

## Overview



The FIDAMAT 6 gas analyzer is suitable for determination of the total hydrocarbon content in air and high-boiling gas mixtures.

## Benefits

The FIDAMAT 6 gas analyzer is distinguished by its wide range of applications:

- In the presence of up to 100% H<sub>2</sub>O vapor
- In ultra-pure gas applications
- With high-boiling components (up to 200 °C)
- In the presence of corrosive gases (with preliminary filter)

The FIDAMAT 6 exhibits:

- Extremely low cross-sensitivity to interference gases
- Low consumption of combustion air
- Low influence of oxygen on measured value

Moreover, the device provides warning and error messages:

- Failure of combustion gas
- Flame is extinguished
- Malfunction of pump and filter

## Application

- Environmental protection
- Wastewater (in combination with a stripping device, detection of hydrocarbon content of liquids)
- TLV (Threshold Limit Value) monitoring at places of work
- Quality monitoring
- Process exhaust monitoring
- Ultra-pure gas measurement in media such as O<sub>2</sub>, CO<sub>2</sub>, inert gases and cold sample gases
- Measurement of corrosive and condensing gases
- Process optimization

### Further applications

- Chemical plants
- Gas manufacturers (ultra-pure gas monitoring)
- Research and development
- Cement industry (measurement of emissions)
- Paint shops and dry-cleaning systems
- Refineries (tank farms, wastewater)
- Drying systems
- Solvent recovery systems

## Application (Continued)

- Pharmaceutical industry
- Automotive industry (engine development, engine and transmission development and certification)

### Specific applications

#### Special applications

Special applications are available on request in addition to the standard combinations, e.g. measuring range 0 to 100%.

#### Performance-tested version

Configuration prepared based on QAL1 according to EN 15267 for systems - sections 13 and 27 of the German Federal Immission Protection Regulations and German Technical Instructions on Air Quality Control (TA Luft).

# Extractive continuous process gas analysis

## Series 6

### FIDAMAT 6

#### Design

- 19" rack unit with 4 U for installation
  - In hinged frame
  - In cabinets with or without telescopic rails
- Front plate can be swung down for servicing purposes (laptop connection)
- Gas connections for sample gas inlet and outlet as well as combustion gas and combustion air; pipe diameter 6 mm or 1/4"
- Gas and electrical connections at the rear of the device
- Internal gas paths: stainless steel (mat. no. 1.4571)

#### Display and operator panel

- Large LCD field for simultaneous display of
  - Measured value
  - Status bar
  - Measuring ranges
- Contrast of LCD panel adjustable using menu
- Permanent LED backlighting
- Washable membrane keyboard with five softkeys
- Menu-driven operation for parameterization, test functions, adjustment
- User help in plain text
- Graphic display of concentration trend; programmable time intervals

#### Inputs and outputs

- One analog output for each measured component
- Two programmable analog inputs
- Six digital inputs freely configurable (e.g. for measuring range switchover, processing of external signals from sample preparation)
- Six relay outputs freely configurable (failure, maintenance demanded, maintenance switch, limit alarm, external solenoid valves, measuring point switchover)
- Expansion with eight additional digital inputs and eight additional relay outputs for autocalibration with up to four calibration gases

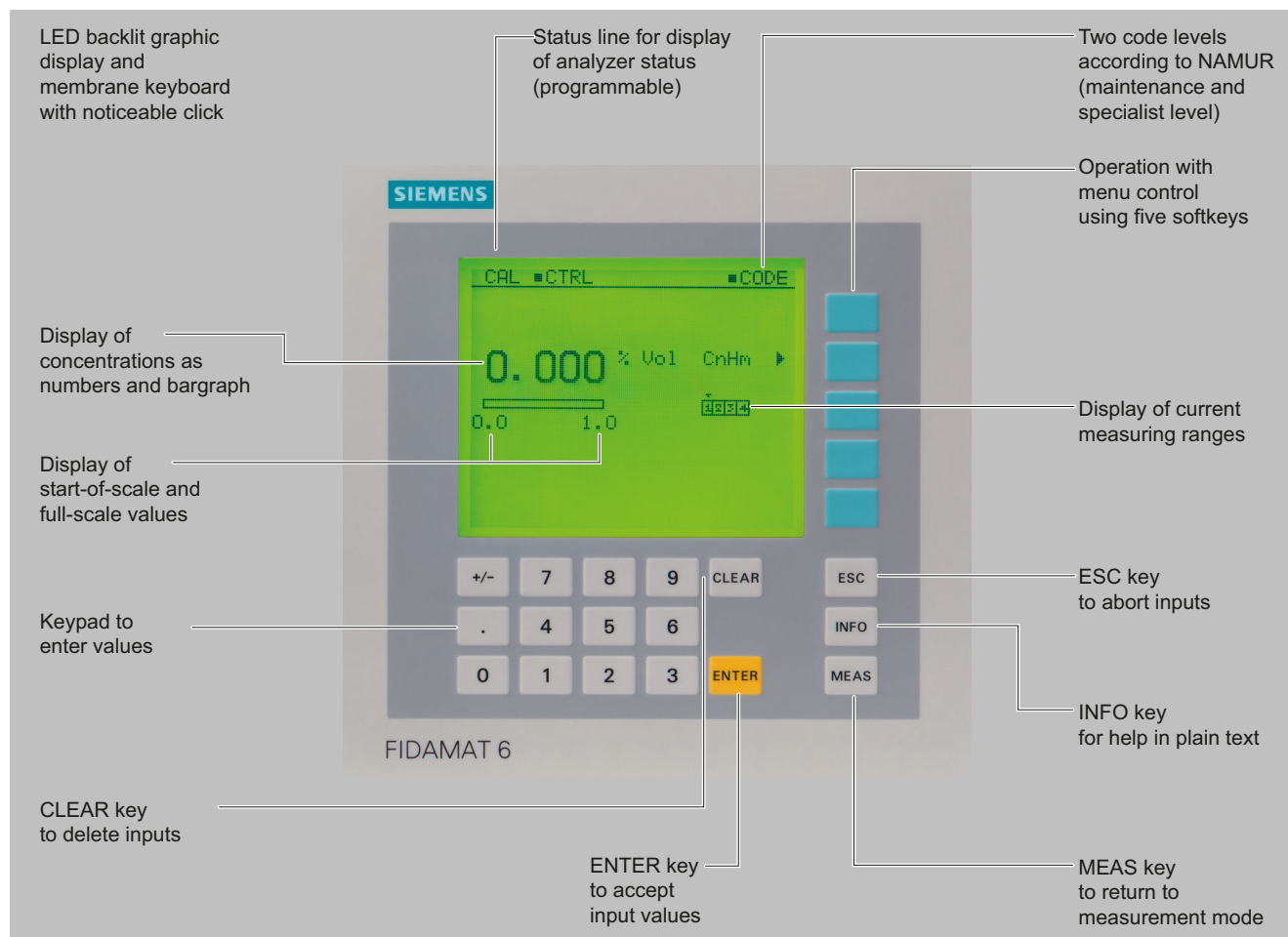
#### Communication

RS 485 present in basic unit (connection from the rear).

#### Options

- RS 485/RS 232 converter
- RS 485/Ethernet converter
- RS 485/USB converter
- Incorporation in networks via PROFIBUS DP/PA interface
- SIPROM GA software as service and maintenance tool

## Design (Continued)



FIDAMAT 6, membrane keyboard and graphic display

## Designs – parts wetted by sample gas

Gas path	Material
Piping	Stainless steel, mat. no. 1.4571
Gas inlet	Stainless steel, mat. no. 1.4571
Gaskets	Graphite
Sample gas restrictor	Quartz
Auxiliary gas restrictors	Stainless steel, mat. no. 1.4571
Pump diaphragm	PTFE
Pump head	Stainless steel, mat. no. 1.4571
<b>Detector</b>	
• Nozzle	Quartz
• FID enclosure	Stainless steel, mat. no. 1.4571

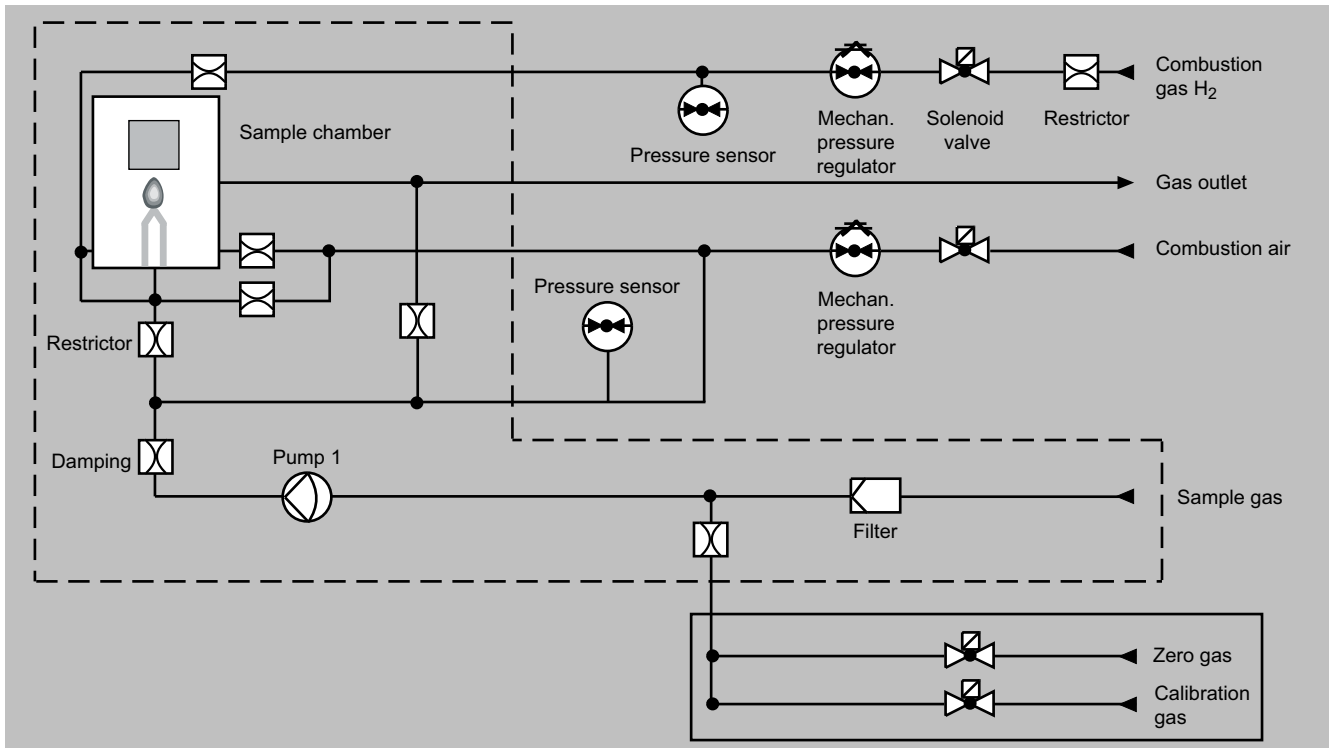
# Extractive continuous process gas analysis

Series 6

FIDAMAT 6

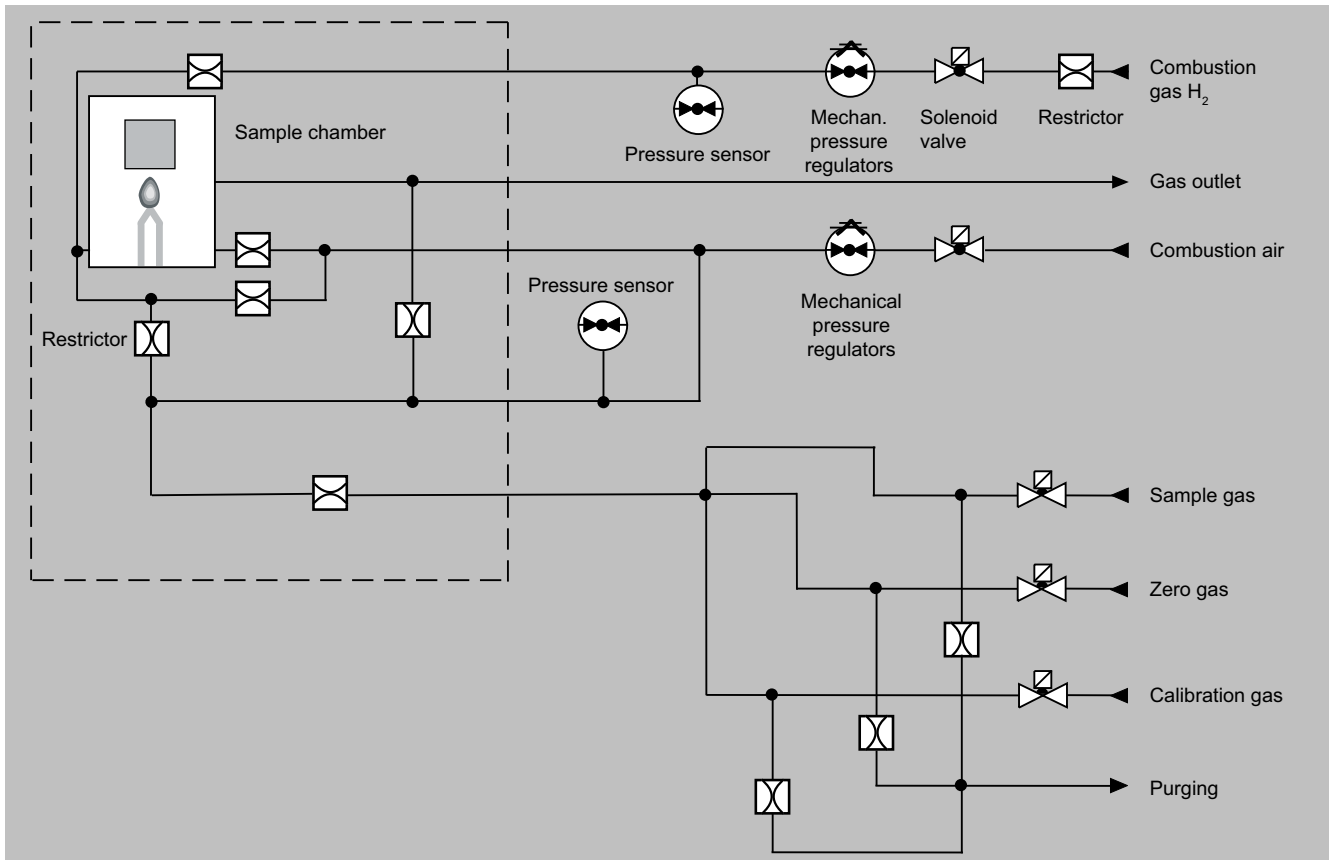
Design (Continued)

Gas path



FIDAMAT 6 total hydrocarbon gas analyzer, gas path with pump and with connection for combustion air

## Design (Continued)



FIDAMAT 6 total hydrocarbon gas analyzer, gas path without pump and with connection for combustion air

## Mode of operation

The FIDAMAT 6 carries out substance-specific measurements and not component-specific measurements. It measures the total of all hydrocarbons in a sample gas, but with different weighting of the hydrocarbon molecules. To a first approximation, the display is proportional to the number of C atoms in the respective molecule. However, there are fluctuations in practice. The display deviation for the respective molecule is expressed by the response factor.

The sample gas is supplied to the FIDAMAT 6 through overpressure or drawn in by the built-in diaphragm pump (optionally via a heated line and an additional filter) and passed on to the flame ionization detector via an obstruction-proof fused-silica restrictor.

In the detector, the hydrocarbons in the sample gas are burned in an oxyhydrogen gas flame. Burning partially ionizes the proportion of organically bound hydrocarbons. The released ions are converted into an ionic current by the voltage present between two electrodes, and measured using a highly sensitive amplifier. The measured current is proportional to the quantity of organically-bound C atoms in the sample gas.

A pressure regulator keeps the combustion gas pressure constant. The balanced system of pump, capillary tubes, and pressure regulator for combustion air ensures that the sample gas pressure is kept constant.

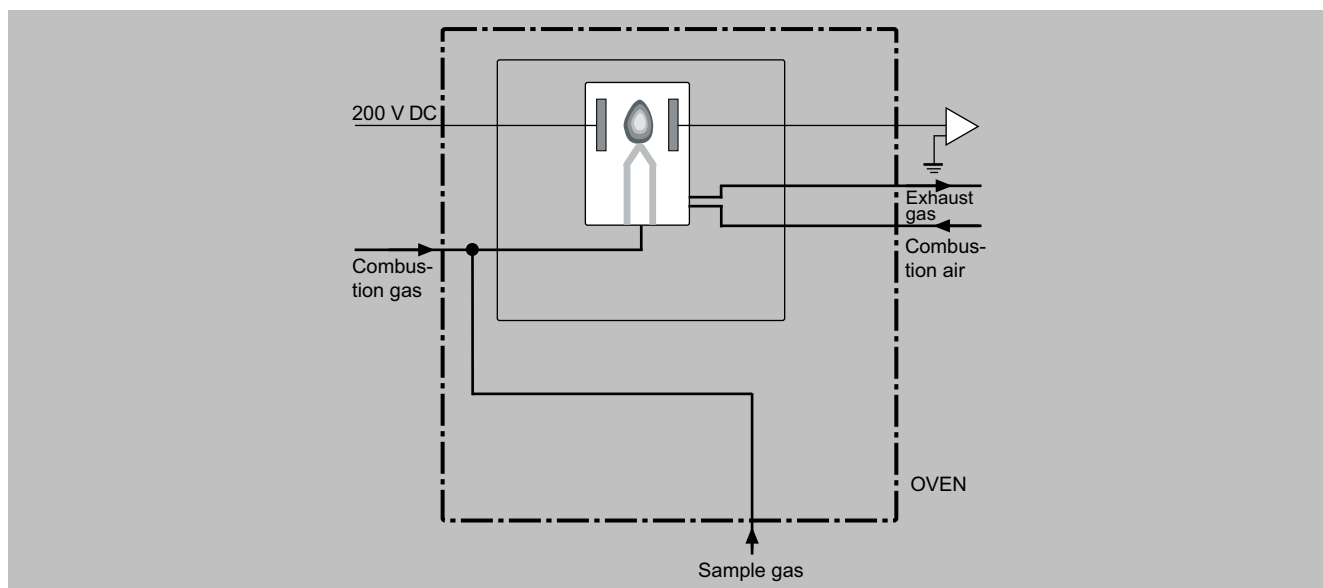
When the analyzer is switched on, ignition is automatic when the setpoint temperature is reached; for "with pump" versions, the pump is also started up.

# Extractive continuous process gas analysis

Series 6

FIDAMAT 6

## Mode of operation (Continued)



FIDAMAT 6, mode of operation

The FIDAMAT 6 provides various messages in the form of floating contacts:

- Maintenance demanded  
E.g. sample gas flow (filter/pump)  
Fan failure (advance warning for measuring accuracy)  
The measured value remains unaffected.
- Fault  
Hydrogen, combustion air and sample gas pressure, temperature, physical part and pump, error in the electronics (temperature). The measured value can be influenced.
- Failure  
In the event of failure of, for example, the electronics, power supply, combustion gas, combustion air or sample gas, the device automatically shuts down (the combustion gas valve is closed).

### Note

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

### Calibration

The calibrating interval should be adapted to the respective measuring task. We recommend  $N_2$  as zero gas (at least 5.0; for measuring of hydrocarbons < 1 vpm: at least 6.0).

The calibration gas should have a concentration of at least 60% of the leading measuring range. The concentration of residual hydrocarbons must not exceed 0.1 vpm.

For pure gas measurement, use suitable accompanying gases.

### Calibration (example)

#### 1. Emission measurement

Measuring range	0 ... 50 mg C/m <sup>3</sup>
Zero gas	N <sub>2</sub> (5.0 or better)
Span gas	21 vpm C <sub>3</sub> H <sub>8</sub> in N <sub>2</sub> (corresponds to 31.43 mg C/m <sup>3</sup> at 20 °C)

#### 2. Purity measurement in 100% O<sub>2</sub>

Measuring range	0 ... 50 vpm C <sub>1</sub>
Zero gas	N <sub>2</sub> (5.0 or better)
Span gas	At least 30 vpm CH <sub>4</sub> in O <sub>2</sub>

## Function

### Main features

- Four measuring ranges which can be freely configured, even with suppressed zero point; all measuring ranges are linear
- Electrically isolated measured value output 0/2/4 through to 20 mA (including inverted)
- Choice of automatic or manual measuring range switchover; remote switching is also possible
- Storage of measured values possible during calibration
- Measuring range identification
- Measuring point switchover for up to 6 measuring points
- Measuring point identification
- Wide range of selectable time constants (static/dynamic noise damping); i.e. the response time of the device can be adapted to the respective measuring task
- Easy handling thanks to menu-driven operation
- Low long-term drift
- Two control levels with separate authorization codes for the prevention of accidental and unauthorized operator interventions
- Automatic measuring range calibration parameterizable
- Operation based on NAMUR recommendation
- Custom-made device designs, such as:
  - Customer acceptance
  - TAG plates
  - Drift recording
- Wear-free, corrosion-resistant filter housing
- No blocking of the sample gas capillaries through the use of a quartz capillary
- Purge function in the event of device or power supply failure (avoids build-up of toxic and corrosive substances in the device)
- Low consumption of combustion air
- Response factors comply with the minimum requirements in accordance with German "Technical Instructions on Air Quality Control" guideline and the Working Group of the German automotive industry
- Simple handling using a numerical membrane keyboard and operator prompting

### Response factors (examples, mean values)

Substance	Mean response factor
n-butane	1.00
n-propane	1.00
n-heptane	1.00
Cyclohexane	1.08
Isopropanol	0.81
Toluene	1.06
Acetone	0.92
Ethyl acetate	0.76
Isobutyl acetate	0.83
Methane	1.06
Ethane	0.99
n-hexane	1.01
Isooctane	1.04
Ethine (acetylene)	0.91
Propene	0.84
Methanol	0.87
Ethanol	0.83
Acetic acid	1.13
Methyl acetate	0.67
Benzene	1.01
Ethyl benzene	0.96
p-xylene	1.03
Dichloromethane	1.13
Trichloroethene	1.01
Tetrachloroethene	1.07
Chloroform	0.72
Chlorobenzene	1.15

# Extractive continuous process gas analysis

## Series 6

### FIDAMAT 6

#### Function (Continued)

#### Cross-interferences (examples)<sup>1)</sup>

Interfering component	Concentration of the interfering component	Induced cross-interference
O <sub>2</sub> in N <sub>2</sub>	(21 vol.%)	< 0.3 mg/m <sup>3</sup>
SO <sub>2</sub> in N <sub>2</sub>	(258 mg/m <sup>3</sup> )	< 0.15 mg/m <sup>3</sup>
NO contact in N <sub>2</sub>	(310 mg/m <sup>3</sup> )	< 0.5 mg/m <sup>3</sup>
NO contact <sub>2</sub> in synth. Air	(146 mg/m <sup>3</sup> )	< 0.1 mg/m <sup>3</sup>
CO in N <sub>2</sub>	(461 mg/m <sup>3</sup> )	< 0.15 mg/m <sup>3</sup>
CO <sub>2</sub> in N <sub>2</sub>	(18 vol.%)	< 0.1 mg/m <sup>3</sup>
HCl in N <sub>2</sub>	(78 mg/m <sup>3</sup> )	< 0.3 mg/m <sup>3</sup>

<sup>1)</sup> With measuring range 0 to 15 mg/m<sup>3</sup>.



## Selection and ordering data

FIDAMAT 6 gas analyzer 19" rack unit for installation in cabinets		Article No. 7MB2421- ● ● ● ● ● - ● ● A ●			
Click on the Article No. for online configuration in the PIA Life Cycle Portal.					
<b>Unavailable combinations are shown in PIA Life Cycle Portal as "not permitted".</b>					
<b>Gas connections</b>					
Pipe with 6 mm outer diameter				0	
Pipe with 1/4" outer diameter				1	
<b>Version</b>					
Without pump, for sample gas with overpressure <sup>1)</sup>				B	
With heated pump, for sample gas with atmospheric pressure				D	
<b>Combustion air feed</b>					
With connection for combustion air				A	
<b>Number of channels</b>					
1-channel version				1	
<b>Add-on electronics</b>					
Without				0	
AUTOCAL function with 8 additional digital inputs/outputs each				1	
AUTOCAL function with 8 digital inputs/outputs each and PROFIBUS PA interface				6	
AUTOCAL function with 8 digital inputs/outputs each and PROFIBUS DP interface				7	
<b>Auxiliary power</b>					
100 ... 120 V AC, 48 ... 63 Hz				0	
200 ... 240 V AC, 48 ... 63 Hz				1	
<b>Combustion gases</b>					
H <sub>2</sub>					A
<b>Language of the operating software</b>					
German					0
English					1
French					2
Spanish					3
Italian					4

<sup>1)</sup> No QAL1 approval according to EN 15267.

Options	Order code
Add "-Z" to article number and then add order code.	
<b>Settings</b>	
Telescopic rails (2 units)	A31
Tag plates (specific inscription based on customer information)	B03
Clean for O <sub>2</sub> service (specially cleaned gas path)	Y02
Measuring range indication in plain text, if different from default setting	Y11
Special setting (only in conjunction with an application no.)	Y12
Extended special setting (only in conjunction with an application no.)	Y13
Configuration according to certificate (QAL1) <sup>1)</sup>	Y37

<sup>1)</sup> For certified operation, compensation of the influence of interference gas caused by the oxygen is required. To do this, the device must be supplied with the current oxygen concentration value of the sample gas. The supply takes place over an external measuring instrument that must also meet the requirements of EN 15267-3 (e.g. ULTRAMAT 23 or OXYMAT 6). The FIDAMAT 6E -Y37 is pre-parameterized accordingly and expects an analog signal of 4 ... 20 mA corresponding to 0 ... 21 vol.% O<sub>2</sub> at analog input AI2.

Accessories	Article No.
RS 485/Ethernet converter	A5E00852383
RS 485/RS 232 converter	C79451-Z1589-U1

# Extractive continuous process gas analysis

## Series 6

### FIDAMAT 6 / 19" rack unit

#### Selection and ordering data (Continued)

Accessories	Article No.
RS 485/USB converter	A5E00852382
AUTOCAL function with 8 digital inputs/outputs each	C79451-A3480-D511
AUTOCAL function with 8 digital inputs/outputs each and PROFIBUS PA	A5E00057307
AUTOCAL function with 8 digital inputs/outputs each and PROFIBUS DP	A5E00057312
Set of Torx screwdrivers	A5E34821625

#### Technical specifications

FIDAMAT 6, 19" rack unit	
<b>General information</b>	
Measuring ranges	4, internally and externally switchable; manual and automatic measuring range switchover possible
Smallest possible measuring span	0 ... 10 vpm
Largest possible measuring span	99.999 vpm*)
Concentration units	vpm, C <sub>1</sub> , C <sub>3</sub> , C <sub>6</sub> or mgC/m <sup>3</sup>
Automatic measuring range switchover	Hysteresis, selectable
Measured value display	Digital concentration indicator (5 digits with floating point)
Resolution of digital display	0.1% of measured value
Operating position	Front wall, vertical
Conformity	CE mark EN 50081-1, EN 50082-2
Oven temperature	Adjustable 100 ... 200 °C
<b>Design, enclosure</b>	
Degree of protection	IP20 according to EN 60529
Weight	Approx. 23 kg
<b>Electrical characteristics</b>	
Auxiliary power	100 ... 120 V AC (nominal range of use 90 ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (nominal range of use 180 ... 264 V), 48 ... 63 Hz
Power consumption	<ul style="list-style-type: none"> <li>• Approx. 150 VA during operation,</li> <li>• Approx. 350 VA during warm-up phase</li> </ul>
EMC interference immunity (electromagnetic compatibility)	In accordance with standard requirements of NAMUR NE21 (08/98)
Electrical safety	In accordance with EN 61010-1, overvoltage category II
Fuse ratings	100 ... 120 V: 4.0T/250 200 ... 240 V: 2.5 T/250
<b>Gas inlet conditions</b>	
Permissible sample gas pressure	
• Without pump	< 2 000 hPa abs.
• With integrated pump	600 ... 1 100 hPa
Sample gas temperature	0 ... 200 °C
Sample gas humidity	< 90% RH (RH: relative humidity)
<b>Time response</b>	
Warm-up period	At room temperature, approx. 2 ... 3 h
Delayed display (T <sub>90</sub> )	2 ... 3 s
Damping (electrical time constant)	0 ... 100 s, configurable
Dead time (purging time of the gas path in the device at 1 l/min)	With filter 2 ... 3 s
Time for device-internal signal processing	< 1 s
<b>Measuring response</b>	
Output signal fluctuation	Based on sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature < 0.75% of the smallest possible measuring range according to nameplate, with electronic damping constant of 1 s (corresponds to ± 0.25% at 2 σ)

## Technical specifications (Continued)

FIDAMAT 6, 19" rack unit	
Zero point drift	< 0.5%/month of the smallest possible measuring span according to nameplate
Measured value drift	< 1%/week of the current measuring range
Repeatability	< 1% of the current measuring range
Detection limit	0.1 vpm (version for ultra-pure gas measurement: 50 ppb)
Linearity error	< 1% of the current measuring range
<b>Influencing variables</b>	Based on sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature
Ambient temperature	< 1%/10 K referred to smallest possible measuring span according to nameplate
Atmospheric pressure	< 1%/50 hPa
Sample gas pressure	< 2% of the current measuring range/1% pressure variation (within 600 ... 1 100 hPa)
Auxiliary power	< 1% of the current measuring range with nominal voltage $\pm$ 10%
Position influence	< 1% with < 15° inclination
<b>Electrical inputs and outputs</b>	
Analog output	0/2/4 ... 20 mA, floating; max. load 750 $\Omega$
Relay outputs	6, with changeover contacts, freely configurable, e.g. for measuring range identification; load rating: 24 V AC/DC/1 A, floating
Analog inputs	2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and correction of influence of accompanying gas (correction of cross-interference)
Digital inputs	6, designed for 24 V, floating, freely configurable, e.g. for measuring range switchover
Serial interface	RS 485
Options	AUTOCAL function each with 8 additional digital inputs and relay outputs; also with PROFIBUS PA or PROFIBUS DP
<b>Climatic conditions</b>	
Permissible ambient temperature	-30 ... +70 °C during storage and transportation, 5 ... 45 °C during operation
Permissible humidity	< 90% RH (RH: relative humidity) as annual average, during storage and transportation (must not fall below dew point)

\*) 100% as special application

FIDAMAT 6 with pump and heated oven, with combustion air connection					
Gases	Inlet pressure	Operating pressure		Flow through FID	Flow through bypass
		Pump startup	With		
	hPa (abs.)	Without	hPa (abs.)	ml/min	ml/min
Combustion gas	3 000 ... 5 000	2 000 $\pm$ 20	2 000 $\pm$ 20	~ 25	—
Combustion air	3 000 ... 5 000	1 420 $\pm$ 20	1 500	~ 320	~ 500
Sample gas	~ 1000	—	1 500 $\pm$ 2	~ 3	~ 1 000
Zero gas	3 500 ... 4 000	—	1 500 $\pm$ 2	~ 3	~ 1 000
Span gas	3 500 ... 4 000	—	1 500 $\pm$ 2	~ 3	~ 1 000

FIDAMAT 6 without pump, with heated oven, with combustion air connection					
Gases	Inlet pressure	Operating pressure		Flow through FID	Flow through bypass
		Sample/calibration gas	With		
	hPa (abs.)	Without	hPa (abs.)	ml/min	ml/min
Combustion gas	3 000 ... 5 000	2 000 $\pm$ 20	2 000 $\pm$ 20	~ 25	—
Combustion air	3 000 ... 5 000	1 480 $\pm$ 5	—	~ 320	~ 300
Sample gas	1 500 ... 2 000	—	1 500 $\pm$ 2	~ 3	~ 500
Zero gas	1 500 ... 2 000	—	1 500 $\pm$ 2	~ 3	~ 500

# Extractive continuous process gas analysis

## Series 6

### FIDAMAT 6 / 19" rack unit

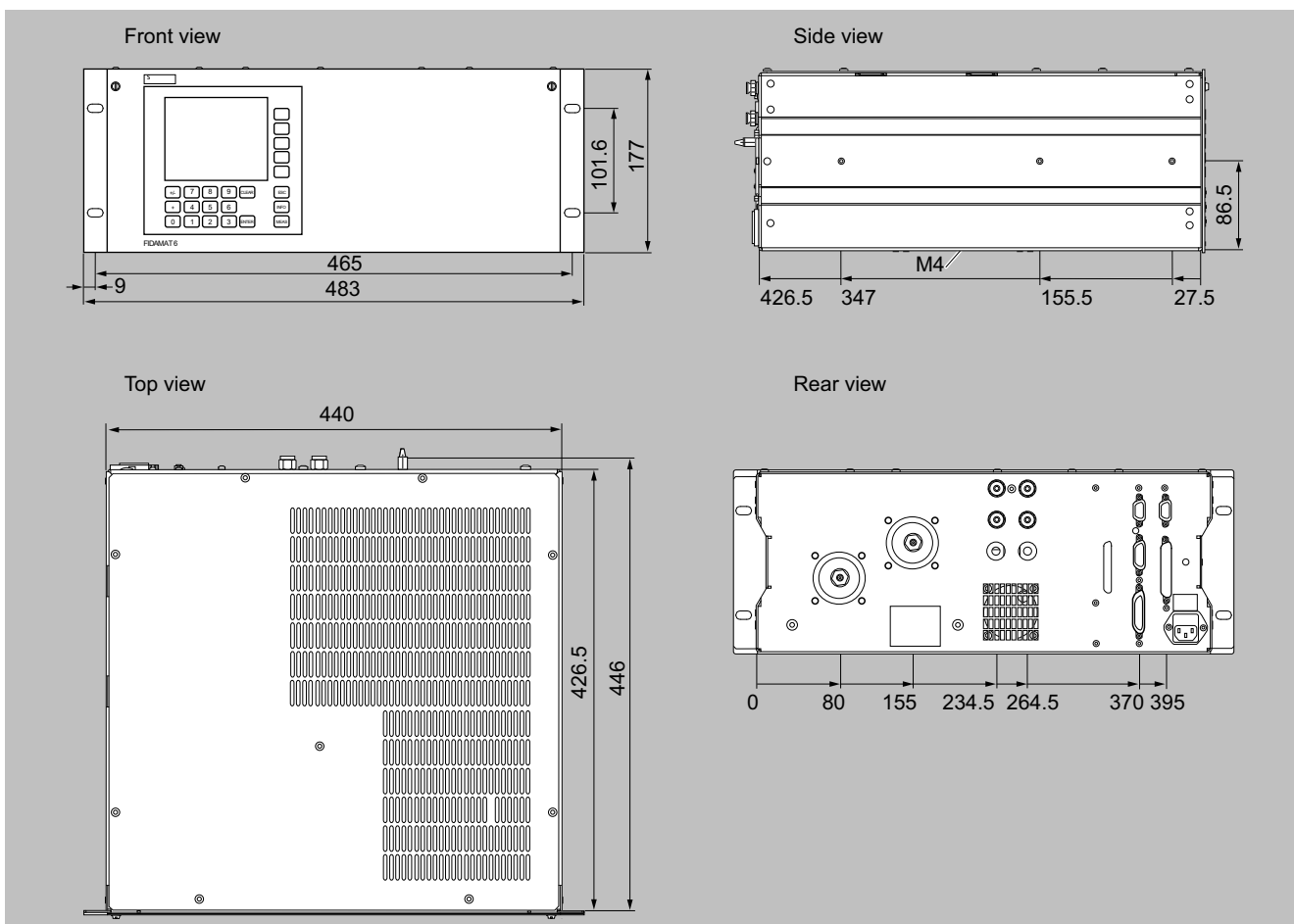
#### Technical specifications (Continued)

FIDAMAT 6 without pump, with heated oven, with combustion air connection

Gases	Inlet pressure hPa (abs.)	Operating pressure Sample/calibration gas		Flow through FID ml/min	Flow through bypass ml/min
		Without hPa (abs.)	With hPa (abs.)		
Span gas	1 500 ... 2 000	—	1 500 ± 2	~ 3	~ 500

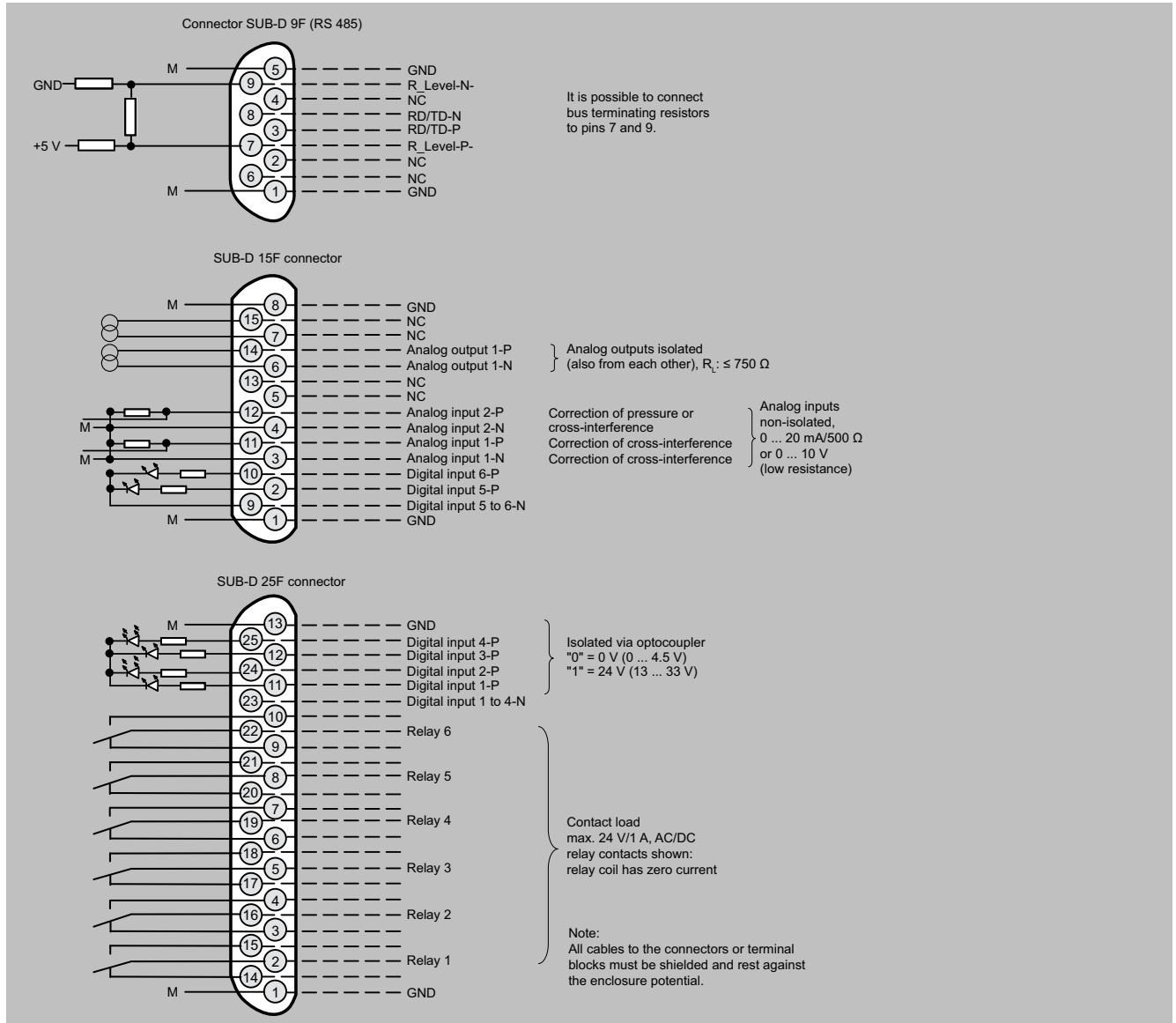
The supply gases (combustion gas, combustion air) must have a degree of purity of 5.0 in order to guarantee correct measurements. The degree of purity must be increased in the case of very small hydrocarbon concentrations (< 1 vpm).

#### Dimensional drawings



FIDAMAT 6, 19" rack unit, dimensions in mm

Circuit diagrams



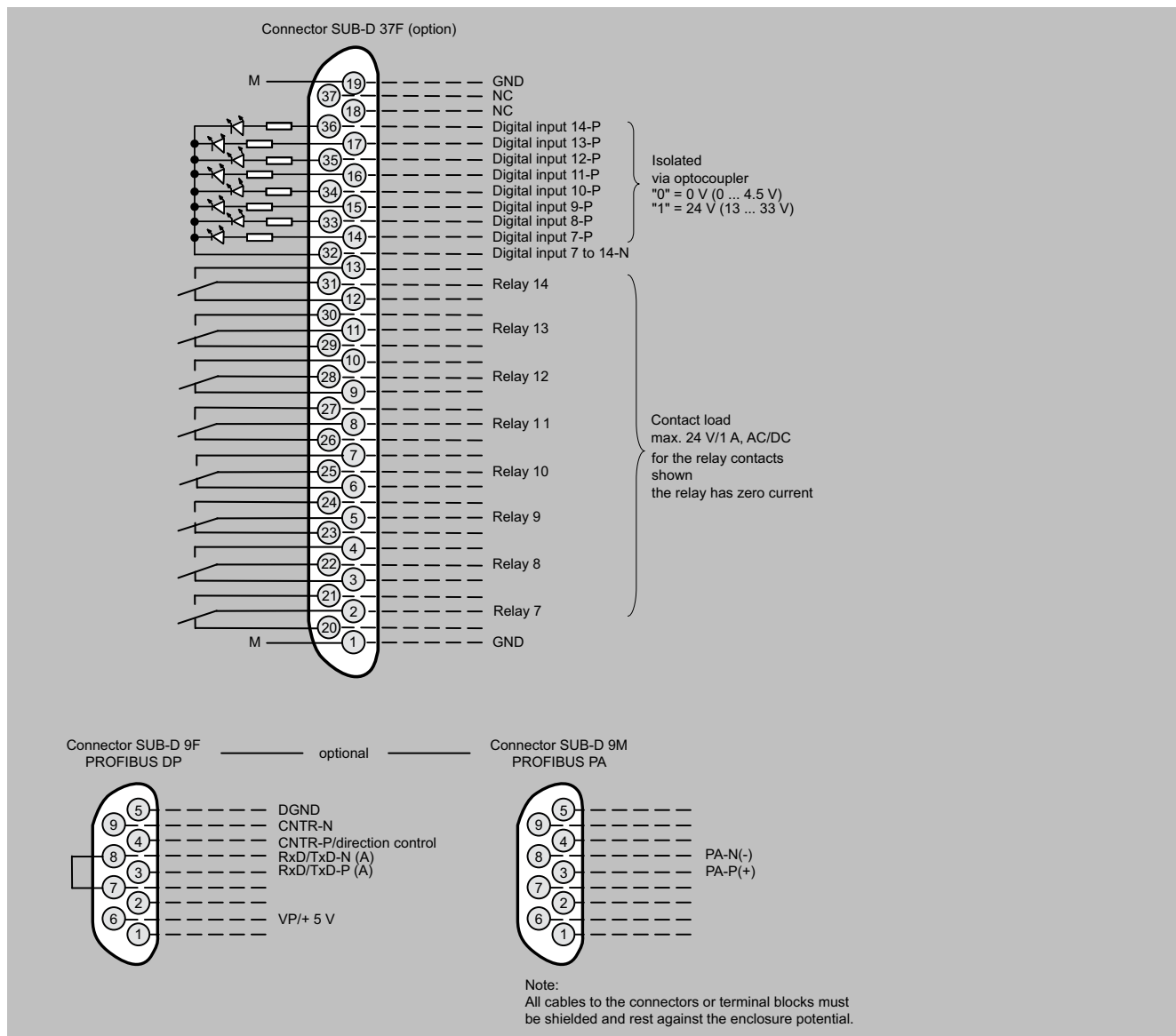
FIDAMAT 6, 19" rack unit, pin assignment

# Extractive continuous process gas analysis

## Series 6

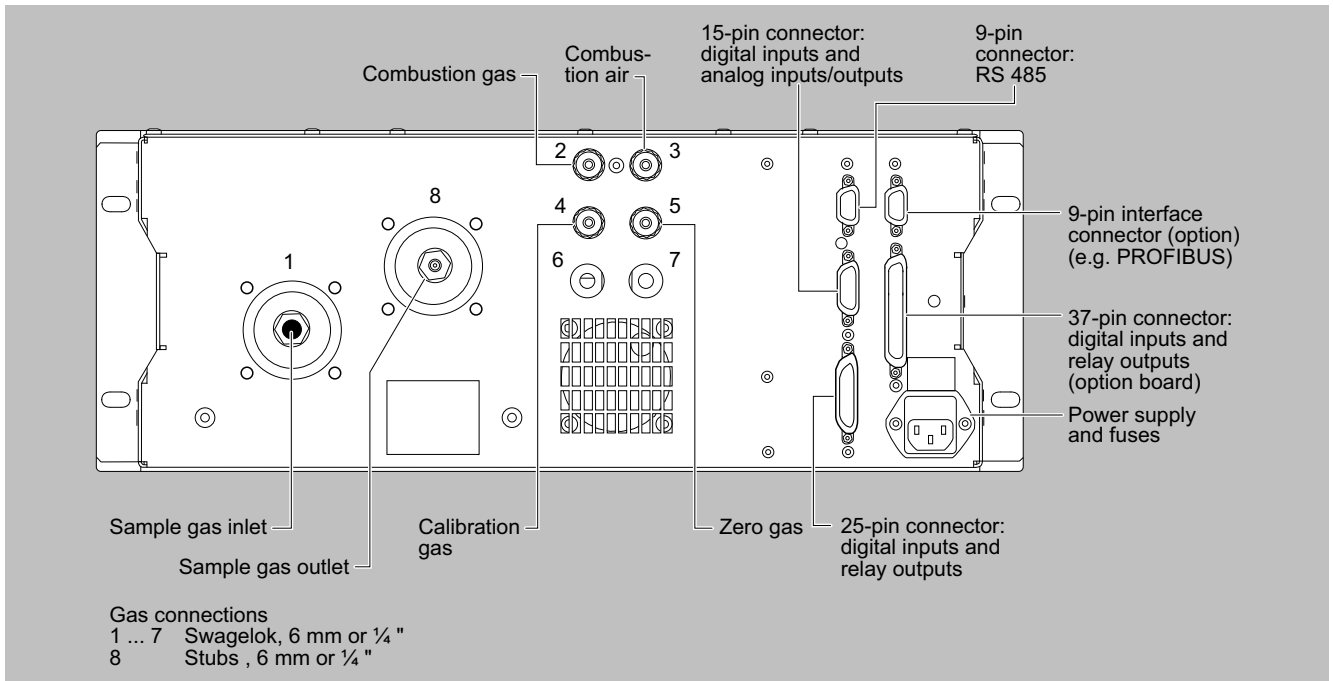
### FIDAMAT 6 / 19" rack unit

#### Circuit diagrams (Continued)

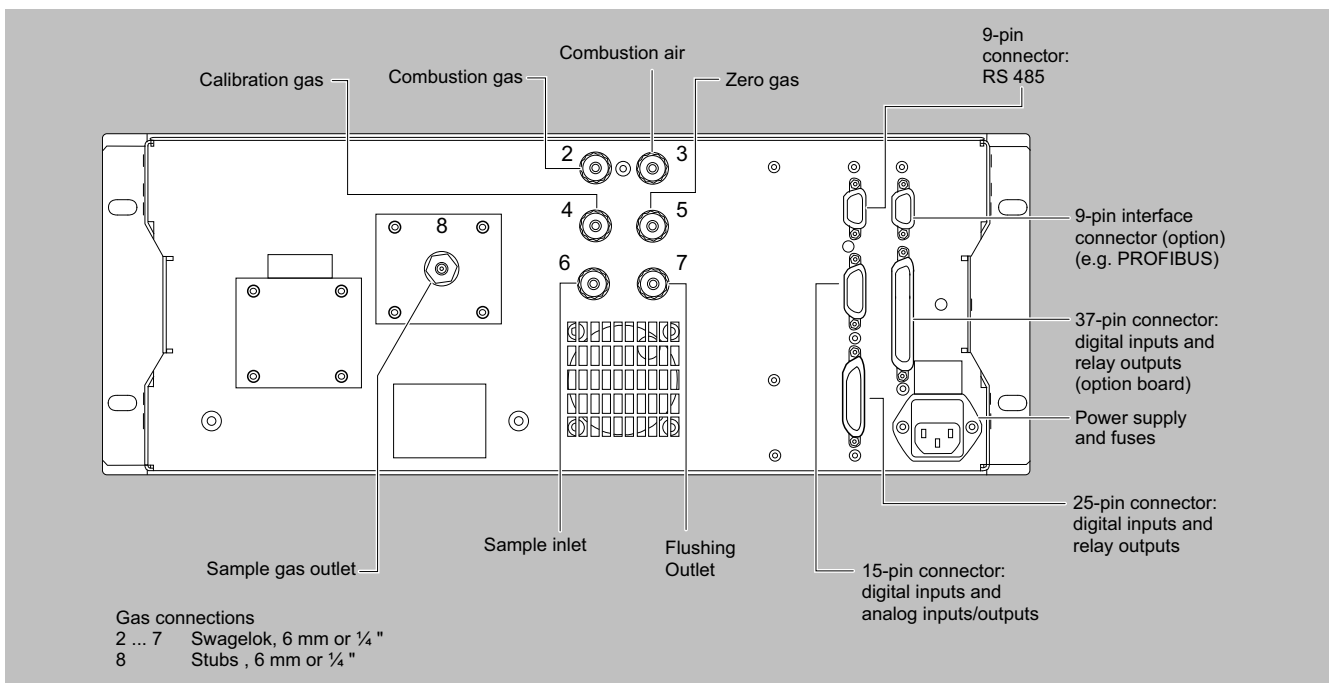


FIDAMAT 6, 19" rack unit, pin assignment of AUTOCAL board and PROFIBUS plugs

## Circuit diagrams (Continued)



FIDAMAT 6, gas connections and pin assignment, version with pump



FIDAMAT 6, gas connections and pin assignment, version with pump

# Extractive continuous process gas analysis

## Series 6

### FIDAMAT 6 / Suggestion for spare parts

#### Selection and ordering data

Description			Article No.	
	2 years (unit)	5 years (unit)	FIDAMAT 6 with pump	FIDAMAT 6 without pump
<b>Analyzer unit</b>				
FI detector, complete		1	A5E00295816	A5E00295816
<b>Sample gas path</b>				
Pump (KNF)	1	1	A5E00882121	
Set of gaskets for pump (KNF)	4	10	A5E03792459	
Filter, with gasket for sample gas	1	3	A5E00248845	
Pressure regulators	1	1	A5E00248851	A5E00248851
Gasket for pressure regulator	1	2	A5E00295107	A5E00295107
Filter, complete (sample gas inlet, 6 mm)		1	A5E00295928	
Filter, complete (sample gas inlet, 1/4")		1	A5E00295976	
Solenoid valve (1-way)	1	2	A5E00296562	A5E00296562
Solenoid valve (2-way)	1	2	A5E00296565	
Gasket, PTFE, 1.5 mm (20 units)	1	2	C79451-A3040-D101	C79451-A3040-D101
Gasket, graphite, 0.5 to 1 mm (20 units)	1	2	C79451-A3040-D102	C79451-A3040-D102
Gasket, graphite, 1.5 mm (20 units)	1	2	C79451-A3040-D103	C79451-A3040-D103
Gasket, graphite, 3 mm (20 units)	1	2	C79451-A3040-D105	C79451-A3040-D105
Pressure ring, 1 mm (20 units)		1	C79451-A3040-D112	C79451-A3040-D112
Pressure ring, 1.5 mm (20 units)		1	C79451-A3040-D113	C79451-A3040-D113
Pressure ring, 3 mm (20 units)		1	C79451-A3040-D115	C79451-A3040-D115
Outer rings, 0.5 ... 1 mm (20 units)		1	C79451-A3040-D121	C79451-A3040-D121
Outer rings, 1.5 ... 3 mm (1/8") (20 units)		1	C79451-A3040-D122	C79451-A3040-D122
<b>Electronics</b>				
Front plate	1	1	A5E00248790	A5E00248790
Adapter plate	1	1	A5E00248795	A5E00248795
Temperature fuse (retrofit kit)	1	2	A5E01040317	A5E01040317
Fusible element, 230 V AC	2	3	A5E00248819	A5E00248819
Fusible element, 110 V AC	2	3	A5E00248822	A5E00248822
LC display	1	1	A5E00248920	A5E00248920
Cable, temperature sensor for oven		1	A5E00283770	A5E00283770
Cable, temperature sensor for analyzer part		1	A5E00283780	A5E00283780
Cable, magnetic distributor		1	A5E00283800	A5E00283800
Cable, heater for oven, 230 V AC		1	A5E00283817	A5E00283817
Cable, heater for oven, 110 V AC		1	A5E00295469	A5E00295469
Cable, electrode voltage, complete		1	A5E00284092	A5E00284092
Cable, signal cable		1	A5E00284094	A5E00284094
Cable, connecting cable (4-pole)	1	1	A5E00284095	A5E00284095
Cable, connecting cable (5-pole)	1	1	A5E00284096	A5E00284096
Axial-flow fan, 24 V DC		1	A5E00313839	A5E00313839

If the device was supplied with a specially cleaned gas path for high oxygen context (so-called "Clean for O<sub>2</sub> service"), please specify when ordering spare parts. This is the only way to ensure that the gas path will continue to comply with the special requirements for this version.

#### More information

If the device was supplied with a specially cleaned gas path for high oxygen context ("Clean for O<sub>2</sub> service"), please ensure that you specify this when ordering spare parts. This is the only way to ensure that the gas path will continue to comply with the special requirements for this version.