Overview

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

FIDAMAT 6

Benefits

The FIDAMAT 6 gas analyzer stands out for its wide range of applications:

- where up to 100% H_2O steam is present
- in high-purity gas applications
- with high-boiling components (up to 200 °C)
- where corrosive gases are present (with pre-filter).

The FIDAMAT 6 has:

- extremely low cross sensitivity to interference gases
- low combustion air consumption
- low oxygen influence.

The device is also equipped with warning and fault messages:

- in the event of combustion gas failure
- if the flame is extinguished
- to indicate faults in the pump and filter.

Application

Application areas

- Environmental protection
- Wastewater (in conjunction with a stripping device, verification of the hydrocarbon content of liquids)
- Measurement of flue gases in accordance with German emission protection legislation and air purity guidelines for fuel types oil, coal, gas, and waste (with German Technical Inspectorate approval)
- TLV (threshold limit value) monitoring at places of work
- Quality monitoring
- Process exhaust monitoring
- High-purity gas measurement 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 (high-purity gas monitoring)
- Research and development
- Cement industry (measurement of emissions)
- Paint shops and dry-cleaning systems
- Refineries (tank storage, waste water)
- Drying systems
- Solvent recovery systems
- Pharmaceuticals industry
- Automobile industry (engine development, engine and transmission development and certification).

Special applications

Special applications are available on request in addition to the standard combinations.

General

Design

- 19“ unit with 4 HU for installation
  - in hinged frames
  - in cabinets, with or without slide rails
- Front panel for service can be hinged down (laptop connection)
- Gas connections for sample gas input and output as well as combustion gas and combustion air, pipe diameter 6 mm or 1/4"
- Gas and electrical connections at the rear
- Internal gas paths: stainless steel (type No. 1.4571).

Display and control panel

- Large LCD panel for simultaneous display of:
  - Measured value
  - Status line
  - Measuring ranges
- Contrast of LCD panel adjustable via menu
- Permanent LED backlighting
- Washable membrane keyboard with five softkeys
- Menu-based operation for configuration, test functions and calibration
- User help in plain text
- Graphic display of concentration trend; programmable time intervals.

Inputs and outputs

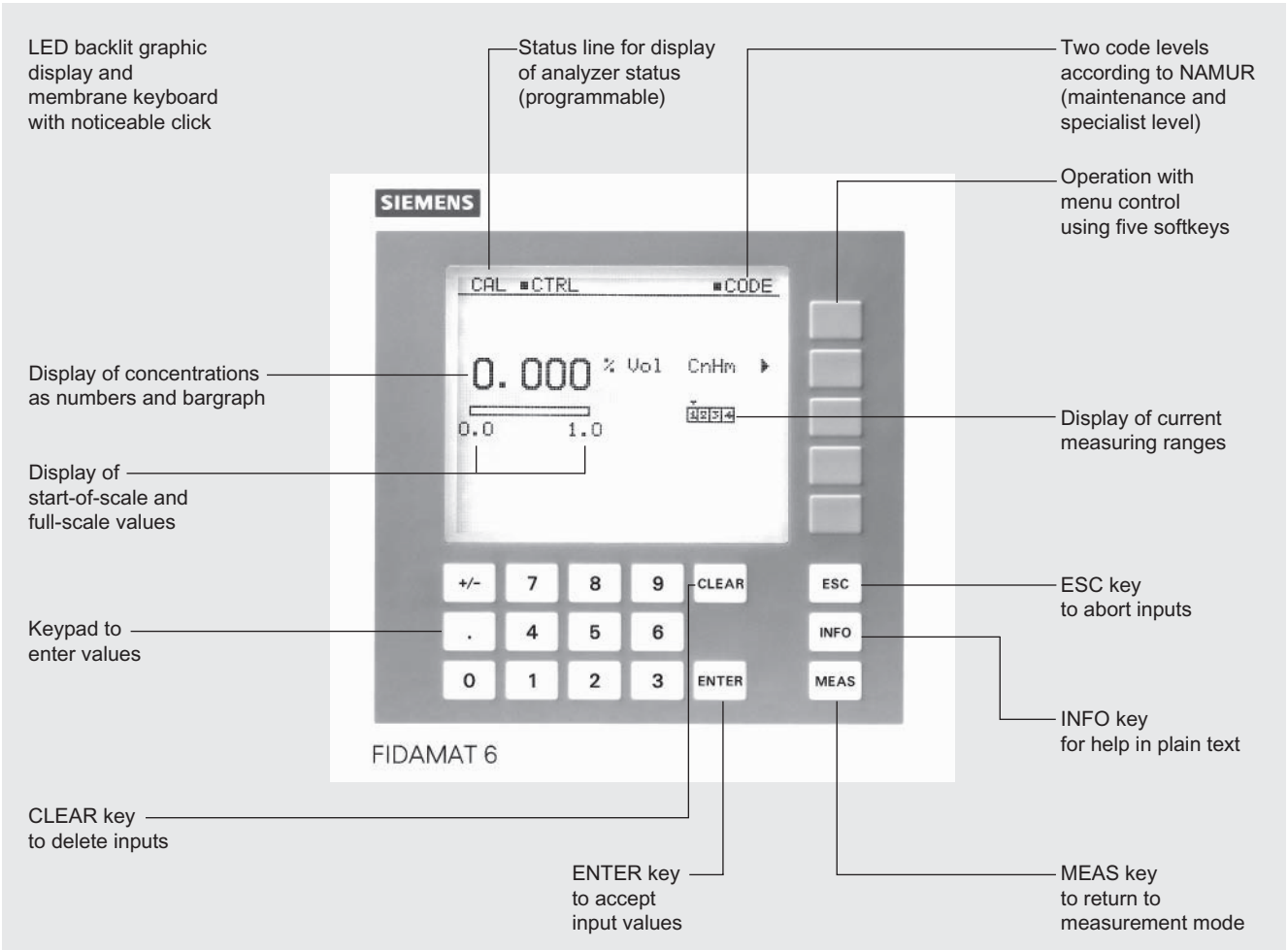
- One analog output
- Two programmable analog inputs
- Six binary inputs freely configurable (e.g. for range switching, processing of external signals from sample preparation)
- Six relay outputs freely configurable (failure, maintenance request, maintenance switch, limit alarm, external solenoid valves, measuring-point switchover)
- Extension with eight additional binary inputs and eight additional relay outputs for automatic calibration with up to four calibration gases.

Communication

- RS 485 included in basic unit (connection at the rear).

Options

- RS 485/RS 232 converter
- RS 485/Ethernet converter
- Linking to networks via PROFIBUS DP/PA interface
- SIPROM GA software as service and maintenance tool.

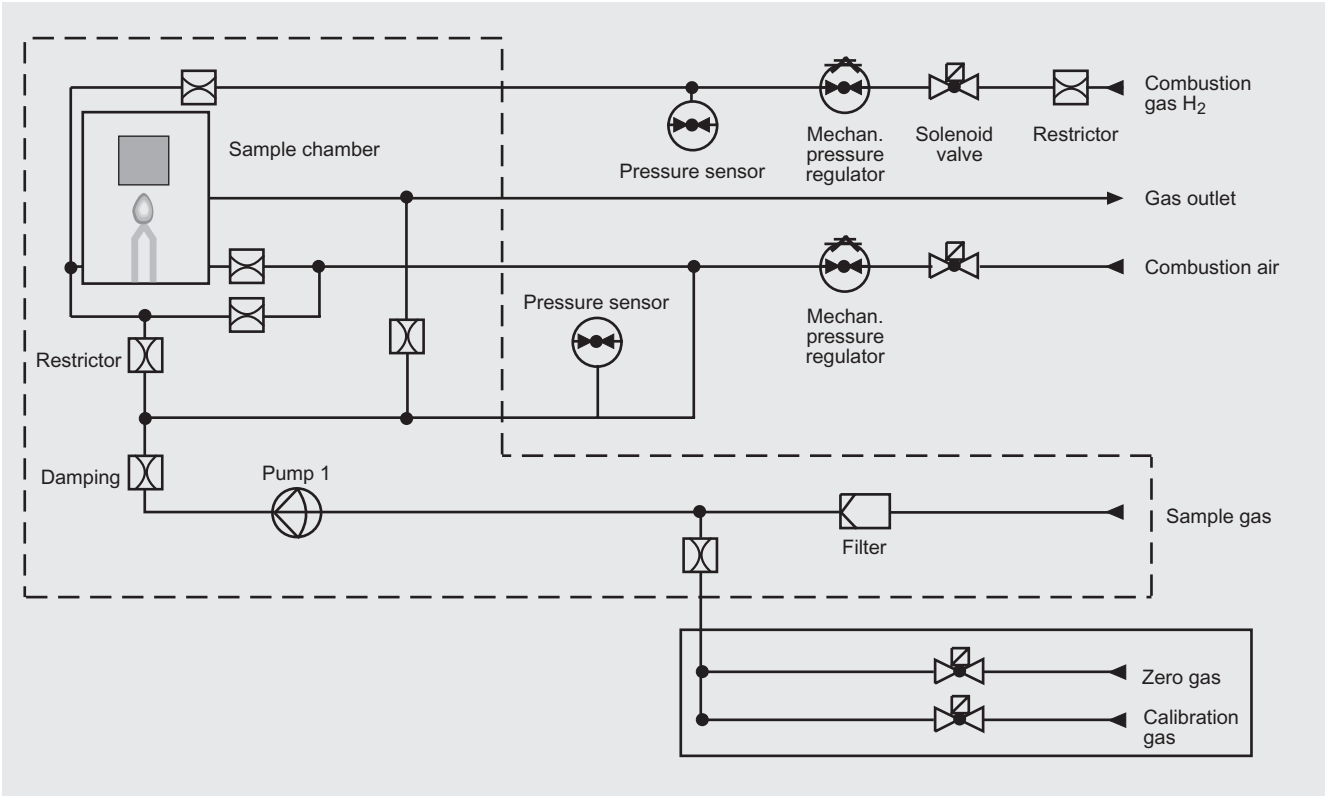


FIDAMAT 6, membrane keyboard and graphic display

Executions of the wetted parts

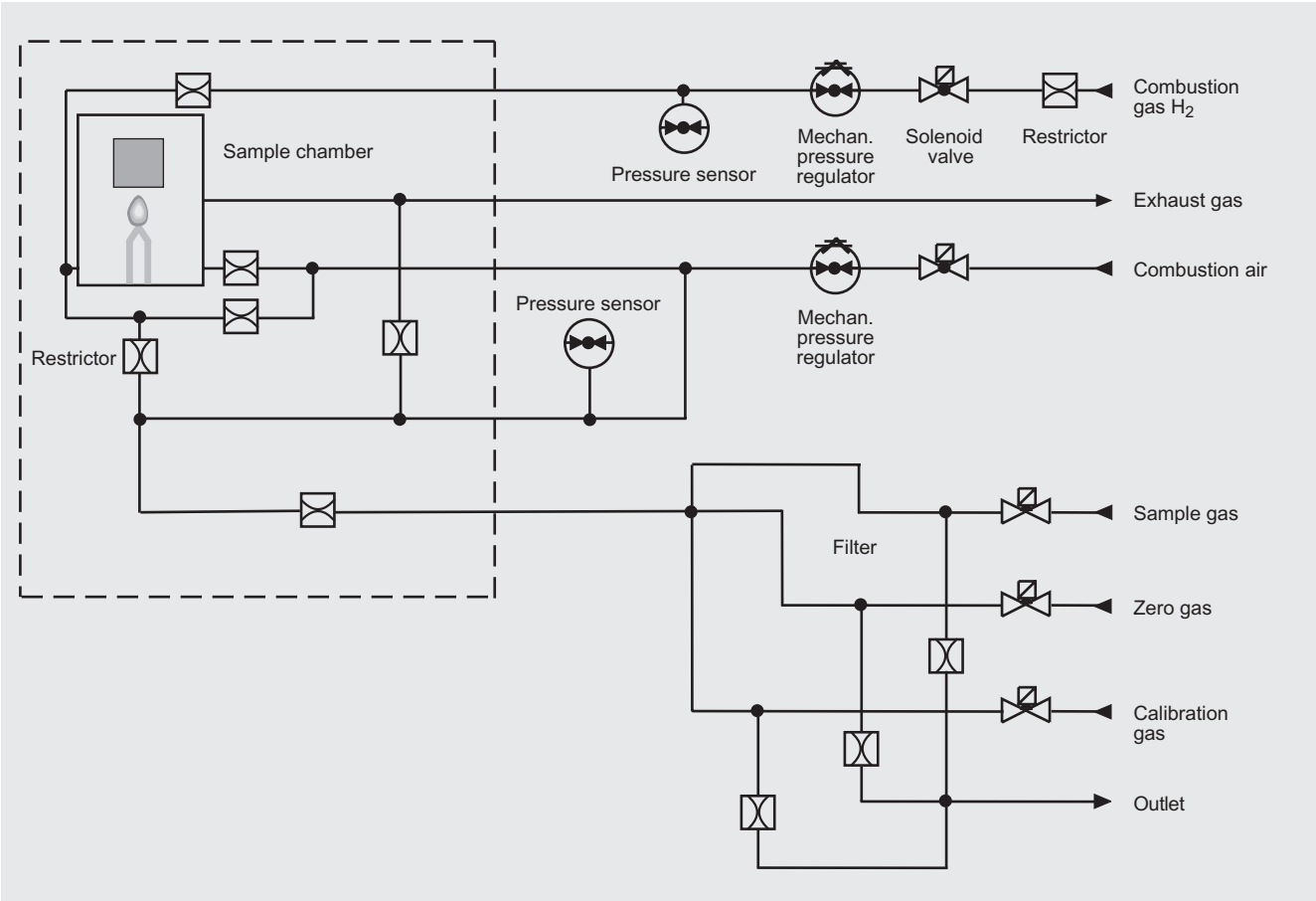
Gas path	19“ unit
Tubing	SS, type No. 1.4571
Gas inlet	SS, type No. 1.4571
Gaskets	Graphite
Sample gas restrictor	Quartz
Auxiliairy gas restrictors	SS, type No. 1.4571
Pump membrane	PTFE
Pump head	SS, type No. 1.4571
Detector	
• Nozzle	Quartz
• FID housing	SS, type No. 1.4571

Gas path



FIDAMAT 6 gas analyzer for determining the total hydrocarbon content, gas path with pump to connect combustion air

General



FIDAMAT 6 gas analyzer for determining the total hydrocarbon content, gas path without pump to connect combustion air

Function

Mode of operation

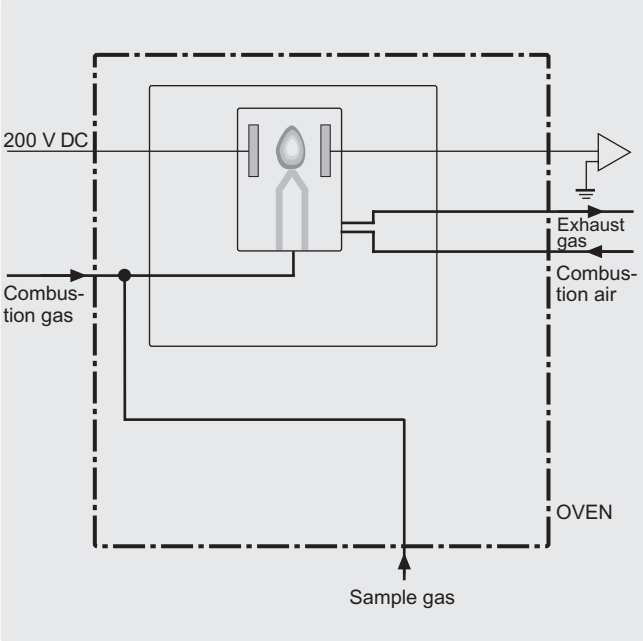
The FIDAMAT 6 performs substance-specific measurement and not component-specific measurement. It measures the total of all hydrocarbons in a sample gas, although with different weighting of the hydrocarbon molecules. At initial exposure, the display is proportional to the number of C atoms in the molecule in question. There are fluctuations in practice, however. The display deviation for the relevant molecule is expressed by the response factor.

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

In the detector, the hydrocarbons in the sample gas are burned in a detonating gas flame. Burning partially ionizes the proportion of organically-bound hydrocarbons. The released ions are converted into a stream by the tension 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 holds the combustion gas pressure constant. The balanced system of pump, capillary tubes, and combustion air ensures that the sample gas pressure is kept constant.

When the analyzer is switched on, ignition and, for versions „with pump“, pump startup are automatic when the setpoint temperature has been reached.



FIDAMAT 6, mode of operation

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

- Maintenance request
  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 pressure, temperature, physical part and pump, fault in the electronics (temperature).
  The measured value can be influenced.
- Failure
  In the event of failure of, for example, the electronics, voltage supply, combustion gas, combustion air and sample gas, the device automatically shuts down (the combustion gas valve is closed).

Note

The sample gas needs to be free of dust. Condensate in the cells must be avoided. That is why the most measuring tasks require an appropriate gas preparation.

Essential characteristics

- Four freely-parameterizable measuring ranges, also with suppressed zero point, all measuring ranges linear
- Galvanically isolated measured value output 0/2/4 bis 20 mA (also inverted)
- Automatic measuring range switchover selectable, remote switchover also possible
- Storage of measured value during calibration possible
- Range identification
- Measuring-point selection for up to 6 measuring points
- Measuring-point identification
- Time constants (static/dynamic noise suppression) can be selected within wide limits; this means the response time of the device can be adapted to the respective measuring task
- Simple handling thanks to menu operation
- Low long-term drift
- Two operation levels with separate authorization code to prevent unintentional and unauthorized use
- Parameterizable automatic measuring range calibration
- Operation based on the NAMUR recommendation
- Customized device versions such as:
  - Customer acceptance
  - TAG labels
  - Drift recording
- Wear-free, corrosion-proof filter housing
- No obstructions in the sample gas restrictors through the use of a quartz restrictor tube
- Purge function in the event of device failure and auxiliary power failure (avoids build-up of toxic and corrosive substances in the device)
- Low combustion air consumption
- Response factors comply with the minimum requirements in accordance with German air purity guidelines and the Working Group of the German Automobile Industry
- Simple operation with the help of a numeric membrane keyboard and operator prompting.

General

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	0.94
Ethylacetate	0.77
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	1.07
Ethylbenzene	0.96
p-xylene	1.03
Dichloromethane	1.13
Trichloroethene	1.01
Tetrachlorethene	1.07
Chloroform	0.72
Chlorobenzene	1.15

Cross influences (examples) [1])

Interference component	Concentration of the interference component	Induced cross influence
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 … 15 mg/m^3.

Technical specifications

General	
Measuring ranges	4, switchable between internal and external; manual and automatic measuring range switchover possible
Smallest possible measuring span	0 ... 10 ppm
Largest possible measuring span	99.999 ppm
Concentration units	ppm, C_1, C_3, C_6 or mgC/m^3
Automatic measuring range switchover	Hysteresis, selectable
Measured value display	Digital concentration display (5 digits with floating point)
Resolution of the digital display	0.1% of the measured value
Position of use	Front panel vertical
Conformity	CE mark EN 50081-1, EN 50082-2
Oven temperature	Adjustable, factory setting 200 °C
Design, enclosure	
Degree of protection	IP20 in accordance with EN 60529
Weight	approx. 23 kg
Electrical characteristics	
Auxiliary power	100 ... 120 V AC (rated operational range 90 V ... 132 V), 48 ... 63 Hz or 200 ... 240 V AC (rated operational range 180 V ... 264 V), 48 ... 63 Hz
Power consumption	approx. 150 VA in operation, approx. 350 VA in the warm-up phase
EMC interference immunity (**E**lectro**M**agnetic **C**ompatibility)	in accordance with standard NAMUR NE21 requirements (08/98)
Electrical safety	in accordance with EN 61010-1, overvoltage category II
Fuse values	100 ... 120 V: 4.0T/250 200 ... 240 V: 2.5T/250
Gas inlet conditions	
Permissible sample gas pressure	
• without pump	< 2000 hPa abs.
• with built-in pump	600 ... 1100 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.)
Time response	
Warm-up period	approx. 2-3 h at room temperature
Response time (T_{90})	2 ... 3 s
Attenuation (electrical time constant)	0 ... 100 s, parameterizable
Dead time (purging time of the gas line in the device at 1 l/min)	with filter 2 ... 3 s
Time for signal processing in the device	< 1 s

Measuring response	
Output signal fluctuation	< 0.75% of the smallest possible measuring range according to the rating plate at an electronic attenuation constant of 1 s (this corresponds to ± 0.25% at 2σ)
Zero drift	< 0.5%/month of the smallest possible measuring span according to the rating plate
Measured value drift	< 1%/week of the appropriate measuring span
Repeatability	< 1% of the appropriate measuring span
Minimum detection limit	0.1 ppm (version for ultra-pure gas measurement: 50 ppb)
Linearity error	< 1% of the appropriate measuring span
Influencing variables	
Ambient temperature	< 1%/10 K related to the least possible measuring span according to the rating plate
Ambient pressure	< 1%/50 hPa
Sample gas pressure	< 2% of the measuring span/1% pressure change (within 600 ... 1100 hPa)
Auxiliary power	< 1% at a change in the output signal span of ± 10%
Frequency	< 1%
Position influence	< 1% at an inclination < 15°
Electrical inputs and outputs	
Analog output	0/2/4 ... 20 mA, floating; max. load 750 Ω
Relay outputs	6, with freely parameterizable changeover contacts for identifying the measuring range, for example; load rating: 24 V AC/DC /1 A, floating
Analog inputs	2, designed for 0/2/4 to 20 mA for pressure pick-ups externally and for correcting the influence of residual gas (interfering gas)
Binary inputs	6, designed for 24 V, floating, freely parameterizable, for measuring range switchover, for example
Serial interface	RS 485
Options	Autocal function with 8 additional binary inputs and relay outputs, also with PROFIBUS PA or PROFIBUS DP
Climatic conditions	
Permissible ambient temperature	5 ... +45 °C in operation, -30 ... +70 °C for storage and transport
Permissible humidity	< 90% RH (RH: relative humidity) mid-year, for storage and transport (no exceeding of dew point)

FIDAMAT 6

19" unit

FIDAMAT 6 with pump and heated oven, with combustion air connection					
Gases	Input 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	3000 ... 5000	1000 ± 20		~ 25	—
Combustion air	3000 ... 5000	420 ± 20	1500	~ 320	~ 500
Sample gas	~ 1000	—	1500 ± 2	~ 3	~ 1000
Zero gas	3500 ... 4000	—	1500 ± 2	~ 3	~ 1000
Calibration gas	3500 ... 4000	—	1500 ± 2	~ 3	~ 1000

FIDAMAT 6 without pump and with heated oven, with combustion air connection					
Gases	Input 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	3000 ... 5000	1000 ± 20		~ 25	—
Combustion air	3000 ... 5000	1485 ± 2	1500	~ 320	~ 300
Sample gas	~ 2000	—	1500 ± 2	~ 3	~ 500
Zero gas	~ 2000	—	1500 ± 2	~ 3	~ 500
Calibration gas	~ 2000	—	1500 ± 2	~ 3	~ 500

Selection and Ordering Data	Order No.
FIDAMAT 6 gas analyzer 19“ unit for installation in cabinets	7MB2421- ■■■■■-■■A■
Gas connections	
Pipe with outer diameter 6 mm	0
Pipe with outer diameter ¼“	1
Version	
Without pump, for sample gas with overpressure [1])	A
Without pump, for sample gas with overpressure; high-purity measurement [1])	B
With heated pump, for sample gas with atm. pressure	D
Combustion air feed	
With combustion air connection	A
Channel number	
1-channel version	1
Additional electronics	
Without	0
Autocal function	
• With 8 additional binary inputs/outputs	1
• With 8 additional binary inputs/outputs and PROFIBUS PA interface [1])	6
• With 8 additional binary inputs/outputs and PROFIBUS DP interface [1])	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

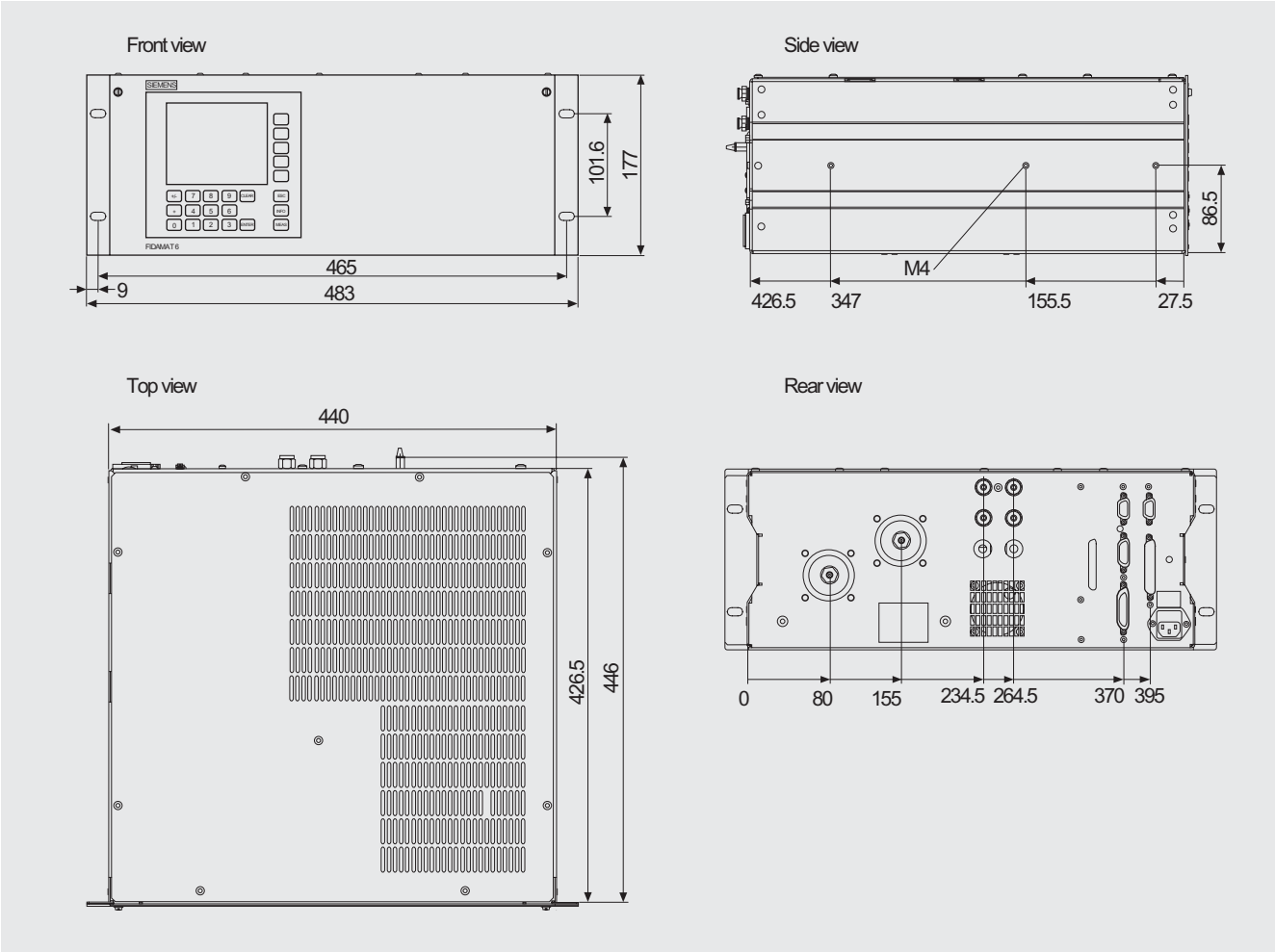
Further versions	Order code
Please add „-Z“ to Order No. and specify order codes.	
Interface converter from RS 485 to RS 232	**A11**
Slide rails (2 rails)	**A31**
Set of Torx tools	**A32**
TAG labels (costumer-defined inscriptions)	**B03**
Clean for O_2 service (specially cleaned gas path) [1])	**Y02**
Measuring range in plain text, if different from 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 according to 17. BImSch [2])	**Y17**

Retrofitting sets	Order No.
RS 485/Ethernet converter [1])	**C79451-A3364-D61**
RS 485/RS 232 converter	**C79451-Z1589-U1**
Autocal function with 8 binary inputs/outputs [1])	**C79451-A3480-D511**
Autocal function with 8 binary inputs/outputs and PROFIBUS PA [1])	**A5E00057307**
Autocal function with 8 binary inputs/outputs and PROFIBUS DP [1])	**A5E00057312**

1) On request.
2) In preparation.

19" unit

Dimensional drawings

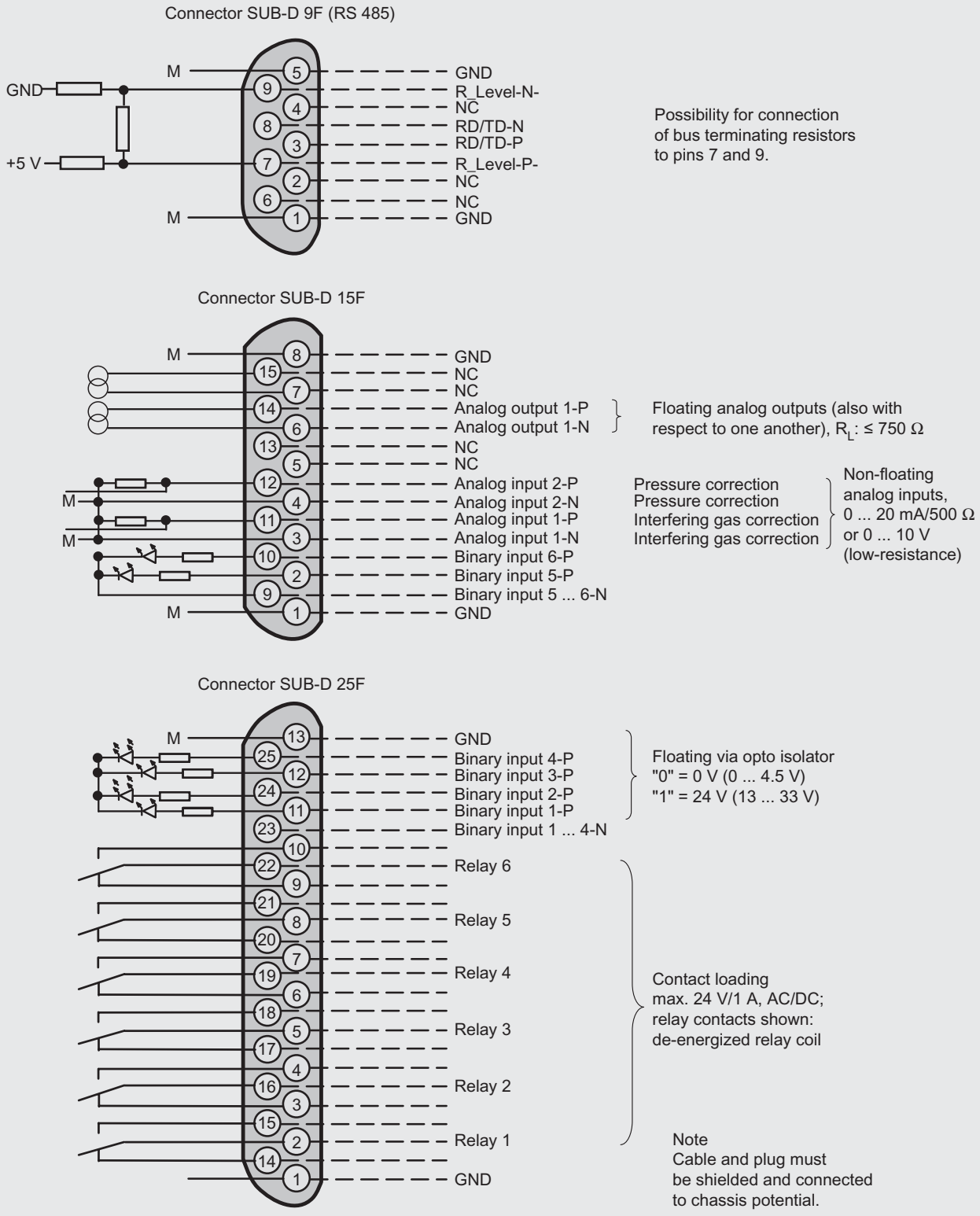


FIDAMAT 6, 19“ unit, dimensions in mm

2

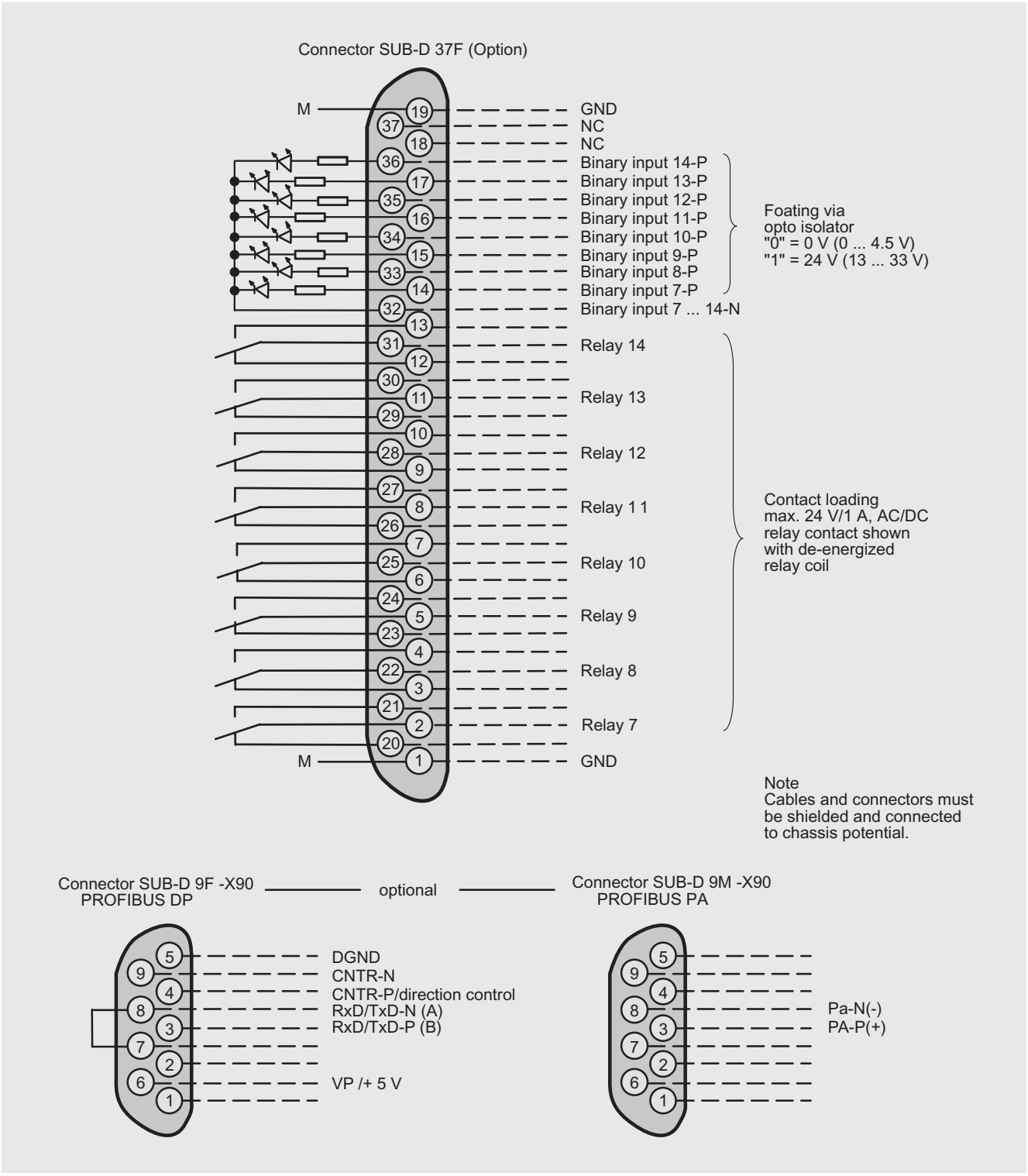
Schematics

Pin assignment (electrical and gas connections)

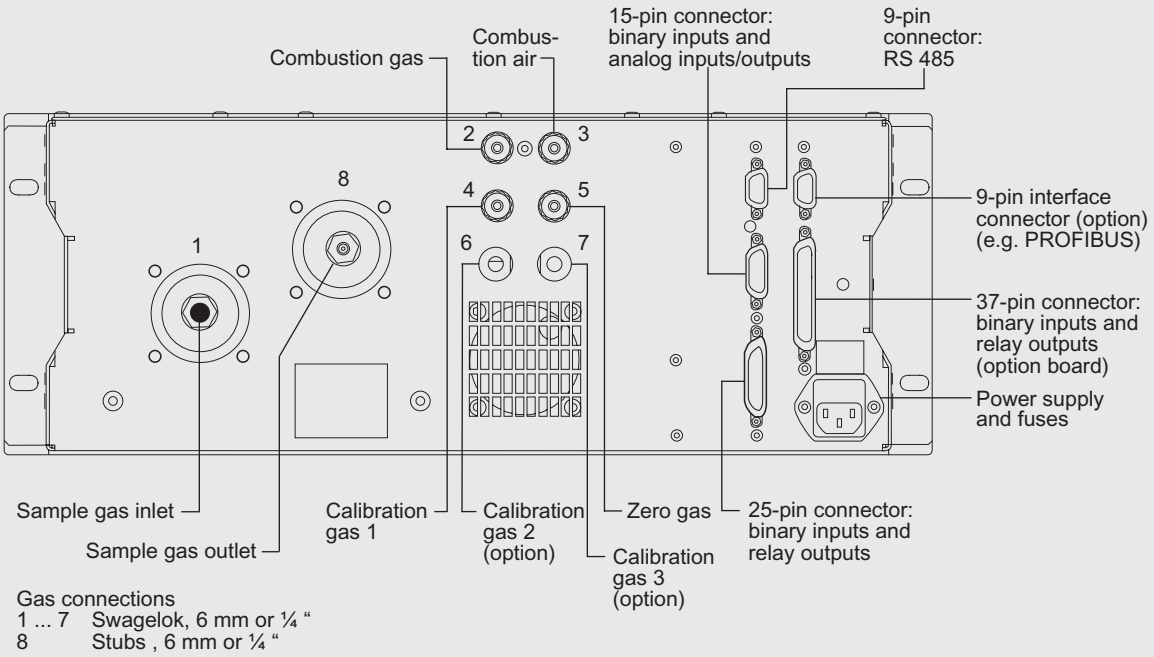


FIDAMAT 6, 19“ unit, pin assignment

19" unit



FIDAMAT 6, 19“ unit, pin assignment of the Autocal board and PROFIBUS connectors



FIDAMAT 6, gas and electrical connections, version with pump

Documentation

Selection and Ordering Data

Manual	Order No.
FIDAMAT 6 Gasanalysengerät zur Bestimmung von Gesamtkohlenwasserstoff (German)	**A5E00221703**
FIDAMAT 6 Gas Analyzer for the Determination of Total Hydrocarbon Content (English)	**A5E00222135**
FIDAMAT 6 Analyseur de gaz pour la détermination des hydrocarbures totaux (French)	**A5E00222138**
FIDAMAT 6 Analizador de gases para la determinación del contenido total de hidrocarburos (Spanish)	**A5E00222141**
FIDAMAT 6 Apparecchio analisi del gas per la determinazione della quantità di idrocarburi totali (Italian)	**A5E00222144**

Selection and Ordering Data

Description	2 years (qty)	2 years (qty)	Order No.
Analyzer section			
FID oven insert	1	1	**A5E00248859**
FI detector, complete		1	**A5E00295816**
Sample gas path			
Pump	1	1	**A5E00248837**
Filter, with gasket for sample gas	1	3	**A5E00248845**
Pressure regulator	1	1	**A5E00248851**
Gasket for pressure regulator	1	2	**A5E00295107**
Filter, complete (sample gas inlet, 6 mm)		1	**A5E00295928**
Filter, complete (sample gas inlet, ¼ “)		1	**A5E00295976**
Solenoid valve (one-way)	1	2	**A5E00296562**
Solenoid valve (two-way)	1	2	**A5E00296565**
Gasket, PTFE, 1,5 mm (20 pieces)	1	2	**C79451-A3040-D101**
Gasket, graphite, 0.5 to 1 mm (20 pieces)	1	2	**C79451-A3040-D102**
Gasket, graphite, 1.5 mm (20 pieces)	1	2	**C79451-A3040-D103**
Gasket, graphite, 3 mm (20 pieces)	1	2	**C79451-A3040-D105**
Clamping ring, 1 mm (20 pieces)		1	**C79451-A3040-D112**
Clamping ring, 1.5 mm (20 pieces)		1	**C79451-A3040-D113**
Outer rings, 0.5 to 1 mm (20 pieces)		1	**C79451-A3040-D121**
Outer rings 1.5 to 3 mm (1/8 inch) (20 pieces)		1	**C79451-A3040-D122**
Electronics			
Front plate	1	1	**A5E00248790**
Adapter plate	1	1	**A5E00248795**
Temperature fuse	1	2	**A5E00248802**
Fuse link, 230 V AC	2	3	**A5E00248819**
Fuse link, 110 V AC	2	3	**A5E00248822**
LC display	1	1	**A5E00248920**
Cable, temperature sensor oven		1	**A5E00283770**
Cable, temperature sensor physics		1	**A5E00283780**
Cable, magnetic distribution		1	**A5E00283800**
Cable, heating oven, 230 V AC		1	**A5E00283817**
Cable, heating oven, 110 V AC		1	**A5E00295469**
Cable, tensile stress, complete		1	**A5E00284092**
Cable, measuring cable		1	**A5E00284094**
Cable, connecting cable	1	1	**A5E00284095**
Cable, connecting cable	1	1	**A5E00284096**
Axial-flow fan, 24 V DC		1	**A5E00313839**

If the unit was delivered with specially cleaned gas path for high oxygen content (so-called "Cleaned for O_2 service"), please absolutely specify it for a spare part order. This is the only way to guarantee that the gas path furthermore corresponds to the special requirements for this variant.