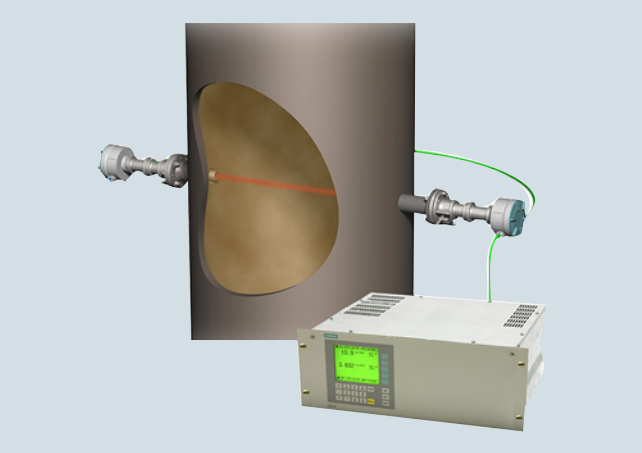
Overview

LDS 6 is a diode laser gas analyzer with a measuring principle based on the specific light absorption of different gas components. LDS 6 is suitable for fast and non-contact measurement of gas concentrations in process or flue gases. One or two signals from up to three measuring points are processed simultaneously by the central analyzer unit. The in-situ cross-duct sensors at each measuring point can be separated up to 700 m from the central unit by using fiber-optic cables. The sensors are designed for operation under harsh environmental conditions and contain a minimum of electrical components.



LDS 6, typical installation with cross-duct sensors

Benefits

The in-situ gas analyzer LDS 6 is characterized by a high availability and unique analytical selectivity, and is optimally suitable for numerous applications. LDS 6 enables the measurement of one or two gas components or - if desired - the gas temperature directly in the process:

- With high dust load
- In hot, humid, corrosive, explosive, or toxic gases
- In applications showing strong varying gas compositions
- Under harsh environmental conditions at the measuring point
- Highly selective, i.e. mostly without cross-sensitivities

LDS 6 properties:

- Little installation effort
- Minimum maintenance requirements
- Extremely rugged design
- High long-term stability through built-in, maintenance-free reference gas cell, field calibration is unnecessary
- Real-time measurements

Moreover, the instrument provides warning and failure messages upon:

- Need for maintenance
  - Erroneous reference function
  - Bad signal quality
- Violation of a lower or upper alarm level for the measured variable
- Transmitted amount of light violating an upper or lower limit

Application

Applications

- Process optimization
- Continuous emission monitoring for all kinds of fuels (oil, gas, coal, and others)
- Process measurements in power utilities and any kind of incinerator
- Process control
- Explosion protection
- Measurements in corrosive and toxic gases
- Quality control
- Environmental protection
- Plant and operator safety

Sectors

- Power plants
- Steel works
- Cement industry
- Chemical and petrochemical plants
- Automotive industry
- Waste incinerators
- Glass and ceramics production
- Research and development
- Semiconductor production

Special applications

In addition to the standard applications, special applications are available upon request. These contain both an expansion of the temperature and pressure range, as well as an expansion of the concentration measuring range. Furthermore, other gas species can be measured using special applications.

General information

Design

The gas analyzer LDS 6 consists of a central unit and up to three in-situ sensors. The connection between the central unit and the sensors is established by a so-called hybrid cable, which contains optical fibers and copper wires. An additional cable connects the transmitter and receiver parts of the cross-duct sensor.

Central unit

The central unit is housed in a 19" rack unit housing with 4 fixing points for mounting:

- In a hinged frame
- In racks with or without telescopic rails

Display and control panel

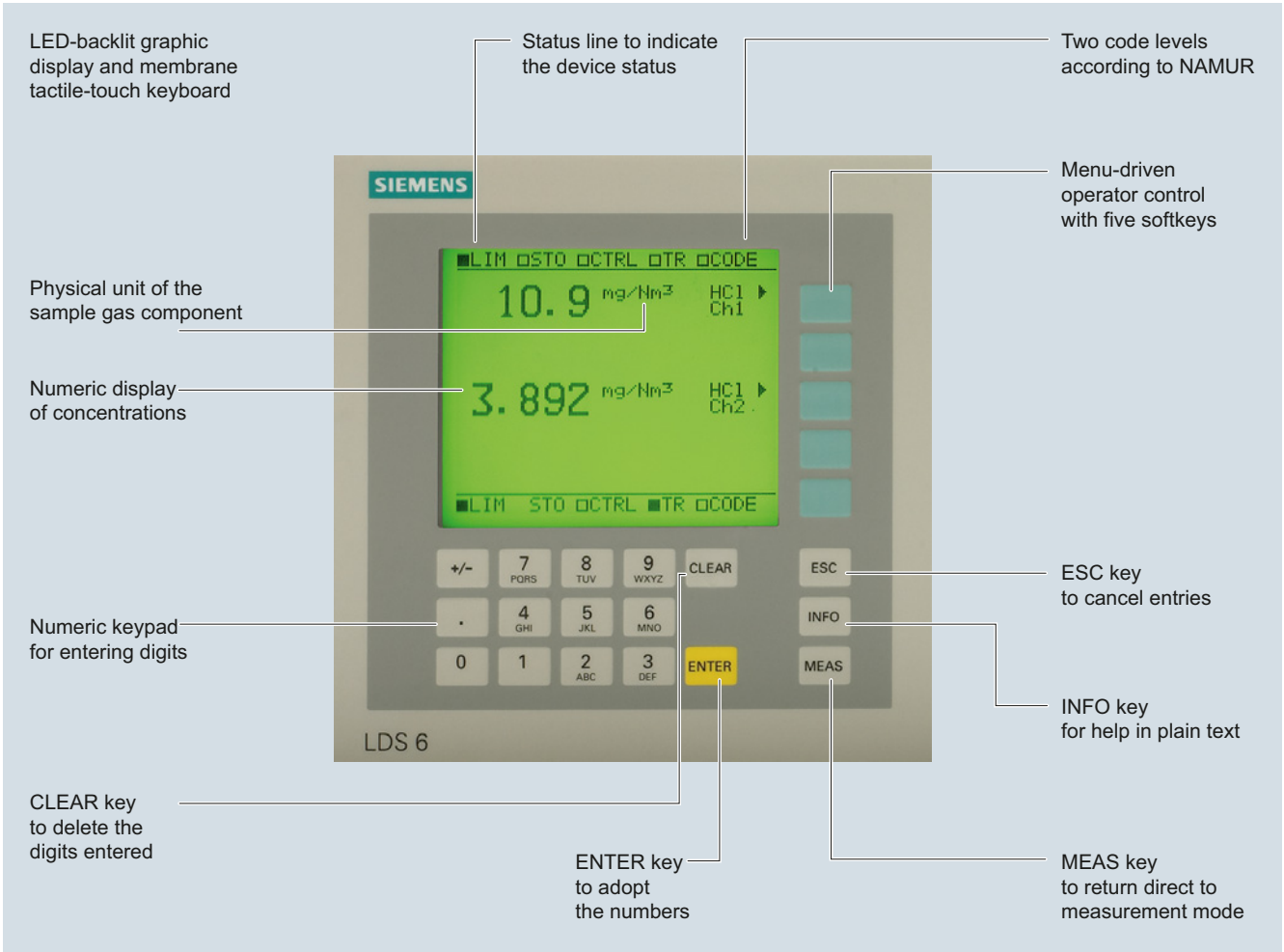
- Large LCD field for simultaneous display of measurement result and device status
- Contrast of the LCD field is adjustable via the menu
- LED background illumination of the display with energy-saving function
- Easy-to-clean membrane touch pad with softkeys
- Menu-driven operation for parameterization and diagnostics
- Operation support in plain text

Inputs and outputs

- One to three measurement channels with hybrid connections for the sensors at the measuring points
- 2 analog inputs per channel for process gas temperature and pressure
- 2 analog outputs per channel for gas concentration(s). For selected versions, the transmission can be read out as an alternative.
- 6 freely configurable binary inputs per channel for signaling faults or maintenance requests from external temperature or pressure transducers or sensor purging failure.
- 6 freely configurable binary outputs per channel (signaling of fault, maintenance requirements, function control, transmission limit alarm, concentration limit alarm, store analog output)

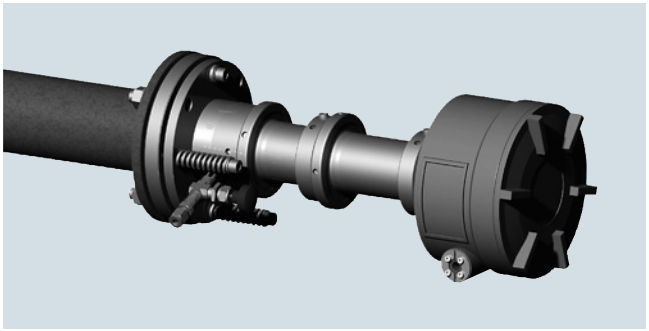
Communication

Network connection: Ethernet (T-Base-10) for remote diagnostics and maintenance.



LDS 6 central unit, membrane keyboard and graphic display

Cross-duct sensors



Sensor CD 6, transmitter or detector unit

- In-situ cross-duct sensors, configured as transmitter and detector unit, connected via sensor cable
- Connection to the LDS 6 central unit via a so-called hybrid cable of max. 700 meters in length (total hybrid and sensor connecting cable length: max. 250 m in Ex Zone 0 and Ex Zone 1)
- Stainless steel, some painted aluminum
- IP65 degree of protection for sensor
- Adjustable flanges with flange connection
- DN 65/PN 6, ANSI 4"/150 lbs
- Optional flameproof window flanges with dimensions: DN 65/PN 6, DN 80/PN 16, ANSI 4"/150 lbs, other process interfaces available on request
- Purging facilities on the process and the sensor sides, configurable application with purging gas connections for:
  - Instrument air
  - Purging air blower
  - Steam
  - Nitrogen
  - Process gases to which the pressure equipment directive cat. 2 does not apply
- In combination with high-pressure window flanges, process purging can be done using instrument air or nitrogen
- Quick release fasteners for cleaning the measurement openings and the sensor window
- Optional: Version with explosion protection in accordance with ATEX / IEC Ex ia
- Sensor type CD 6 is compliant with the pressure equipment directive

Parts in contact with the process gas

The sensors normally do not come into contact with the process gas, since purging with a gaseous media is applied at the process side. Stainless steel purging gas tubes in front of the sensor windows immerse slightly into the process gas and thus limit the purging volume. Special materials such as Hastelloy and plastics (PP) are available on request.

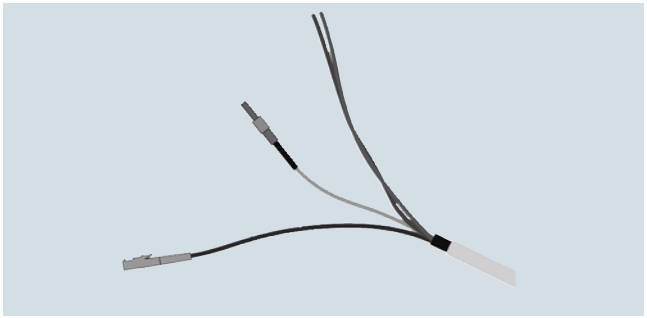
Hybrid and sensor cables

A combination of fiber-optic cables and twisted copper wires connects the sensors to the central unit. The hybrid cable connects the central unit with the detector unit of the sensor, the sensor cable connects the transmitter and receiver units of the sensor.

For installation in Ex-protected environments, the legislative regulations have to be complied with, such as the spatial separation of intrinsically-safe from non-intrinsically-safe cables.

In compliance with standard EN IEC 60079-14, systems with intrinsically-safe circuits must be installed such that their intrinsic safety is not impaired by electric or magnetic fields. Therefore the hybrid and sensor cables of the LDS 6 in an Ex application must be routed in such a way that they cannot generate electric or magnetic fields, e.g. by coiling them in more than one cable loop. To guarantee a good signal quality and to avoid impermissible inductance loops, the hybrid and sensor cables should be kept as short as possible.

- The distance between central unit and measuring point can be
  - up to 250 m for Ex units when used in Zone 0 and Zone 1 (total hybrid and sensor connecting cable length)
  - up to 700 m for Ex units used in Zone 2 and for non-Ex units
- Hybrid and sensor cables
  - Multimode fiber-optic cable, provided with SMA connections for transmission of the measured signal
  - Two-wire copper cable, in twisted pair version, for +24 V supply of the detector electronics (+12 V in the case of Ex-suitable instruments)
- Additionally for the hybrid cable:
  - Single-mode fiber-optic cable, configured double-sided with E2000 connectors for transmission of laser light
- Rugged cable sheath for laying in open cable ducts or ductworks
- Sheath material: oil-resistant polyurethane



Connections of the hybrid cable

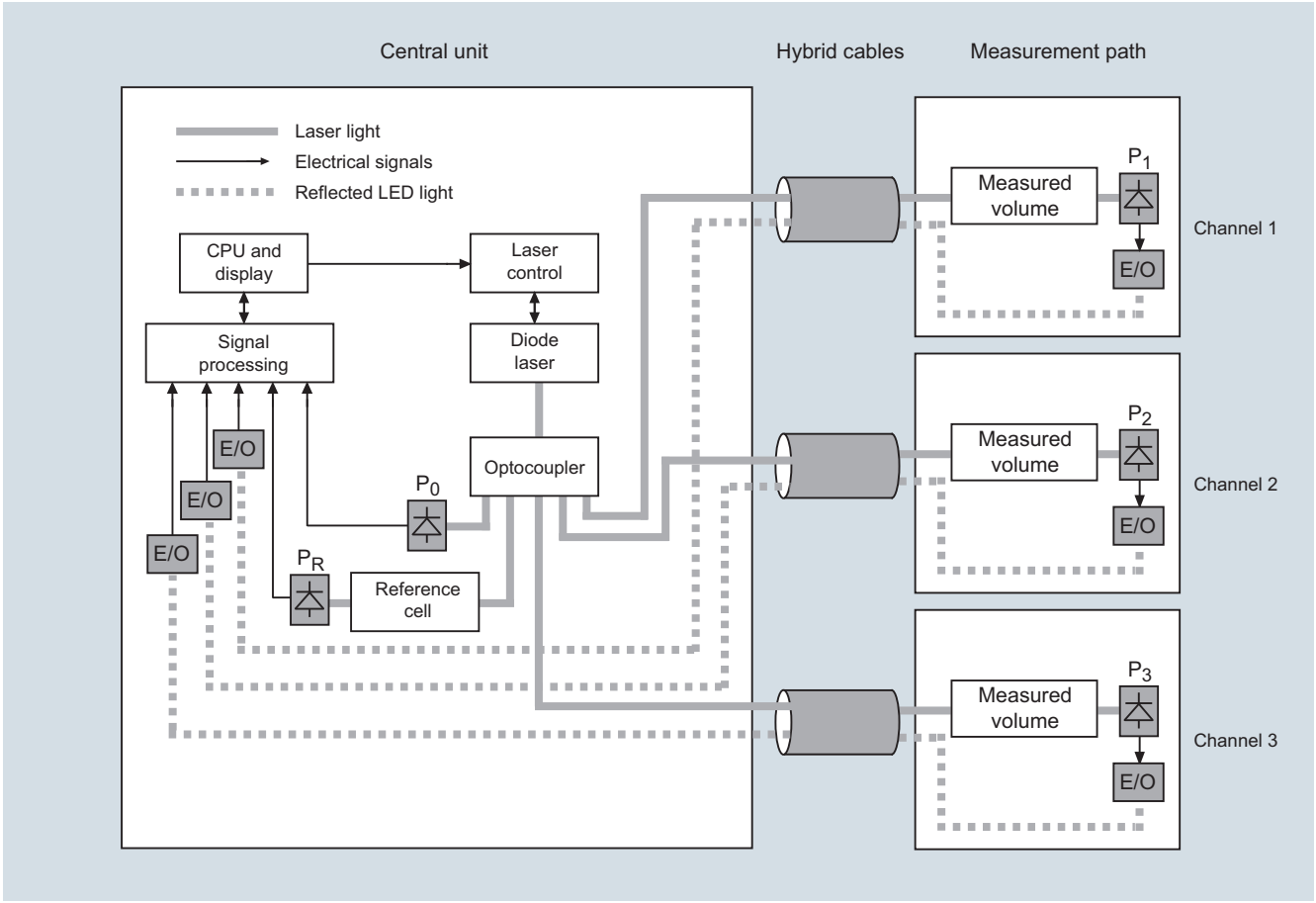
2

Function

Operating principle

LDS 6 is a gas analyzer employing single-line molecular absorption spectroscopy. A diode laser emits a beam of near-infrared light, which passes through the process gas and is detected by a receiver unit. The wavelength of the laser diode output is tuned to a gas-specific absorption line. The laser continuously scans this single absorption line with a very high spectral resolution.

The result is a fully resolved single molecular line which is analyzed in terms of absorption strength and line shape. The influence of cross-sensitivities on the measurement is negligible, since the quasi-monochromatic laser light is absorbed very selectively by only one specific molecular line in the scanned spectral range.

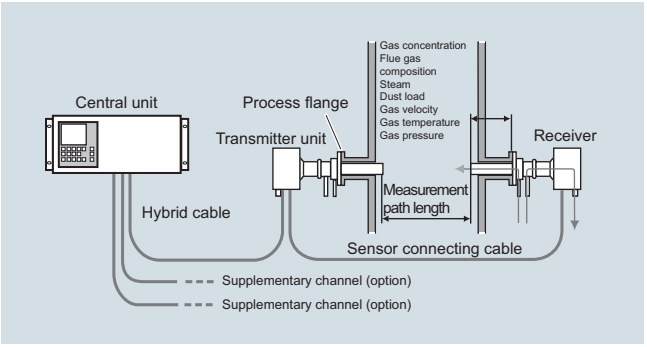


Basic design of the LDS 6

Configuration examples

A feature of the in-situ analytical procedure is that the physical measurement takes place directly in the stream of process gas, and usually also directly in the actual process gas line. All process parameters such as gas matrix, pressure, temperature, moisture, dust load, flow velocity and mounting orientation can influence the measuring properties of the LDS 6 and must therefore be systematically investigated for each new application.

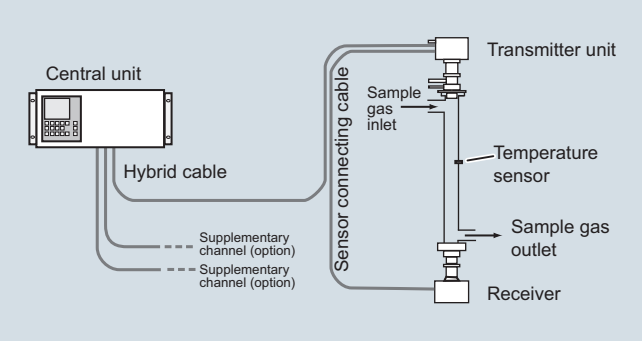
A feature of the standard applications defined in the ordering data of the LDS 6 is that the typical process conditions are well-known, documented, and the guaranteed measuring properties can be proven by reference installations. If you cannot find your application among the standard applications, please contact Siemens. We will be pleased to check your possible individual application of the LDS 6. You can find an application questionnaire on the LDS 6 product sites on the Internet:
www.siemens.com/insituquestionnaire



Typical transmitted light setup of LDS 6, in-situ

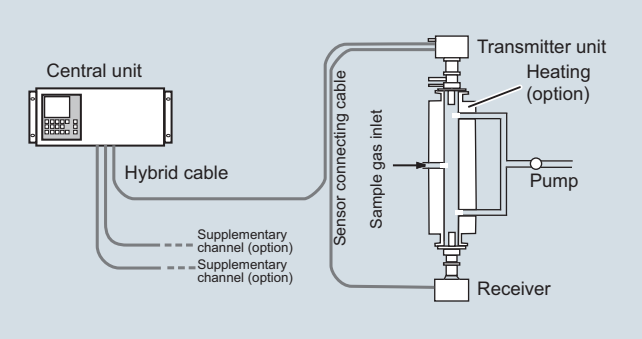
To avoid contamination of sensor optics on the process side, clean gaseous purging media such as instrument air, N_2 or steam are used. Purging air tubes on the sensor heads, which slightly penetrate into the process gas stream, define the effective measuring path length.

The LDS 6 can measure in both the transverse and longitudinal directions of the process gas flow. In certain cases, the process conditions make it necessary to condition the sample gas stream in a bypass line with respect to process temperature, pressure and/or optical path length. Further treatment of the process gas, such as drying or dust precipitation, is usually unnecessary.



Typical transmitted light setup of LDS 6, in bypass

A flow cell is available by special application for the LDS 6 which has been specially optimized for use with the LDS 6 and its transmitted-light sensors with respect to handling and measuring performance. It is designed to reduce surface effects, and is therefore also highly suitable for polar gases like ammonia. This flow cell is available in heated and non-heated versions. Wheel mounted and wall mounted versions are available.



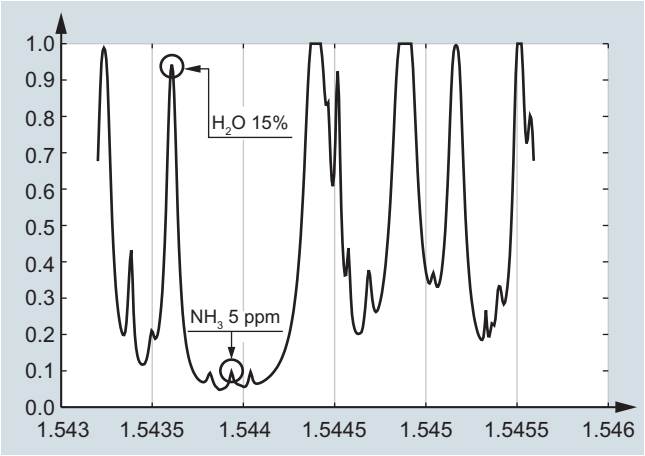
Measuring configuration of LDS 6 with heated flow cell

General information

LDS 6 is connected to the measuring points by fiber optics. The laser light is guided by a single-mode fiber from the central unit to the transmitter unit of the in-situ sensor. The sensor consists of a transmitter and a receiver; the distance between them defines the measurement path. In the receiver box, the light is focused onto a suitable detector. The detector signal is then converted into an optical signal and transmitted via a second optical fiber to the central unit, where the concentration of the gas component is determined from the detected absorption signal.

LDS 6 usually measures a single gas component by means of the absorption capacity of a single fully resolved molecular absorption line. The absorption results from conversion of the radiation energy of the laser light into the internal energy of the molecule.

In some specific cases, two components can be measured simultaneously if their absorption lines are so close to each other that they can be detected within the laser spectrum by one single scan (for example water (H_2O) and ammonia (NH_3)).



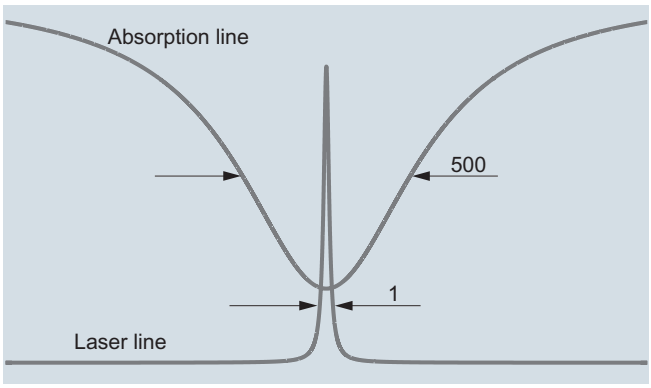
Absorption spectra of water and ammonia

Typical measurable gases for LDS 6 are:

- Oxygen (O_2) for low and high pressure
- Hydrogen fluoride (HF) + water
- Hydrogen chloride (HCl) + water
- Ammonia (NH_3) + water
- Water vapor (H_2O)
- Carbon monoxide (CO)
- Carbon dioxide (CO_2)
- CO + CO_2

By using an internal reference cell normally filled with the gas measured, the stability of the spectrometer is permanently checked in a reference channel.

By doing so, the continuous validity of the calibration is ensured without the need to carry out external recalibration using bottled calibration gases or reference gas cells.



Typical spectral bandwidth of an absorption line compared to the bandwidth of the laser light.

Influences on the measurement

Dust load

As long as the laser beam is able to generate a suitable detector signal, the dust load of the process gases does not influence the analytical result. By applying a dynamic background correction, measurements can be carried out without any negative impact. Under good conditions, particle densities up to 100 g/Nm^3 (distance 1 m) can be handled by the LDS 6. Varying dust loads are compensated by scanning the laser over the gas absorption line and the current background.
The effect of a high dust load is complex and depends on the path length and particle size. The optical damping increases at longer path lengths. Smaller particles also have a large influence on the optical damping. With a combination of high dust load, long path length and small particle size, the technical support at Siemens should be consulted.

Temperature

The effect of temperature on the absorption strength of the molecule line is compensated by a correction factor. A temperature signal can be fed into an analog instrument from an external temperature sensor. This signal is then used to correct the influence of the temperature on the observed line strength. If the temperature of the sample gas remains constant, it is alternatively possible to carry out a static correction using a preset value.
At high process gas temperatures, generally from approximately 1 000 °C, there may be noticeable broadband IR radiation of gas and dust, or flames may occasionally occur in the measurement path. An additional optical bandpass filter can be set upstream of the detector to protect it and prevent saturation by the strong background radiation.

Pressure

The effect of pressure on the absorption line, and consequently on the measured concentration, is compensated with a correction factor. The gas pressure can affect the line shape of the molecular absorption line. An analog pressure signal can be sent to the device from an external pressure sensor to fully compensate for the effect of the pressure including the density effect.

Optical path length

The absorption values analyzed by the LDS 6 are typically small. As a result of Beer-Lambert's law, the absorption of laser light depends on the optical path length within the gas, among other factors. Therefore, the precision in determining the effective optical path length in the process might limit the overall precision of the measurement.
As the sensor optics on the process side normally need to be purged to keep them clean over a long period of time, the thickness of the mixing zone between the purging medium and the process gas and its concentration distribution need to be considered. In a typical in-situ installation directly in the line and with some meters of path, the influence of the purging gas on the effective path length can be neglected.
Path length and dust load are mutually influencing: the higher the dust load in the process, the shorter the max. possible path length. For short path lengths in the range ≤ 0.3 m, contact Siemens Technical Support.

Maintenance and fault messages

LDS 6 outputs different warnings via relays:

- Need for maintenance (measured value is not influenced)
- Operating error (measured value might be influenced)

Note

Individual requirements for the measuring point can make the utilization of special sensor equipment necessary. The possibilities for adapting the sensors are:

- Different purging media, such as instrument air, ambient air, nitrogen or steam
- Different purging modes on process and sensor sides
- Special materials of purging tubes and/or sensor flanges
- Cooling or heating of the sensors
- Explosion-protected sensor configurations

Essential characteristics

- Integrated calibration adjustment with an internal reference cell
- Negligible long-term drifts of zero and span
- Dynamic background correction for varying dust loads
- Isolated signal outputs, 4 to 20 mA
- User-friendly, menu-driven operation
- Selectable time constants (response time)
- Two user levels with individual access codes for prevention of unwanted and unauthorized operations
- Operation according to NAMUR recommendations
- Monitoring of overall optical transmission
- Remote preventive maintenance and servicing via Ethernet/modem
- Straightforward replacement of the central unit, since connections can easily be removed
- Sensor and central unit housing free of wear and corrosion
- Easy operation with a numerical keypad and menu prompting

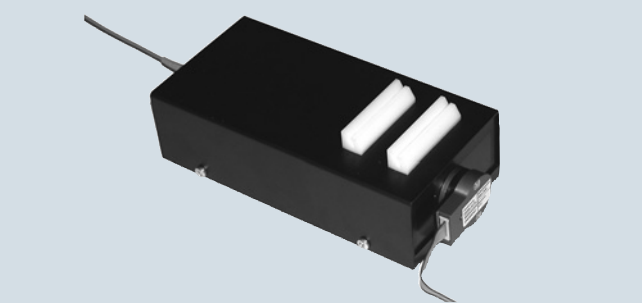
Certified versions for emission monitoring

The LDS 6 is available as certified instrument for emission monitoring of NH_3, NH_3/H_2O, H_2O, HCl, HCl/H_2O. The certificates are issued by TÜV for Germany and MCERTS for the United Kingdom. Test kits for ammonia, water and HCl should be used to conduct regular calibration and linearity checks on site. These kits can be ordered separately as instrument accessories. For new analyzer orders, the NH_3, NH_3/H_2O and H_2O kits named "Version 2" must be ordered. For already installed analyzers, please contact Siemens Technical Support for spotting the correct kit version, or consult the instrument manual.

Verification of calibration

Assembly with certified, maintenance-free calibration gas cell with connections for laser fiber-optic conductors and detector module of cross-duct sensor. These are used to rapidly verify the factory calibration in the field without compressed gas bottles and flow cell.

Calibration verification kits are available for the following sample gases: O_2 (application codes AA, AC), NH_3, CO, CO_2, CO/CO_2. A "Zero gas test kit" is also available for individual applications. (see "Additional units")



Example of an assembly for verification of calibration

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Technical specifications

Analytical performance

Measuring range	Depending on sample gas component: see table for standard applications.
Detection limit (DL): Calculated in accordance with VDI 2449, measured on every supplied analyzer during the temperature test (between 5 ... 45 °C) in accordance with VDI 4203.	Depending on sample gas component: see table for standard applications. For application code ET and FT: in accordance with the requirements of 17th and 27th BImSchV
Smallest recommended measuring range (with 1 m path length)	Depending on sample gas component: see table for standard applications.

The maximum applicable measuring ranges can be found in the table of standard combinations. These can only be applied if the individual process conditions allow it. Please contact the Technical Support from Siemens for checking the applicability.

Accuracy[1)]	2 % / 5 %, depending on sample gas component and application code. At best: detection limit. See table for standard applications. For application code ET and FT: in accordance with the requirements of 17th and 27th BImSchV
Linearity	Better than 1 %
Repeatability	2 % of the measured value or same amount as the minimum detection limit (whichever is largest) For application code ET and FT: in accordance with the requirements of 17th and 27th BImSchV
Calibration interval	No recalibration required thanks to internal reference cell

General information

Concentration units	ppmv, Vol%, mg/Nm^3
Display	Digital concentration display (5 digits with floating decimal point)
Laser protection class	Class 1, safe to the eye
Certificates	CE marking, TÜV, MCERTS

Design, enclosure

Degree of protection	IP20 according to EN 60529
Dimensions	177 x 440 x 380 mm
Weight	Approx. 13 kg
Mounting	Horizontal

Electrical characteristics

Power supply	100 ... 240 V AC 50 ... 60 Hz, automatically adapted by the system; with a 3-channel central unit, an additional external power supply +24 V DC, 50 VA is included in the scope of delivery
Power consumption	50 W
EMC	According to EN 61326 and standard classification of NAMUR NE21
Electrical safety	According to EN 61010-1, overvoltage classification II
Fuse specifications	100 ... 240 V: T2.5L250V

Dynamic response

Warm-up time at 20 °C ambient temperature	Approx. 15 min
Response time	Min. of 1 s, depending on application
Integration time	1 … 100 s, adjustable

Influencing variables

Ambient temperature	< 0.5 %/10 K of the measured value
Atmospheric pressure	Negligible
Process gas pressure compensation	Recommended
Process gas temperature compensation	Recommended
Process gas pressure range	See table for standard applications
Power supply changes	< 1 %/30 V

Electrical inputs and outputs

Number of measurement channels	1 … 3, optional
Analog output	2 per channel, 4 ... 20 mA, floating, ohmic resistance max. 750 Ω
Analog inputs	2 per channel, designed for 4 ... 20 mA, 50 Ω
Binary outputs	6 per channel, with changeover contacts, configurable, 24 V AC/DC/1 A, floating
Binary inputs	6 per channel, designed for 24 V, floating, configurable
Communication interface	Ethernet 10BaseT (RJ-45)

Climatic conditions

Temperature range	5 … 45 °C during operation, -40 … +70 °C during storage and transportation
Atmospheric pressure	800 … 1 200 hPa
Humidity	< 85 % relative humidity, above dew point (in operation and storage)

[1)] The accuracy corresponds to intrinsic uncertainty according to IEC 61207 for 7MB6121-xKD00-0xxx

Selection and ordering data		Article No.	Cannot be combined
LDS 6 in-situ gas analyzer ↗ 19" rack unit for installation in cabinets		**7MB6121-** ■■■ **0** ■ **- 0** ■■■	
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.			
Explosion protection[1]			
Without, not suitable for connection to Ex sensors		**0**	
Without, suitable for connection to Ex sensors in accordance with II 1 G Ex ia op is IIC T4 Ga, II 1 D Ex ia op is IIIC T135 °C Da		**1**	**1 1 1**
Measured component	Possible with application code of the respective channel		
O_2	B, C, P	**A**	
NH_3	A, E, F, L, T	**C**	
NH_3/H_2O	A, E, F, L, T	**D**	
HCl	A, H, T	**E**	
HCl/H_2O	A, H, T	**F**	
HF	A, H	**G**	
HF/H_2O	A, H	**H**	
CO	C	**J**	
CO/CO_2	D	**K**	
CO_2	A	**L**	
H_2O	A, T	**M**	
Application code of measured component channel 1	Application examples channel 1[1]		
A	Emission monitoring, non-certified	**A**	
B	Emission monitoring, combustion optimization	**B**	
C	Safety monitoring with appropriate plant concept	**C**	
D	Process control	**D**	
E	SNCR-DeNOx	**E**	
F	SCR-DeNOx	**F**	
H	Filter optimization	**H**	
L	Automotive, for use according EU regulation No. 595/2009/EC from June 18, 2009 (EURO VI)	**L**	
P	Process control (high pressure)	**P**	
T	Emission measurement, device design in accordance with QAL1 certification acc. to EN 14181 and EN 15267. Notice: Only in combination with measuring component version C, D, M, E and F (NH3, NH_3/H_2O, H_2O, HCl, HCl/H_2O).	**T**	**T**
CD 6, sensor alignment kit			
With		**0**	
Without		**1**	
Application code of measured component channel 2	Application examples channel 2[1]		
X	Channel 2 not used	**X**	
A	Emission monitoring	**A**	
B	Combustion optimization	**B**	
C	Safety monitoring with appropriate plant concept	**C**	
D	Process control	**D**	
E	SNCR-DeNOx	**E**	
F	SCR-DeNOx	**F**	
H	Filter optimization	**H**	
L	Automotive, for use according EU regulation No. 595/2009/EC from June 18, 2009 (EURO VI)	**L**	
P	Process control (high pressure)	**P**	
T	Emission measurement, device design in accordance with QAL1 certification acc. to EN 14181 and EN 15267. Notice: Only in combination with measuring component version C, D, M, E and F (NH3, NH_3/H_2O, H_2O, HCl, HCl/H_2O).	**T**	**T**

1) Complete and consistent implementation of the safety concept by the plant operator must be ensured during the commissioning and operation of the in-situ laser spectrometer LDS6 or the sensor CD 6 in hazardous atmospheres.

2) The examples shown represent possible applications where appropriately configured LDS 6 solutions can be used. The user is responsible for the prevailing conditions (plant concept (possibly redundant), application of appropriate components required in addition, compliance with possible directives, etc.). It is only possible to configure the same applications for multiple channels. If required, please contact Siemens for a special application (refer to page 2/19)

19" central unit

Selection and ordering data

Selection and ordering data		Article No.	
LDS 6 in-situ gas analyzer 19" rack unit for installation in cabinets		**7MB6121-** ■■■ **0** ■ **- 0** ■■■	Cannot be combined
Application code of measured component channel 3	Application examples channel 3[1] External 24 V DC power supply included in scope of delivery		
X	Channel 3 not used	**X**	
A	Emission monitoring	**A**	
B	Combustion optimization	**B**	
C	Safety monitoring with appropriate plant concept	**C**	
D	Process control	**D**	
E	SNCR-DeNOx	**E**	
F	SCR-DeNOx	**F**	
H	Filter optimization	**H**	
L	Automotive, for use according EU regulation No. 595/2009/EC from June 18, 2009 (EURO VI)	**L**	
P	Process control (high pressure)	**P**	
T	Emission measurement, device design in accordance with QAL1 certification acc. to EN 14181 and EN 15267. Notice: Only in combination with measuring component version C, D, M, E and F (NH3, NH_3/H_2O, H_2O, HCl, HCl/H_2O).	**T**	**T**
Language (supplied documentation, software)			
German		**0**	
English		**1**	
French		**2**	
Spanish		**3**	
Italian		**4**	

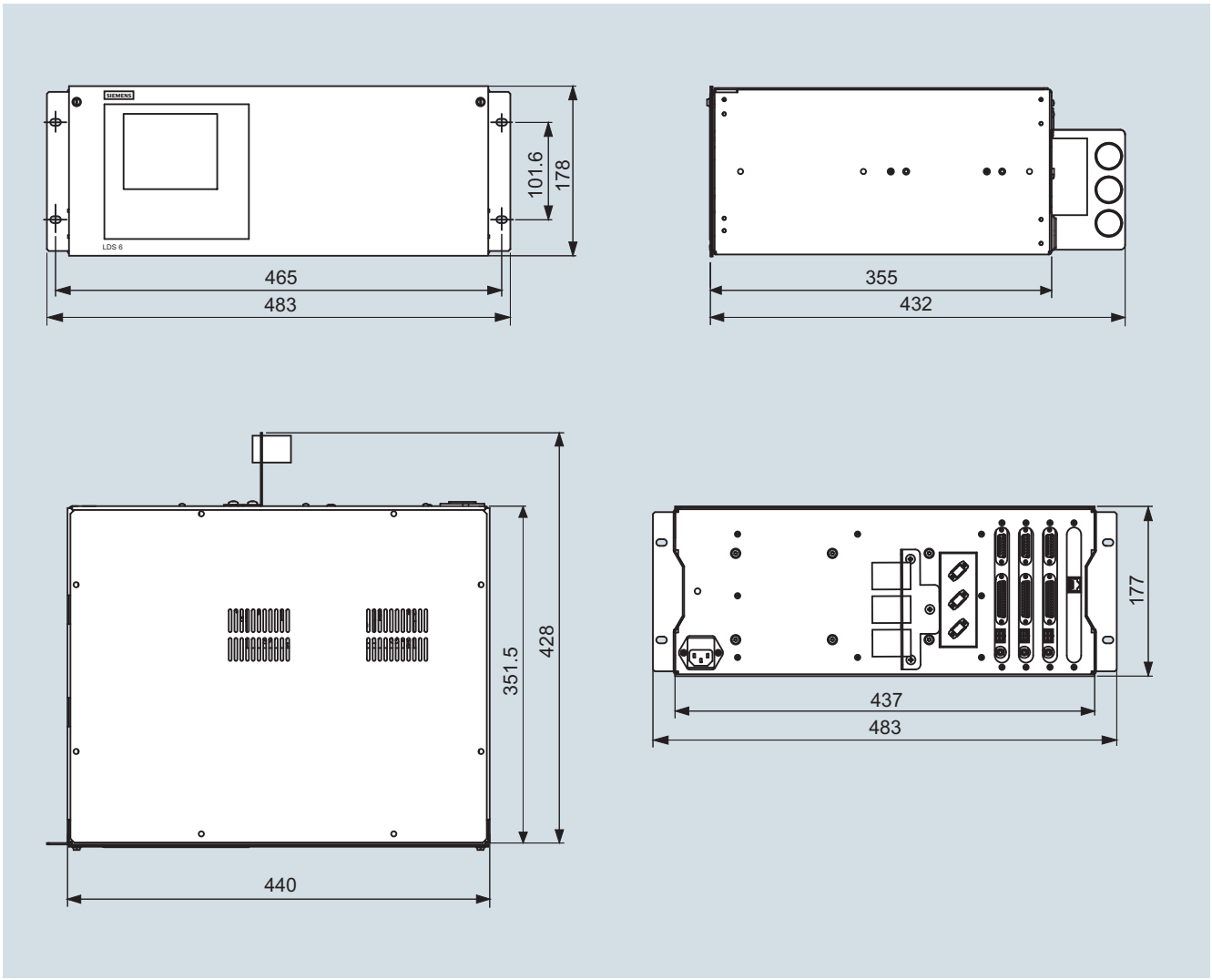
Selection and ordering data

Additional versions	Order code
Add "-Z" to Article No. and specify Order code	
Telescopic rails (2 units)	**A31**
Set of Torx tools	**A32**
TAG labels (customized inscription)	**Y30**
Additional units	**Article No.**
Optical band-pass filter for suppressing IR background radiation (flame filter)	**A5E00534668**
External power supply for hybrid cable length > 500 m	**A5E00854188**
Calibration verification kit for NH_3 (version 2)	**A5E01075594**
TÜV/MCERTS linearity verification kit NH_3 (version 2), 2 cells	**A5E00823339013**
TÜV/MCERTS linearity verification kit NH_3/H_2O (version 2), 3 cells	**A5E00823339014**
TÜV/MCERTS linearity verification kit H_2O (version 2), 2 cells	**A5E00823339015**
Calibration verification kit for NH_3 (version 1)	**A5E00534675**
TÜV/MCERTS linearity verification kit NH_3 (version 1), 2 cells	**A5E00823339003**
TÜV/MCERTS linearity verification kit NH_3/H_2O (version 1), 3 cells	**A5E00823339004**
TÜV/MCERTS linearity verification kit H_2O (version 1), 2 cells	**A5E00823339005**
TÜV/MCERTS linearity verification kit HCl, 2 cells	**A5E00823339008**
TÜV/MCERTS linearity verification kit HCl/H_2O, 3 cells	**A5E00823339009**
TÜV/MCERTS linearity verification kit H_2O (only for HCl/H_2O analyzers), 5 cells	**A5E00823339007**
TÜV/MCERTS linearity verification kit H_2O (only for NH_3/H_2O analyzers), version 1, 5 cells	**A5E00823339002**
TÜV/MCERTS linearity verification kit H_2O (only for NH_3/H_2O analyzers), version 2, 5 cells	**A5E00823339012**
TÜV/MCERTS linearity verification kit HCl, 5 cells	**A5E00823339006**
TÜV/MCERTS linearity verification kit NH_3, version 1, 5 cells	**A5E00823339001**
TÜV/MCERTS linearity verification kit NH_3, version 2, 5 cells	**A5E00823339011**
Linearity verification kit NH_3 (version 2), 10 cells[2]	**A5E03693426**
Calibration verification kit for O_2 (only for application codes AA, AC and AD)	**A5E01143755001**
Calibration verification kit for CO	**A5E01143755003**
Calibration verification kit for CO_2	**A5E01143755004**
Calibration verification kit for CO/CO_2	**A5E01143755006**

[1] The examples shown represent possible applications where appropriately configured LDS 6 solutions can be used. The user is responsible for the prevailing conditions (plant concept (possibly redundant), application of appropriate components required in addition, compliance with possible directives, etc.). It is only possible to configure the same applications for multiple channels. If required, please contact Siemens for a special application (refer to page 2/19).

[2] In combination with the LDS 6 applications CL/DL suitable to measure NH_3 according to the requirements of "Regulation No. 595/2009/EC on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (EURO VI) from June 18, 2009 and its implementation standard the regulation 582/2011/EC from May 25, 2011" of the Commission of the European Community.

Dimensional drawings

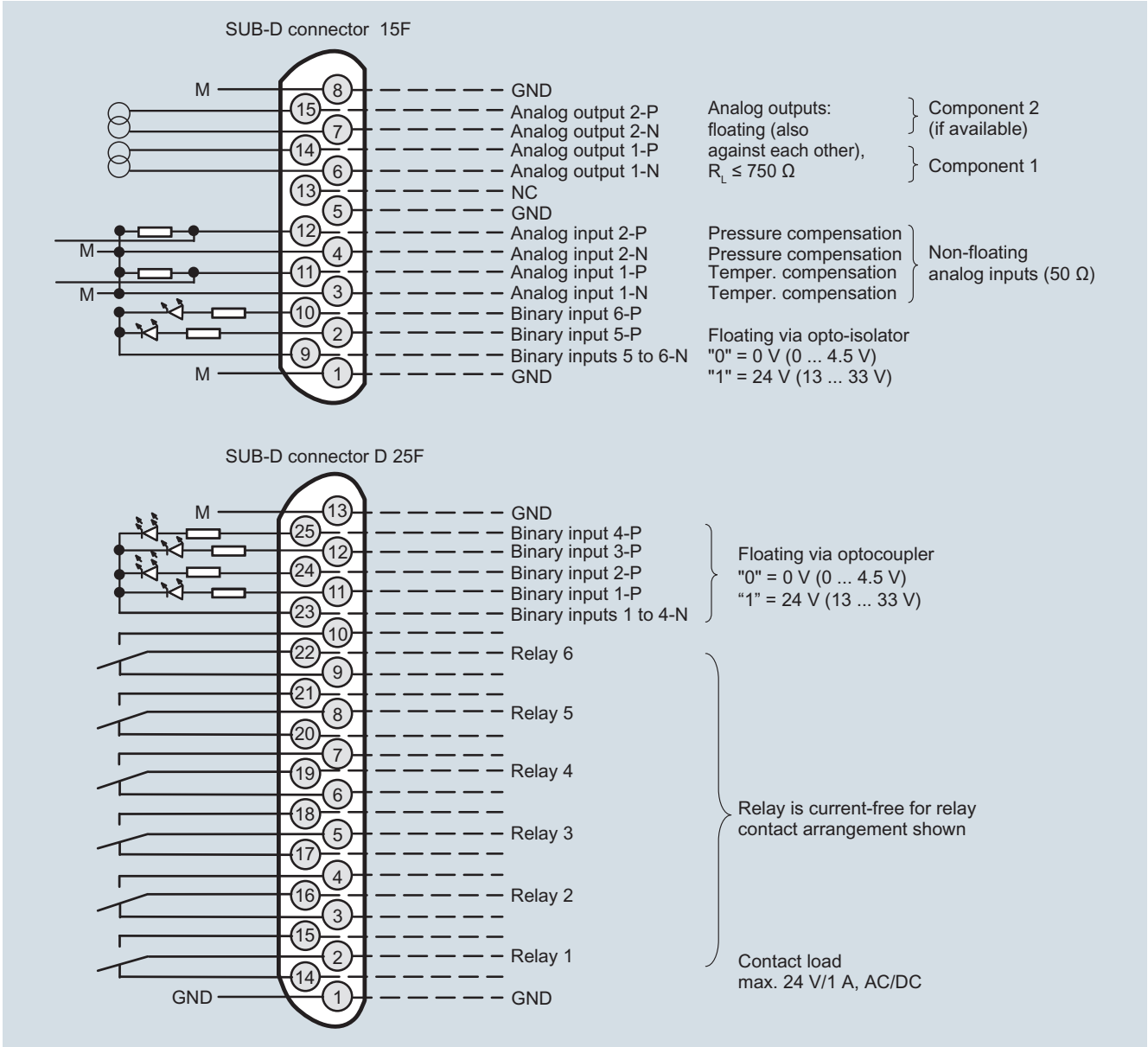


LDS 6, 19" central unit, dimensions in mm

2

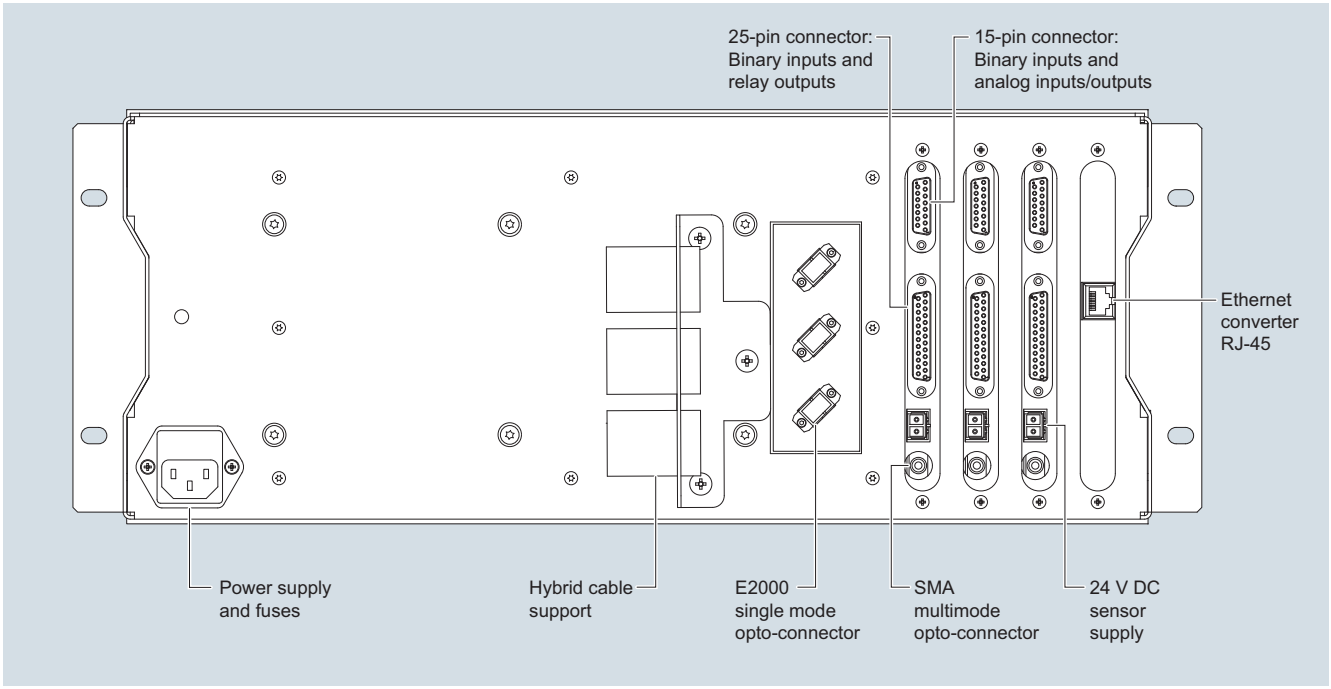
Schematics

Pin assignments



LDS 6, 19" central unit, pin assignments

Optical and electrical connections



LDS 6, three-channel 19" central unit, optical and electrical connections

2

More information

The following table lists the measuring conditions for standard applications. The listed values for the measuring range and detection limit (DL) are only approximate values. The exact values at the respective measuring point depend on the totality of all influencing variables and can be determined by Siemens for the specific case.

Please note that the values for the detection limit and the maximum measuring range refer to a path length of 1 m. Longer path lengths will improve the detection limit, but not linearly. due to limiting effects such as dust load. The maximum applicable measuring ranges can only be used if permitted by the process conditions such as dust load.

Standard application **Effective optical path length: 0.3 … 12 m** **Dust load[2]: < 50 g/Nm³**				**Process gas temperature T_{min} … T_{max}**	**Process gas pressure p_{min} … p_{max}**	**Min. measuring range** (with 1 m eff. opt. path length)	**Max. measuring range** (also dependent on eff. opt. path length: see following column)	**(Max. measuring range x path length)**	**(DL x path length)** under standard conditions[1] without cross-interference of other gases	**(DL x path length)** at 1 013 hPa with cross-interference of gas 2	**Accuracy[3]**
Gas 1	**Gas 2**	**Gas code**	**Appl. code**			**Gas 1**	**Gas 1**	**Gas 1**	**Gas 1**	**Gas 1**	**Gas 1**
O_2		A	B[6]	600 … 1 200 °C	950 … 1 050 hPa	0 … 15 vol%	0 … 100 vol%	240 vol%*m	0.3 vol%*m at 600 °C		5 %
			C	0 … 600 °C	950 … 1 050 hPa	0 … 5 vol%	0 … 100 vol%	75 vol%*m	0.1 vol%*m		2 %[4]
			P	0 … 200 °C	950 … 5 000 hPa	0 … 5 vol%	0 … 100 vol%	75 vol%*m	0.1 vol%*m		2 %
NH_3		C	A	0 … 150 °C	950 … 1 050 hPa	0 … 25 ppmv	0 … 500 ppmv	2 500 ppmv*m	0.5 ppmv*m	0.9 ppmv*m at 15 vol% H_2O, 55 °C	2 %
			T	0 … 150 °C	950 … 1 050 hPa	0 … 25 ppmv	0 … 500 ppmv	2 500 ppmv*m	0.5 ppmv*m	0.9 ppmv*m at 15 vol% H_2O, 55 °C	2 %
			E	250 … 350 °C	950 … 1 050 hPa	0 … 45 ppmv	0 … 500 ppmv	2 500 ppmv*m	0.9 ppmv*m at 250 °C	1.4 ppmv*m at 15 Vol% H_2O, 250 °C	2 %
			F	300 … 400 °C	950 … 1 050 hPa	0 … 50 ppmv	0 … 500 ppmv	2 500 ppmv*m	1 ppmv*m at 300 °C	1.5 ppmv*m at 15 Vol% H_2O, 300 °C	2 %
			L[7]	0 … 400 °C[8]	920 … 1 120 hPa	0 … 15 ppmv	0 … 500 ppmv	2 500 ppmv*m	0.5 ppmv*m	1.4 ppmv*m at 15 Vol% H_2O, 250 °C	2 %
NH_3	**H_2O**	D	A	0 … 150 °C	950 … 1 050 hPa	0 … 25 ppmv	0 … 100 ppmv	1 200 ppmv*m	0.5 ppmv*m	0.9 ppmv*m at 15 vol% H_2O, 55 °C	2 %
			T	0 … 150 °C	950 … 1 050 hPa	0 … 25 ppmv	0 … 100 ppmv	1 200 ppmv*m	0.5 ppmv*m	0.9 ppmv*m at 15 vol% H_2O, 55 °C	2 %
			E	250 … 350 °C	950 … 1 050 hPa	0 … 45 ppmv	0 … 100 ppmv	1 200 ppmv*m	0.9 ppmv*m at 250 °C	1.4 ppmv*m at 15 vol% H_2O, 250 °C	2 %
			F	300 … 400 °C	950 … 1 050 hPa	0 … 50 ppmv	0 … 100 ppmv	1 200 ppmv*m	1 ppmv*m at 300 °C	1.5 ppmv*m at 15 vol% H_2O, 300 °C	2 %
			L[7]	0 … 400 °C[8]	920 … 1 120 hPa	0 … 15 ppmv	0 … 100 ppmv	1 200 ppmv*m	0.5 ppmv*m	1.4 ppmv*m at 15 Vol% H_2O, 250 °C	2 %
HCl		E	A	0 … 150 °C	950 … 1 050 hPa	0 … 30 ppmv	0 … 6 000 ppmv	1 200 ppmv*m	0.6 ppmv*m	2.2 ppmv*m at 15% H_2O, 55 °C	5 %
			T	120 … 210 °C	950 … 1 050 hPa	0 … 10 ppmv	0 … 60 ppmv	720 ppmv*m			
			H	150 … 250 °C	950 … 1 050 hPa	0 … 50 ppmv	0 … 6 000 ppmv	1 200 ppmv*m	1.0 ppmv*m at 150 °C	3.1 ppmv*m at 15 Vol% H_2O, 150 °C	5 %
HCl	**H_2O**	F	A	0 … 150 °C	950 … 1 050 hPa	0 … 30 ppmv	0 … 100 ppmv	1 200 ppmv*m	0.6 ppmv*m	2.2 ppmv*m at 15% H_2O, 55 °C	5 %
			T	120 … 210 °C	950 … 1 050 hPa	0 … 10 ppmv	0 … 60 ppmv	720 ppmv*m			
			H	150 … 250 °C	950 … 1 050 hPa	0 … 50 ppmv	0 … 100 ppmv	1 200 ppmv*m	1.0 ppmv*m at 150 °C	3.1 ppmv*m at 15 vol% H_2O, 150 °C	5 %

Footnotes: See page 2/18.

Standard application **Effective optical path length: 0.3 … 12 m** **Dust load[3]: < 50 g/Nm³**				**Min. measuring range** (with 1 m eff. opt. path length)	**Max. measuring range** (usually also dependent on eff. opt. path length: see following column)	**(Max. measuring range x path length)**	**(DL x path length)** under standard conditions [1) 2)]	**(DL x path length)** at 1 013 hPa with cross-interference of gas 1	**Accuracy[4)]**	**Purging gas mode**		**Purging gas medium**
Gas 1	**Gas 2**	**Gas code**	**Appl. code**	**Gas 2**	**Gas 2**	**Gas 2**	**Gas 2**	**Gas 2**	**Gas 2**	**Standard**	**Optional**	
O_2		A	B[6)]							E, F	G, H	Steam + air, N_2
			C							D	B	N_2
			P							D	B	N_2
NH_3		C	A							C	G	Air
			T							C	G	Air
			E							E	G	Air
			F							E	G	Air
			L							C	D	Air
NH_3	**H_2O**	D	A	0 … 5 vol%	0 … 30 vol%	240 vol%*m	0.1 vol%*m	0.1 vol%*m	5 %	C	G	Air
			T	0 … 5 vol%	0 … 30 vol%	240 vol%*m	0.1 vol%*m	0.1 vol%*m	5 %	C	G	Air
			E	0 … 5 vol%	0 … 30 vol%	240 vol%*m	0.1 vol%*m at 250 °C	0.1 vol%*m at 250 °C	5 %	E	G	Air
			F	0 … 5 vol%	0 … 30 vol%	240 vol%*m	0.1 vol%*m at 300 °C"	0.1 vol%*m at 300 °C"	5 %	E	G	Air
			L	0 … 5 vol%	0 … 30 vol%	250 vol%*m	0.1 vol%*m at 250 °C"	0.1 vol%*m at 250 °C"	5 %	C	D	Air
HCl		E	A							C	G	Air
			T							C	G	Air
			H							E	G	Air
HCl	**H_2O**	F	A	0 … 5 vol%	0 … 30 vol%	360 vol%*m	0.1 vol%*m	0.1 vol%*m	5 %	C	G	Air
			T	0 … 5 vol%	0 … 30 vol%	360 vol%*m				C	G	Air
			H	0 … 5 vol%	0 … 30 vol%	360 vol%*m	0.1 vol%*m at 150 °C	0.1 vol%*m at 150 °C	5 %	E	G	Air

Footnotes: See page 2/19.

19" central unit

Standard application **Effective optical path length: 0.3 … 12 m** **Dust load[2]: < 50 g/Nm³**				**Process gas temperature T_{min} … T_{max}**	**Process gas pressure p_{min} … p_{max}**	**Min. measuring range** (with 1 m eff. opt. path length)	**Max. measuring range** (also dependent on eff. opt. path length: see following column)	**(Max. measuring range x path length)**	**(DL x path length)** under standard conditions[1] without cross-interference of other gases	**(DL x path length)** at 1 013 hPa with cross-interference of gas 2	**Accuracy[3]**
Gas 1	**Gas 2**	**Gas code**	**Appl. code**			**Gas 1**	**Gas 1**	**Gas 1**	**Gas 1**	**Gas 1**	**Gas 1**
HF		G	A	0 … 150 °C	950 … 1 050 hPa	0 … 5 ppmv	0 … 1 500 ppmv	200 ppmv*m	0.1 ppmv*m	0.6 ppmv*m at 15 vol% H_2O, 55 °C	5 %
			H	150 … 250 °C	950 … 1 050 hPa	0 … 5 ppmv	0 … 1 500 ppmv	200 ppmv*m	0.11 ppmv*m at 150 °C	0.6 ppmv*m at 15 vol% H_2O, 150 °C	5 %
HF	**H_2O**	H	A	0 … 150 °C	950 … 1 050 hPa	0 … 5 ppmv	0 … 200 ppmv	200 ppmv*m	0.1 ppmv*m	0.6 ppmv*m at 15 vol% H_2O, 55 °C	5 %
			H	150 … 250 °C	950 … 1 050 hPa	0 … 5 ppmv	0 … 200 ppmv	200 ppmv*m	0.11 ppmv*m at 150 °C	0.6 ppmv*m at 15 vol% H_2O, 150 °C	5 %
CO		J	C	0 … 600 °C	950 … 1 050 hPa	0 … 1.5 vol%	0 … 100 vol%	40 vol%*m	300 ppmv*m	1 000 ppmv *m at 50 vol% CO_2, 20 °C	2 %
CO	**CO_2**	K	D	0 … 400 °C	800 …1 400 hPa	0 … 5 vol%	0 … 100 vol%	0 ... 200 vol%*m	0,1 vol%*m	0.5 Vol% at 50 vol% CO_2, 20 °C	2 %[5]
CO_2		L	A	0 … 150 °C	950 … 1 050 hPa	0 … 7.5 vol%	0 … 100 vol%	40 vol%*m	300 ppmv*m		2 %
H_2O		M	A	0 … 150 °C	950 … 1 050 hPa	0 … 5 vol%	0 … 30 vol%	240 vol%*m	0.1 vol%*m		5 %
			T	0 … 150 °C	950 … 1 050 hPa	0 … 5 vol%	0 … 30 vol%	240 vol%*m	0.1 vol%*m		5 %

1) All technical data apply to an optical path distance of 1 m in a nitrogen atmosphere under standard conditions 25 °C (or T_{min}) and 1 013 hPa. The effective detection limit, the measuring range and the accuracy can be influenced by process parameters such as pressure, temperature and gas composition. Not all combinations of maximum pressure and temperature can be realized with the minimum measuring ranges. If the process conditions deviate from the specifications of the standard applications, special applications are also possible on request.
Please complete the application questionnaire which can be found on the Internet at www.siemens.com/insituquestionnaire.

2) At 0.3 m effective optical path length, average diameter of the dust particles: 15 µm, specific weight of the dust particles: 650 kg/m³

3) At least: Detection limit

4) Up to 200 °C, 5 % above this

5) The accuracy corresponds to intrinsic uncertainty according to IEC 61207: 2 % of MV (0 ... 200 °C); 2.5 % of MV (0 ... 400 °C); at best 0.25 vol%*m.

6) At high process temperatures, the use of an IR filter A5E00534668 is recommended for the CD 6 sensor (see page 2/26).

7) Suitable to measure NH_3 according to the requirements of "Regulation No. 595/2009/EC on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (EURO VI) from June 18, 2009 and its implementation standard the regulation 582/2011/EC from May 25, 2011" of the Commission of the European Community.

8) The analyzer can measure at temperatures above 400 °C up to 1 000 °C. As NH_3 will decompose at higher temperature levels no analyzer specification can be given for these temperature ranges.

Standard application **Effective optical path length: 0.3 … 12 m** **Dust load[3]: < 50 g/Nm³**				**Min. measuring range** (with 1 m eff. opt. path length)	**Max. measuring range** (usually also dependent on eff. opt. path length: see following column)	**(Max. measuring range x path length)**	**(DL x path length)** under standard conditions[1] [2]	**(DL x path length)** at 1 013 hPa with cross-interference of gas 1	**Accuracy[4]**	**Purging gas mode**		**Purging gas medium**
Gas 1	**Gas 2**	**Gas code**	**Appl. code**	**Gas 2**	**Gas 2**	**Gas 2**	**Gas 2**	**Gas 2**	**Gas 2**	**Standard**	**Optional**	
HF		G	A							C	G	Air
			H							E	G	Air
HF	**H_2O**	H	A	0 … 5 vol%	0 … 30 vol%	360 vol%*m	0.1 vol%*m	0.1 vol%*m	5 %	C	G	Air
			H	0 … 5 vol%	0 … 30 vol%	360 vol%*m	300 ppmv*m at 200 °C	300 ppmv*m at 200 °C	5 %	E	G	Air
CO		J	C							E	G	Air, N_2
CO	**CO_2**	K	D	0 … 10 vol%	0 … 100 vol%	0 ... 200 vol%*m	0.2 vol%*m	1 vol% at 50 vol% CO, 20 °C	5 %[5]	C	G	Air
CO_2		L	A							C	G	Air
H_2O		M	A							C	G	Air
			T							C	G	Air

1) At 20 °C, 1 013 hPa

2) If the smallest permissible process gas temperature of the application is T_{min} > 20 °C, the detection limit refers to T_{min} and standard pressure (1 013 hPa)

3) At 0.3 m optical path length, average diameter of the dust particles: 15 µm, specific weight of the dust particles: 650 kg/m³

4) At least: Detection limit

5) The accuracy corresponds to intrinsic uncertainty according to IEC 61207: 5 % of MV; at best 0.5 vol%*m.

6) At high process temperatures, the use of an IR filter A5E00534668 is recommended for the CD 6 sensor (see page 2/26).

Special applications


SIEMENS Fragebogen für in-situ Prozessanalyse

If the process conditions deviate from the specifications of the standard applications, special applications are also possible on request. Please complete the application questionnaire which can be found at www.siemens.com/insituquestionnaire on the Internet.

2

Overview

Cross-duct sensors CD 6 and cables for non-Ex applications

The standard cross-duct sensor consists of a transmitter unit and a detector unit with the same dimensions. The transmitter unit provides a connector for the fiber-optic cable. The laser light is transmitted through this cable. The receiver unit contains a photodetector and an electronics PCB, and is connected to the detector unit by a sensor cable.

The sensors are mounted onto flanges. The easiest way to avoid condensation and dust deposits on the sensor windows is to use a purging gas, e.g. with instrument air. Purging must be selected depending on the application. The cross-duct sensors can therefore be configured for the respective situation. The application reference table provides recommendations for suitable purging with standard applications.

If a component is to be measured which is also present in measurable quantities in the purging medium - such as oxygen or moisture - it is necessary to use purging gases such as nitrogen, superheated process steam or similar. In such cases it is usually also necessary to purge the sensor heads, since the ambient air must also be displaced here out of the laser beam path. A differentiation is therefore made between purging on the process side and purging on the sensor side.

Note: For measurement of O_2 at gas temperatures above 600 °C, it may also be possible to tolerate air as the purging medium since its influence on the measurement can be compensated.

Applications with oxygen (high-pressure)

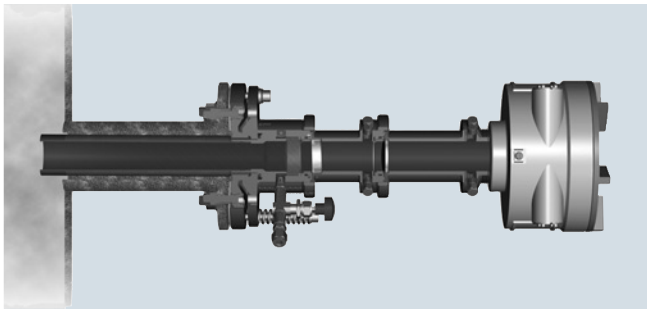
For oxygen measurements with a higher process gas pressure (1 to 5 bar), the sensor CD 6 can be used together with a high-pressure window flange as the process connection. This window flange is also available in the standard sizes DN 65/PN 6, DN 80/PN 16 or ANSI 4"/150 lbs. The optical surface to the process is made of borosilicate glass. High-pressure window flanges can be equipped with window purging, but without purging tubes. Possible purge modes for the window flanges are "A-C" (no purging or moderate purging on the process side). Window flanges are tested for leakage before delivery using overpressure, and show leakage rates of less than 10^{-5} mbar·l/s.

For ordering this application, the MLFB code of the central unit with the application code "P" must be selected. The process interface suitable for the sensors can be chosen by selection of the corresponding code in the 6th configurable position of the MLFB number.

The most important sensor purging configurations are presented below:

Purging on the process side with moderate flow

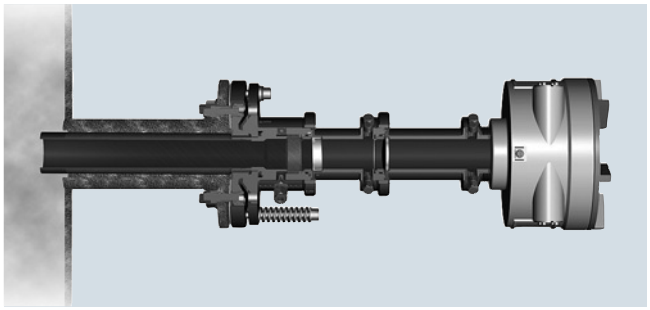
Is selected e.g. for pure gas applications, emission monitoring, inerting monitoring. The purging gas flow can be adjusted between 0 and approx. 120 l/min at each sensor head using a needle valve (included in delivery).



Moderate purging on the process side

Purging on the process side with increased flow

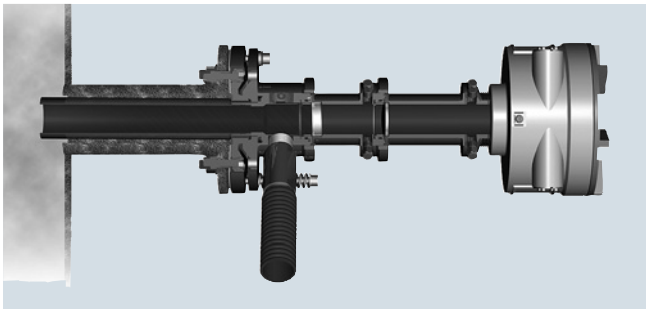
Through omission of needle valve. This type of purging is selected in crude gas applications with higher concentrations of particles and/or condensation as well as in non-purified flue gases in combustion plants. The purging gas flow is typically set between 200 and 500 l/min on each sensor head depending on the input pressure of the purging medium.



Increased purging on the process side

Purging on the process side with high flow

Through use of air blower or dry process steam. Connectors with hose adapters are included in the delivery. An additional Swagelok adapter must be ordered if a high flow of steam or instrument air purging is required (option A27). This type of purging is selected in crude gas applications with very high concentrations of particles and/or condensation such as in the furnaces of combustion plants. If instrument air is not available, an air blower is also an alternative for purging in applications with lower demands. On the process side, dry steam can be used as the inert purging gas instead of nitrogen (T_{max} 240 °C). The purging gas flow is automatically set between 500 and < 1 000 l/min on each sensor head depending on the purging air blower or the steam pressure.



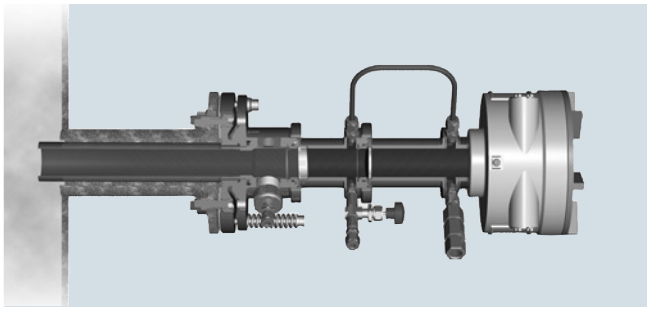
Increased purging on the process side, with hose connection adapter

Purging on sensor side

Can be combined with any purging mode on the process side, and is always selected if the ambient air must never have an influence on the measurement. The volumes within the sensor head are then continuously purged with an O_2-free gas (with H_2O-free gas in the case of moisture measurement).

Note

With purging on the process side, it may be necessary to use non-return valves to ensure no process gas can enter the purging gas line in the event of failure of the purging gas supply. This applies especially in the case of cascaded process and sensor purging where there is otherwise the danger that, for example, corrosive process gases could enter the sensor enclosure.



Sensor configuration with high purging on the process side, with 6 mm joint for use with steam, and with N_2 purging on the sensor side

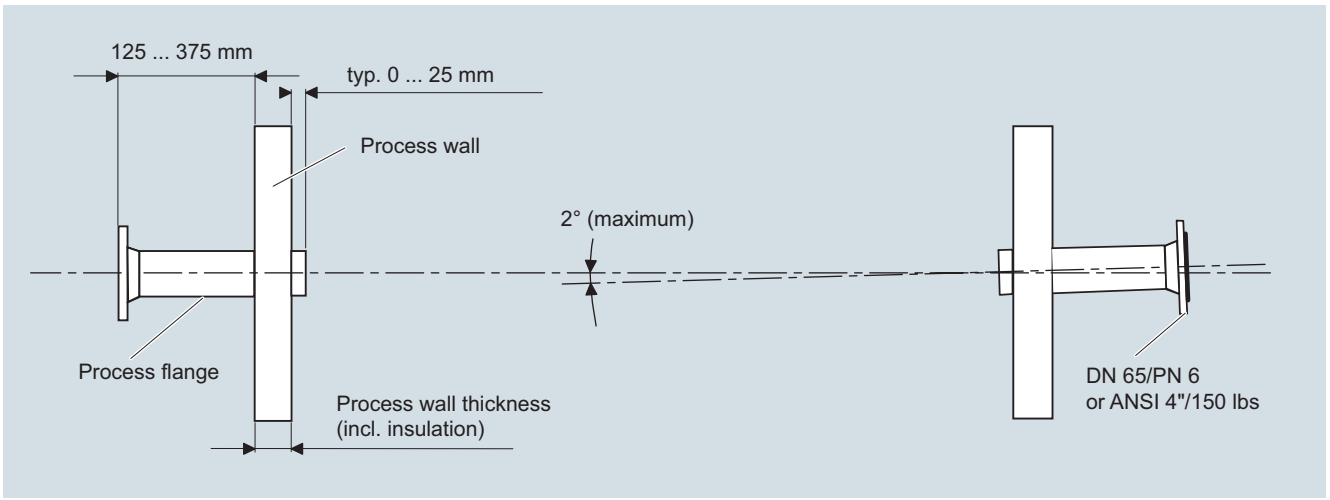
The purging media used on the process side flow through purging gas tubes into the process gas flow. The tubes extend a few centimeters into the process area, and usually receive a flow of process gas from the side. This results in a wedge being generated in the inlet zone of the purging gas. The effective measuring path in the process gas is therefore well-defined as the distance between the ends of the two purging gas inlet tubes.

Cross-duct sensor CD 6: Options and accessories

Sensor alignment kit

Includes a battery-operated visible light source, a centering aid with crosshair, and two hook spanners for opening the optics tube of the sensors.

Please note: the sensor alignment kit is not explosion protected.

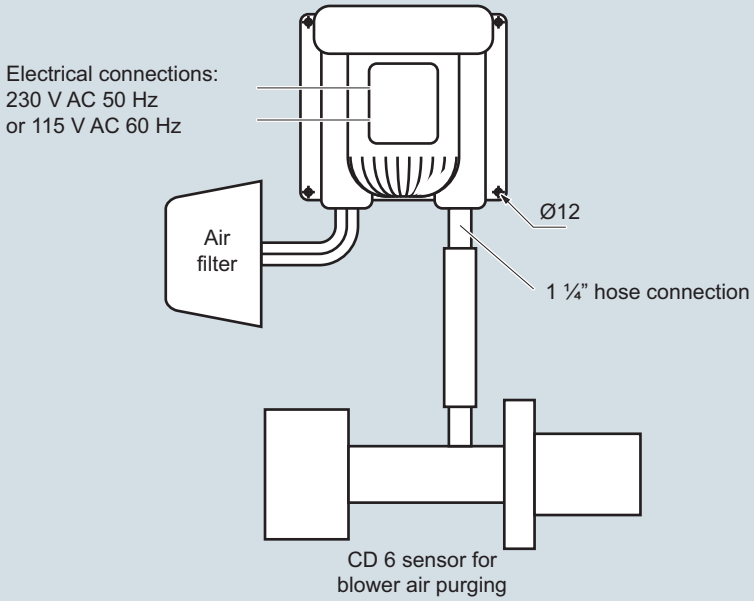


Installation requirements for the cross-duct sensors CD 6

Cross-duct sensor CD 6

Purging air blower

Two purging air blowers are required to purge the sensor heads.
Both 230 V AC and 115 V AC versions can be ordered.



Sensor configuration with purging air blower

Flow cell (available on special application)

For implementation of measuring configurations with bypass mode. The cell consists of a stainless steel tube whose internal surfaces are coated with PTFE to minimize surface effects. With an effective measuring path of 1 m, the inner volume is only 1.2 l, and fast gas displacement times can therefore be achieved. The flow of sample gas can be from the ends or from the center of the tube, since appropriate 6 mm joints are present here. The flow cell can be ordered in four configurations:

- Unheated, including assembly for wall mounting
- Unheated, including assembly for wall mounting and a 19" housing with an air jet pump with a delivery rate of max. 30 l/min
- As above, but can be heated up to approx. 200 °C
- As above, but can be heated up to approx. 200 °C and mounted on a rack with wheels and integrated 19" frame

Optical bandpass filter (only for O_2 CD 6)

Serves to protect the light-sensitive detector in the receiver unit of the sensor from saturation by IR background radiation. Is used with measurements in very hot process gases (T > 1 000 °C) or with unavoidable appearances of flames in the measurement path.

Technical specifications

Cross-duct sensor CD 6

General information	
Design	Transmitter and detector units, connected by a sensor cable
Materials	Stainless steel (1.4305/303), aluminum
Installation	Vertical or parallel to the gas flow
Laser protection class	Class 1, safe to the eye
Explosion protection	II 1 G Ex ia op is IIC T4 Ga, II 1 D Ex ia op is IIIC T135 °C Da A defined leak rate can only be guaranteed when using high-pressure window flanges. Otherwise it may be necessary for the owner to carry out an evaluation in accordance with ATEX DEMKO 06 ATEX 139648X; IECEx UL 13.0029X
Design, enclosure	
Degree of protection	IP65
Dimensions	Diameter: 163, L: 450 mm
Purging gas tube in mm	400 (370 net) x 44 x 40 800 (770 net) x 54 x 40 1 200 (1 170 net) x 54 x 40
Weight	2 x approx. 11 kg
Mounting	DN 65/PN 6, DN 80/PN 16, ANSI 4"/150 lbs

Please note:

- For purging tubes with a length of 800 and 1 200 mm, the wall thickness must not exceed 200 mm with DN 65/PN 6 connections. To carry out measurements with thicker walls, please contact Siemens.
- The optimum adjustment of the flanges can change with high differences in temperature between the process and environment depending on the type of assembly.

Electrical characteristics	
Power supply	24 V DC, supply from central unit via hybrid cable
Power consumption	< 2 W during operation, max. 0.6 W with Ex configuration
Climatic conditions	
Sensor temperature	
• Non-Ex	-20 ... +70 °C during operation, -30 ... +70 °C during storage and transportation
• Ex	-20 ... +60 °C during operation, -30 ... +70 °C during storage and transportation
Humidity	< 95 % RH, above dew point
Pressure	800 ... 1 100 hPa
Temperature range on the sensor side of the process interface (connection plate)	-20 … +70 °C
Measuring conditions	
Measurement path	0.3 ... 12 m (other lengths on request)
Dust load	The influence of dust is very complex and depends on the path length and particle size. The optical attenuation increases exponentially at longer path lengths. Smaller particles also have a large influence on the optical attenuation. With high dust load, long path length and small particle size, the technical support at Siemens should be consulted.

Accessories

Purging

Nitrogen is permissible as the purging gas for the sensor side. Nitrogen, steam, air and gases which are not subject to the pressure equipment directive Cat. 2 are permissible as purging gases for the process side.

Purging with instrument air, N_2	
• Max. overpressure in the sensor	< 500 hPa
• Quality	
- Instrument air	According to ISO 8573-1:2010 [2:3:3] Note: It is sufficient if the pressure condensation point is min. 10 K below the minimum ambient temperature.
- Nitrogen	Purity better than 99.7 %. For oxygen measurements, an O_2 content < 0.01 % in the purging gas (optical path length ≥ 1 m, min. 5 % oxygen in the process gas)
• Maximum flow rate (process purging)	500 l/min
• Dew point	Benchmark: < -10 °C, condensation on the optics must be avoided
Blower purging	
• Maximum counter pressure	40 hPa
• Maximum flow rate	850 l/min
• Power consumption	370 W
• Degree of protection (fan)	IP54, cover required to protect against rain
Steam purging	
• Steam conditioning	Overheated
• Maximum temperature	240 °C
• Minimum pressure	> 4 000 hPa
• Maximum pressure	16 000 hPa, refers to a volume flow of approx. 1 100 l/min

Cross-duct sensor CD 6

Hybrid and sensor cables

General information	
Configuration hybrid cable	Two optical fibers and two twisted copper wires in one cable for 24 V DC. Single-mode optical fiber configured at both ends with E2000 angle connectors. Multi-mode optical fiber configured at both ends with SMA connectors. Cable is flame-retardant, very good resistance to oil, gasoline, acids and alkalis, outer sheath UV-resistant
Cable sheath	Oil-resistant polyurethane
Dimensions	• For > 500 m, an external power supply must be additionally ordered • For installation in hazardous zones, non-intrinsically-safe cables have to be spatially separated from intrinsically-safe lines
• Diameter	< 8.5 mm
• Length	• Use in non-hazardous and Ex Zone 2: Up to 700 m • Use in Ex Zone 0 and Zone 1: Up to 250 m
Weight	75 kg/km
Maximum tensile force	200 N
Maximum lateral pressure	1 000 N/cm
Impact resistance	200 N/cm
Maximum tensile strength	500 N
Minimum bending radius	12 cm
Climatic conditions	
Ambient temperature	-40 ... +70 °C during transport, storage and operation -5 ... +50 °C during laying
Humidity	< 95 % rel. humidity, above dew point (in operation and storage)

Selection and ordering data		Article No.	Cannot be combined
LDS 6 in-situ gas analyzer Pair of sensors (cross-duct sensor) ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		↗ **7MB6122-** ■■■■■ - ■■■■	
Explosion protection[1]			
Without		**0**	
II 1 G Ex ia op is IIC T4 Ga, II 1 D Ex ia op is IIIC T135 °C Da		**1**	
Sensor type	**Measured component**		
Standard cross-duct sensor	O_2	**A**	
	All gases except O_2	**W**	
Purging, process side	**Sensor side**		
Without purging	Without purging	**A**	
	Air or N_2, 1 to 2 l/min; incl. needle valve, 6 mm Swagelok	**B**	
Instrument air or N_2 Reduced flow: 0 ... 120 l/min incl. needle valve, 6 mm Swagelok	Without purging	**C**	
	Air or N_2, 1 to 2 l/min; incl. needle valve, 6 mm Swagelok	**D**	
Air or N_2 Increased flow: 200 ... 500 l/min incl. 6 mm Swagelok	Without purging	**E**	
	Air or N_2, 1 to 2 l/min; incl. needle valve, 6 mm Swagelok	**F**	
Air, fan or steam; high flow: > 500 l/min incl. 1¼" hose adapter	Without purging	**G**	**G**
	Air or N_2, 1 to 2 l/min; incl. needle valve, 6 mm Swagelok	**H**	**H**
Purging tubes, material			
No purging tubes		**0**	
Stainless steel, EN 1.4432/316L		**1**	**1**
Purging tubes, length			
No purging tubes		**0**	
400 mm		**1**	
800 mm		**2**	
1 200 mm		**3**	
75 mm, e.g. for engine test rigs		**4**	
Process connection			
Stainless steel flange (1.4404/316L), connection dimension DN 65/PN 6, MAWP (PS) @ 20 °C: 0.05 MPa		**0**	**0** → **C12, C13**
Stainless steel flange (1.4404/316L), connection dimension ANSI 4"/150 lbs, MAWP (PS) @ 20 °C: 7.25 psi		**1**	**1** → **C12, C13**
Stainless steel flange (1.4404/316L), connection dimension DN 65/PN 6, MAWP (PS) @ 20 °C: 0.05 MPa, incl. enclosed welding flanges, e.g. for engine test rigs		**2**	**2** → **C12, C13**
Pressure-resistant window flange (1.4404/316L, borosilicate glass), connection dimension DN 65/PN 6, MAWP (PS) @ 20 °C: 0.6 MPa		**3**	**3 3 3**
Pressure-resistant window flange (1.4404/316L, borosilicate glass), connection dimension DN 80/PN 16, MAWP (PS) @ 20 °C: 1.6 MPa		**4**	**4 4 4**
Pressure-resistant window flange (1.4404/316L, borosilicate glass), connection dimension ANSI 4"/150 lbs, MAWP (PS) @ 20 °C: 232 psi		**5**	**5 5 5**
Hybrid cable	**Length [m]**		
No hybrid cable		**X**	
Standard length	5	**A**	
	10	**B**	
	25	**E**	
	40	**G**	
	50	**H**	
Customized length	(specified in complete meters)	**Z**	

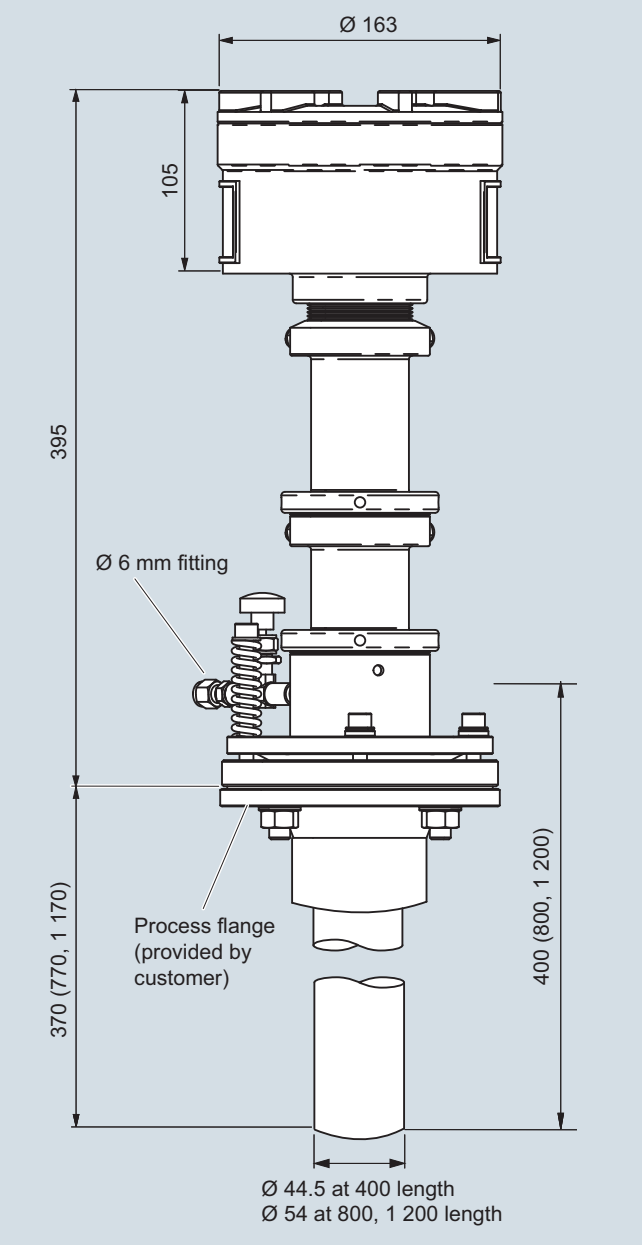
[1] Complete and consistent implementation of the safety concept by the plant operator must be ensured during the commissioning and operation of the in-situ laser spectrometer LDS6 or the sensor CD 6 in hazardous atmospheres.

Cross-duct sensor CD 6

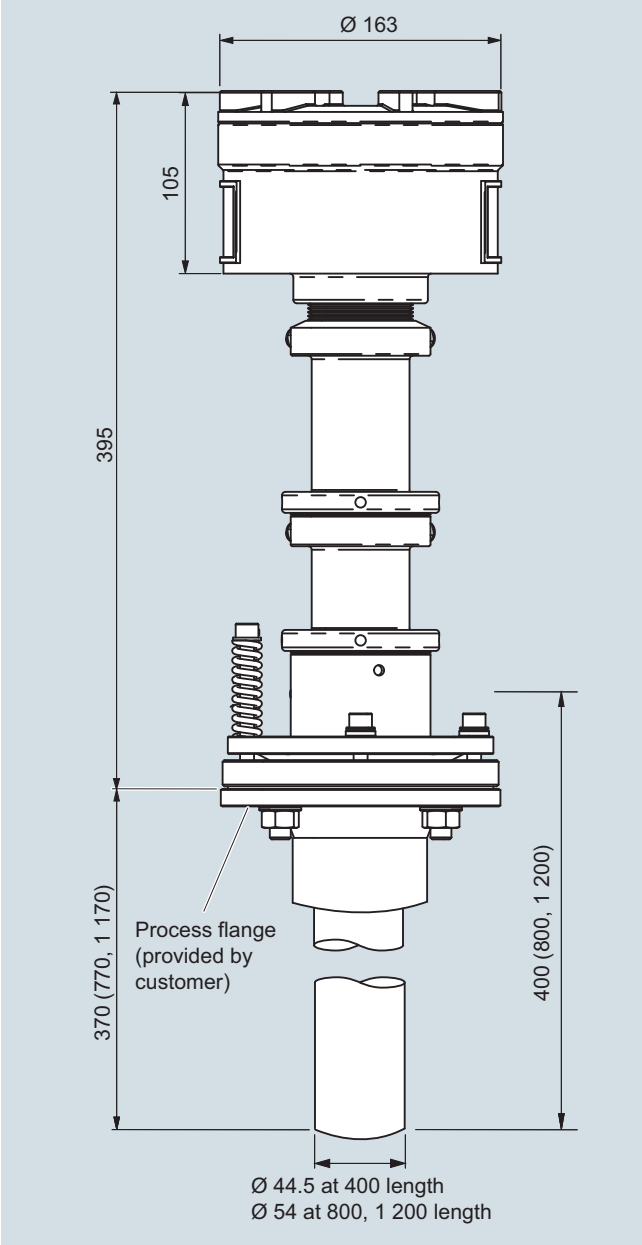
Selection and ordering data		Article No.	
LDS 6 in-situ gas analyzer Pair of sensors (cross-duct sensor)		**7MB6122-** ■■■■■ - ■■■■	Cannot be combined
Sensor connecting cable	**Length [m]**		
No sensor connecting cable		**X**	
Standard length	5	**A**	
	10	**B**	
	25	**E**	
Customer-specific length	(specified in complete meters)	**Z**	
Language (supplied documentation)			
German		**0**	
English		**1**	
French		**2**	
Spanish		**3**	
Italian		**4**	

Selection and ordering data	Order code
Additional versions	
Add "-Z" to Article No. and specify Order code	
6 mm Swagelok adapter for purging with steam, purging modes G and H	**A27**
Acceptance test certificate 3.1 (leak test) in accordance with EN 10204 (only in combination with pressure-resistant window flanges)	**C12**
Acceptance test certificate 3.1 (material certificate) in accordance with EN 10204 (only in combination with pressure-resistant window flanges)	**C13**
Hybrid cable, customized length	**P1Y**
Sensor cable, customized length	**Q1Y**
TAG label, customized inscription	**Y30**
Additional units	**Article No.**
Purging air blower 230 V	**A5E00829151**
Purging air blower 115 V	**A5E00829150**
CD 6, sensor alignment kit	**A5E00253142**
Optical filter for reducing IR background radiation (flame filter), only O_2	**A5E00534668**

Dimensional drawings

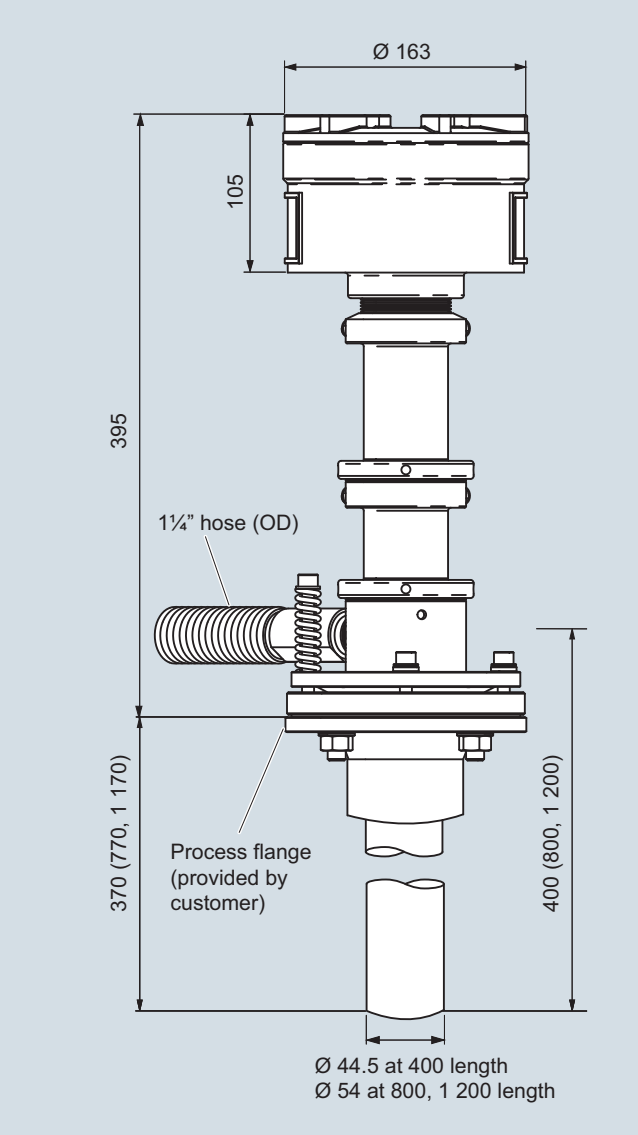


Cross-duct sensor CD 6, moderate purging (instrument air), version according to Article No. 7MB6122-**C1*-0***, dimensions in mm

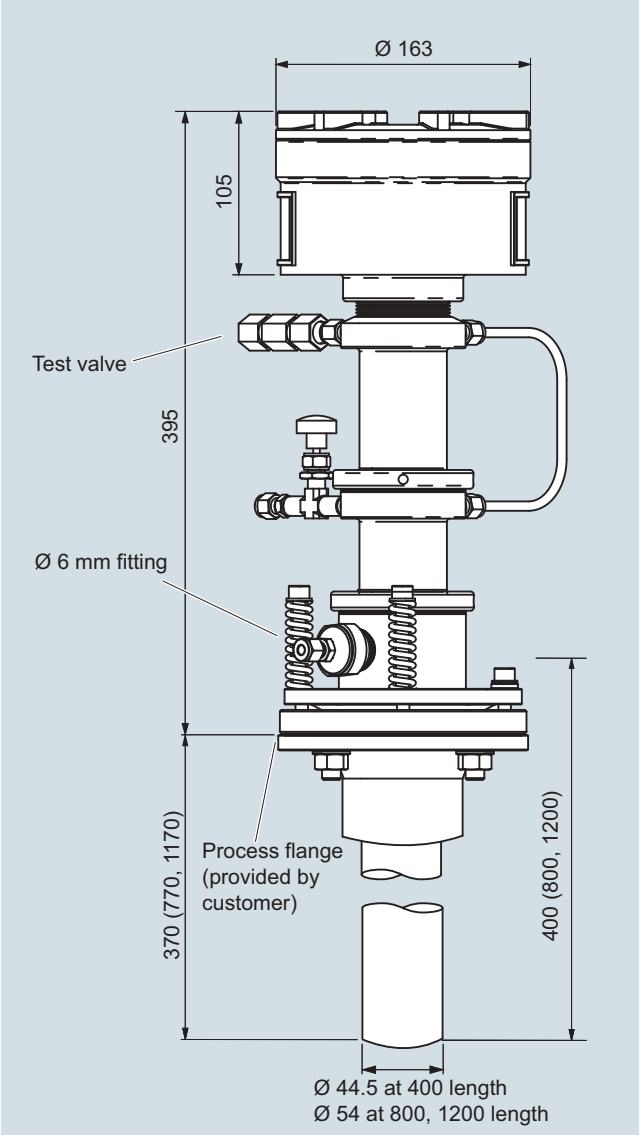


Cross-duct sensor CD 6, increased purging (instrument air), version according to Article No. 7MB6122-**E1*-0***, dimensions in mm

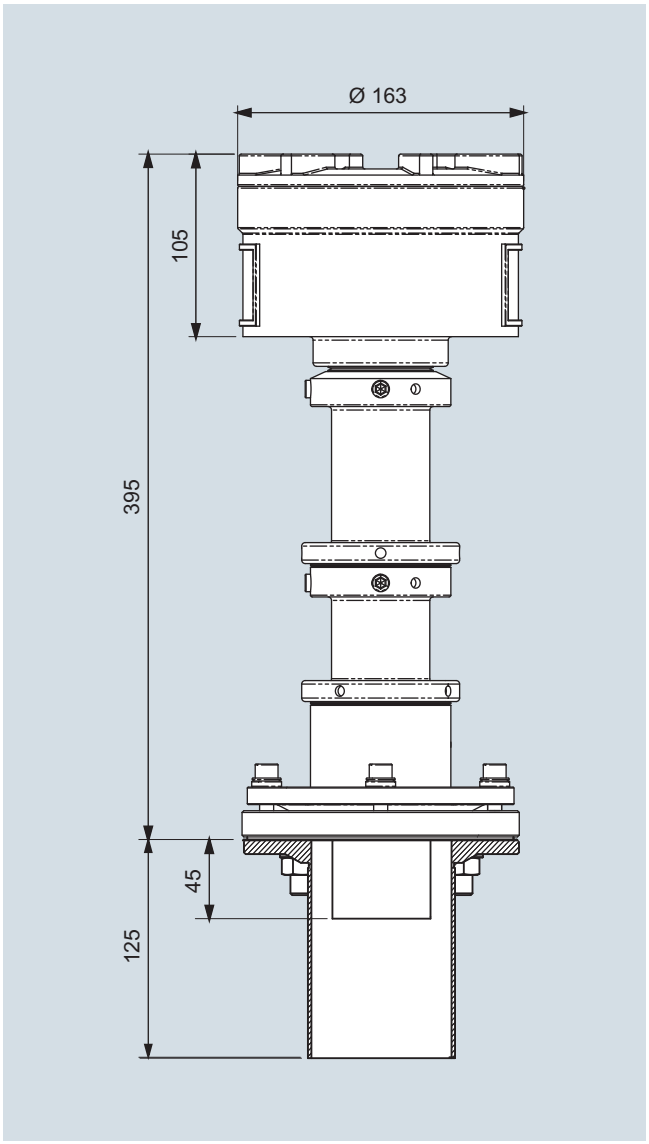
Cross-duct sensor CD 6



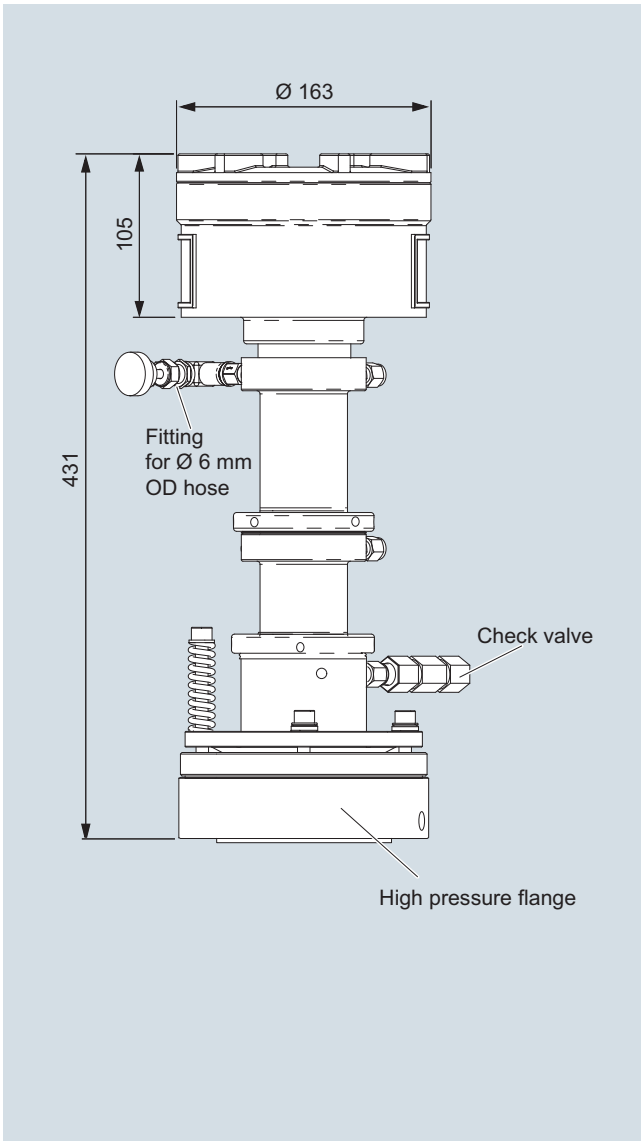
Cross-duct sensor CD 6, blower purging, version according to Article No. 7MB6122-**G1*-0***, dimensions in mm



Cross-duct sensor CD 6, sensor and process side purging, version according to Article No. 7MB6122-**H1*-0***-Z A27, dimensions in mm



Cross-duct sensor CD 6, purged version according to Article No. 7MB6122-*WC14-2***, dimensions in mm



CD 6 high-pressure sensor for oxygen, dimensions in mm

Documentation

Selection and ordering data

Manual	Article No.
LDS 6 manual	
• German	**A5E00295893**
• English	**A5E00295894**
• French	**A5E00295895**
• Italian	**A5E00295896**
• Spanish	**A5E00362720**

Suggestions for spare parts

Selection and ordering data

Description	Quantity for 2 years	Quantity for 5 years	Article No.
CD 6, window module, quartz	1	2	**A5E00338487**
CD 6, window module, engine test rig, no purging	1	2	**A5E00338490**
CD 6, high-pressure window flange (1.4404/316L), DN 65/PN 6	1	2	**A5E00534662**
CD 6, high-pressure window flange (1.4404/316L), DN 80/PN 16	1	2	**A5E00534663**
CD 6, high-pressure window flange (1.4404/316L), ANSI 4"/150 lbs	1	2	**A5E00534664**
Gasket for CD 6 hybrid cable	1	2	**A5E00853911**
CD 6, sensor electronics FO InGaAs (version 2)	1	1	**A5E01090409**
CD 6, sensor electronics FO Ge, only HCl (version 2)	1	1	**A5E01090413**
CD 6, sensor electronics SW, only O_2	1	1	**A5E00338533**
CD 6, sensor electronics ATEX SW, only O_2	1	1	**A5E00338563**
CD 6, sensor electronics ATEX HCl	1	1	**A5E00853896**
CD 6, sensor electronics ATEX NH_3, CO, CO_2, HF, H_2O, low gain	1	1	**A5E00338572**
CD 6, purging tube 400 mm 1.4432/316L	1	2	**A5E00253111**
CD 6, purging tube 800 mm 1.4432/316L	1	2	**A5E00253112**
CD 6, purging tube 1200 mm 1.4432/316L	1	2	**A5E00253113**

More information

For demanding applications it is recommended to keep purging tubes, window modules and detector electronics in stock (quantities stated per measuring point, i.e. per pair of sensors).

For the suitability of different parts (version 1 or version 2) please consult the instrument manual or contact Siemens directly. In general, all new analyzers are compatible with spare parts of version 2.