Overview

The FIDAMAT 6 gas analyzer is suitable for the determination of the total hydrocarbon content in the 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_2O 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 interfering gases
- Low consumption of combustion air
- Low influence of oxygen on measured value

The analyzer is additionally equipped with warning and fault messages:

- For failure of combustion gas
- If the flame is extinguished
- To indicate pump and filter faults

Application

Areas of application

- Environmental protection
- Wastewater (in conjunction with a stripping device, verification of the hydrocarbon content of liquids)
- TLV (Threshold Limit Value) monitoring at places of work
- Quality monitoring
- Process exhaust monitoring
- Ultra-pure gas measurements in media such as O_2, CO_2, 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
- Pharmaceutical industry
- Automotive industry (engine development, engine and transmission development and certification)

Special applications

Special applications

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

TÜV version

Measurement of flue gases according to 13th BImSchV/17th BImSchV and TA Luft for oil, coal, gas, and waste as fuels.

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

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

General information

Design

- 19" rack unit with 4 HU for installation
  - in hinged frame
  - in cabinets with or without telescopic rails
- Front plate can be swung down for servicing purposes (laptop connection)
- Gas connections for sample gas inlet and outlet as well as combustion gas and combustion air; pipe diameter 6 mm or ¼"
- Gas and electrical connections at the rear
- Internal gas paths: stainless steel (mat. no. 1.4571)

Display and control 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

Input and outputs

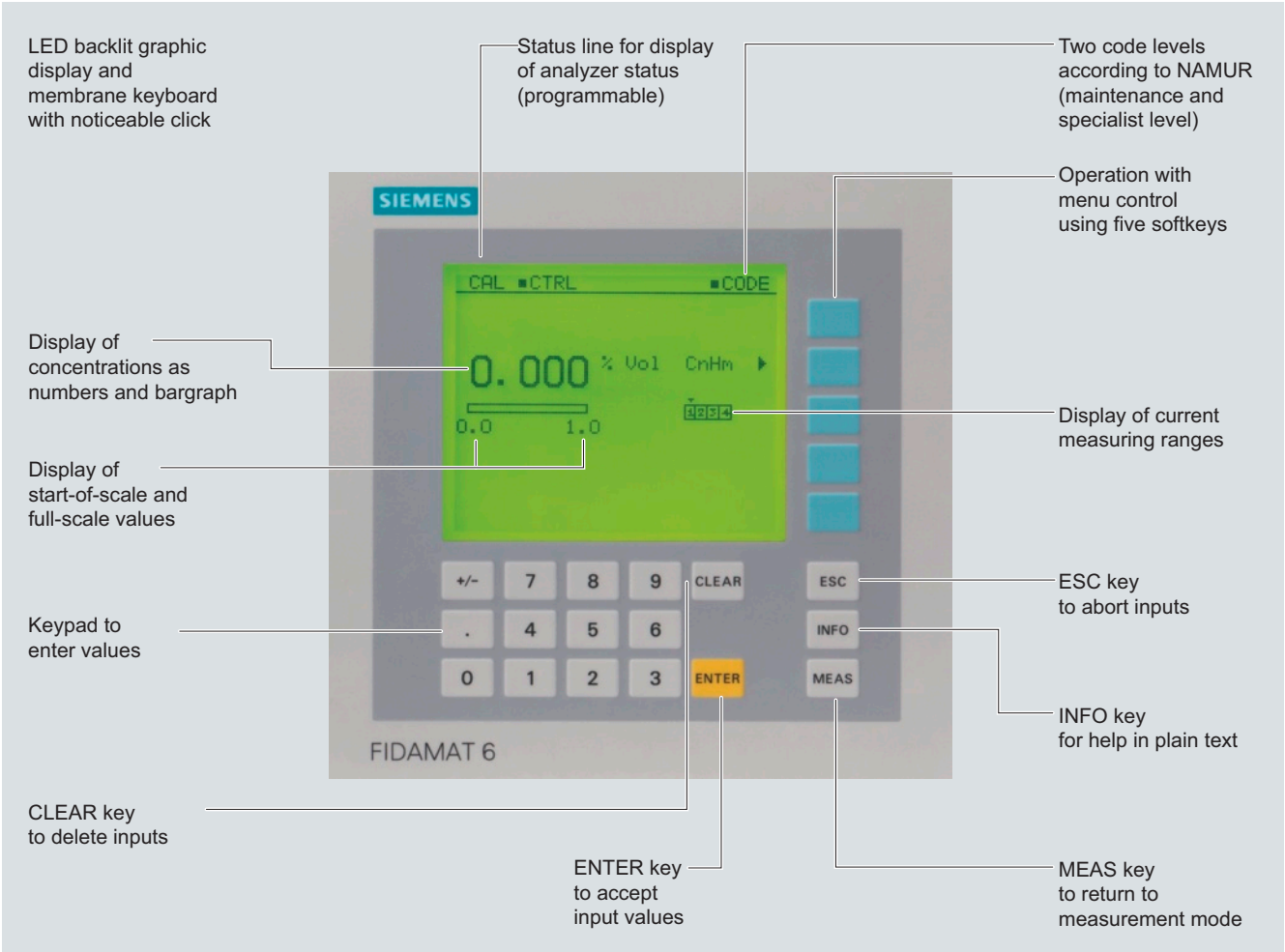
- One analog output for each measured component
- Two programmable analog inputs
- Six binary inputs freely configurable (e.g. for measurement range switchover, processing of external signals from sample preparation)
- Six relay outputs freely configurable (failure, maintenance request, maintenance switch, limit alarm, external solenoid valves, measuring point switchover)
- Extension with eight additional binary 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

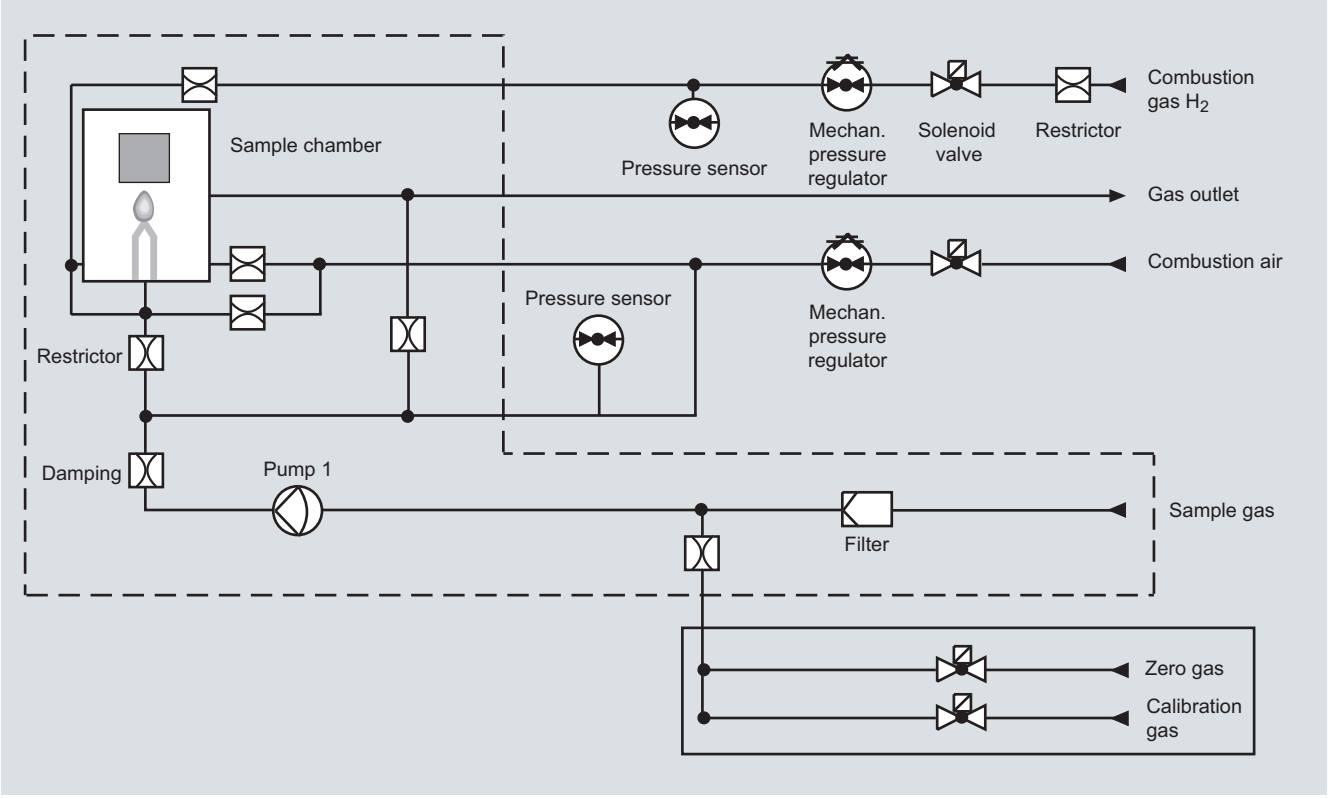


FIDAMAT 6, membrane keyboard and graphic display

Designs – parts wetted by sample gas

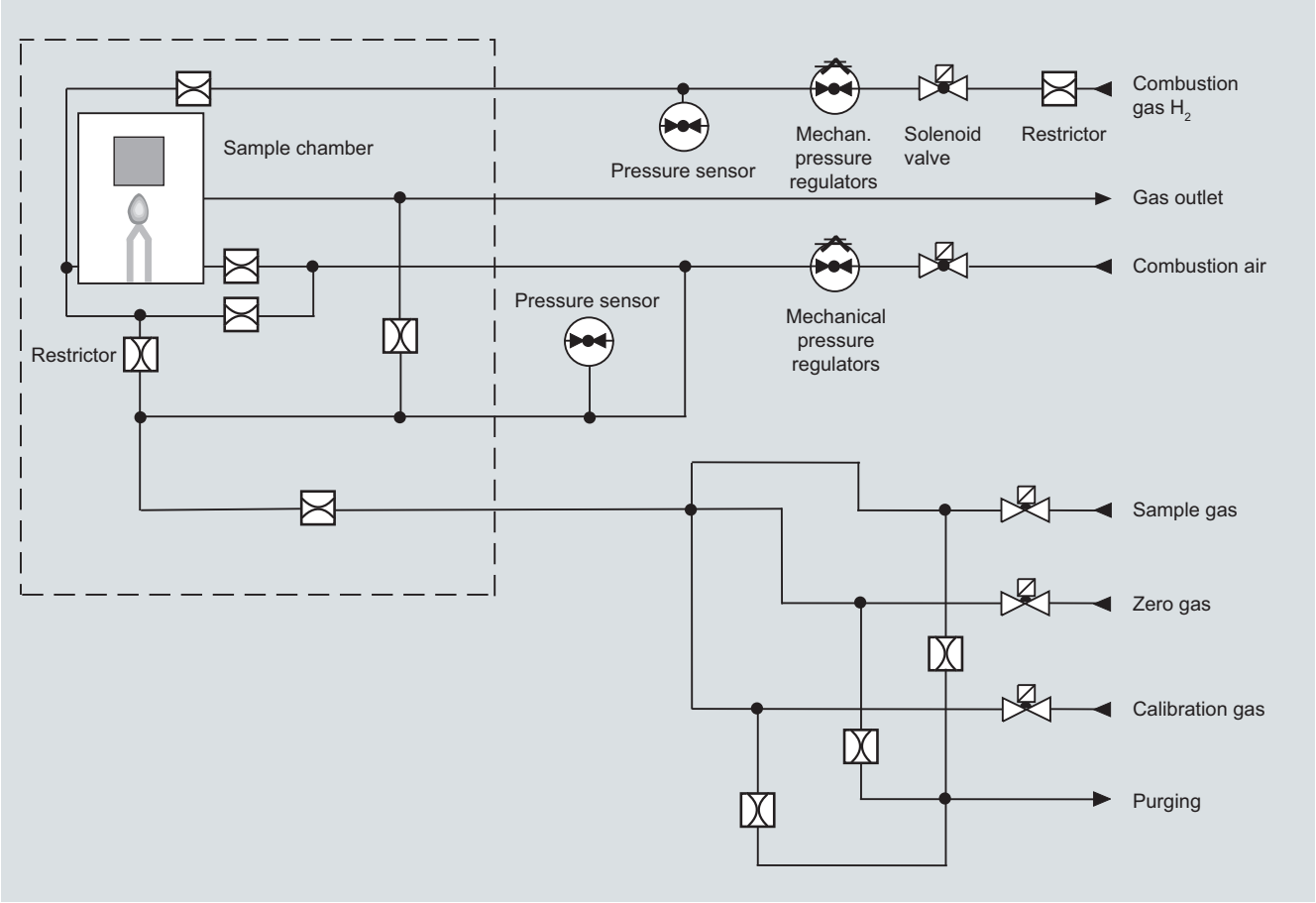
Gas path	Material
Piping	Stainless steel, mat. no. 1.4571
Gas inlet	Stainless steel, mat. no. 1.4571
Gaskets	Graphite
Sample gas restrictor	Quartz
Auxiliary gas restrictors	Stainless steel, mat. no. 1.4571
Pump membrane	PTFE
Pump head	Stainless steel, mat. no. 1.4571
Detector	
• Nozzle	Quartz
• FID housing	Stainless steel, mat. no. 1.4571

Gas path



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

General information



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

Function

Principle of operation

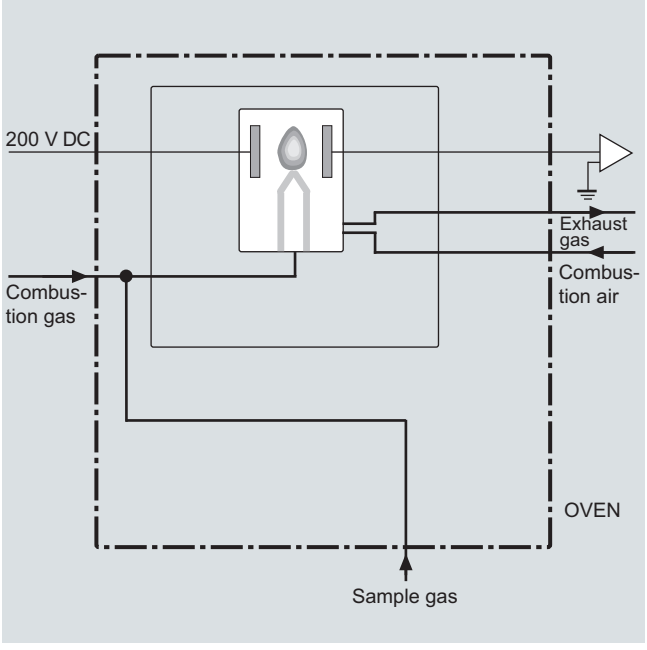
The FIDAMAT 6 carries out substance-specific measurements and not component-specific measurements. It measures the total of all hydrocarbons in a sample gas, but with different weighting of the hydrocarbon molecules. To a first approximation, the display is proportional to the number of C atoms in the 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 current measured 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 carried out automatically when the setpoint temperature has been reached and, for versions "with pump", the pump is also started up.



FIDAMAT 6, principle of operation

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

- Maintenance request
  E.g. sample gas flow (filter/pump)
  Fan failure (advance warning for measuring accuracy)
  The measured value remains unaffected.
- Fault
  E.g. hydrogen, combustion air and sample gas pressures, temperature, analyzer part and pump, fault in the electronics (temperature).
  The measured value may be influenced.
- Failure
  In the event of failure of, for example, the electronics, power supply, combustion gas, combustion air or sample gas, the analyzer 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 appropriate gas preparation is required for most applications.

Essential characteristics

- Four freely parameterizable measuring ranges, also with suppressed zero, all measuring ranges linear
- Galvanically isolated measured-value output 0/2/4 to 20 mA (also inverted)
- Autoranging possible; remote switching is also possible
- Storage of measured values possible during adjustments
- Measuring range identification
- Measuring point switchover for up to 6 measuring points
- Measuring point identification
- Wide range of selectable time constants (static/dynamic noise suppression); 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 their own authorization codes for the prevention of accidental and unauthorized operator interventions
- Automatic range calibration can be parameterized
- Operation based on the NAMUR recommendation
- Customer-specific analyzer options such as:
  - Customer acceptance
  - TAG labels
  - Drift recording
- Wear-free, corrosion-proof filter housing
- No blocking of the sample gas capillaries through the use of a quartz restrictor
- Purge function in the event of analyzer 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 air purity guidelines and the Working Group of the German automotive Industry
- Simple handling using a numerical membrane keyboard and operator prompting

General information

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
iso-octane	1.04
Ethine (acetylene)	0.91
Propene	0.84
Methanol	0.87
Ethanol	0.83
Ethanoic acid	1.13
Methyl acetate	0.67
Benzene	1.01
Ethyl benzene	0.96
p-xylene	1.03
Dichloromethane	1.13
Trichloroethene	1.01
Tetrachlorethene	1.07
Chloroform	0.72
Chlorobenzene	1.15

Cross-interferences (examples)[1)]

Interfering component	Concentration of the interfering component	Induced cross-interference
O_2 in N_2	(21 vol.%)	< 0.3 mg/m^3
SO_2 in N_2	(258 mg/m^3)	< 0.15 mg/m^3
NO in N_2	(310 mg/m^3)	< 0.5 mg/m^3
NO_2 in synth. air	(146 mg/m^3)	< 0.1 mg/m^3
CO in N_2	(461 mg/m^3)	< 0.15 mg/m^3
CO_2 in N_2	(18 vol.%)	< 0.1 mg/m^3
HCl in N_2	(78 mg/m^3)	< 0.3 mg/m^3

[1)] With measuring range 0 to 15 mg/m^3.

Technical specifications

General information	
Measuring ranges	4, internally and externally switchable; manual and autoranging possible
Smallest possible measuring span	0 ... 10 vpm
Largest possible measuring span	99.999 vpm*)
Concentration units	ppm, C_1, C_3, C_6 or mgC/m^3
Autoranging	Hysteresis, selectable
Measured-value display	Digital concentration display (5 digits with floating point)
Resolution of digital display	0.1 % of measured value
Operating position	Front wall, vertical
Conformity	CE mark in accordance with EN 50081-1, EN 50082-2
Oven temperature	Adjustable, 100 ... 200 °C
Design, enclosure	
Degree of protection	IP20 according to EN 60529
Weight	Approx. 23 kg
Electrical characteristics	
Power supply	100 ... 120 V AC (nominal range of use 90 ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (nominal range of use 180 ... 264 V), 48 ... 63 Hz
Power consumption	• Approx. 150 VA during operation, • approx. 350 VA during warm-up phase
EMC (**E**lectro**m**agnetic **C**ompatibility)	In accordance with standard requirements of NAMUR NE21 (08/98)
Electrical safety	In accordance with EN 61010-1, overvoltage category II
Fuse values	• 100 ... 120 V: 4.0T/250 • 200 ... 240 V: 2.5 T/250
Gas inlet conditions	
Permissible sample gas pressure	
• Without pump	< 2 000 hPa abs.
• With integrated pump	600 ... 1 100 hPa
Sample gas flow	18 ... 60 l/h (0.3 ... 1 l/min)
Sample gas temperature	0 ... 200 °C
Sample gas humidity	< 90 % RH (RH: relative humidity)
Dynamic response	
Warm-up period	At room temperature, approx. 2 ... 3 h
Delayed display (T_{90})	2 ... 3 s
Damping (electrical time constant)	0 ... 100 s, parameterizable
Dead time (purging time of the gas path in the unit at 1 l/min)	With filter, 2 ... 3 s
Time for device-internal signal processing	< 1 s

Measuring response	
(relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Output signal fluctuation	< 0.75 % of the smallest possible measuring range according to rating plate, with electronic damping constant of 1 s (corresponds to ± 0.25 % at 2 σ)
Zero point drift	< 0.5 %/month of the smallest possible measuring span according to rating plate
Measured-value drift	< 1 %/week of the current measuring range
Repeatability	< 1 % of the current measuring range
Detection limit	0.1 ppm (version for ultra-pure gas measurement: 50 ppb)
Linearity error	< 1 % of the current measuring range
Influencing variables	
(relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)	
Ambient temperature	< 1 %/10 K referred to smallest possible span according to rating plate
Atmospheric pressure	< 1 %/50 hPa
Sample gas pressure	< 2 % of the current measuring range range/1 % pressure change (within 600 ... 1 100 hPa)
Power supply	< 1 % of the current measuring range with rated voltage ± 10 %
Position influence	< 1 % with < 15° inclination
Electrical inputs and outputs	
Analog output	0/2/4 ... 20 mA, isolated; max. load 750 Ω
Relay outputs	6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; load: 24 V AC/DC/1 A, potential-free
Analog inputs	2, dimensioned for 0/2/4 to 20 mA for external pressure sensor and correction of influence of accompanying gas (correction of cross-interference)
Binary inputs	6, designed for 24 V, floating, freely parameterizable, e.g. for measuring range switchover
Serial interface	RS 485
Options	AUTOCAL function with 8 additional binary inputs and relay outputs each, also with PROFIBUS PA or PROFIBUS DP
Climatic conditions	
Permissible ambient temperature	5 ... 45 °C during operation, -30 ... +70 °C during storage and transportation
Permissible humidity	< 90 % RH (RH: relative humidity) as annual average, during storage and transportation (must not fall below dew point)

*) 100 % as special application

19" rack unit

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

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

Selection and ordering data		Order No.
FIDAMAT 6 gas analyzer 19" rack unit for installation in cabinets	D)	**7MB2421-** ■■■■■-■■A■
Gas connections		
Pipe with 6 mm outer diameter		**0**
Pipe with ¼" outer diameter		**1**
Version		
Without pump, for sample gas with overpressure[1)]		**A**
Without pump, for sample gas with overpressure; ultra-pure gas measurement		**B**
With heated pump, for sample gas with atm. pressure		**D**
With heated pump, for sample gas with atm. pressure, ultra-pure gas measurement O_2		**E**
Combustion air feed		
With connection for combustion air		**A**
Number of channels		
1-channel version		**1**
Add-on electronics		
Without		**0**
AUTOCAL function		
• With 8 additional binary inputs/outputs		**1**
• With 8 binary inputs/8 binary outputs, PROFIBUS PA interface		**6**
• With 8 binary inputs/8 binary outputs, PROFIBUS DP interface		**7**
Power supply		
100 ... 120 V AC, 48 ... 63 Hz		**0**
200 ... 240 V AC, 48 ... 63 Hz		**1**
Combustion gases		
H_2		**A**
Language (supplied documentation, software)		
German		**0**
English		**1**
French		**2**
Spanish		**3**
Italian		**4**

Additional versions	Order code
Add "-Z" to Order No. and specify Order code	
Telescopic rails (2 units)	**A31**
Set of Torx screwdrivers	**A32**
TAG labels (specific inscription based on customer information)	**B03**
Clean for O_2 service (specially cleaned gas path)	**Y02**
Measuring range indication in plain text, if different from the standard setting	**Y11**
Special setting (only in conjunction with an application No.)	**Y12**
Extended special setting (only in conjunction with an application No.)	**Y13**
TÜV version acc. to 17th BImSchV	**Y17**

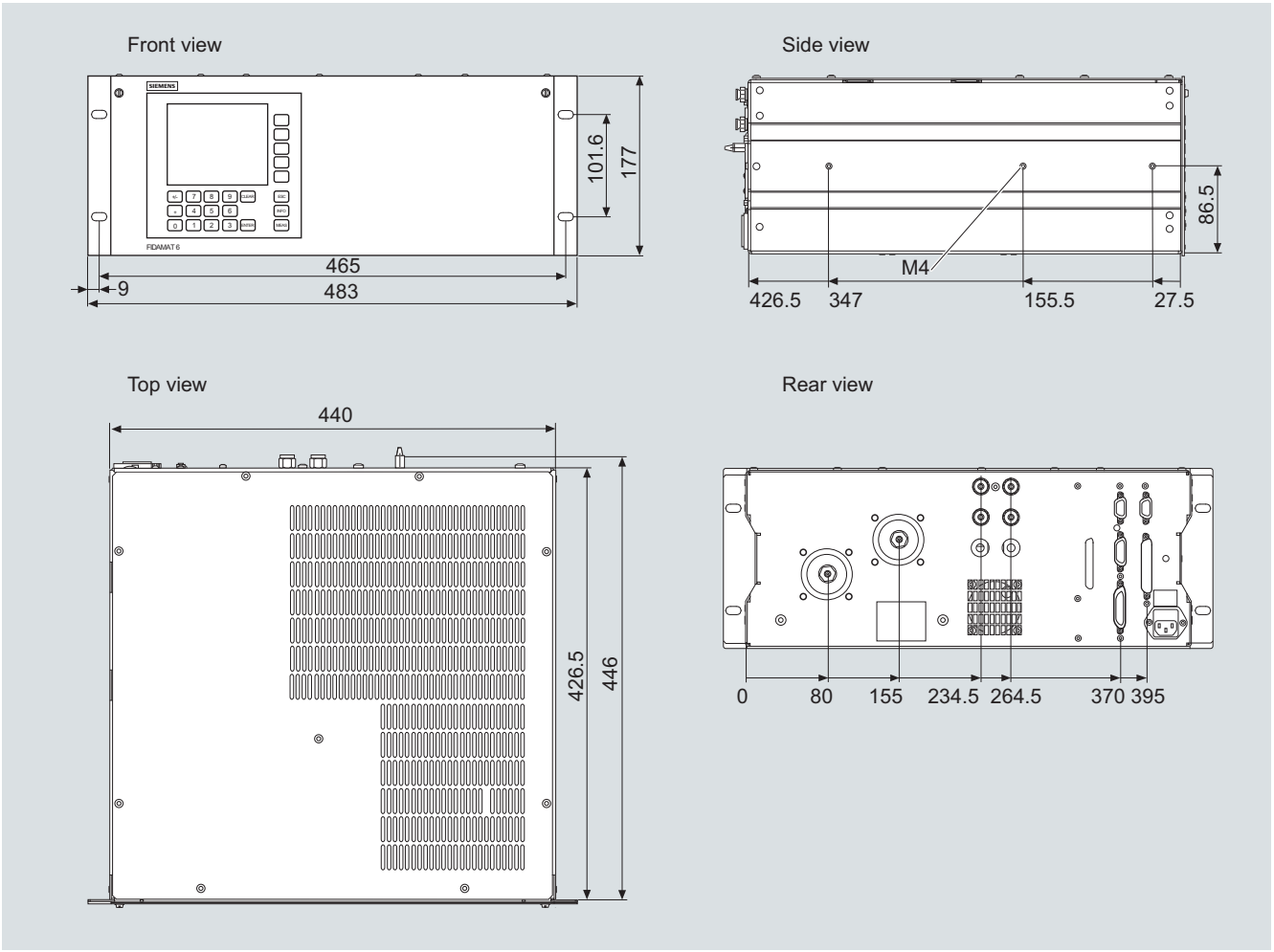
Retrofitting sets	Order No.
RS 485/Ethernet converter	**A5E00852383**
RS 485/RS 232 converter	**C79451-Z1589-U1**
RS 485/USB converter	**A5E00852382**
AUTOCAL function each with 8 binary inputs/outputs	**C79451-A3480-D511**
AUTOCAL function 8 binary inputs/outputs each and PROFIBUS PA	**A5E00057307**
AUTOCAL function 8 binary inputs/outputs each and PROFIBUS DP	**A5E00057312**

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

1) On request.

19" rack unit

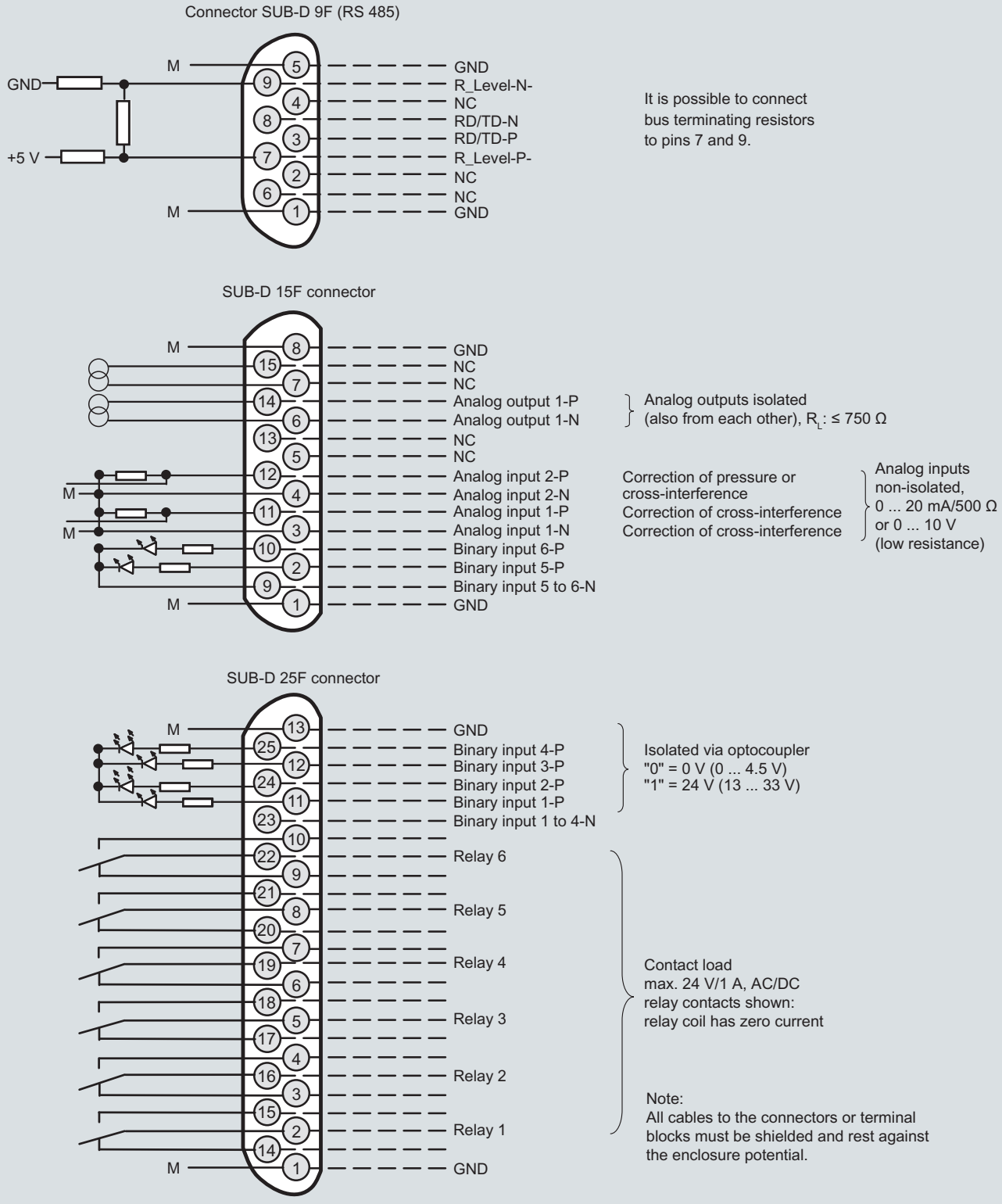
Dimensional drawings



FIDAMAT 6, 19“ unit, dimensions in mm

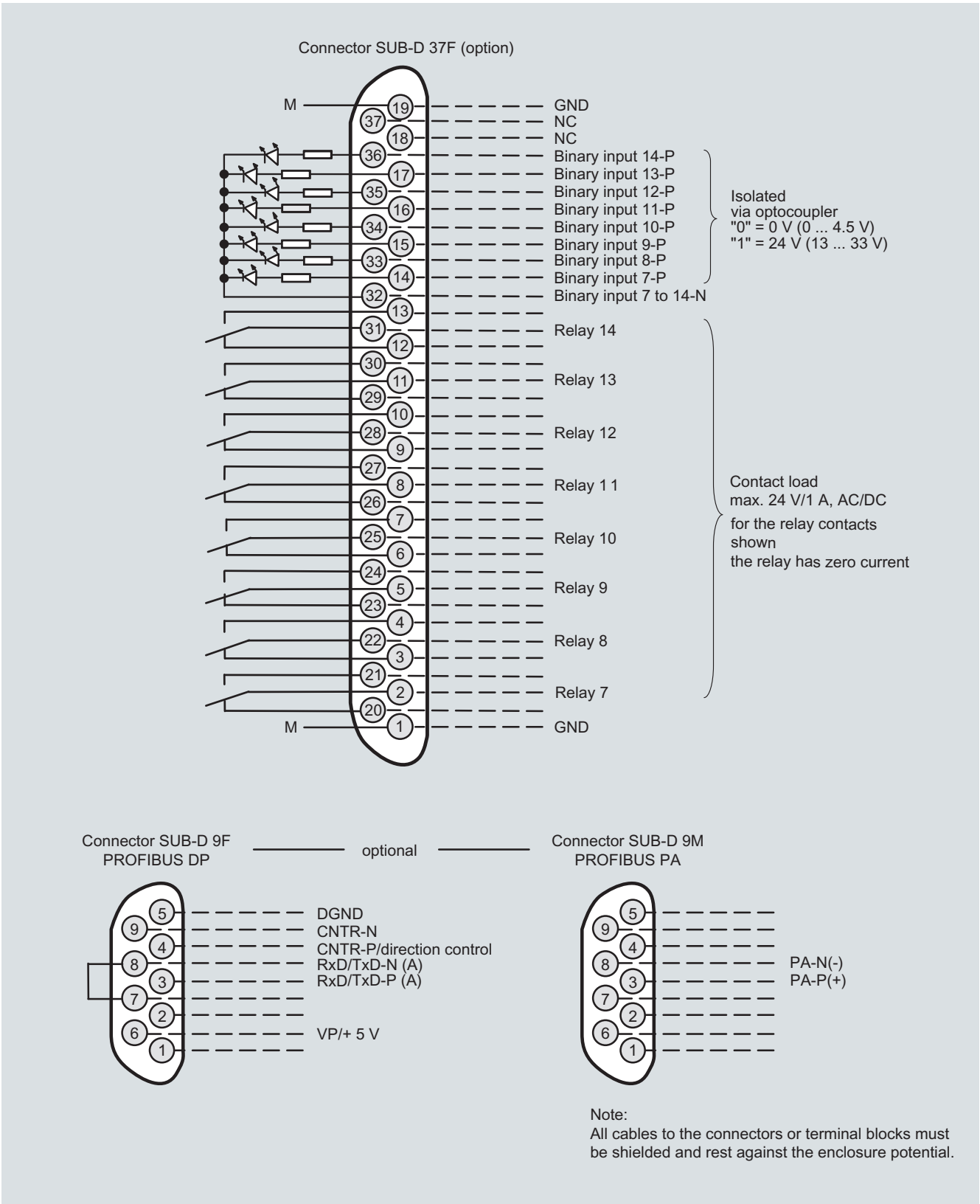
Schematics

Pin assignment (electrical and gas connections)

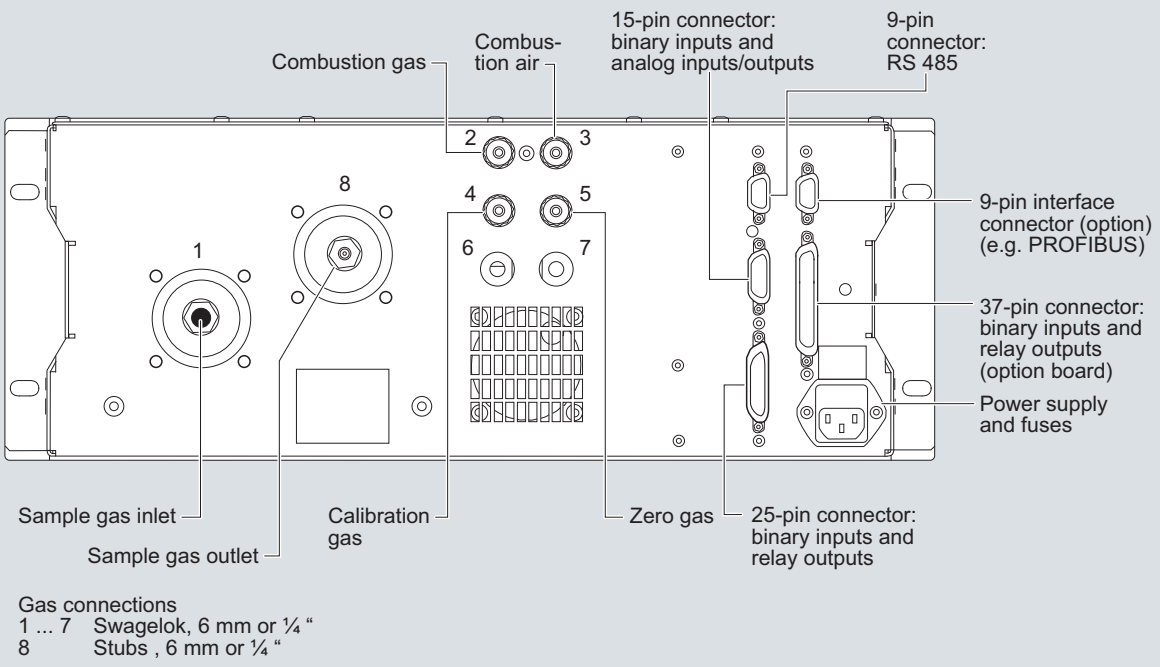


FIDAMAT 6, 19" rack unit, pin assignment

19" rack unit

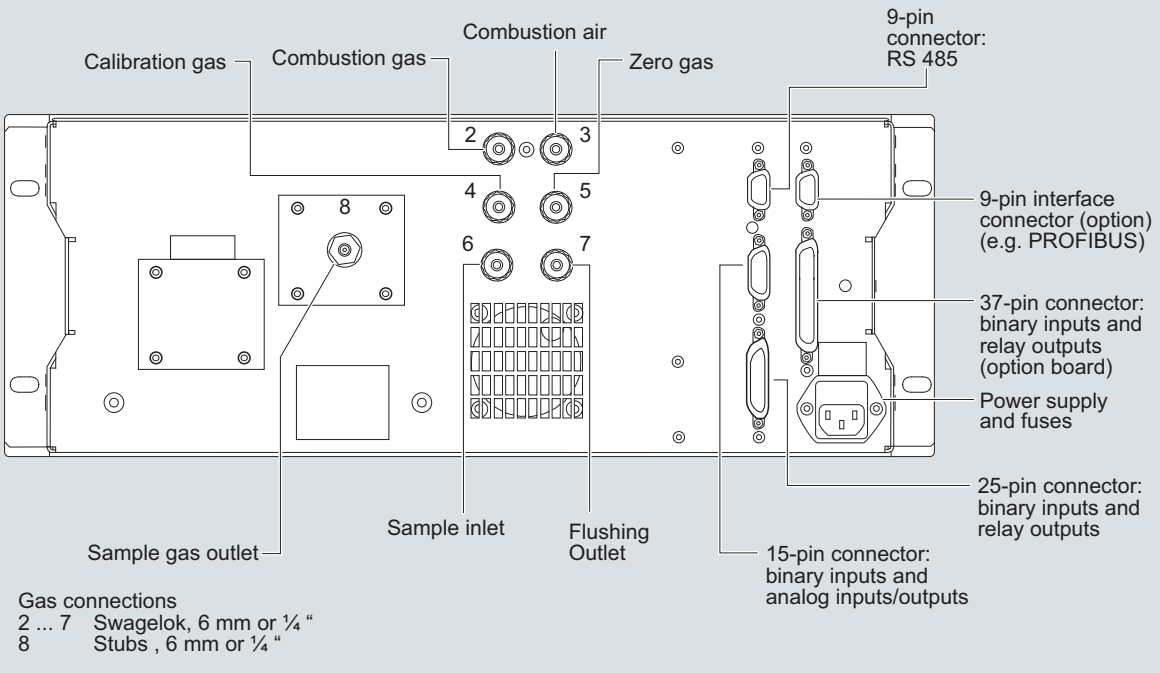


FIDAMAT 6, 19" rack unit, pin assignment of the AUTOCAL board and PROFIBUS connectors



Gas connections
1 ... 7 Swagelok, 6 mm or ¼ “
8 Stubs , 6 mm or ¼ “

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



Gas connections
2 ... 7 Swagelok, 6 mm or ¼ “
8 Stubs , 6 mm or ¼ “

FIDAMAT 6, gas connections and pin assignment, version without pump

Documentation

Selection and ordering data

Operating instructions	Order No.
FIDAMAT 6	
Gas analyzer for determination of total hydrocarbon concentration	
• German	**A5E00221703**
• English	**A5E00222135**
• French	**A5E00222138**
• Spanish	**A5E00222141**
• Italian	**A5E00222144**
FIDAMAT 6-G	
Gas analyzer for determination of total hydrocarbon content	
• German	**A5E00476038**
• English	**A5E00478463**
• French	**A5E00478466**
• Spanish	**A5E00478468**
• Italian	**A5E00478469**

Selection and ordering data

Description	2 years (quantity)	5 years (quantity)		Order No. FIDAMAT 6 With pump		Without pump
Analyzer unit						
FI detector, complete		1		**A5E00295816**		**A5E00295816**
Sample gas path						
Pump (KNF)	1	1	D)	**A5E00882121**		
Set of gaskets for pump (KNF)	4	10	D)	**C79451-Z1030-U2**		
Filter, with gasket for sample gas	1	3		**A5E00248845**		
Pressure regulator	1	1		**A5E00248851**		**A5E00248851**
Gasket for pressure regulator	1	2	D)	**A5E00295107**	D)	**A5E00295107**
Filter, complete (sample gas inlet, 6 mm)		1		**A5E00295928**		
Filter, complete (sample gas inlet, ¼")		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	D)	**C79451-A3040-D101**	D)	**C79451-A3040-D101**
Gasket, graphite, 0.5 to 1 mm (20 units)	1	2	D)	**C79451-A3040-D102**	D)	**C79451-A3040-D102**
Gasket, graphite, 1.5 mm (20 units)	1	2	D)	**C79451-A3040-D103**	D)	**C79451-A3040-D103**
Gasket, graphite, 3 mm (20 units)	1	2	D)	**C79451-A3040-D105**	D)	**C79451-A3040-D105**
Pressure ring, 1 mm (20 units)		1	D)	**C79451-A3040-D112**	D)	**C79451-A3040-D112**
Pressure ring, 1.5 mm (20 units)		1	D)	**C79451-A3040-D113**	D)	**C79451-A3040-D113**
Pressure ring, 3 mm (20 units)		1		**A5E00295333**		**A5E00295333**
Outer rings, 0.5 … 1 mm (20 units)		1	D)	**C79451-A3040-D121**	D)	**C79451-A3040-D121**
Outer rings, 1.5 … 3 mm (1/8") (20 units)		1	D)	**C79451-A3040-D122**	D)	**C79451-A3040-D122**
Electronics						
Front plate	1	1		**A5E00248790**		**A5E00248790**
Adapter plate	1	1	C)	**A5E00248795**	C)	**A5E00248795**
Temperature fuse (retrofitting set)	1	2		**A5E01040317**		**A5E01040317**
Temperature fuse (spare part), from N1-V3-940 onwards				**A5E01040312**		**A5E01040312**
Fuse, 230 V AC	2	3		**A5E00248819**		**A5E00248819**
Fuse, 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	C)	**A5E00284095**	C)	**A5E00284095**
Cable, connecting cable (5-pole)	1	1	C)	**A5E00284096**	C)	**A5E00284096**
Axial-flow fan, 24 V DC		1		**A5E00313839**		**A5E00313839**

C) Subject to export regulations AL: N, ECCN: EAR99

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

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

Notes