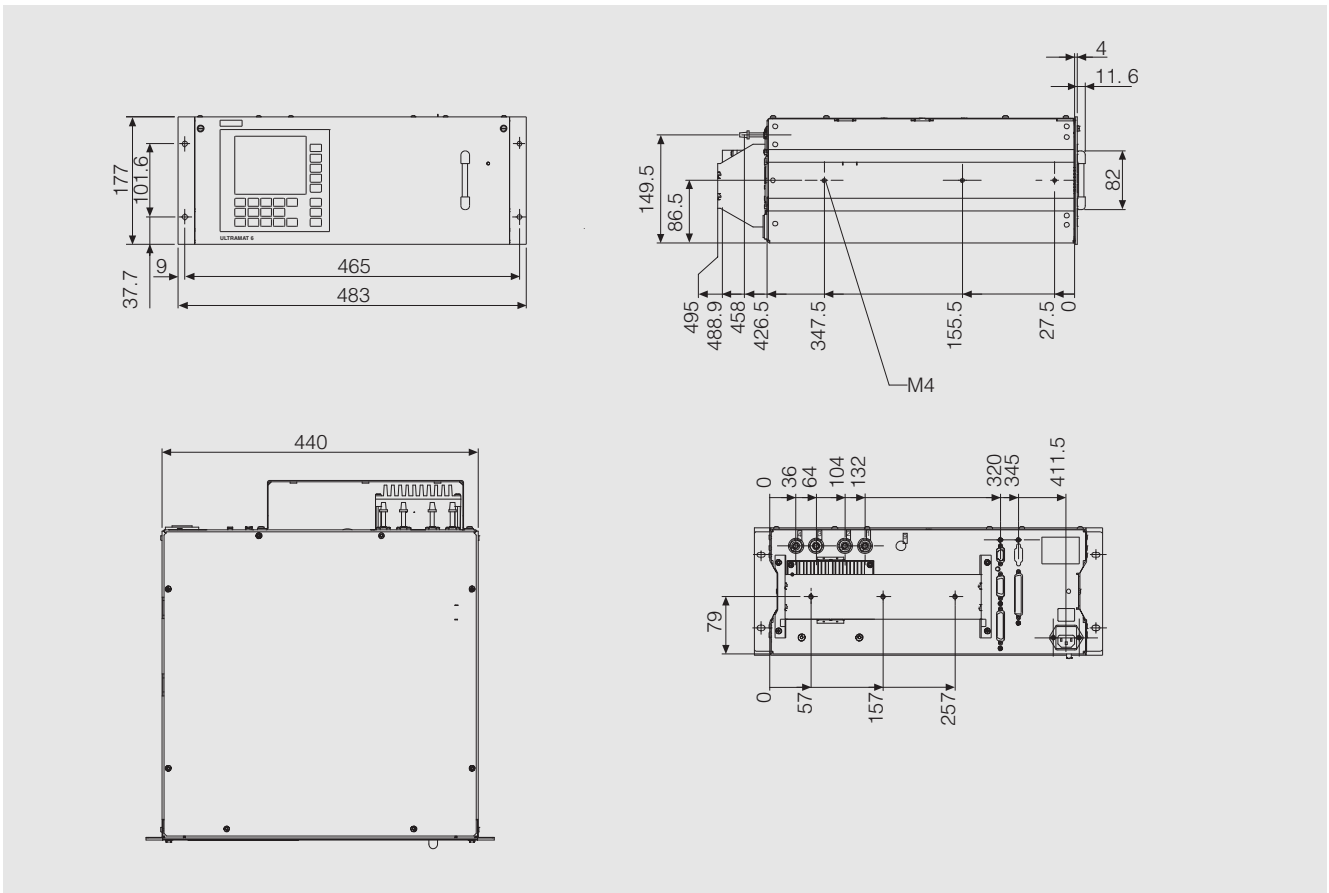


Fig. 10 ULTRAMAT 6, 19" unit, dimensions in mm

ULTRAMAT 6

19" unit

Ordering data
ULTRAMAT 6E, 1 channel, 1 IR-component

Ordering data

ULTRAMAT 6 gas analyzer

Single-channel 19" unit for installation in cabinets
to measure one IR-component

Gas connections for sample gas and reference gas

Piping with outer diameter 6 mm

Piping with outer diameter 1/4"

Measured component ⁵⁾	Possible with range codes
CO	11 to 30
CO highly selective (with optical filter)	12 to 30
CO (TÜV, see additional versions p. 22)	
CO ₂	10 to 30
CH ₄	13 to 30
C ₂ H ₂	15 to 30
C ₂ H ₄	15 to 30
C ₂ H ₆	14 to 30
C ₃ H ₆	14 to 30
C ₃ H ₈	13 to 30
C ₄ H ₆	15 to 30
C ₄ H ₁₀	14 to 30
C ₆ H ₁₄	14 to 30
SO ₂ (TÜV, see additional versions p. 22)	13 to 30
NO (TÜV, see additional versions p. 22)	14 to 30
NH ₃ (dry)	14 to 30
H ₂ O	17 to 20,22
N ₂ O	13 to 30

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

Internal gas paths ⁶⁾	Sample cell (lining)	Reference cell (flow)
Viton hose	Aluminium	Non-flow-type Flow-type
Titanium pipe	Tantalum	Non-flow-type Flow-type

with sample gas monitoring

Viton hose	Aluminium	Non-flow-type Flow-type
------------	-----------	----------------------------

Order No.

7MB2121- cannot be combined Order code „-Z“

The diagram shows the structure of the order number 7MB2121- with positions for various options. The first two positions are for range codes (A-W). The next two positions are for gas connections (0, 1). The next two positions are for internal paths (0, 1, 2, 3, 4, 5). The final position is for the order code „-Z“.

Range codes (A-W) are listed vertically on the left. Gas connections (0, 1) are listed vertically on the right. Internal paths (0, 1, 2, 3, 4, 5) are listed vertically on the right. Arrows point from the internal path codes to the range codes A20, A21.

see next page

Ordering data (continued)

ULTRAMAT 6 gas analyzer

Single-channel 19" unit for installation in cabinets
to measure one IR-component

Additional electronics

Without

Autocal board

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

Power supply

100 V to 120 V AC, 48 to 63 Hz

200 V to 240 V AC, 48 to 63 Hz

Operating software and documentation

German

English

French

Spanish

Italian

Order No.

7MB2121-

- ■ ■ ■ ■ ■ ■ ■ ■ - A A ■

↑ ↑ ↑

0

1

3

6

7

0

1

0

1

2

3

4

Ordering data

Further versions

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

Order code

RS 485/RS 232 converter

A11

Flow-type reference side with reduced flow, 6 mm ¹⁾

A20

Flow-type reference side with reduced flow, ¼" ¹⁾

A21

Slide rails (2 rails)

A31

Set of Torx tools, socket spanner

A32

TAG labels (customer-defined inscriptions)

B03

Kalrez gaskets in sample gas path

B04

Customer acceptance (in factory before delivery) ²⁾

Y01

Clean for O₂ service (specially cleaned gas path)

Y02

Drift recording ³⁾

Y03

Measuring range in plain text, if different from standard setting ⁴⁾

Y11

Special setting (only in conjunction with an application No., e.g. extended measuring range outside standard ranges)

Y12

Extended special setting (only in conjunction with an application No., e.g. determination of cros-interferences, supplement calibration curves)

Y13

TÜV version according to 17. BlmSch

Y17

Retrofitting sets

RS 485/Ethernet converter

C79451-A3364-D61

RS 485/RS 232 converter

C79451-Z1589-U1

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

Footnotes see page 21

ULTRAMAT 6

19" unit

Ordering data ULTRAMAT 6E-2P, 2 channels, 2 IR-components

Ordering data

ULTRAMAT 6 gas analyzer

Two-channel 19" unit for installation in cabinets
to measure two IR-components

Gas connections for sample gas and reference gas

Piping with outer diameter 6 mm

Piping with outer diameter 1/4"

Channel 1 Measured component ⁵⁾	Possible with range codes
---	------------------------------

CO	11 to 30
CO highly selective (with optical filter)	12 to 30
CO (TÜV, see additional versions p. 22)	
CO ₂	10 to 30
CH ₄	13 to 30
C ₂ H ₂	15 to 30
C ₂ H ₄	15 to 30
C ₂ H ₆	14 to 30
C ₃ H ₆	14 to 30
C ₃ H ₈	13 to 30
C ₄ H ₆	15 to 30
C ₄ H ₁₀	14 to 30
C ₆ H ₁₄	14 to 30
SO ₂ (TÜV, see additional versions p. 22)	13 to 30
NO (TÜV, see additional versions p. 22)	14 to 30
NH ₃ (trocken)	14 to 30
H ₂ O	17 to 20.22
N ₂ O	13 to 30

Smallest measuring range	Largest measuring range	Range code
-----------------------------	----------------------------	---------------

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

Internal gas paths ⁶⁾	Sample cell (lining)	Reference cell (flow)
-------------------------------------	-------------------------	--------------------------

Viton hose	Aluminium	Non-flow-type Flow-type
Titanium pipe	Tantalum	Non-flow-type Flow-type

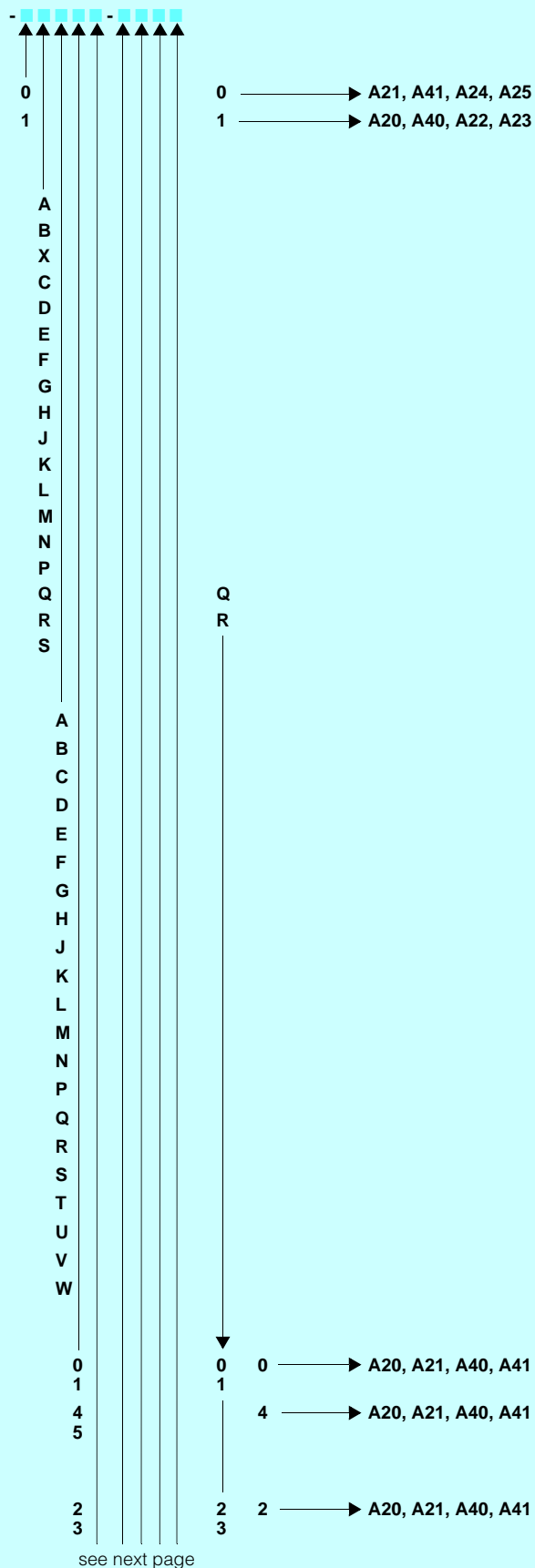
with sample gas monitoring

Viton hose	Aluminium	Non-flow-type Flow-type
------------	-----------	----------------------------

Order No.

7MB2123-

cannot be combined Order code „-Z“



see next page

Ordering data (continued)

ULTRAMAT 6 gas analyzer

Two-channel 19" unit for installation in cabinets
to measure two IR-components

Additional electronics

Without

Autocal board

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

Power supply

100 V to 120 V AC, 48 to 63 Hz

200 V to 240 V AC, 48 to 63 Hz

Channel 2 Measured component ⁵⁾	Possible with range codes
---	------------------------------

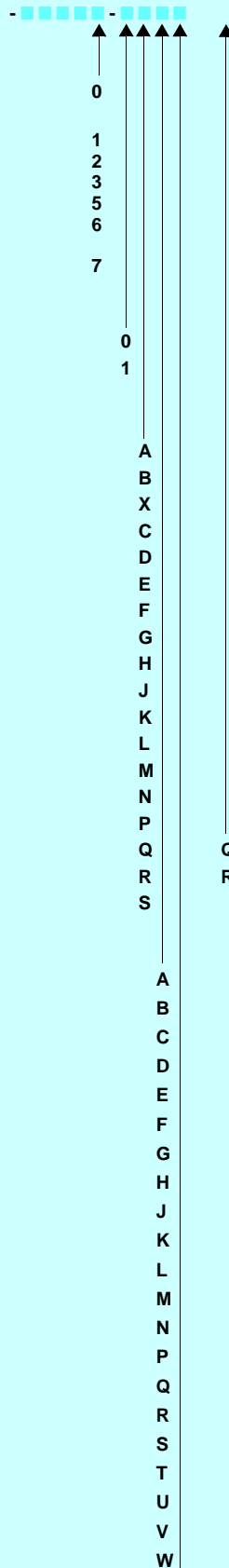
CO	11 to 30
CO highly selective (with optical filter)	12 to 30
CO (TÜV, see additional versions p. 22)	
CO ₂	10 to 30
CH ₄	13 to 30
C ₂ H ₂	15 to 30
C ₂ H ₄	15 to 30
C ₂ H ₆	14 to 30
C ₃ H ₆	14 to 30
C ₃ H ₈	13 to 30
C ₄ H ₆	15 to 30
C ₄ H ₁₀	14 to 30
C ₆ H ₁₄	14 to 30
SO ₂ (TÜV, see additional versions p. 22)	13 to 30
NO (TÜV, see additional versions p. 22)	14 to 30
NH ₃ (dry)	14 to 30
H ₂ O	17 to 20,22
N ₂ O	13 to 30

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

Order No.

7MB2123-

cannot be combined



see next page

ULTRAMAT 6

19" unit

Ordering data

ULTRAMAT 6E-2P, 2 channels, 2 IR-components

Ordering data (continued)

Order No.

ULTRAMAT 6 gas analyzer

Two-channel 19" unit for installation in cabinets
to measure two IR-components

Operating software and documentation

German
English
French
Spanish
Italian

7MB2123-

- ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ - ■ ■ ■ ■ ■ ■ ■ ■ ■ ■



0
1
2
3
4

Ordering data

Further versions

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

Order code

RS 485/RS 232 converter

A11

Flow-type reference side with reduced flow, 6 mm (channel 1) ¹⁾

A20

Flow-type reference side with reduced flow, 1/4" (channel 1) ¹⁾

A21

Flow-type reference side with reduced flow, 6 mm (channel 2) ¹⁾

A40

Flow-type reference side with reduced flow, 1/4" (channel 2) ¹⁾

A41

Connection pipe made of titanium 6 mm,
complete with screwed gland, for sample gas side

A22

Connection pipe made of titanium 6 mm,
complete with screwed gland, for reference gas side

A23

Connection pipe made of titanium 1/4",
complete with screwed gland, for sample gas side

A24

Connection pipe made of titanium 1/4",
complete with screwed gland, for reference gas side

A25

Slide rails (2 rails)

A31

Set of Torx tools, socket spanner

A32

TAG labels (customer-defined inscriptions)

B03

Kalrez gaskets in sample gas path (channel 1)

B04

Kalrez gaskets in sample gas path (channel 2)

B05

Customer acceptance (in factory before delivery) ²⁾

Y01

Clean for O₂ service (specially cleaned gas path, channel 1 + 2)

Y02

Drift recording ³⁾

Y03

Measuring range in plain text, if different from standard setting ⁴⁾

Y11

Special setting (only in conjunction with an application No., e.g.
extended measuring range outside standard ranges)

Y12

Extended special setting (only in conjunction with an application
No., e.g. determination of cros-interferences, supplement
calibration curves)

Y13

TÜV version according to 17. BlmSch

Y17

Retrofitting sets

RS 485/Ethernet converter

C79451-A3364-D61

RS 485/RS 232 converter

C79451-Z1589-U1

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

Footnotes see page 21

Ordering data

ULTRAMAT 6 gas analyzer

Single or dual-channel 19" unit for installation in cabinets to measure two or three IR-components

Gas connections for sample gas and reference gas

Piping with outer diameter 6 mm

Piping with outer diameter 1/4"

Measuring component ⁵⁾	Smallest measuring range	Largest measuring range
CO	0 to 100 ppm	0 to 1 000 ppm
NO	0 to 100 ppm	0 to 1 000 ppm
CO	0 to 300 ppm	0 to 3 000 ppm
NO	0 to 300 ppm	0 to 3 000 ppm
CO	0 to 1 000 ppm	0 to 10 000 ppm
NO	0 to 1 000 ppm	0 to 10 000 ppm
for CO/NO TÜV versions see page 22		
CO ₂	0 to 100 ppm	0 to 1 000 ppm
CO	0 to 100 ppm	0 to 1 000 ppm
CO ₂	0 to 300 ppm	0 to 3 000 ppm
CO	0 to 300 ppm	0 to 3 000 ppm
CO ₂	0 to 1 000 ppm	0 to 10 000 ppm
CO	0 to 1 000 ppm	0 to 10 000 ppm
CO ₂	0 to 3 000 ppm	0 to 30 000 ppm
CO	0 to 3 000 ppm	0 to 30 000 ppm
CO ₂	0 to 1 %	0 to 10 %
CO	0 to 1 %	0 to 10 %
CO ₂	0 to 3 %	0 to 30 %
CO	0 to 3 %	0 to 30 %
CO ₂	0 to 10 %	0 to 100 %
CO	0 to 10 %	0 to 100 %
CO ₂	0 to 10 %	0 to 100 %
CH ₄	0 to 10 %	0 to 100 %
CO ₂	0 to 100 ppm	0 to 1 000 ppm
NO	0 to 100 ppm	0 to 1 000 ppm
CO ₂	0 to 300 ppm	0 to 3 000 ppm
NO	0 to 300 ppm	0 to 3 000 ppm

Internal gas paths ⁶⁾	Sample cell (lining)	Reference cell (flow)
Viton hose	Aluminium	Non-flow-type Flow-type
Titanium pipe	Tantalum	Non-flow-type Flow-type
with sample gas monitoring		
Viton hose	Aluminium	Non-flow-type Flow-type

Additional electronics (Autocal board)

Without

Autocal board

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

Power supply

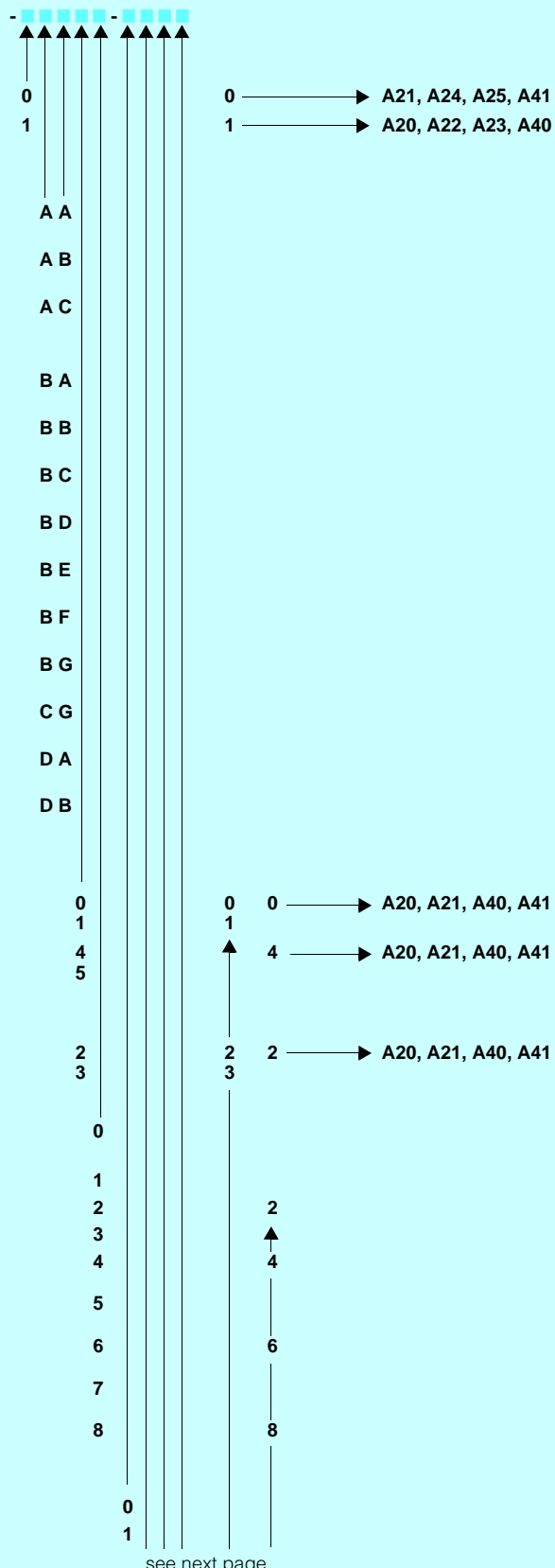
100 V to 120 V AC, 48 to 63 Hz

200 V to 240 V AC, 48 to 63 Hz

Order No.

7MB2124-

cannot be combined Order code „-Z“



ULTRAMAT 6

19" unit

Ordering data ULTRAMAT 6E-2R/3K 1 channel,
2 components or 2 channels, 3 components

Ordering data (continued)

ULTRAMAT 6 gas analyzer

Single or dual-channel 19" unit for installation in cabinets
to measure two or three IR-components

Channel 2 Measured component ⁵⁾	Possible with range codes
Without channel 2	
CO	11 to 30
CO highly selective (with optical filter)	12 to 30
CO (TÜV, see additional versions p. 22)	
CO ₂	10 to 30
CH ₄	13 to 30
C ₂ H ₂	15 to 30
C ₂ H ₄	15 to 30
C ₂ H ₆	14 to 30
C ₃ H ₆	14 to 30
C ₃ H ₈	13 to 30
C ₄ H ₆	15 to 30
C ₄ H ₁₀	14 to 30
C ₆ H ₁₄	14 to 30
SO ₂ (TÜV, see additional versions p. 22)	13 to 30
NO (TÜV, see additional versions p. 22)	14 to 30
NH ₃ (dry)	14 to 30
H ₂ O	17 to 20,22
N ₂ O	13 to 30

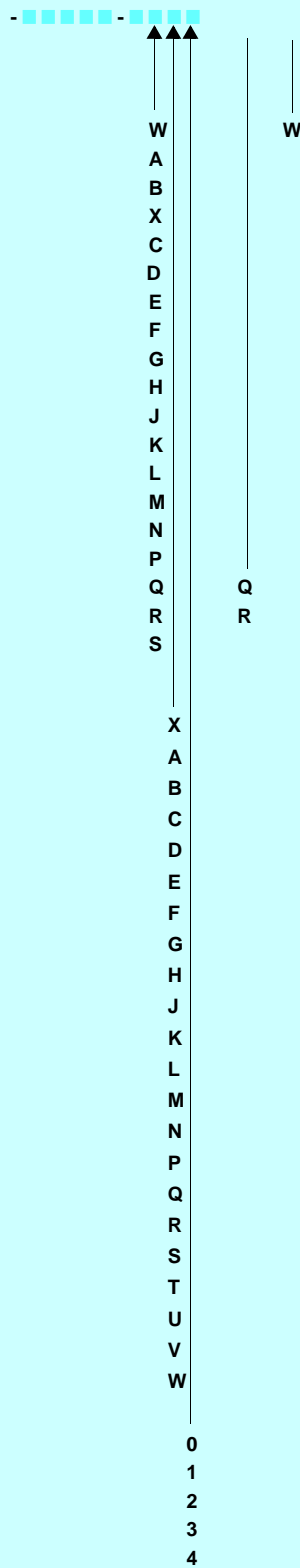
Smallest measuring range	Largest measuring range	Range code
Without channel 2		
0 to 5 vpm	0 to 100 vpm	10
0 to 10 vpm	0 to 200 vpm	11
0 to 20 vpm	0 to 400 vpm	12
0 to 50 vpm	0 to 1 000 vpm	13
0 to 100 vpm	0 to 1 000 vpm	14
0 to 300 vpm	0 to 3 000 vpm	15
0 to 500 vpm	0 to 5 000 vpm	16
0 to 1 000 vpm	0 to 10 000 vpm	17
0 to 3 000 vpm	0 to 10 000 vpm	18
0 to 3 000 vpm	0 to 30 000 vpm	19
0 to 5 000 vpm	0 to 15 000 vpm	20
0 to 5 000 vpm	0 to 50 000 vpm	21
0 to 1 %	0 to 3 %	22
0 to 1 %	0 to 10 %	23
0 to 3 %	0 to 10 %	24
0 to 3 %	0 to 30 %	25
0 to 5 %	0 to 15 %	26
0 to 5 %	0 to 50 %	27
0 to 10 %	0 to 30 %	28
0 to 10 %	0 to 100 %	29
0 to 30 %	0 to 100 %	30

Operating software and documentation

German	0
English	1
French	2
Spanish	3
Italian	4

Order No.

7MB2124- cannot be combined



Ordering data

Further versions Please add „-Z“ to Order No. and specify Order code	Order code
RS 485/RS 232 converter	A11
Flow-type reference side with reduced flow, 6 mm (channel 1) ¹⁾	A20
Flow-type reference side with reduced flow, 1/4" (channel 1) ¹⁾	A21
Flow-type reference side with reduced flow, 6 mm (channel 2) ¹⁾	A40
Flow-type reference side with reduced flow, 1/4 " (channel 2) ¹⁾	A41
Connection pipe made of titanium 6 mm, complete with screwed gland, for sample gas side	A22
Connection pipe made of titanium 6 mm, complete with screwed gland, for reference gas side	A23
Connection pipe made of titanium 1/4", complete with screwed gland, for sample gas side	A24
Connection pipe made of titanium 1/4", complete with screwed gland, for reference gas side	A25
Slide rails (2 rails)	A31
Set of Torx tools, socket spanner	A32
TAG labels (customer-defined inscriptions)	B03
Kalrez gaskets in sample gas path (channel 1)	B04
Kalrez gaskets in sample gas path (channel 2)	B05
Customer acceptance (in factory before delivery) ²⁾	Y01
Clean for O ₂ service (specially cleaned gas path, channel 1 + 2)	Y02
Drift recording ³⁾	Y03
Measuring range in plain text, if different from standard setting ⁴⁾	Y11
Special setting (only in conjunction with an application No., e.g. extended measuring range outside standard ranges)	Y12
Extended special setting (only in conjunction with an application No., e.g. determination of cross-interferences, supplement calibration curves)	Y13
TÜV version according to 17. BlmSch	Y17
Retrofitting sets	
RS 485/RS 232 converter	C79451-Z1589-U1
RS 485/Ethernet converter	C79451-A3364-D61
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

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

²⁾ Customer acceptance: 1/2 day at factory in presence of customer.
The following work is carried out: comparison of analyzer with ordering data;
linearization check (zero, mid-point value and full-scale value);
reproducibility check with calibration gas (recording in each case on XT recorder,
logging of results).

³⁾ Drift recording: an XT recording is supplied when the analyzer is delivered:
zero drift with 16 hours continuous operation and sensitivity drift (largest measuring range)
with 6 hours continuous operation.

⁴⁾ Standard setting:

smallest possible measuring range	}	in % or	
25 % of largest possible range			ppm
50 % of largest possible range			(vpm)
largest range			

⁵⁾ Further measured components on request.

⁶⁾ Further materials on request.

Note: conversion factors with optional selection of dimension ppm (vpm) into mg/m³
at normal conditions (20 °C, 1013 hPa)

SO₂: 0.38 ppm ≈ 1 mg/m³

NO: 0.80 ppm ≈ 1 mg/m³

CO: 0.86 ppm ≈ 1 mg/m³.

ULTRAMAT 6

19" unit

Ordering data Additional versions for TÜV units

Single component

Component	CO (TÜV)		SO ₂ (TÜV)		NO (TÜV)	
	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	1500 mg/m ³		
D	50 mg/m ³	1000 mg/m ³	300 mg/m ³	3000 mg/m ³		
E			500 mg/m ³	5000 mg/m ³	100 mg/m ³	2000 mg/m ³
F	300 mg/m ³	3000 mg/m ³	1000 mg/m ³	10000 mg/m ³	300 mg/m ³	3000 mg/m ³
G	500 mg/m ³	5000 mg/m ³			500 mg/m ³	5000 mg/m ³
H	1000 mg/m ³	10000 mg/m ³	3000 mg/m ³	30000 mg/m ³	1000 mg/m ³	10000 mg/m ³
K	3000 mg/m ³	30000 mg/m ³	10 g/m ³	100 g/m ³	3000 mg/m ³	30000 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	1000 g/m ³	30 g/m ³	300 g/m ³
V	100 g/m ³	1160 g/m ³	300 g/m ³	2630 g/m ³	100 g/m ³	1250 g/m ³

Example for ordering

ULTRAMAT 6E, TÜV
 component CO
 measuring range 0 to 50/1000 mg/m³
 with hoses, non-flow-type reference side
 without automatic calibration (Autocal)
 230 V; German
7MB2121-0XD00-1AA0-Z +Y17

2 components in series (2R)

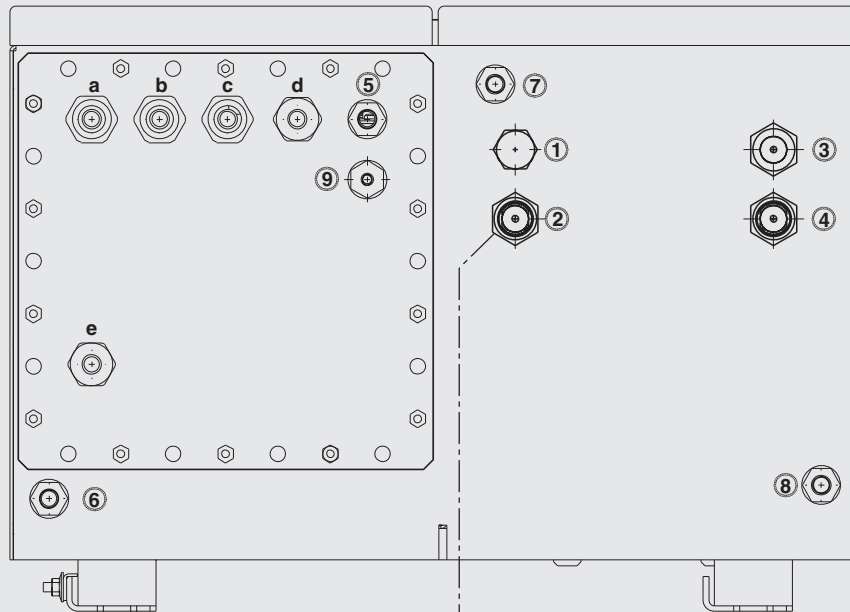
Component	CO (TÜV)		NO (TÜV)	
	Smallest measuring range from 0 to ...	Largest measuring range from 0 to ...	Smallest measuring range from 0 to ...	Largest measuring range from 0 to ...
AA	75 mg/m ³	1000 mg/m ³	200 mg/m ³	2000 mg/m ³
AB	300 mg/m ³	3000 mg/m ³	300 mg/m ³	3000 mg/m ³
AC	1000 mg/m ³	10000 mg/m ³	1000 mg/m ³	10000 mg/m ³

Example for ordering

ULTRAMAT 6E-2R/3K, TÜV
 components CO/NO + SO₂
 measuring range CO: 0 to 75/1000 mg/m³
 NO: 0 to 200/2000 mg/m³
 SO₂: 0 to 75/1500 mg/m³
 with hoses, non-flow-type reference side
 without automatic calibration (Autocal)
 230 V; German
7MB2124-0AA00-1NC0-Z +Y17

Note: for 3 components take both tables into consideration.

Gas and electrical connections (unit underside)



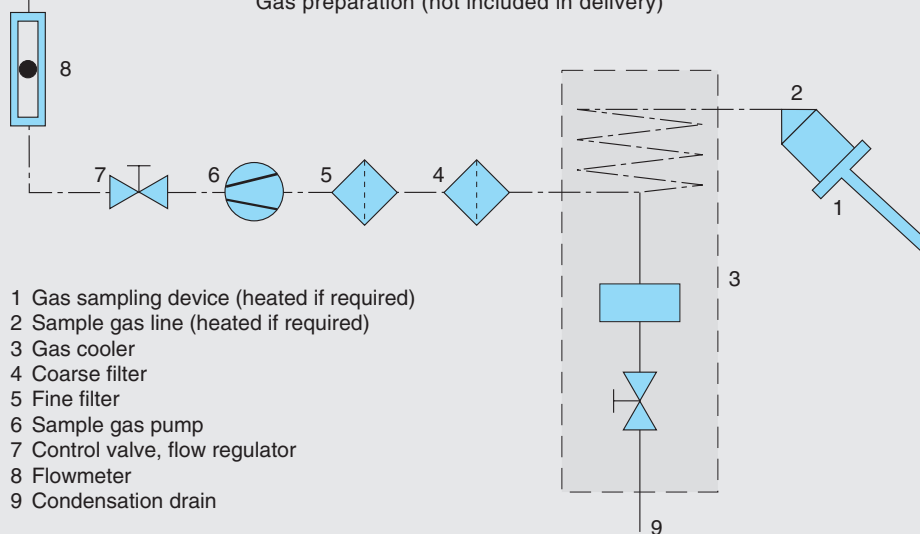
Gas connections

- | | | |
|-----|------------------------------------|---|
| ① | Sample gas inlet | } Clamping ring connection for pipe
Ø 6 mm or ¼" |
| ② | Sample gas outlet | |
| ③ | Reference gas inlet | |
| ④ | Reference gas outlet | |
| ⑤-⑧ | Purging gas inlets/outlets | Stubs Ø 10 mm or 3/8" |
| ⑨ | Barometric input sensor connection | Stub Ø ¼" |

Electrical connections

- a - c Signal line (analog + digital): Pg 16
- d Interface connection: Pg 13.5
- e Supply connection: Pg 13.5

Gas preparation (not included in delivery)



- 1 Gas sampling device (heated if required)
- 2 Sample gas line (heated if required)
- 3 Gas cooler
- 4 Coarse filter
- 5 Fine filter
- 6 Sample gas pump
- 7 Control valve, flow regulator
- 8 Flowmeter
- 9 Condensation drain

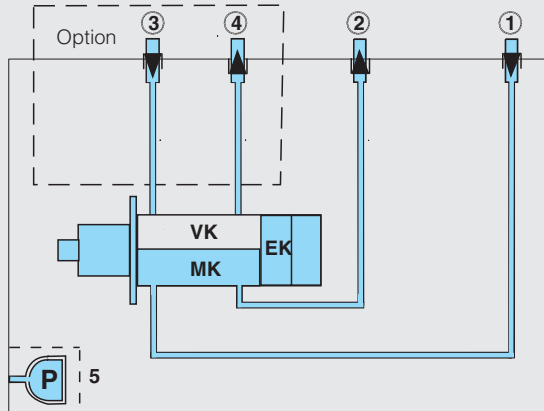
Fig. 11 ULTRAMAT 6, field unit, gas and electrical connections shown at top, installation preparation with external gas preparation (example) shown at bottom

ULTRAMAT 6

Field unit

Gas paths

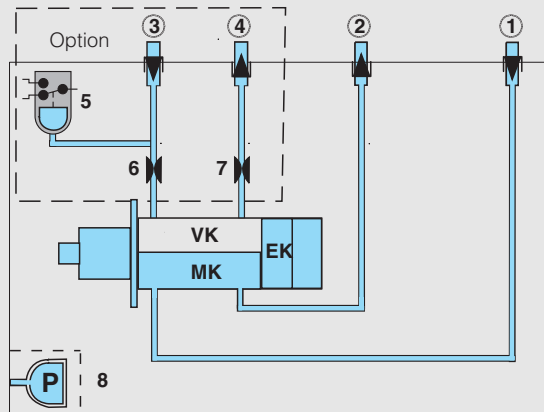
Internal gas paths, gas flow diagrams, basic layout



- ① Sample gas inlet
- ② Sample gas outlet
- ③ Reference gas inlet
- ④ Reference gas outlet
- 5 Pressure sensor to correct variations in atmospheric pressure

EK Receiver cell (detector)
 MK Sample cell
 VK Reference cell, flow-type } IR physics

Fig. 12 Gas path ULTRAMAT 6F with flow-type reference cell (option)



- ① Sample gas inlet
- ② Sample gas outlet
- ③ Reference gas inlet
- ④ Reference gas outlet
(reduced flow: 3-10 ml/min,
3000 to 4000 hPa absolute)
- 5 Pressure switch in reference gas path
- 6 Inlet restrictor in reference gas path
- 7 Outlet restrictor in reference gas path
- 8 Pressure sensor to correct variations in atmospheric pressure

EK Receiver cell (detector)
 MK Sample cell
 VK Reference cell, flow-type } IR physics

Fig. 13 Gas path ULTRAMAT 6F with reduced flow-type reference cell (option)

Pin assignment

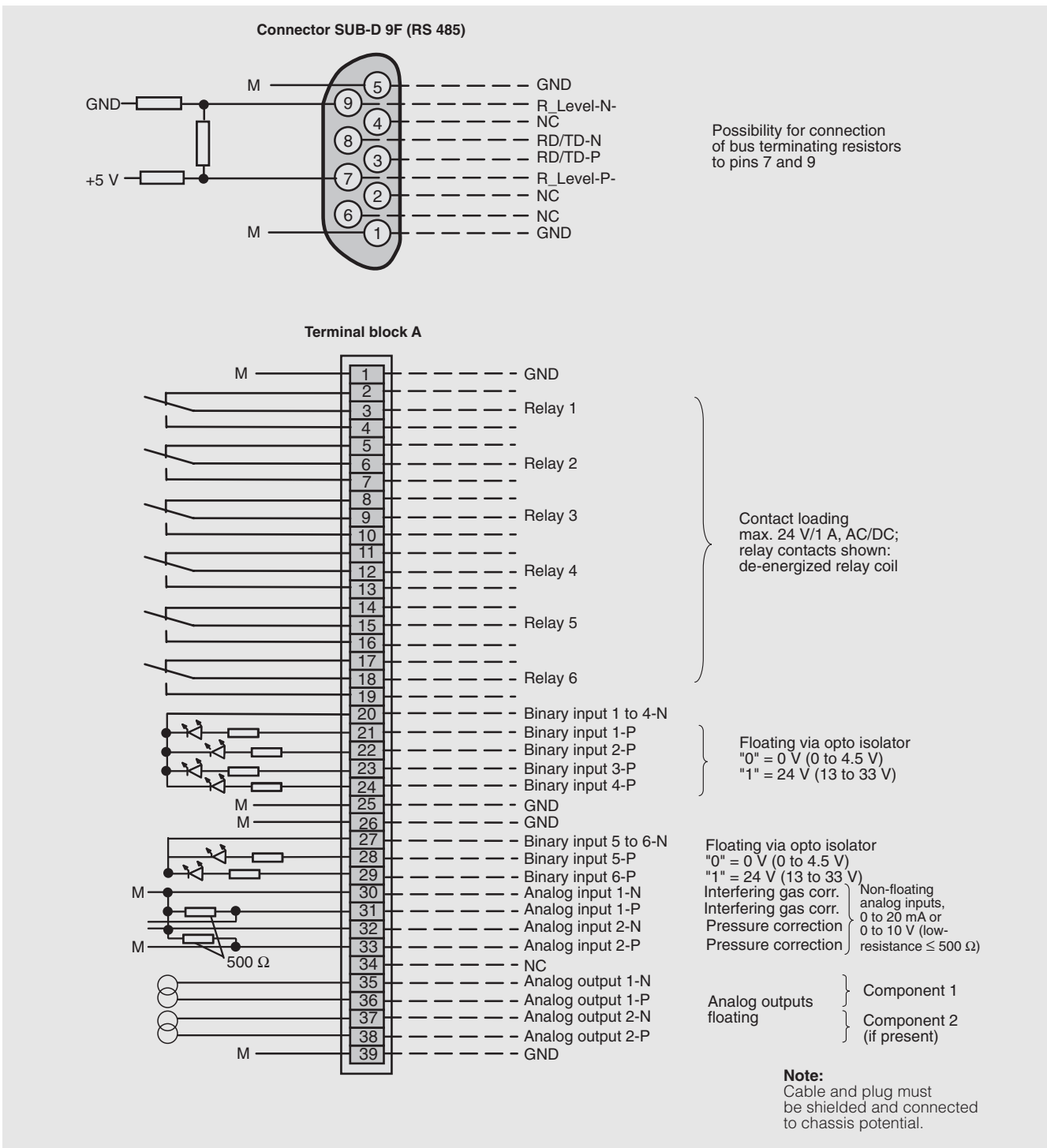


Fig. 14 ULTRAMAT 6F, field unit, connector and terminal assignment

ULTRAMAT 6

Field unit

Electrical connection

Pin assignment (continued)

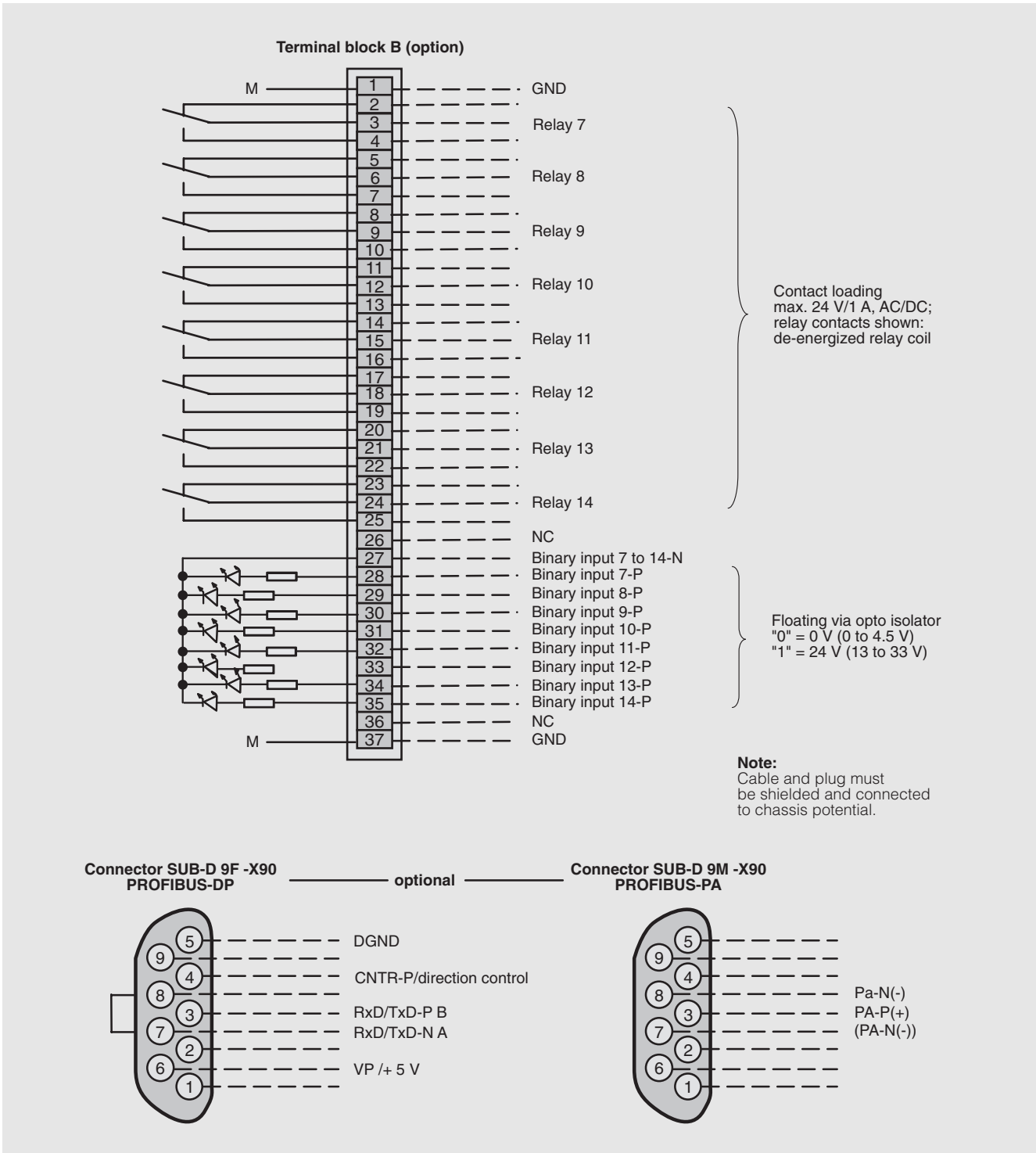


Fig. 15 ULTRAMAT 6F, field unit, connector and terminal assignment of the Autocal board and PROFIBUS connectors

ULTRAMAT 6

Field unit

Technical data

Technical data

General

Measuring ranges	4, switchable internally and externally; autoranging is also possible
Smallest possible measuring range	depending on application, e.g. CO: 0 to 10 vpm CO ₂ : 0 to 5 vpm
Largest possible measuring range	Depending on application
Measuring range with suppressed zero	Any zero point within 0 to 100 % can be achieved; smallest possible span 20 %
Characteristic	Linearized
Position of use	Front panel vertical
Conformity	CE identification EN 50081-1, EN 50082-2

Design, enclosure

Dimensions	see Fig. 16
Weight	Approx. 32 kg
Degree of protection	IP 65 according to EN 60529, restricted breathing to EN 50021

Electrical characteristics

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

Gas inlet conditions

Perm. sample gas pressure	
• for analyzers with hoses (without pressure switch)	600 to 1500 hPa (absolute)
• for analyzers with pipes (without pressure switch)	500 to 1500 hPa (absolute)
- Ex (leakage compensation)	500 to 1160 hPa (absolute)
- Ex (continuous purging)	500 to 1500 hPa (absolute)
Purging gas pressure	
• permanent	< 165 hPa above ambient
• for short periods	250 hPa above ambient
Sample gas flow	18 to 90 l/h (0.3 to 1.5 l/min)
Sample gas temperature	0 to 50 °C, with heated version: 0 to 80 °C
Sample gas humidity	< 90 % RH ¹⁾ or depending on application

Time response

Warm-up period	With amb. temperature < 30 min ²⁾ heated version: ca. 90 min
Response time (T ₉₀ time)	Dependent on length of analyzer cell, sample gas line and damping
Damping (electric time constant)	0 to 100 s, programmable
Dead time (purging time of gas path in analyzer at 1 l/min)	Approx. 0.5 to 5 s depending on version
Time for internal signal processing	< 1 s

Pressure correction range

Pressure sensor	
• internal	600 to 1200 hPa absolute
• external	600 to 1500 hPa absolute

Measuring response ²⁾

Output signal fluctuation	± 0.1 % to ± 1 % of smallest possible measuring range specified on rating plate, depending on application with the unit electronic time constant (corresponds to ± 0.33 % with 2 σ)
Zero drift	< 1 % of measuring range/week
Measured-value drift	< 1 % of measuring range/week
Repeatability	between 0.1 % and 1 % of respective measuring range
Linearity error	< 0.5 % of full-scale value

Influencing variables ³⁾

Ambient temperature	< 1 % of measuring range/10 K
Sample gas pressure	With pressure compensation: < 0.15 % of setpoint/1 % change in atmospheric pressure
Sample gas flow	Negligible
Power supply	< 0.1 % of output signal span with rated voltage ± 10 %
Ambient conditions	Application-dependent influencing of measurement if ambient air contains measured component or cross-sensitive gases

Electric inputs and outputs

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

Ambient conditions

Perm. ambient temperature	-30 to +70 °C during storage and transport, +5 to +45 °C during operation
Permissible humidity	< 90 % RH ¹⁾ as annual average, during storage and transport ⁴⁾

¹⁾ RH: relative humidity.

²⁾ Maximum accuracy achieved after 2 hours.

³⁾ Referred to 1000 hPa absolute sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature.

⁴⁾ Dew point must not be fallen below.

ULTRAMAT 6

Field unit

Dimensions

Dimensions

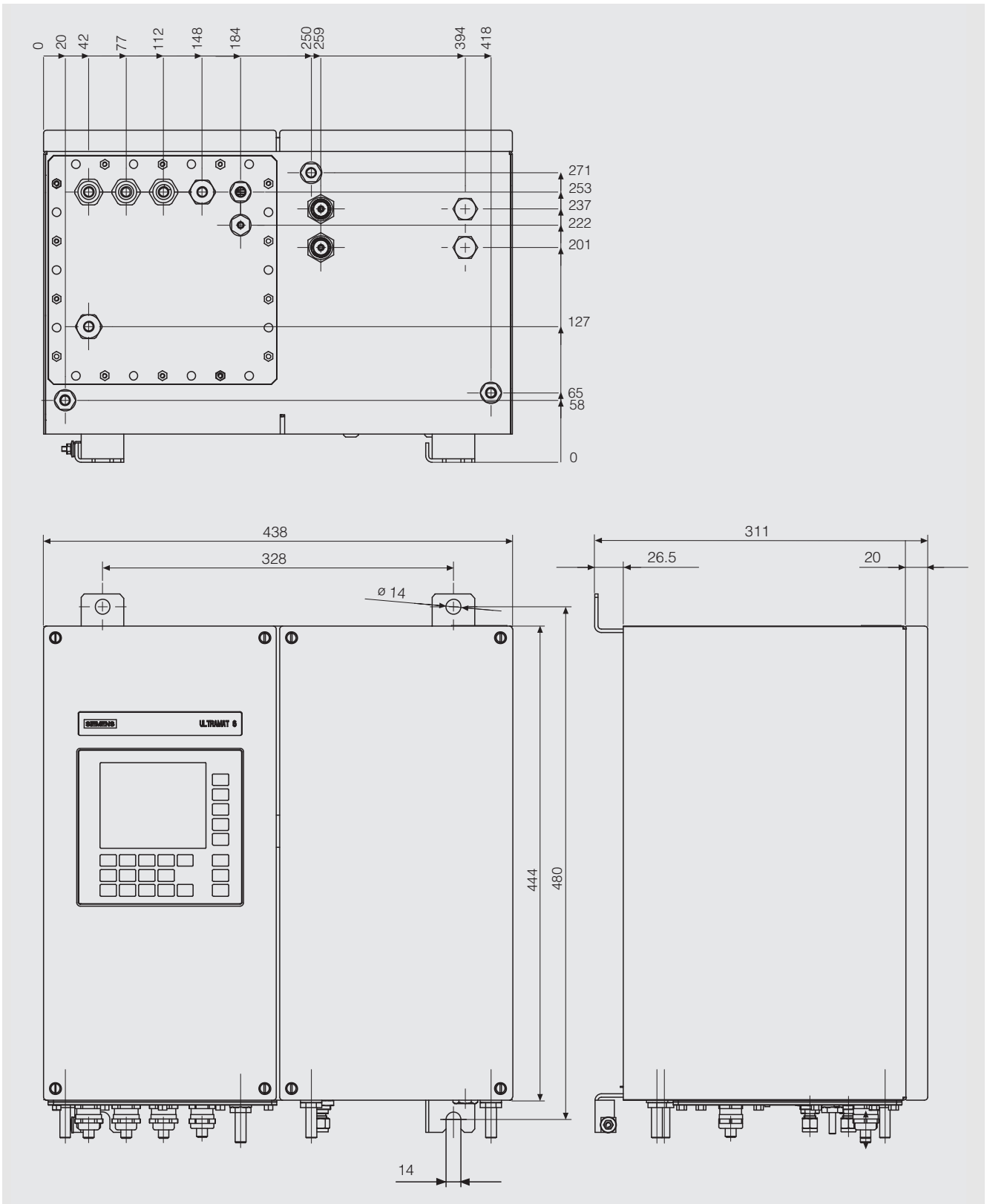


Fig. 16 ULTRAMAT 6, field unit, dimensions in mm

ULTRAMAT 6 Field unit

Ordering data
ULTRAMAT 6F, 1 channel, 1 IR-component

Ordering data

**ULTRAMAT 6 gas analyzer
for field mounting, single-channel**

Gas connections

Clamping ring connection for pipe, outer diameter 6 mm
lamping ring connection for pipe, outer diameter 1/4"

Measured component ⁴⁾	Possible with range codes
CO	11 to to 30
CO highly selective (with optical filter)	12 to 30
CO (TÜV, see additional versions p. 34)	
CO ₂	10 to 30
CH ₄	13 to 30
C ₂ H ₂	15 to 30
C ₂ H ₄	15 to 30
C ₂ H ₆	14 to 30
C ₃ H ₆	14 to 30
C ₃ H ₈	13 to 30
C ₄ H ₆	15 to 30
C ₄ H ₁₀	14 to 30
C ₆ H ₁₄	14 to 30
SO ₂ (TÜV, see additional versions p. 34)	13 to 30
NO (TÜV, see additional versions p. 34)	14 to 30
NH ₃ (dry)	14 to 30
H ₂ O	17 to 20.22 (17 to 24.26 heated)
N ₂ O	13 to 30

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

Internal gas paths ⁵⁾	Sample cell (lining)	Reference cell (flow)
Viton hose	Aluminium	Non-flow-type Flow-type
Titanium pipe	Tantalum	Non-flow-type Flow-type

Order No.

7MB2111- cannot be combined Order code „-Z“

0 → A29
1 → A28

0 0 → A28, A29
1 1
2 → A28, A29

see next page

ULTRAMAT 6

Field unit

Ordering data

ULTRAMAT 6F, 1 channel, 1 IR-component

Ordering data (continued)

ULTRAMAT 6 gas analyzer
for field mounting, single-channel

Additional electronics

Without

Autocal board

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

Power supply

100 V to 120 V AC, 48 to 63 Hz

200 V to 240 V AC, 48 to 63 Hz

100 V to 120 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 ⁶⁾
(operating mode: leakage compensation)

200 V to 240 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 ⁶⁾
(operating mode: leakage compensation)

100 V to 120 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 ⁶⁾
(operating mode: continuous purging)

200 V to 240 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 ⁶⁾
(operating mode: continuous purging)

Heating of the internal gas paths and analyzer section

Without

With (max. 65 °C)

Language (supplied documentation, software)

German

English

French

Spanish

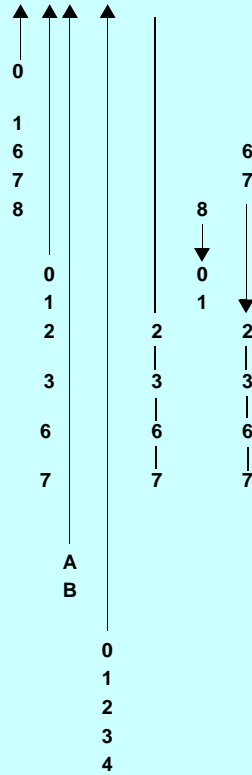
Italian

Order No.

7MB2111-

cannot be combined

- ■ ■ ■ ■ ■ - ■ ■ A ■



Ordering data

Further versions

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

Order code

RS 485/RS 232 converter

A11

Flow-type reference side with reduced flow, 6 mm ¹⁾

A28

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

A29

Set of Torx tools, socket spanner

A32

TAG labels (customer-defined inscriptions)

B03

Kalrez gaskets in sample gas path

B04

Certificate: ATEX 100; II 3G EEx nR; restricted breathing
(Ex zone 2) (only for gas compound < LEL)

E11

Certificate: ATEX 100; II 2/3G EEx nPR; (Ex zone 2) ⁶⁾
(gas compounds > LEL)

E12

Customer acceptance (in factory before delivery) ²⁾

Y01

Clean for O₂ service (specially cleaned gas path)

Y02

Drift recording ³⁾

Y03

Measuring range in plain text, if different from standard setting ⁴⁾

Y11

Special setting (only in conjunction with an application No., e.g.
extended measuring range outside standard ranges)

Y12

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

Y13

TÜV version according to 17. BlmSch

Y17

Footnotes see page 31

Ordering data (continued)

Additional units for explosion-proof versions, ATEX category 2G (zone 1)	Order No.
Bartec EEx p control unit, 230 V, „Leakage compensation“	7MB8000-2BA
Bartec EEx p control unit, 115 V, „Leakage compensation“	7MB8000-2BB
Bartec EEx p control unit, 230 V, „Continuous purging“	7MB8000-2CA
Bartec EEx p control unit, 115 V, „Continuous purging“	7MB8000-2CB
Explosion-protected isolation amplifier	7MB8000-3AA
Explosion-protected isolating relay	7MB8000-4AA
Differential pressure switch for corrosive gases	7MB8000-5AA
Differential pressure switch for non-corrosive gases	7MB8000-5AB
Flame inhibitor made of stainless steel	7MB8000-6AA
Flame inhibitor made of Hastelloy	7MB8000-6AB
Supplementary units for Ex versions, ATEX category 3G (zone 2)	Order No.
Ex purging unit MiniPurge FM	7MB8000-1AA
Bartec EEx p control unit (for units with order code E12)	7MB8000-1BA
Retrofitting sets	Order No.
RS 485/Ethernet converter	C79451-A3364-D61
RS 485/RS 232 converter	C79451-Z1589-U1
Autocal board with 8 binary inputs/outputs	A5E00064223
Autocal board with 8 binary inputs/outputs and PROFIBUS-PA	A5E00057315
Autocal board with 8 binary inputs/outputs and PROFIBUS-DP	A5E00057318
Autocal board with 8 binary inputs/outputs and PROFIBUS-PA Ex i (requires Firmware 4.1.10)	A5E00057317

- 1) Cannot be combined with non-flow-type reference side.
- 2) Customer acceptance: ½ day at factory in presence of customer.
The following work is carried out: comparison of analyzer with ordering data; linearization check (zero, mid-point value and full-scale value); reproducibility check with calibration gas (recording in each case on XT recorder, logging of results).
- 2) Drift recording: an XT recording is supplied when the analyzer is delivered: zero drift with 16 hours continuous operation and sensitivity drift (largest measuring range) with 6 hours continuous operation.
- 3) Standard setting:

smallest possible measuring range	}	in % or ppm (vpm)
25 % of largest possible range		
50 % of largest possible range		
largest range		
- 4) Further measured components on request.
- 5) Further materials on request.
- Note: conversion factors with optional selection of dimension ppm (vpm) into mg/m³ at normal conditions (20 °C, 1013 hPa)
- | | |
|-------------------|--------------------------------|
| SO ₂ : | 0.38 ppm ≈ 1 mg/m ³ |
| NO: | 0.80 ppm ≈ 1 mg/m ³ |
| CO: | 0.86 ppm ≈ 1 mg/m ³ |
- 6) Only in relation with an approved purging unit.

ULTRAMAT 6

Field unit

Ordering data ULTRAMAT 6F-2R, 1 channel, 2 IR-components

Ordering data

ULTRAMAT 6 gas analyzer
for field mounting, single-channel, 2 components

Gas connections for sample gas and reference gas

Clamping ring connection for pipe, outer diameter 6 mm

Clamping ring connection for pipe, outer diameter 1/4"

Measuring component 4)	Smallest measuring range	Largest measuring range
CO	0 to 100 ppm	0 to 1 000 ppm
NO	0 to 100 ppm	0 to 1 000 ppm
CO	0 to 300 ppm	0 to 3 000 ppm
NO	0 to 300 ppm	0 to 3 000 ppm
CO	0 to 1 000 ppm	0 to 10 000 ppm
NO	0 to 1 000 ppm	0 to 10 000 ppm
for CO/NO-TÜV versions see page 34		
CO ₂	0 to 100 ppm	0 to 1 000 ppm
CO	0 to 100 ppm	0 to 1 000 ppm
CO ₂	0 to 300 ppm	0 to 3 000 ppm
CO	0 to 300 ppm	0 to 3 000 ppm
CO ₂	0 to 1 000 ppm	0 to 10 000 ppm
CO	0 to 1 000 ppm	0 to 10 000 ppm
CO ₂	0 to 3 000 ppm	0 to 30 000 ppm
CO	0 to 3 000 ppm	0 to 30 000 ppm
CO ₂	0 to 1 %	0 to 10 %
CO	0 to 1 %	0 to 10 %
CO ₂	0 to 3 %	0 to 30 %
CO	0 to 3 %	0 to 30 %
CO ₂	0 to 10 %	0 to 100 %
CO	0 to 10 %	0 to 100 %
CO ₂	0 to 10 %	0 to 100 %
CH ₄	0 to 10 %	0 to 100 %
CO ₂	0 to 100 ppm	0 to 1 000 ppm
NO	0 to 100 ppm	0 to 1 000 ppm
CO ₂	0 to 300 ppm	0 to 3 000 ppm
NO	0 to 300 ppm	0 to 3 000 ppm

Internal gas paths 5)	Sample cell (lining)	Reference cell (flow)
Viton hose	Aluminium	Non-flow-type Flow-type
Titanium pipe	Tantalum	Non-flow-type Flow-type

Additional electronics

Without

Autocal board with 8 additional binary inputs and outputs

Autocal board with 8 binary inputs/outputs and PROFIBUS-PA interface

Autocal board with 8 binary inputs/outputs and PROFIBUS-DP interface

Autocal board for connection to PROFIBUS-PA Ex i

Power supply

100 V to 120 V AC, 48 to 63 Hz

200 V to 240 V AC, 48 to 63 Hz

100 V to 120 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 6)

(protection mode: leakage compensation)

200 V to 240 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 6)

(protection mode: leakage compensation)

100 V to 120 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 6)

(operating mode: continuous purging)

200 V to 240 V AC, 48 to 63 Hz, to ATEX 100, Ex zone 1 6)

(operating mode: continuous purging)

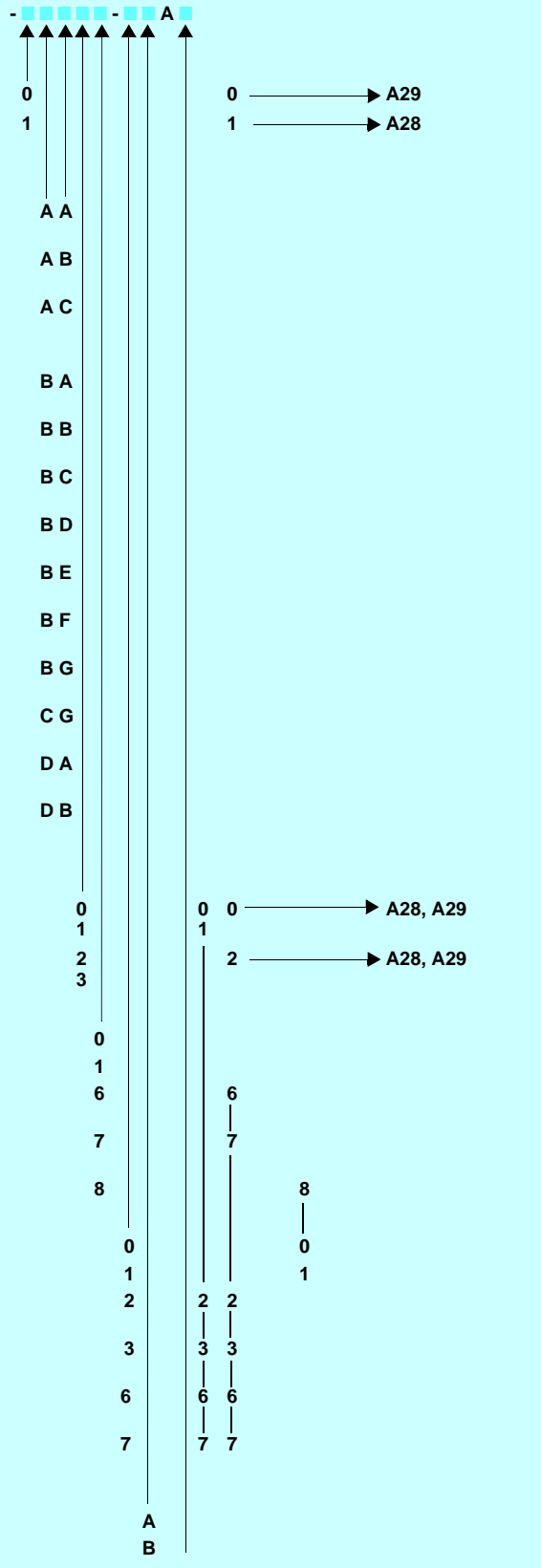
Heating of the internal gas paths and analyzer section

Without

With (max. 65 °C)

Order No.

7MB2112- cannot be combined Order code „-Z“



see next page

Footnotes see page 31

Ordering data (continued)

ULTRAMAT 6 gas analyzer
for field mounting, single-channel, 2 components

Order No.

7MB2112-

- ■■■■■ - ■ ■ ■ A ■

↑

0

1

2

3

4

Language (supplied documentation, software)

German
English
French
Spanish
Italian

Ordering data

Further versions

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

Order code

RS 485/RS 232 converter	A11
Flow-type reference side with reduced flow, 6 mm ¹⁾	A28
Flow-type reference side with reduced flow, 1/4" ¹⁾	A29
Set of Torx tools, socket spanner	A32
TAG labels (customer-defined inscriptions)	B03
Kalrez gaskets in sample gas path	B04
Certificate: ATEX 100; II 3G EEx nR; restricted breathing (Ex zone 2) (only for gas compound < LEL)	E11
Certificate: ATEX 100; II 2/3G EEx nPR; (Ex zone 2) ⁶⁾	E12
Customer acceptance (in factory before delivery) ²⁾	Y01
Clean for O ₂ service (specially cleaned gas path)	Y02
Drift recording ³⁾	Y03
Customer acceptance explosion-protected units incl. BARTEC purging enclosure	Y04
Measuring range in plain text, if different from standard setting ⁴⁾	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, supplement calibration curves)	Y13
TÜV version according to 17. BlmSch	Y17

Additional units for explosion-proof versions, ATEX category 2G (zone 1)

Order No.

Bartec EEx p control unit, 230 V, „Leakage compensation“	7MB8000-2BA
Bartec EEx p control unit, 115 V, „Leakage compensation“	7MB8000-2BB
Bartec EEx p control unit, 230 V, „Continuous purging“	7MB8000-2CA
Bartec EEx p control unit, 115 V, „Continuous purging“	7MB8000-2CB
Explosion-protected isolation amplifier	7MB8000-3AA
Explosion-protected isolating relay	7MB8000-4AA
Differential pressure switch for corrosive gases	7MB8000-5AA
Differential pressure switch for non-corrosive gases	7MB8000-5AB
Flame inhibitor made of stainless steel	7MB8000-6AA
Flame inhibitor made of Hastelloy	7MB8000-6AB

Additional units for explosion-proof versions, ATEX category 3G (zone 2)

Order No.

Ex purging unit MiniPurge FM	7MB8000-1AA
Bartec EEx p control unit	7MB8000-1BA

Retrofitting sets

RS 485/Ethernet converter	C79451-A3364-D61
RS 485/RS 232 converter	C79451-Z1589-U1
Autocal board with 8 binary inputs/outputs	A5E00064223
Autocal board with 8 binary inputs/outputs and PROFIBUS-PA	A5E00057315
Autocal board with 8 binary inputs/outputs and PROFIBUS-DP	A5E00057318
Autocal board with 8 binary inputs/outputs and PROFIBUS-PA Ex i (requires Firmware 4.1.10)	A5E00057317

Footnotes see page 31

ULTRAMAT 6

Field unit

Ordering data
Additional versions for TÜV units

Single component

Component	CO (TÜV)		SO ₂ (TÜV)		NO (TÜV)	
	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	1500 mg/m ³		
D	50 mg/m ³	1000 mg/m ³	300 mg/m ³	3000 mg/m ³		
E			500 mg/m ³	5000 mg/m ³	100 mg/m ³	2000 mg/m ³
F	300 mg/m ³	3000 mg/m ³	1000 mg/m ³	10000 mg/m ³	300 mg/m ³	3000 mg/m ³
G	500 mg/m ³	5000 mg/m ³			500 mg/m ³	5000 mg/m ³
H	1000 mg/m ³	10000 mg/m ³	3000 mg/m ³	30000 mg/m ³	1000 mg/m ³	10000 mg/m ³
K	3000 mg/m ³	30000 mg/m ³	10 g/m ³	100 g/m ³	3000 mg/m ³	30000 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	1000 g/m ³	30 g/m ³	300 g/m ³
V	100 g/m ³	1160 g/m ³	300 g/m ³	2630 g/m ³	100 g/m ³	1250 g/m ³

Example for ordering

ULTRAMAT 6F, TÜV
component CO
measuring range 0 to 50/1000 mg/m³
with hoses, non-flow-type reference side
without automatic adjustment
230 V; without heating, German
7MB2111-0XD00-1AA0-Z +Y17

2 components in series (2R)

Component	CO (TÜV)		NO (TÜV)	
	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	1000 mg/m ³	200 mg/m ³	2000 mg/m ³
AB	300 mg/m ³	3000 mg/m ³	300 mg/m ³	3000 mg/m ³
AC	1000 mg/m ³	10000 mg/m ³	1000 mg/m ³	10000 mg/m ³

Example for ordering

ULTRAMAT 6F-2R, TÜV
Components CO/NO
measuring range CO: 0 to 75/1000 mg/m³
NO: 0 to 200/2000 mg/m³
with hoses, non-flow-type reference side
without automatic adjustment
230 V; without heating, German
7MB2112-0AA00-1AA0-Z +Y17

Note: for 3 components take both tables into consideration.

Use of the ULTRAMAT 6 in hazardous areas

Suitability-tested field analyzers of series 6 must be used to measure gases in hazardous areas. The preferred explosion protection for these analyzers is the pressurized enclosure EEx p for zone 1 or the simplified pressurized enclosure EEx n P for zone 2. In addition, these analyzers must be connected to monitoring equipment which must also be suitability-tested for zone 1.

Exception: a pressurized enclosure is not required in zone 2 for the measurement of gases whose composition always remains below the lower explosion limit (LEL); in this case it is sufficient for the field housing to be gas damp-proof (type of protection EEx n R).

Following pre-purging of 5 minutes, the monitoring equipment ensures that no gas damp can enter the housing, and accumulation of the sample gas in the housing is prevented. The volume flow during the pre-purging phase is > 50 l/min. The protective gas is usually fed into the analyzer housing from a supply network via the monitoring equipment.

Ex zone 1

Two versions of pressurized enclosure EEx p complying with directive 94/9/EC are available for use in zone 1:

- *Pressurized enclosure with compensation of losses resulting from leaks*
Only that volume of protective gas required to hold an overpressure of at least 50 Pa compared to the sample gas pressure *and* atmospheric pressure is fed into the housing. The maximum purging gas pressure is 165 hPa; this causes a max. permissible sample gas pressure of 160 hPa.
Test certificate: PTB 00 ATEX 2022 X
Analyzer identification: II 2 G EEx p [ia] ia IIC T4
- *Pressurized enclosure with continuous purging*
Protective gas continuously flows through the housing with a volume flow of at least 1 l/min; furthermore, the flow results in an overpressure in the housing of at least 50 Pa compared to atmospheric pressure.
The max. permissible purging gas pressure is 25 hPa. The max. permissible sample gas pressure is equivalent to the analyzer sample gas pressure.
Test certificate: TÜV 01 ATEX 1708 X
Analyzer identification: II 2 G EEx p [ia] ia IIC T4

The fundamental safety requirements are satisfied by compliance with the European standards EN 50014:1997, EN 50016:1995, EN 50020:1994 and EN 954:1996.

The EExp monitoring equipment is a stand-alone unit which is connected electrically and pneumatically to the analyzer. Ex protection is only provided when these two units are connected together.

Ex zone 2

Two versions complying with directive 94/9/EC are available for use in zone 2:

- *Ex protection resulting from gas damp-proof housing*
The housing is sealed sufficiently such that gas damp cannot penetrate. With this type of protection, only sample gases may be connected which are below the LEL.
Test certificate: TÜV 01 ATEX 1686 X
Analyzer identification: II 3 G EEx n R II T6
- *Simplified pressurized enclosure with continuous purging*
This type of protection must always be selected if flammable gases or gas mixtures are to be connected. Protective gas continuously flows through the housing with a volume flow of at least 1 l/min; furthermore, the flow results in an overpressure in the housing of at least 50 Pa compared to atmospheric pressure. Manually controlled pre-purging with the analyzer power supply switched off is sufficient for the simplified pressurized enclosure. It is not necessary for the analyzer to be switched off automatically should the protective gas fail.
Test certificate: TÜV 01 ATEX 1697 X
Analyzer identification: II 2/3 G EEx n P II T4

The fundamental safety requirements are satisfied by compliance with the European standards EN 50021:1999, EN 60079:1997, Sec. 13 and ZH 1/10, Sec. 1.

The EEx nP monitoring equipment is a stand-alone unit which is connected electrically and pneumatically to the analyzer. Ex protection is only provided when these two units are connected together.

FM Class 1 Div 2

The same applies here as to the simplified pressurized enclosure with continuous purging; the required Ex protection is only provided when appropriate equipment is connected.

Type of protection and flame inhibitor

It generally applies that selection of the protective gas and use of flame inhibitors depend on the type of sample gas:

- Connection of combustible gases above the LEL always require an inert gas (e.g. N₂) as the protective gas. Furthermore, the process must be protected by flame inhibitors if it cannot be excluded that explosive gas mixtures could occasionally be present in the sample gas path.
- Gas mixtures which could be frequently or permanently explosive must not be connected!
- With gases below the LEL, air can also be used as the protective gas, and flame inhibitors can be omitted.

ULTRAMAT 6

Explosion-proof design

Explosion-proof design

Type of gas Zone	Sample gas non-flammable or permanently below the lower explosive limit (LEL)	Sample gas seldom above LEL, and only briefly in such cases	Sample gas occasionally above LEL
0	Not possible	Not possible	Not possible
1	<ul style="list-style-type: none"> Analyzer in ATEX 100a - EEx p version Metal pipe for gas path EEx p control unit in mode "Leakage compensation" 	<ul style="list-style-type: none"> Analyzer in ATEX 100a - EEx p version Metal pipe for gas path <p>Sample gas pressure < 165 hPa, fail-safe:</p> <ul style="list-style-type: none"> EEx p control unit in mode "Leakage compensation" Differential pressure switch (if the sample gas pressure is not controlled fail-safe) <p>Sample gas pressure occasionally >165 hPa:</p> <ul style="list-style-type: none"> EEx p control unit in mode "Continuous purging" 	<ul style="list-style-type: none"> Analyzer in ATEX 100a - EEx p version Metal pipe for gas path Flame inhibitors in sample gas inlet and outlet¹⁾ <p>Sample gas pressure < 165 hPa, fail-safe:</p> <ul style="list-style-type: none"> EEx p control unit in mode "Leakage compensation" Differential pressure switch (if the sample gas pressure is not controlled fail-safe) <p>Sample gas pressure occasionally > 165 hPa:</p> <ul style="list-style-type: none"> EEx p control unit in mode "Continuous purging"
2	<ul style="list-style-type: none"> Analyzer in field housing with degree of protection EEx nR (restricted breathing enclosure) Metal pipe for gas path 	<ul style="list-style-type: none"> Analyzer in field enclosure with degree of protection EEx nP Metal pipe for gas path Simplified pressurized enclosure with continuous purging with inert gas or EEx nRP (restricted breathing enclosure for electronics unit, and simplified pressurized enclosure for physical unit with continuous purging with inert gas) 	<ul style="list-style-type: none"> Analyzer in field enclosure with degree of protection EEx nP Metal pipe for gas path Flame inhibitors in sample gas inlet and outlet¹⁾ Simplified pressurized enclosure with continuous purging with inert gas

Table 1 Explosion-proof configuration – Principle selection criteria

Additional units (Ex zone 1)

	Signal conductor guide		
	Ex 1 → Ex 1	Ex 1 → Ex 2	Ex 1 → Ex free
Ex-i isolation amplifier	required	conditional use (when energy recovery cannot be excluded)	conditional use (when energy recovery cannot be excluded)
Isolating relay	required	not required	not required
Pressure switch • non-flammable gases • flammable gases		•not required •required (when customer pressure is not controlled fail-safe)	
Flame inhibitors		see above	

Table 2 Additional units

¹⁾ The flame inhibitor of the sample gas output is not necessary when the sample gas flows in the Ex zone.

ULTRAMAT 6 Explosion-proof design, Ex zone 1

BARTEC EEx p control unit

Description "leakage compensation"

The APEX 2003.SI/A2 control unit controls and monitors the prepurging phase and the operating phase of gas analyzers with „Containment Systems“.

The control unit redundantly monitors the set overpressure of the purging gas. When the overpressure decreases, it is corrected to the adjustable setpoint (max. purging gas pressure 165 hPa).

4 programmable relay outputs and 8 relay contacts are available to interrupt the data lines.

Additional function

Due to the connection of additional pressure sensors, the internal pressure of the enclosure is maintained at a pressure higher than the sample gas with a proportional valve. During the prepurging phase the purging gas flow is max. 4100 NI/h with an internal enclosure pressure of 50 hPa.

4 programmable relay inputs and 8 relay contacts are available to separate the data lines.

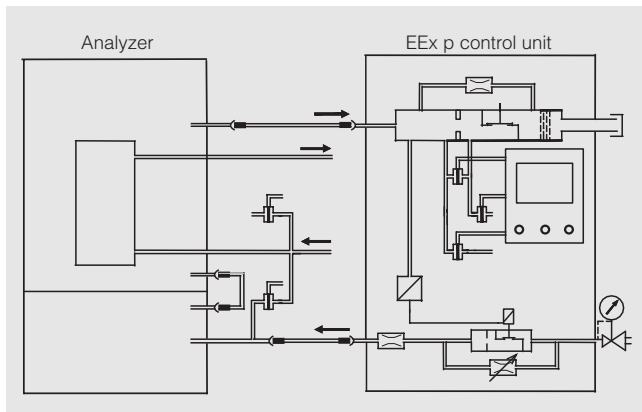


Fig. 17 BARTEC control unit, gas connection diagram

Technical data

Guidelines	EC EMC guideline 89/336/EEC EC low voltage RL 73/23/EWG Ex guideline 94/9EC
Design	Explosion-protected enclosure (EEx e) with viewing window in the cover
Enclosure material	glas-fiber reinforced polyester
Degree of protection	IP 65
Terminals	2.5 mm, stranded conductor
Pressure sensors	MIN A = 0 to 300 hPa MIN B = 0 to 300 hPa MAX = 0 to 300 hPa MAX 1 = 0 to 300 hPa DIFF A = 0 to 25 hPa DIFF B = 0 to 25 hPa
Prepurging time	0 to 99 min; 5 s delayed
Weight	11 kg
Electrical data	
Supply voltage	230 V AC (115 V AC)
Power consumption	21 W /230 V
NO contact	K2/3; max. 250 V, 5 A with $\cos \varphi = 1$, K4/K5; supply voltage or floating, max. 250 V, 5 A with $\cos \varphi = 1$
Communication	RS 485 interface
Temperature switching value (option)	0 to + 40 °C
Explosion-protected type	
Marking	EEx e d ib [ia p] IIC T4/T6
Certification	DMT 99 ATEX E 082
Ambient temperature	-20 to +40 °C

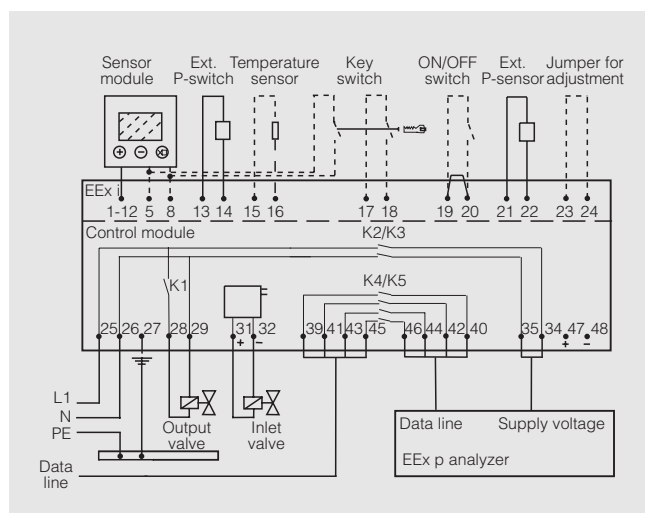


Fig. 18 BARTEC control unit, electric connection diagram

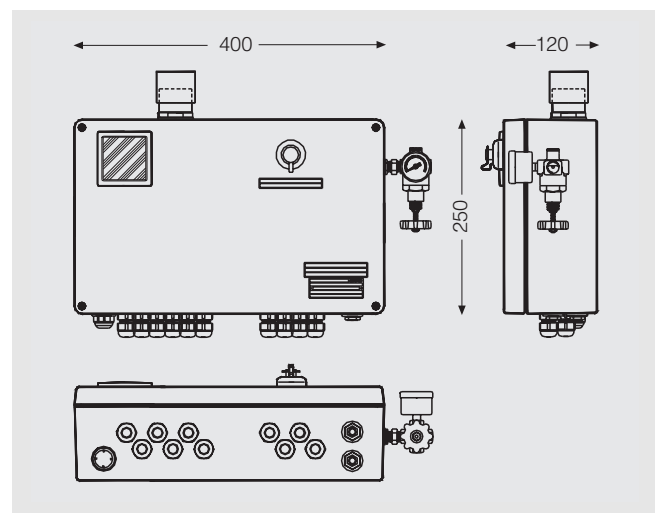


Fig. 19 BARTEC control unit, dimensions in mm

ULTRAMAT 6

Explosion-proof design, Ex zone 1

BARTEC EEx p control unit

Description „Continuous purging“

The APEX 2003.SI/A4 control unit controls and monitors the prepurging phase and the operating phase of gas analyzers with „Containment Systems“.

The control unit redundantly monitors a continuous current of protection gas through the connected analyzer and thereby dilutes the eventually appearing sample gas below the lower explosive limit (max. purging gas pressure 25 hPa).

4 programmable relay outputs and 8 relay contacts are available to interrupt the data lines.

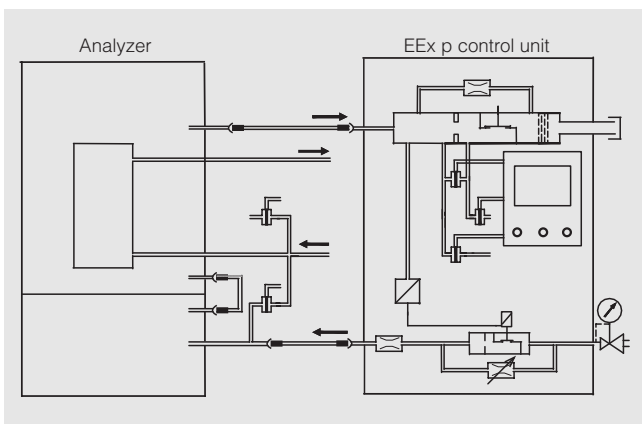


Fig. 20 BARTEC control unit, gas connection diagram

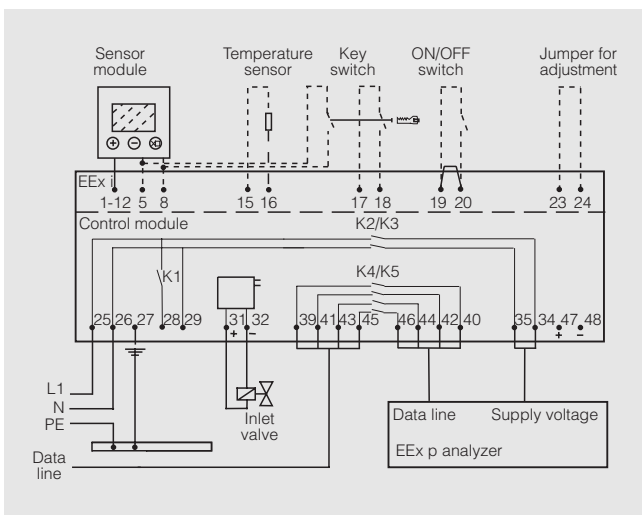


Fig. 21 BARTEC control unit, electric connection diagram

Technical data

Guidelines	EC EMC guideline 89/336/EEC EC low voltage RL 73/23/EWG Ex guideline 94/9EC
Design	Explosion-protected enclosure (EEx e) with viewing window in the cover
Enclosure material	glas-fiber reinforced polyester
Degree of protection	IP 65
Terminals	2.5 mm, stranded conductor
Pressure sensors	MIN A = 0 to 25 hPa MIN B = 0 to 25 hPa MAX = 0 to 25 hPa MAX 1 = 0 to 25 hPa DIFF A = 0 to 25 hPa DIFF B = 0 to 25 hPa
Prepurging time	0 to 99 min; 5 s delayed
Weight	10 kg
Electrical data	
Supply voltage	230 V AC (115 V AC)
Power consumption	14 W / 230 V
NO contact	K2/3; max. 250 V, 4 A with $\cos \varphi = 1$, K4/K5; supply voltage or floating, max. 250 V, 5 A with $\cos \varphi = 1$
Communication	RS 485 interface
Temperature switching value (option)	0 to +40 °C
Explosion-protected type	
Marking	EEx e d ib [ia p] IIC T4/T6
Certification	DMT 99 ATEX E 082
Ambient temperature	-20 to +40 °C

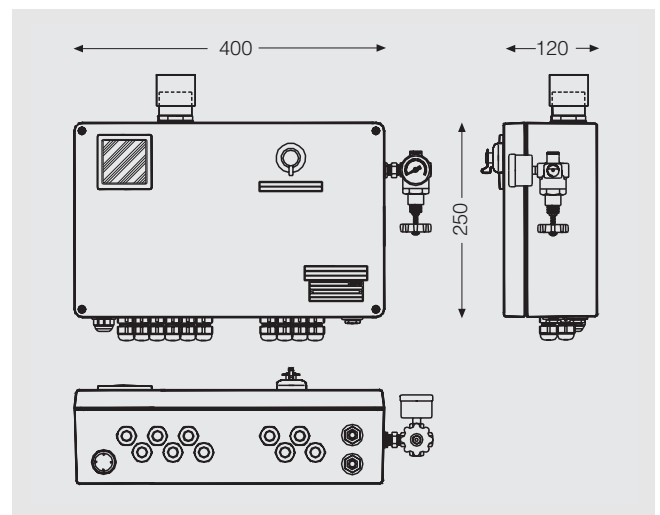


Fig. 22 BARTEC control unit, dimensions in mm

ULTRAMAT 6

Explosion-proof design, Ex zone 2

BARTEC EEx p control unit

Description, for flammable gases

Compact EEx p control unit for the explosion protection of pressurized analyzers in zone 2, inclusive redundant surveillance of the purging gas pressure and flow during purging and operating phase.

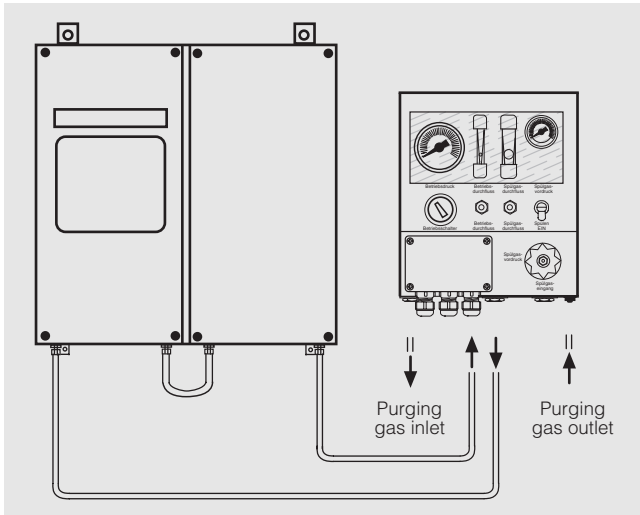


Fig. 23 BARTEC control unit, gas connection diagram

Technical data

Guidelines	EC EMC guideline 89/336/EEC RL 73/23/EWG Ex guideline 94/9EC
Design	Explosion-protected enclosure (EEx e) with viewing window in the cover
Enclosure material	stainless steel
Terminals	2.5 mm, stranded conductor
Pressures	
• Purging gas pressure	0.2 MPa to 1,0 MPa (0.2 MPa)
• Purging gas flow	0 to 3.5 m ³ /h (2,0 m ³ /h)
• Operating pressure	0 to 60 hPa (8 hPa)
• Operating flow	0 to 1.5 l/min (1 l/min)
Weight	4.3 kg
Electrical data	
Line voltage	0...230 V AC, 0...30 V DC
Switching capacity	max. 6 A with cos φ = 1 / max. AC 253 V max. 1.5 A with cos φ = 0,6 / max. AC 253 V max. 2 A with L/R ~ 0 ms / max. DC 30 V
Explosion-protected type	
Marking	EEx n A C R (P) II C T6
Certification	TÜV 01 ATEX 1748 X
Ambient temperature	-20 to +60 °C

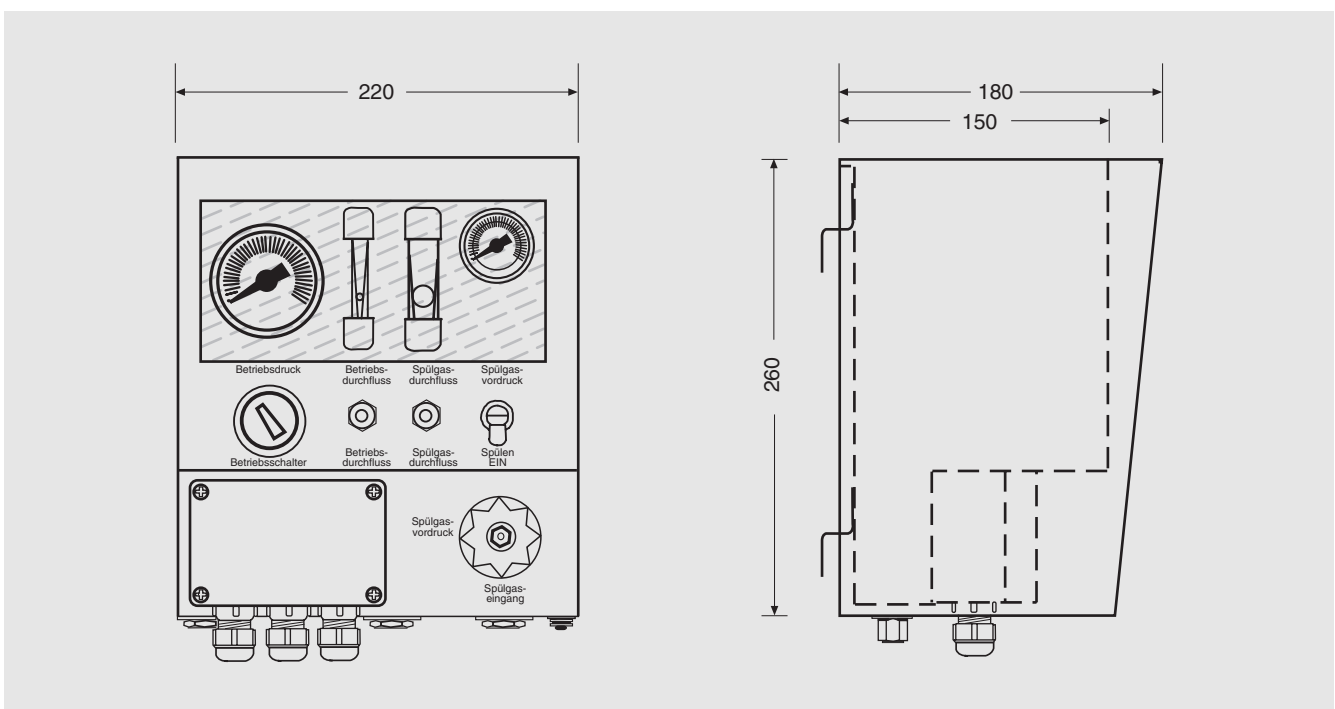


Fig. 24 BARTEC control unit, dimensions in mm

ULTRAMAT 6

Explosion-proof design, Ex zone 2

Ex purging unit MiniPurge FM

Description

The Ex purging unit MiniPurge FM is used to monitor the pressure during continuous purging of an analyzer with purging gas or inert gas. If the pressure falls below the set value, an optical display is triggered and the relay is activated. This monitoring unit is driven by the purging gas pressure and therefore does not require an additional power supply.

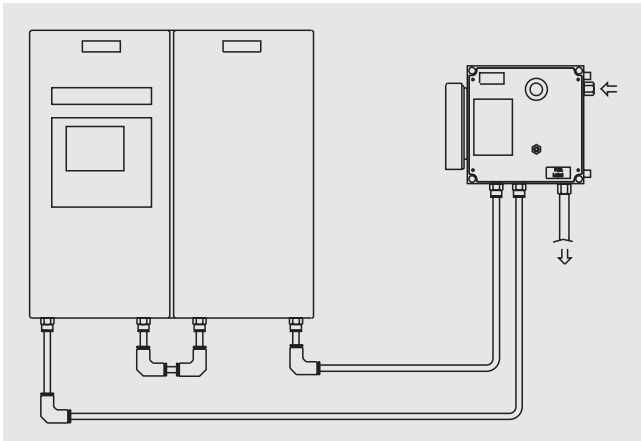


Fig. 25 MiniPurge, gas connections

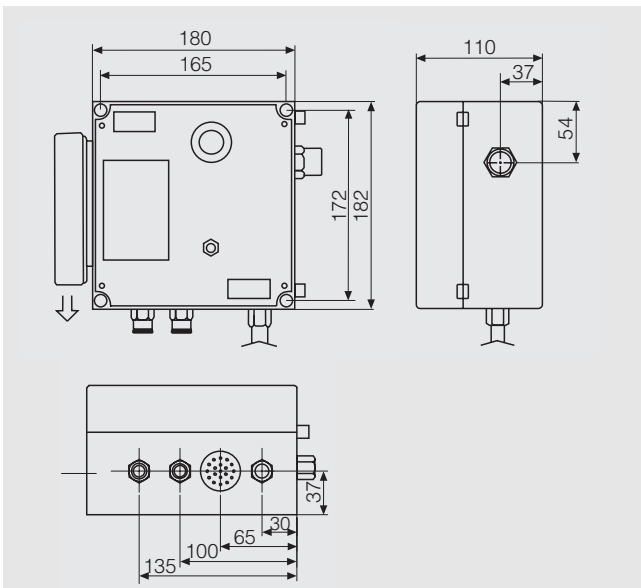


Fig. 26 MiniPurge, dimensions in mm

Technical data

Classification	Class 1 Division 2
Enclosure dimensions (in mm)	444 x 438 x 275
Enclosure volume (l) for purging	Approx. 50 l
Enclosure pressure (normal)	1 hPa
FM certificate	Certificate of compliance 1X8A4.AE / 0B3A3.AE
Reaction upon failure of pressure	Opening of switching contact, and alarm via signal indicator (red display)
System type	MiniPurge complete system
Operating mode	Continuous purging
Type of enclosure	Strengthened polycarbonate
Enclosure surface	RAL 7035 gray with transparent cover
Pressure supply	Dry, oil-free air or inert gas with regulated pressure of approx. 30 psi/2000 hPa at inlet of MiniPurge
Supply connections	Pressure via 1/4 BSPP connection, pressure hose at least 1/2" or 12 mm
Display (signal indicator)	Pneumatically driven color signal: green/red
Switching contact	Via SPCO switch approved for Class 1 Division 2
Settings	Lower operating limit 0.5 hPa set relative to purging gas flow of 1 to 2 l/min
Prepurging time	Is defined by operator, and controlled manually
Housing pressure limitation	By means of stainless steel RLV 25 output valve with integral flame arrester; opens at 10 hPa \pm 10 %

ULTRAMAT 6

Spare parts

Proposition of spare parts for a 2-year service
(standard units, without heater)

Ordering data

Description	Qty	Order No.
Analyzer section		
IR source	1	C79451-A3462-B12
Chopper	1	C79451-A3462-B510
Chopper holder	1	C79451-A3462-B501
Window		
• for analyzer cell length 0.2 to 6 mm	2	C79451-A3462-B152
• for analyzer cell length 20 to 180 mm	2	C79451-A3462-B151
O-ring		
• Cooling element	1	C75121-Z101-C1
• Beam divider	1	C75121-Z101-C2
• Chopper plate	1	C75121-Z101-C3
• Reflector	1	C75121-Z101-C4
• Sample cell	4	C79121-Z100-A24
• Connection stub sample cell	1	C71121-Z100-A159
Flowmeter (only for ULTRAMAT 6E with sample gas monitoring)	1	C79402-Z560-T1
Electronics		
Fuse		
• 0.63 A / 250 V (230-V version)	4	W79054-L1010-T630
• 1.0 A / 250 V (110-V version)	4	W79054-L1011-T100
LC display	1	W75025-B5001-B1
Adapter board LCD/keyboard	1	C79451-A3474-B605
Front panel with keyboard	1	C79165-A3042-B504

Documentation

Catalog extract	Order No.
ULTRAMAT 6 NDIR-Gasanalysengeräte, Ein- oder Zweikanalausführung (German)	E86060-K3510-B131-A3
ULTRAMAT 6 NDIR Gas Analyzers, Single-channel or Dual-channel Versions (English)	E86060-K3510-B131-A3-7600
ULTRAMAT 6 Analyseurs de gaz NDIR, versions à un ou deux canaux (French)	E86060-K3510-B131-A3-7700

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

Conditions of sale and delivery Export regulations, contact addresses

Terms and Conditions of Sale and Delivery

in the Federal Republic of Germany

By using this catalog you can acquire hardware and software products described therein from the Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside the Federal Republic of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity.

for customers based in the Federal Republic of Germany

The General Terms of Payment as well as the General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry shall apply.

For software products, the General License Conditions for Software Products for Automation and Drives for Customers with Seat or registered Office in Germany shall apply.

for customers with a seat or registered office outside the Federal Republic of Germany

The General Terms of Payment as well as the General Conditions for Supplies of Siemens, Automation and Drives for Customers with a Seat or registered Office outside of Germany shall apply.

For software products, the General License Conditions for Software Products for Automation and Drives for Customers with Seat or registered Office outside of Germany shall apply.

General

The prices are in € (Euro) ex works, exclusive packaging.
The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.
In addition to the prices of products which include silver and/or copper, surcharges may be calculated if the respective limits of the notes are exceeded.
Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.
The dimensions are in mm. Illustrations are not binding.
Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

Comprehensive Terms and Conditions of Sale and Delivery are available free of charge from your local Siemens business office under the following Order Nos.:

- 6ZB5310-0KR30-0BA0
(for customers based in the Federal Republic of Germany)
- 6ZB5310-0KS53-0BA0
(for customers based outside of the Federal Republic of Germany)

or download them from the Internet:
www.siemens.com/automation/mall
(A&D Mall Online-Help System)

Export regulations

The products listed in this catalog / price list may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog / price list:

AL	Number of the <u>German Export List</u> . Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an " <u>AL not equal to N</u> " are subject to a European or German export authorization when being exported out of the EU.
ECCN	<u>Export Control Classification Number</u> . Products marked other than "N" are subject to a reexport license to specific countries. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an " <u>ECCN not equal to N</u> " are subject to a US re-export authorization.

Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.
Subject to change without prior notice.

If you have any questions, please contact your local sales representative or any of the contact addresses below.

Siemens AG
A&D PI 2M Process Analytics
Oestliche Rheinbrueckenstr. 50
D-76187 Karlsruhe
Germany
Tel.: +49 721 595 4234
Fax: +49 721 595 6375
E-Mail: processanalytics@siemens.com
www.processanalytics.com

Siemens Applied Automation
500 West Highway 60
Bartlesville, OK 74003
USA
Tel.: +1 918 662 7000
Fax: +1 918 662 7052
E-Mail: saaisales@sea.siemens.com
www.sea.siemens.com/ia

Siemens Pte. Limited
A&D PI2 Regional Head Quarter
19A Tech Park Crescent
Singapore 637846
Tel.: +65 6897 7376
Fax: +65 6897 7353
E-Mail: splanalytics.sp@siemens.com
www.processanalytics.com

Siemens AG
Automation and Drives
Process Instrumentation and Analytics
D-76181 Karlsruhe
Germany

Order No.: E86060-K3510-B131-A3-7600

Only available as electronic document
KG K 1102 PDF 42 En / 315068