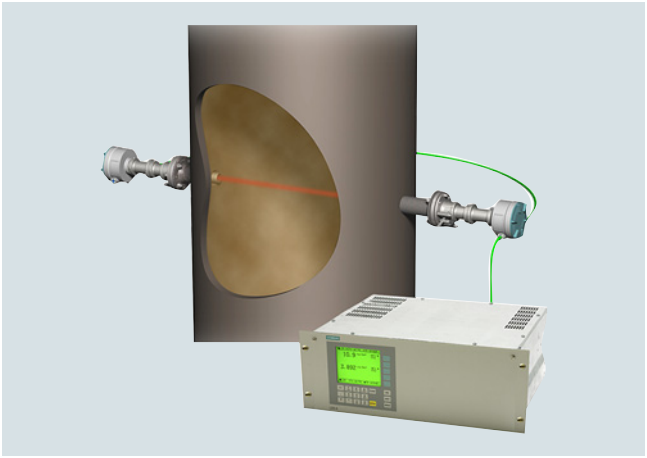
Overview



LDS 6, typical installation with transmitted-light sensors

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.

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 and computer chip 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 application.

2

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 operator panel

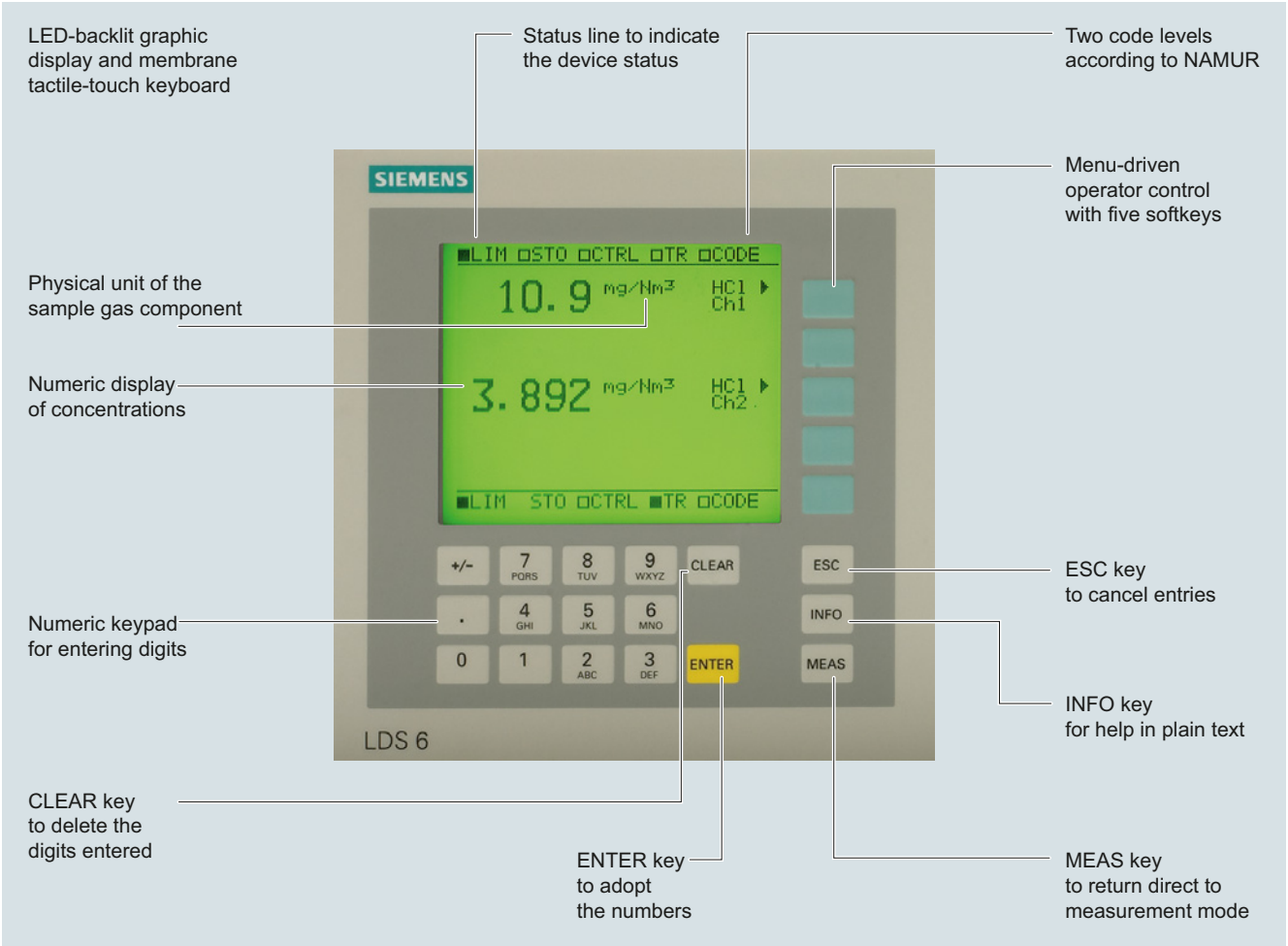
- Large LCD field for simultaneous display of measurement result and device status
- Contrast of the LCD field is adjustable via the menu
- LED background illumination of the display with energy-saving function
- Easy-to-clean membrane touch pad with softkeys
- Menu-driven operation for parameterization 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 digital inputs per channel for signaling faults or maintenance requests from external temperature or pressure transducers or sensor purging failure.
- 6 freely configurable digital outputs per channel (signaling of fault, maintenance requirements, function control, transmission limit alarm, concentration limit alarm, store analog output)

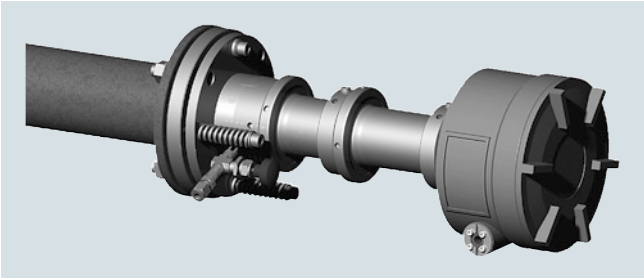
Communication

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 m 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, purging can be performed at the process end with 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 are immersed slightly into the process gas and thus limit the purging volume. Special materials such as Hastelloy and plastics (PP) are available on request.

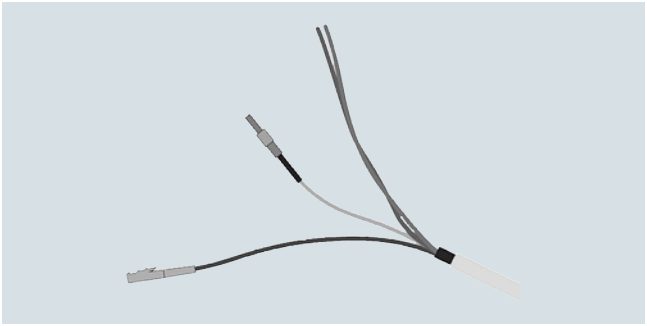
Hybrid and sensor cables

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

General information

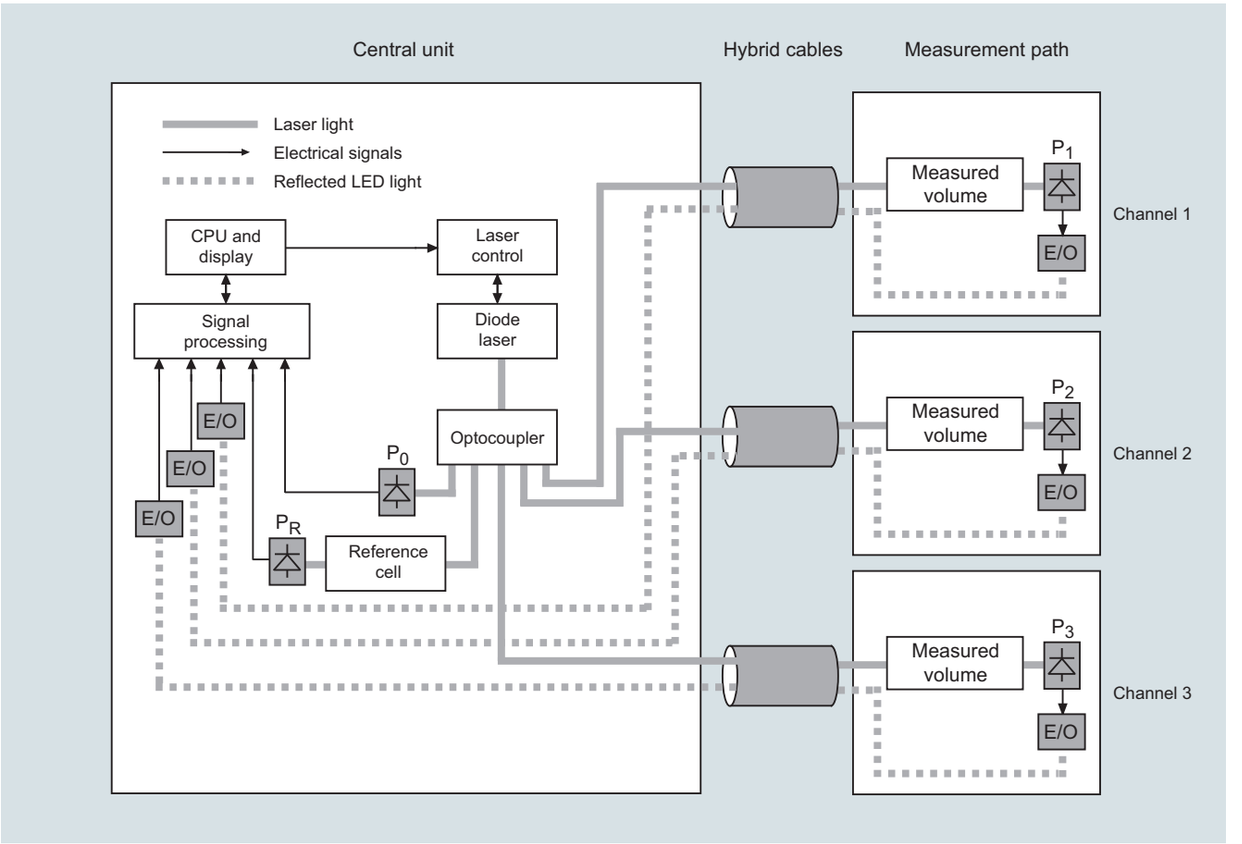
2

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.

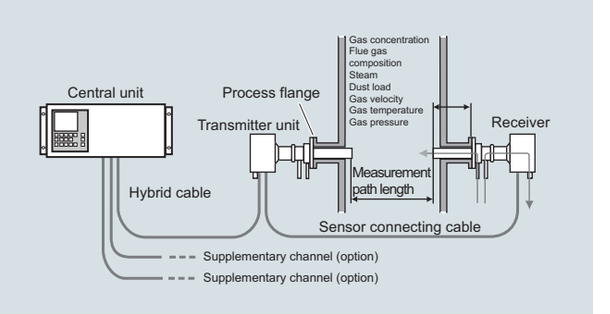


Basic design of the LDS 6

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.

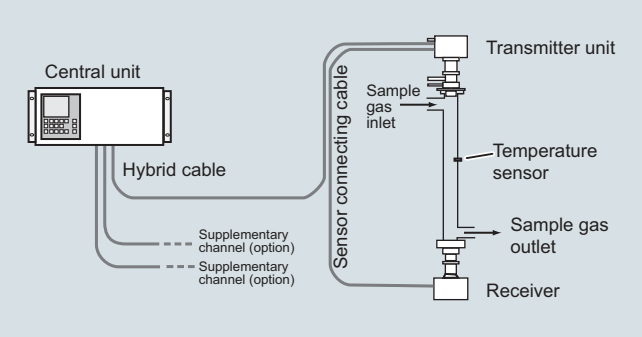
A feature of the standard applications defined in the ordering data of the LDS 6 is that the typical process conditions are well-known, documented, and the guaranteed measuring properties can be proven by reference installations. If you cannot find your application among the standard applications, please 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 pages on the Internet:
www.siemens.com/insituquestionnaire



Typical transmitted light setup of LDS 6, in-situ

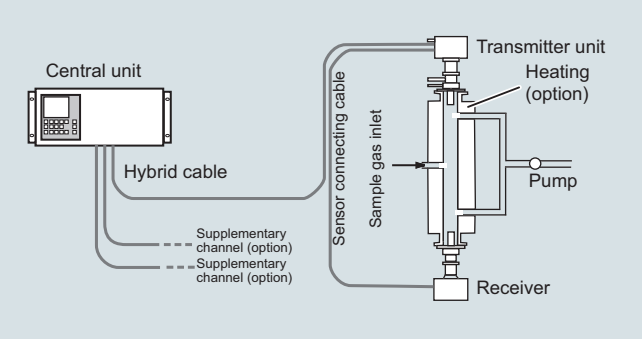
To avoid contamination of sensor optics on the process side, clean gaseous purging media such as instrument air, N_2 or steam are used. Purging air tubes on the sensor heads, which slightly penetrate into the process gas stream, define the effective measuring path length.

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.



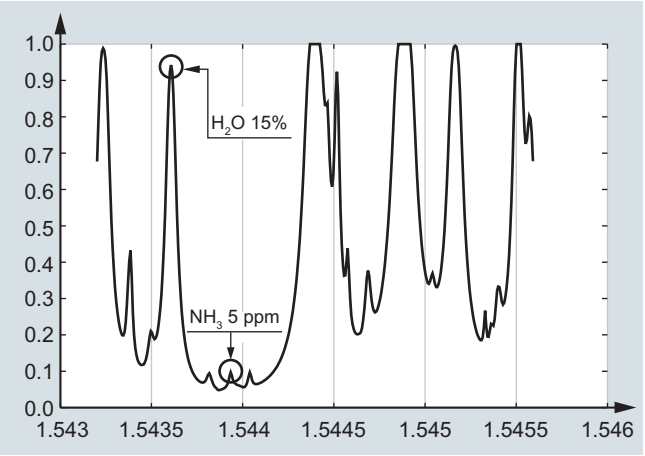
Measuring configuration of LDS 6 with heated flow cell

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)).



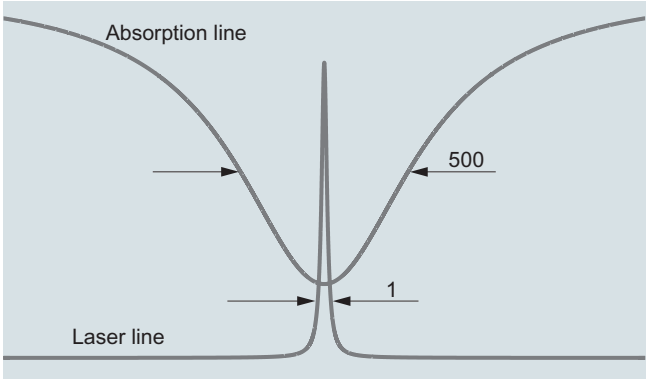
Absorption spectra of water and ammonia

Typical measurable gases for LDS 6 are:

- Oxygen (O_2) for low pressure range
- 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.

General information

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 very large influence on the optical attenuation. 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 for an LDS 6 measuring O_2 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. According to the Lambert-Beer 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

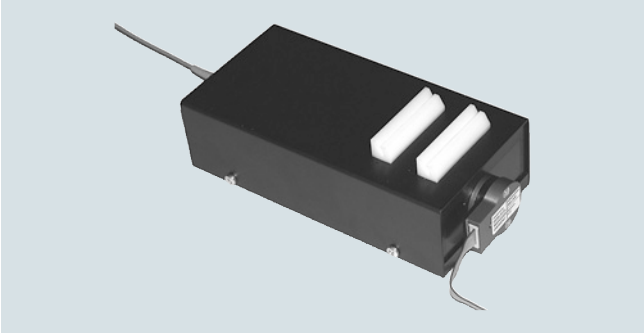
Certified versions for emission monitoring

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 analyzers already installed, 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 or flow cell.

Calibration test kits are available for the following sample gases: O_2, 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

2

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 letter ET and FT: in accordance with the requirements of 17th and 27th BImSchV
Smallest recommended measuring range (with 1 m path length) 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.	Depending on sample gas component: see table for standard applications.
Accuracy[1)]	2% / 5%, depending on sample gas component and application letter. At best: detection limit. See table for standard applications. For application letter 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 detection limit (whichever is larger) For application letter 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
Time 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
Digital outputs	6 per channel, with changeover contacts, configurable, 24 V AC/DC/1 A, floating
Digital 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	**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	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**	
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, non-certified	**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**	
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 2/41)

19" central unit

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■■■**	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, non-certified	**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**	
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 codes.	
Telescopic rails (2 units)	**A31**
Set of Torx tools	**A32**
TAG label, customized inscription	**Y30**

Additional units	Article No.
LDS 6, optical bandpass filter for reducing infrarot background radiation (flame filter)	**A5E00534668**
LDS 6, external power supply unit for 3 channels	**A5E00854188**
LDS 6, linearity verification kit NH_3, Version 2	**A5E01075594**
LDS 6, TÜV/MCERT linearity verification kit NH_3, Version 2; 2 cells	**A5E00823339013**
LDS 6, TÜV/MCERT linearity verification kit NH_3/H_2O, Version 2; 3 cells	**A5E00823339014**
LDS 6, TÜV/MCERT linearity verification kit H_2O (for H_2O single component analyzer), Version 2; 2 cells	**A5E00823339015**
LDS 6, TÜV/MCERT linearity verification kit NH_3 (version 1); 2 cells	**A5E00534675**
LDS 6, TÜV/MCERT linearity verification kit NH_3/H_2O, Version 1; 3 cells	**A5E00823339003**
LDS 6, TÜV/MCERT linearity verification kit H_2O, Version 1; 2 cells	**A5E00823339004**
LDS 6, TÜV/MCERT linearity verification kit HCl; 2 cells	**A5E00823339005**
LDS 6, TÜV/MCERT linearity verification kit H_2O; 3 cells	**A5E00823339008**
LDS 6, TÜV/MCERT linearity verification kit H_2O, Version 1; 2 cells	**A5E00823339009**
LDS 6, TÜV/MCERT linearity verification kit HCl; 2 cells	**A5E00823339007**
LDS 6, TÜV/MCERT linearity verification kit H_2O; 3 cells	**A5E00823339002**
LDS 6, TÜV/MCERT linearity verification kit H_2O (only for HCl/H_2O analyzers); 5 cells	**A5E00823339012**
LDS 6, TÜV/MCERT linearity verification kit H_2O (only for NH_3/H_2O analyzers), Version 2; 5 cells	**A5E00823339006**
LDS 6, TÜV/MCERT linearity verification kit HCl; 5 cells	**A5E00823339001**
LDS 6, TÜV/MCERT linearity verification kit NH_3, Version 1; 5 cells	**A5E00823339011**
LDS 6, linearity verification kit NH_3, Version 2; 10 cells[2)]	**A5E03693426**
LDS 6, calibration test kit O_2, Version 1	**A5E01143755001**
LDS 6, calibration test kit CO Version 2	**A5E01143755003**
LDS 6, calibration test kit CO_2, Version 2	**A5E01143755004**
LDS 6, calibration test kit CO/CO_2, Version 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 design, 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 needed, contact Siemens for a special application (refer to page 2/41).

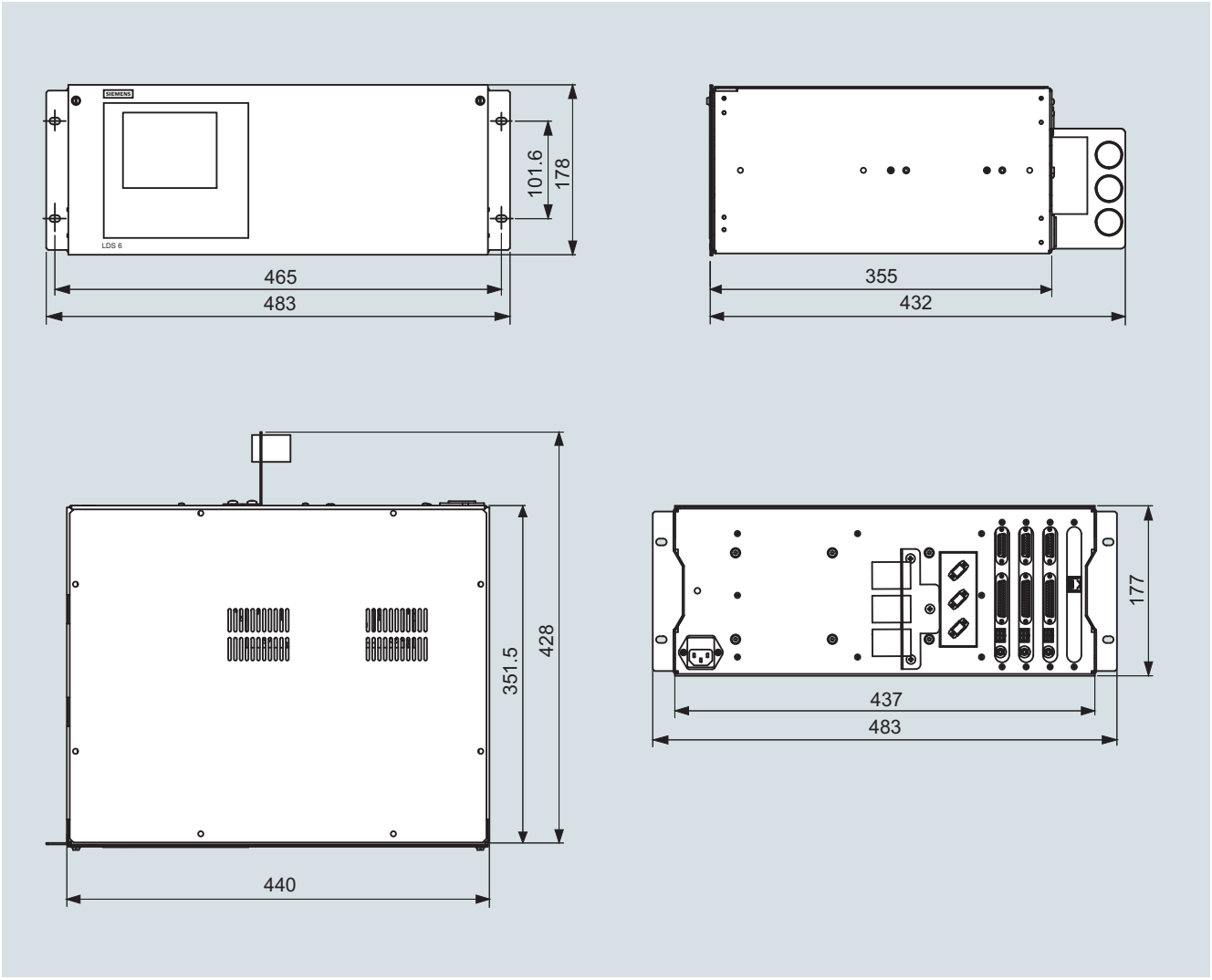
2) In combination with the CL/DL LDS 6 application, suitable for use to measure NH_3 according to the requirements of regulation 595/2009/EC "Implementing regulations on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (EURO VI)" from June 18, 2009 and its regulation for implementation of number 582/2011/EC from May 25, 2011 of the Commission of the European Union.

Additional accessories

You can find more accessories and spare parts in our PIA Life Cycle Portal product selector:
http://www.pia-portal.automation.siemens.com

2

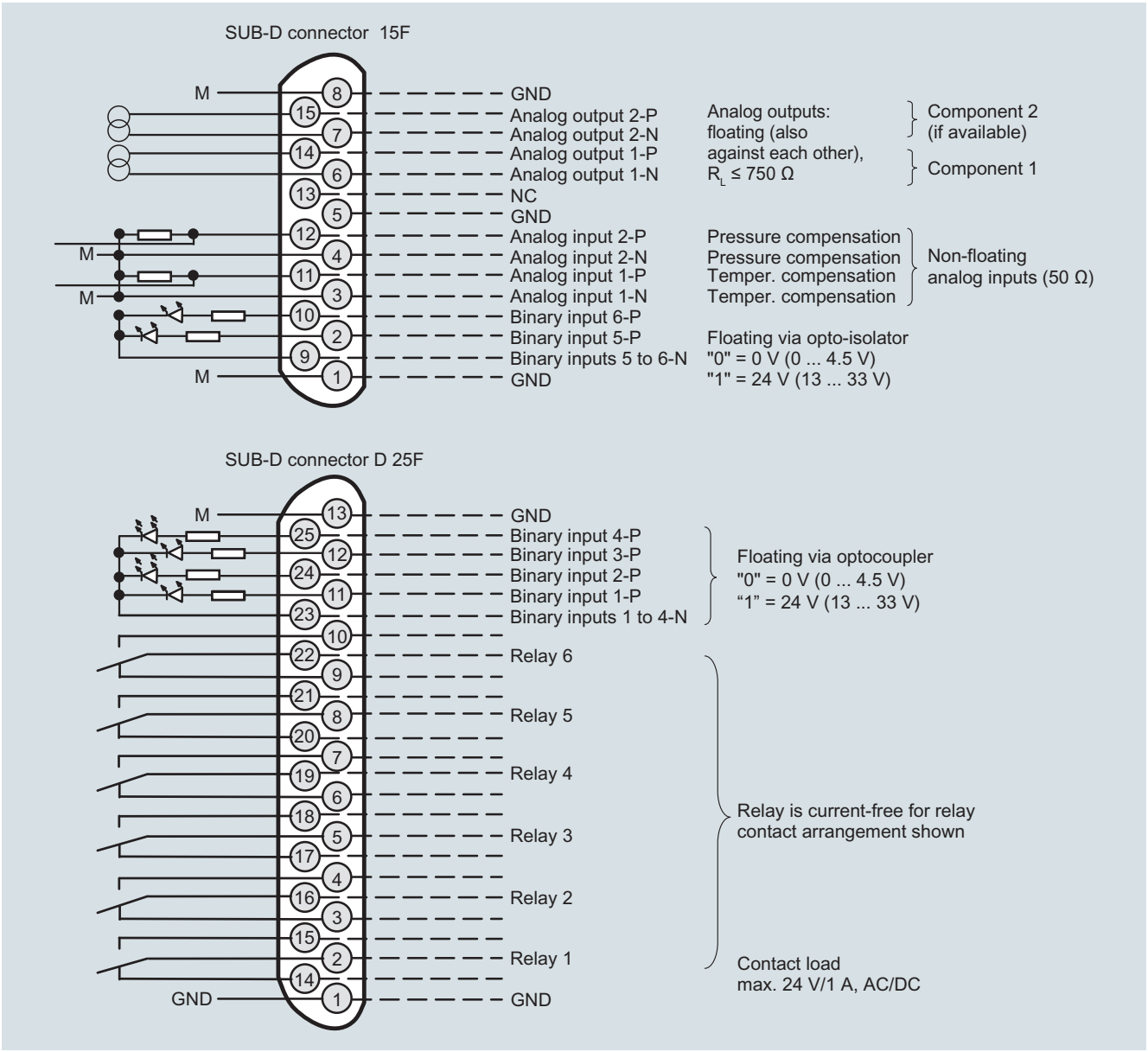
Dimensional drawings



LDS 6, 19" central unit, dimensions in mm

Circuit diagrams

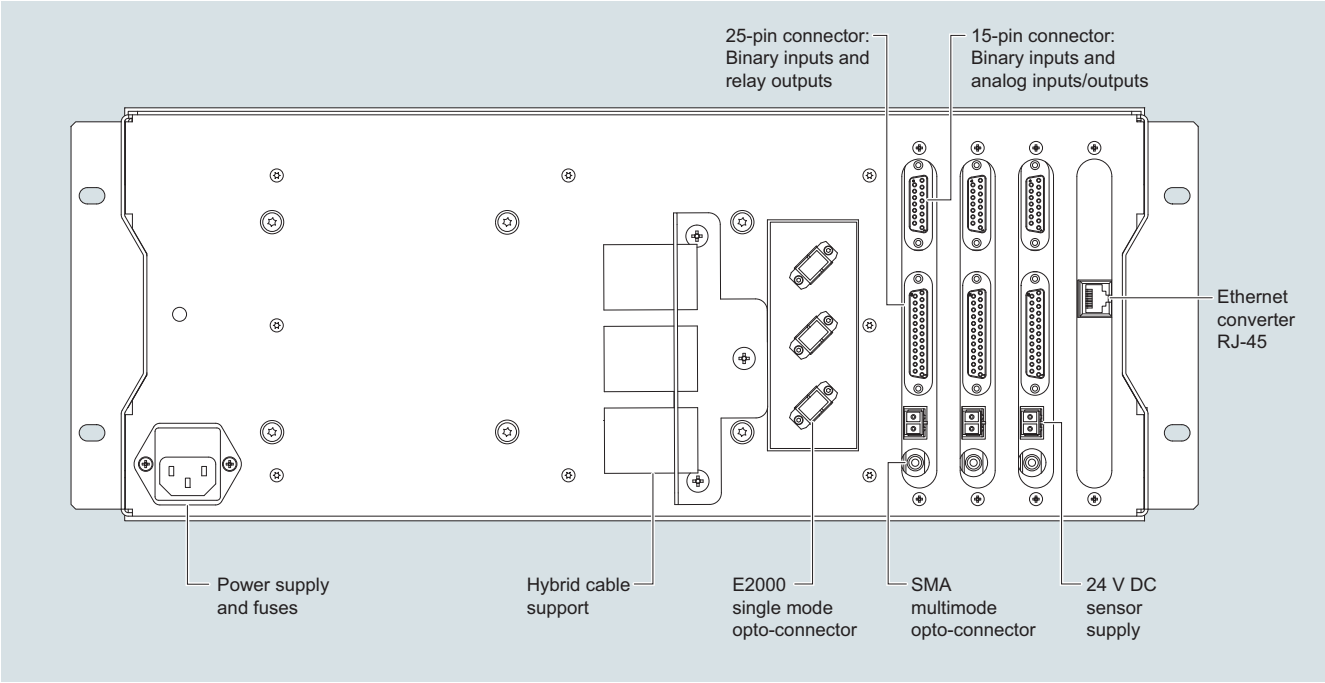
Pin assignments



LDS 6, 19" central unit, pin assignments

19" central unit

Optical and electrical connections



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

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

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 next column)	**Max. measuring range x path length**	**DL x path length** (under standard conditions[1] without cross-interference from other gases)	**DL x path length** (at 1 013 hPa with cross-interference from 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	C	0 … 600 °C	950 …1 050 hPa	0 … 5 vol%	0 … 100 vol%	75 vol%*m	0.1 vol%*m		2%[4]
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[6]	0 … 400 °C[7]	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[6]	0 … 400 °C[7]	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%

1) All technical specifications 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.
Complete the application questionnaire which can be found on the Internet at http://www.siemens.com/insituquestionnaire .

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

3) At least: Detection limit

4) Up to 200 °C, 5% above this

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

6) Suitable for use to measure NH_3 according to requirements of Directive 595/2009/EC "Implementing regulations on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (EURO VI)" from 18 June 2009 and its regulation for implementation of number 582/2011/EC from 25 May 2011 of the Commission of the European Union.

7) Device also able to operate above 400 °C to 1 000 °C. Due to decomposition of NH_3 at higher temperatures, no specification can be given in these 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 next 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 from 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	C							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

[1] At 20 °C, 1 013 hPa

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

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

[4] At least: Detection limit

[5] Accuracy corresponds to intrinsic uncertainty acc. to IEC 61207: 5% of MV; at best 0.5 vol%*m.

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 next column)	Max. measuring range x path length	DL x path length (under standard conditions[1] without cross-interference from other gases)	DL x path length (at 1 013 hPa with cross-interference from 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 specifications 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.
Complete the application questionnaire which can be found on the Internet at http://www.siemens.com/insituquestionnaire .

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

3) At least: Detection limit

4) Up to 200 °C, 5% above this

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

6) Suitable for use to measure NH_3 according to requirements of Directive 595/2009/EC "Implementing regulations on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (EURO VI)" from 18 June 2009 and its regulation for implementation of number 582/2011/EC from 25 May 2011 of the Commission of the European Union.

7) Device also able to operate above 400 °C to 1 000 °C. Due to decomposition of NH_3 at higher temperatures, no specification can be given in these 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 next 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 from 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 application is T_{min} > 20 °C, the DL refers to T_{min} and standard pressure (1 013 hPa)

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

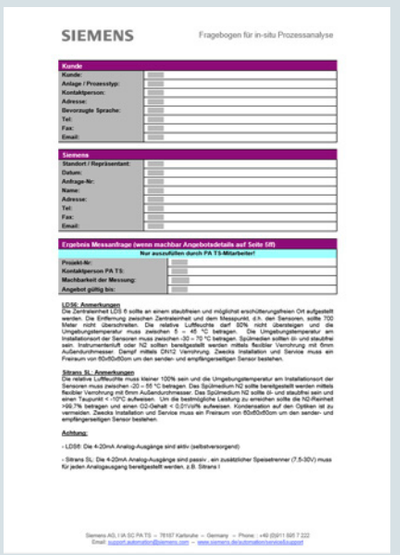
[4] At least: Detection limit

[5] Accuracy corresponds to intrinsic uncertainty acc. to IEC 61207: 5% of MV; at best 0.5 vol%*m.

Special applications

If the process conditions deviate from the specifications of the standard applications, special applications are also possible on request.

- Complete the application questionnaire which can be found on the Internet at http://www.siemens.com/insituquestionnaire: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Fragebogen für in-situ Prozessanalyse

Kunde

Kunde:
Anlage / Prozesstyp:
Kontaktperson:
Adresse:
Bevorzugte Sprache:
Tel:
Fax:
Email:

Siemens

Standort / Repräsentant:
Datum:
Anfrage-Nr:
Name:
Adresse:
Tel:
Fax:
Email:

Ergebnis Messanfrage (wenn machbar Angebotsdetails auf Seite 6ff)

Nur auszufüllen durch PA TS-Mitarbeiter!

Projekt-Nr:
Kontaktperson PA TS:
Machbarkeit der Messung:
Angebot gültig bis:

LDS6: Anmerkungen

Die Zentraleinheit LDS 6 sollte an einem staubfreien und möglichst erschütterungsfreien Ort aufgestellt werden. Die Entfernung zwischen Zentraleinheit und dem Messpunkt, d.h. den Sensoren, sollte 700 Meter nicht überschreiten. Die relative Luftfeuchte darf 80% nicht übersteigen und die Umgebungstemperatur muss zwischen 5 – 45 °C betragen. Die Umgebungstemperatur am Installationsort der Sensoren muss zwischen -30 – 70 °C betragen. Spülmedien sollten öl- und staubfrei sein. Instrumentenluft oder N2 sollten bereitgestellt werden mittels flexibler Verrohrung mit 6mm Außendurchmesser. Dampf mittels DN12 Verrohrung. Zwecks Installation und Service muss ein Freiraum von 60x60x60cm um den senden- und empfängerseitigen Sensor bestehen.

Sitrans SL: Anmerkungen

Die relative Luftfeuchte muss kleiner 100% sein und die Umgebungstemperatur am Installationsort der Sensoren muss zwischen -20 – 55 °C betragen. Das Spülmedium N2 sollte bereitgestellt werden mittels flexibler Verrohrung mit 6mm Außendurchmesser. Das Spülmedium N2 sollte öl- und staubfrei sein und einen Taupunkt < -10°C aufweisen. Um die bestmögliche Leistung zu erreichen sollte die N2-Reinheit >99.7% betragen und einen O2-Gehalt < 0.01Vol% aufweisen. Kondensation auf den Optiken ist zu vermeiden. Zwecks Installation und Service muss ein Freiraum von 60x60x80cm um den senden- und empfängerseitigen Sensor bestehen.

Achtung:

- LDS6: Die 4-20mA Analog-Ausgänge sind aktiv (selbstversorgend)
- Sitrans SL: Die 4-20mA Analog-Ausgänge sind passiv , ein zusätzlicher Speisetrenner (7,5-30V) muss für jeden Analogausgang bereitgestellt werden, z.B. Sitrans I

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