ISO 9001:2008 / ATEX

Original operating manual:
Photoelectric distance sensor type LDN-301-DI4-OP-S308

CE 0158

Ex

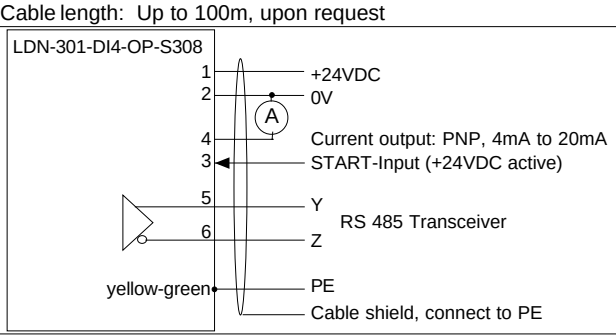
II 3G Ex nA op is IIB T4 Gc
II 3D Ex tc op is IIIB T135°C Dc IP67

- ATEX declaration by manufacturer for Gas & Dust
- For use in Ex zones 2, 22
- Measurement range analog output: 50mm to 1500mm
- Measurement range digital output: 50mm to 30m
- High measurement accuracy
- Analog output signal 4mA to 20mA and serial data interface RS-485
- Easy alignmenent through visible red light laser
- Stainless steel 1.4404 housing

Technical data \ Type	LDN-301-DI4-OP-S308
Measuring method	Time-of-flight measuring
Measurement range	50mm to 1500mm
Type of Ex protection Gas, according to 2014/34/EU	II 3G Ex nA op is IIB T4 Gc
Type of Ex protection Dust, according to 2014/34/EU	II 3D Ex tc op is IIIB T135°C Dc IP67
For use in Ex zones	Zones 2, 22
Maximum optical radiant intensity	<=1mW, wave length: 620nm to 690nm
Maximum optical radiant power	<=5mW/mm²
Light source	Laser Class 2, in accordance with EN 60825-1
Response time	minimum 0.5s, maximum 2.5s
Power-up delay time	800ms
Supply voltage	24 VDC +-10%
Maximum permissible voltage Um	30VDC
Current consumption	70mA
Maximum power dissipation	2.4W
Typical measurement tolerance	up to 10m: +-1mm, applies for 100% target reflectivity, in low-light ambient, T_{amb}: 25°C
Maximum measurement tolerance	up to 10m: +-2mm, applies for 10% to 500% target reflectivity, in strong light ambient
Distance dependent increase of measurement tolerance	<= 0.15mm/m
Analog current output, type	PNP, 4mA to 20mA, short circuit protected
Analog current output, range	50mm to 1500mm (50mm = 4mA, 1500mm = 20mA)
Analog current output, error indication	3.5mA: Measurement invalid 20.5mA: Object out of measurement range
Analog current output, resolution	1mm = 0,011mA
Analog current output, load range	500Ω <= R_L <=1000Ω
Serial interface, type	RS 485, Format: 9600 baud, 8 data bits, 1 stop bit, Parity none, Handshaking none
Serial interface, range	50mm to 30m
Serial interface, resolution	1mm
START input, type	PNP compatible
START input, function	"H" +24VDC: Starts measurement, "L" 0V: Stops measurement
Housing	M42, material: stainless steel 1.4404
Enclosure rating according to EN 60529	IP67
Ambient operating temperature range T_{amb}	-10°C up to +35°C Note 1
Storage temperature range	-20°C ... +70°C
Relative humidity	15% ... 80%
Pollution degree, EN 60664-1:2007	4
Categorization, according to EN 60947-5-2	D3A42AP1
Laser lifetime	Appr. 30'000h, typically, at a housing temperature of +20°C. During continuous operation. Urgent recommendation: Apply 0V to the START-input, when no measurement is necessary
Connection cable	7 x AWG24, PTFE, jacked: FEP, shielded, wires colored, length: 5m according to USPXXIII Class VI, cable diameter: 5.4mm, bending radius single = 30mm, bending radius moving = 60mm
Accessories	2 nuts M42
Options	- Cable length: Up to 100m, upon request

Electrical connection:

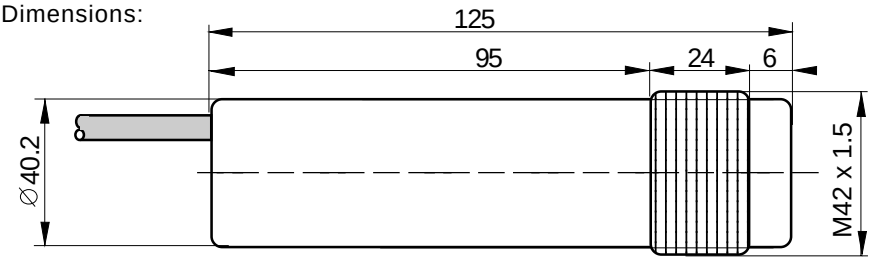
Wire color:	Function:
brown:	+24VDC
white:	0V
pink:	START-Input
grey:	Analog output 4...20mA
yellow:	RS 485 - Y
green:	RS 485 - Z
yellow-green:	PE
white, with designation:	Cable shield
Housing:	PE



EX related markings CE 0158
Manufacturer with address
Date of production: Numerals 5 to 8 of the serial number (year/calendar week)
Type of Ex protection Gas: Ex II 3G Ex nA op is IIB T4 Gc — ATEX Declaration by manufacturer according to the ATEX directive 2014/34/EU
Type of Ex protection Dust: Ex II 3D Ex tc op is IIIB T135°C Dc IP67 — ATEX Declaration by manufacturer according to the ATEX directive 2014/34/EU
T_{amb}: -10°C < T_{amb} < +35°C — Electrical data according to the table "Technical data"
(X designation of the certification number: Fibre optics must only be used with sensors with certificated limited optical power)

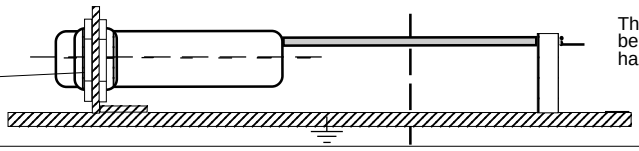
Note 1: For a longer life time of the laser diode, the housing temperature of +35°C must not be exceeded.

Dimensions:



Safe equipotential bonding for Ex devices:

Check the reliable, noncorrosive holding of the protection earth connection.



The end of the cable must be connected outside the hazardous locations.

The cable shield is to connect to PE in a wide area.

Operating Manual, EC-/EU - Declaration of Conformity:

Intended Use

The distance sensor type LDN-301-DI4-OP-S308 is designed to measure distances within potentially explosive atmospheres. It must be installed and operated in accordance to this operating manual.

Installation prescriptions for hazardous locations

It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The local potential equalization must be connected with the PA-connector using a reliable and noncorrosive connection. The PE/PA connector is permanently attached to the enclosure. The absolute maximum supply voltage Um = 30 VDC must not be exceeded. No external parts are allowed for focusing or reshaping of the emitted laser beam, except for original parts. The cable must be protected against damaging. The end of the cable must either be installed within a certificated Ex housing or must be installed outside of any Ex area.
Type LDN-301-DI4-OP-S308: Allowed to be installed and operated within Ex zones 2, 22.

General Installation Prescriptions Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short. The cable shield must be connected to the protection earth, large-surfaced. Connection cables must not be installed parallel to high voltage cables. The cable shield is to connect at PE.

Function

The sensor uses the time of flight measurement principle. The travel time of an emitted pulse of light is measured, whereby the pulse travels from the sensor to the measured object and back. The relation between distance and travel time is given by the speed of light. This measurement principle requires the measured object to reflect a part of the incident radiation towards the source. The acquired measurement result is available at the analog current output and the RS 485 interface in parallel.

Analog current output

Output current 4mA to 20mA:	Valid measurement result
Output current 3.5mA:	No valid measurement could be achieved
Output current 20.5mA:	No object could be detected within range

Serial interface

The RS 485 serial interface presents the measurement results, in the range from 0.05m to 30m, in a digital format. The interface is configured to 9600 baud, 8 data bits, 1 stop bit, no party and no handshaking. Each result is presented as human readable ASCII string containing the measured distance in millimeters followed by carriage return and line feed characters (CR+LF).

START input

The measurement process is started by applying +24VDC at the START input. The device will stop to perform measurements if the START input is connected to 0V. For a longer liftetime of the laser, activate the sensor only when measurement is necessary.

Maintenance and durability

Urgent recommendation for longer lifetime of the laser: When no measurement is being made, disable the laser, by switching the START input to 0V. The sensor is maintenance-free. The measurement window must be cleaned carefully if soiled. Never use aggressive cleaning agents. Equipment must only be repaired or serviced by the manufacturer.

Safety regulations for Laser devices class 2

By the installation, the going into operation and the application, it is necessary to take into consideration the valid rule EN 60825-1. Do not stare into the beam!

General safety informations

The equipment is not used for the prevention of accidents. In worst case of disturbance, the output can show any state. The mounting, wiring, application and maintenance must be realized in accordance with the relevant rules and prescriptions. It is necessary to take into consideration the relevant international and national regulations.
The sensors are conform to the following standards: IEC/EN 60079-0:2012 + A11:2013, IEC/EN 60079-15:2010, IEC/EN 60079-28:2015, IEC/EN 60079-31:2010, EN 60529:2014, EN 60950-1:2006; EN 61000-4-2 to EN 61000-4-6, EN 61000-6-1/-2, EN 61000-6-4, ATEX directive: 2014/34/EU, Machine directive: 2006/42/EC, EMC directive: 2014/30/EU, RoHS directive: 2011/65/EU.

General Notes, disposal

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with the local waste disposal regulations.

EC-/EU-Declaration of conformity

ATEX certification, types LDN: II 3G Ex nA op is IIB T4 Gc, II 3D Ex tc op is IIIB T135°C Dc IP67. Declaration by manufacturer, according to the ATEX directive 2014/34/EU. ATEX certification of quality management system, type production of Ex devices, in accordance to the ATEX directive 2014/34/EU, CE 0158. Certification No. BVS 15 ATEX ZQS / E118, QAR No. DE/BVS/QAR13.0004/02. Mr. Hans Bracher, Matrix Elektronik AG, is authorized to generation of documentation. The conformity of the devices with the EC standards and directives and the observation of the quality management system ISO 9001:2008 with the ATEX module „Production“, declares: Hans Bracher,

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