

# LASER

## Laser Displacement Sensor



### Series LLD-500

#### Key-Features:

- Measuring on hot surfaces and in bright environments
- Measurement range 0.15 to 200.0 m
- Measured value resolution: max.  $\pm 0.1$  mm,
- Accuracy: max.  $\pm 2.1$  mm (at 20 Hz)
- Switching output
- Protection class IP67
- Working temperature -10 to 60 °C, -40°C (option H)
- Maximum measuring frequency: 100 Hz (adjustable)
- Analog output 4...20 mA
- available digital outputs RS232, RS422, RS485, SSI and Profibus

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## TECHNICAL DATA

Measurement range *	0.15...100 m on natural, diffuse reflecting surfaces (on target Oralite 5200 up to 200 m)
Resolution max.	±0.1 mm
Measurement accuracy **	Max. ±2.1 mm at measurement frequency <20 Hz , ≤3.9 mm at measurement frequency >20Hz
Measurement time	minimum 10 ms
Measurement frequency	adjustable up to 100 Hz
Power supply	10...30 VDC
Power consumption	<10 W
Power consumption Option H (with heating)	<42 W (at 24 V)
Analog output (parameterise using RS232)	4...20 mA (12 bit), error handling with 3 mA/21 mA, total output error for 20 mA: +0.15% at a temperature of 25°C
Digital interfaces	RS232, RS422, RS485, SSI and Profibus
Transfer rate	Profibus: 9.6 kBaud...12 MBaud, SSI: 200, 250, 300 kHz
Switching output	3x „High side“, load up to 0.2 A
Trigger	1 x trigger in/out, 3...30 VDC
Connection ***	1 x 12-pole M16, 2 x 5-pole M12 B-coded, 1 x 5-pole M12 A-coded
Wavelength	635 nm
Laser class	2
Laser spot in 10 m distance	4 mm x 5 mm
Protection class	IP67, for outdoor applications and difficult environmental conditions an additional housing/protection is recommended
Storage temperature	-40...+70 °C
Working temperature	-10...+60 °C
Working temperature, Option H(with heating)	-40...+60 °C
Humidity	15%...90%, no condensation
EMC	EN 61326-1
Weight ***	approx. 700 g

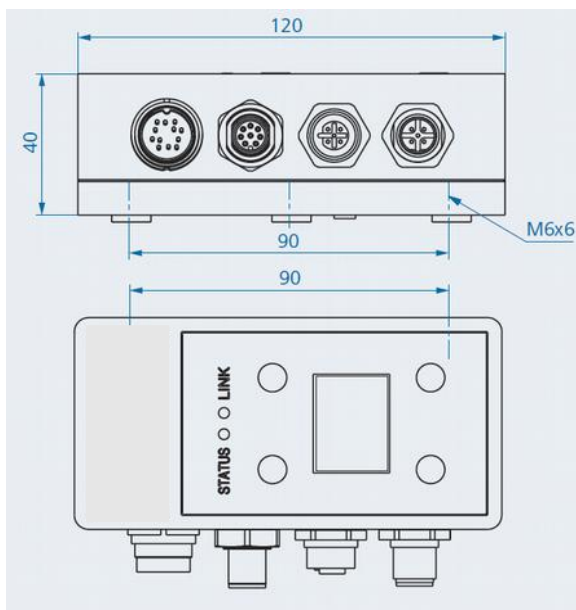
\* Measurement range depending on measuring frequency , target reflectivity , stray light and environmental conditions

\*\* depending on target reflectivity , stray light and environmental conditions

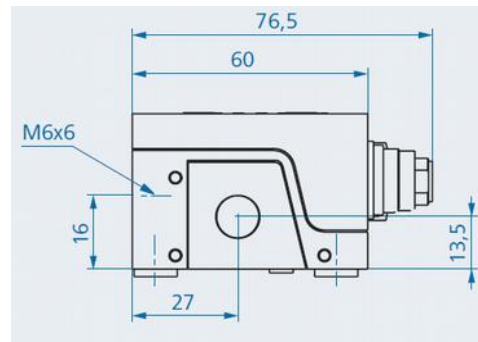
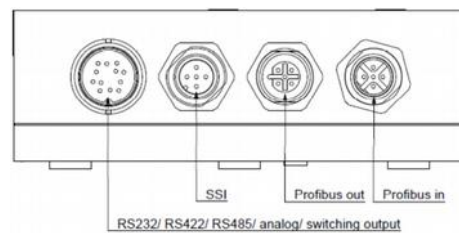
\*\*\* depending on device type / configuration

## TECHNICAL DRAWING

### LLD-500



This technical drawing shows all connector and interface options that are available for the LLD-500 product series.



The LLD-500 can be screwed on using 3 (underside) or 2 M6 fastening screws respectively (length to be chosen depending on the counter piece). 3 M6 fastening screws plus washers and washer springs are included in the scope of delivery.

## DIRECT CONTROLLING

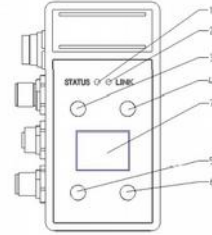
The LLD-500 can directly be parameterized and set for measurements without an additional PC.

Precondition is that it is supplied with voltage through the interface cable. The LLD-500 is ready for operation when the green STATUS LED is lit.

The individual menu items can be selected using 4 membrane keys, each 2 above and 2 below the OLED display.

The user language is English.

The display can be deactivated during the measurement. It can be switched on again by pressing key T3 or T4.



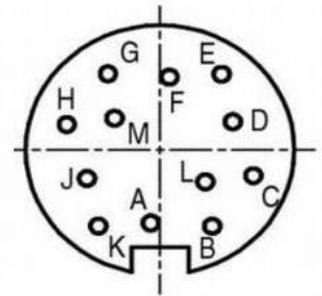
- |   |                 |  |
|---|-----------------|--|
| 1 | Status LED off  | Power supply off                         |
|   | red             | Power supply on, not ready for operation |
|   | green           | LUMOS ready for operation                |
| 2 | LINK LED off    | no data transfer                         |
|   | green, flashing | data transfer (Profibus/serial) active   |
| 3 | key T1          | Function see display indication          |
| 4 | key T2          | Function see display indication          |
| 5 | key T3          | Function see display indication          |
| 6 | key T4          | Function see display indication          |
| 7 | Display         |  |



- STOP Measurement will be stopped
- Disp. Display will be disabled  
The display can be enabled with key T4 or T3.

## ELECTRICAL CONNECTION

PIN	Color code	RS232	RS422	RS485	Description
A	white	RxD	Rx+	n.c.	RS232 Receiver data/ RS422 Receiver data +
B	brown	n.c.	Rx-	n.c.	RS422 Receiver data -
C	green	TRIG	TRIG	TRIG	Trigger input / output
D	yellow	QA	QA	QA	Analog output (3 mA ... 21 mA)
E	grey	n.c.	Tx-	B	RS232 Transmitter data/ RS422 Transmitter data -
F	pink	TxD	Tx+	A	RS422 Transmitter data +
G	blue	Q3	Q3	Q3	Switching output Q3
H	red	VCC	VCC	VCC	Supply voltage 10 ... 30 VDC
J	black	GND <sub>power</sub>	GND <sub>power</sub>	GND <sub>power</sub>	Ground supply voltage
K	violet	Q2	Q2	Q2	Switching output Q2
L	grey/ pink	GND <sub>signal</sub>	GND <sub>signal</sub>	GND <sub>signal</sub>	Ground output signal, analog
M	red/ blue	Q1	Q1	Q1	Switching output Q1

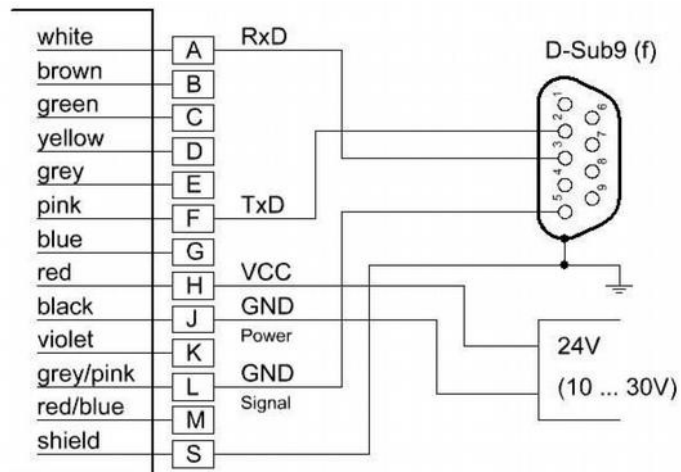


- The shield of the device cable is to be connected to the shield connector of the equipment, e.g. PLC.
- Inverse polarity protection is provided.
- Over-voltage protection is provided up to a maximum of 30 V DC.

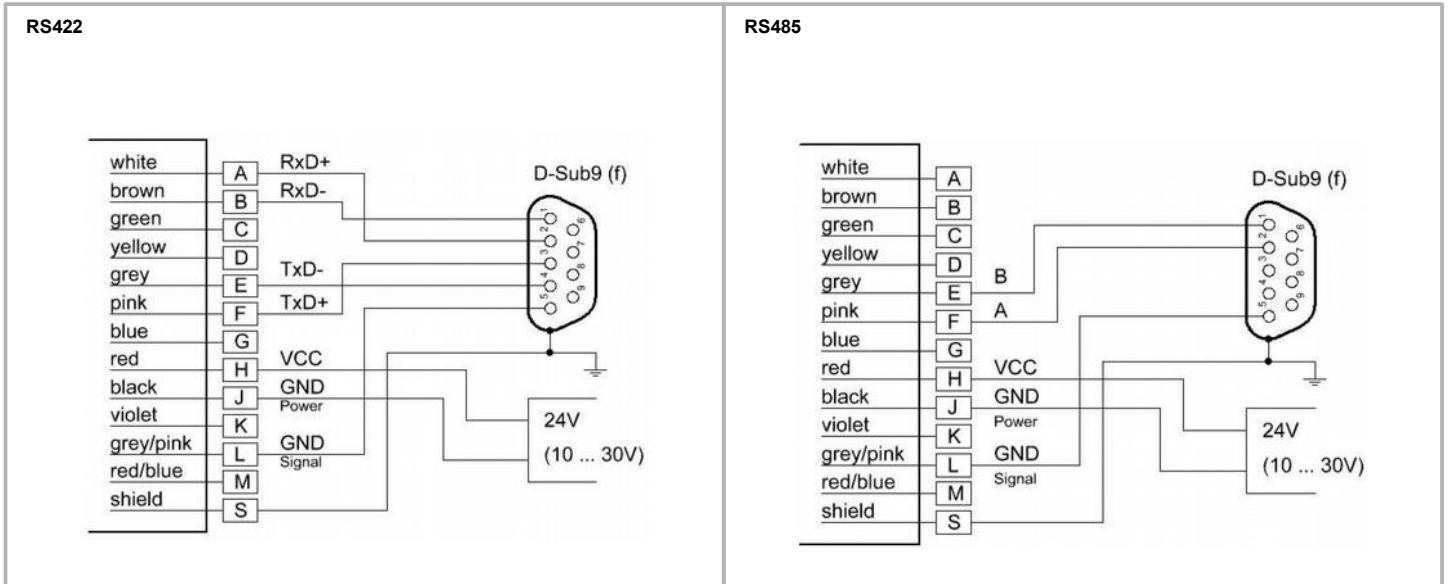
## SERIAL INTERFACE RS232

The serial interface RS232 can be used for

- Measured data transmission
- LLD500 parameterization: by using the serial interface or the display. Precondition for programming via serial interface is a connection provided by a terminal program (e.g. HyperTerminal).



## SERIAL INTERFACES RS422, RS485



## SWITCHING OUTPUT

The switching outputs Q1, Q2 and Q3 show distance information as logic switching information. They signalize when values are above or below a preset switching range subject to hysteresis. Hence, they are perfectly suitable for the direct further processing of monitoring variables such as filling level or object detection. Parameterization is done via the serial interface.

A load resistance of > 150 Ohms/ 6 W (30 V max. operating voltage; 0.2 A max. load current) must be switched against  $GND_{power}$  at the switching output. It is essential that the load current of 0.2 A is not exceeded.

You will find a detailed description of the settings in the manual.

## TRIGGER INPUT

The LLD-500 Trigger can be used as input or output.

1) Trigger input / external trigger function:

External trigger signal will be sent → start of measurement DM in accordance with parameter TRI.

2) Trigger output / e.g. connection between 2 LLD-500:

The output trigger signal of the 1. LLD-500 (parameterized with TRO) starts a single measurement DM of the second LLD-500 (parameterized with TRO).

You will find a detailed description of the settings in the manual.

## LASER BEAM IMAGE

The laser beam of the LLD-500 has a divergence of 0.13 mrad x 0.17 mrad (width x height). The diameter of the laser spot on the exit lens measures 4 mm.

The table below shows the size of the laser spot in dependence on the distance. The laser spot has an elliptical shape.

Distance	Laser spot width	Laser spot height
1 m	5 mm	5 mm
5 m	3 mm	3 mm
10 m	4 mm	5 mm
50 m	6 mm	7 mm
100 m	26 mm	34 mm
200 m	52 mm	68 mm

The above-mentioned laser spot holds approx. 50 % of the entire laser energy. An aura with less energy forms around that spot.

## ORDER CODE

LLD-500

<b>Interface</b> RS232, RS422, RS485 RS232, RS422, RS485, SSI RS232, RS422, RS485, Profibus RS232, RS422, RS485, SSI, Profibus	RS SSI PROF SSIPRO
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-	no heating
H	(not for SSI, SSIPRO) with heating

## CABLES AND ACCESSORIES

### Cable LLD-500-RS and power supply

KAB-LLD500-2M-S	Interface cable 2 m, straight connector
KAB-LLD500-5M-S	Interface cable 5 m, straight connector
KAB-LLD500-10M-S	Interface cable 10 m, straight connector
KAB-LLD500-2M-SW	Interface cable 2 m, angular connector
KAB-LLD500-5M-SW	Interface cable 5 m, angular connector
KAB-LLD500-10M-SW	Interface cable 10 m, angular connector

### Cable LLD-500-SSI

K5P2M-LLD500-S-SSI	Cable 2 m, SSI, straight connector
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### Accessories

ZT51_WEISS	Target board for Laser type LLD
Stautubus	light protector against stray light, Ø100 mm
3M 3279 special	Reflective tape, 300 x 300 mm
Oralite 5200	Reflective tape, 1000 x 1000 mm

### Cable LLD-500-PROF

K5P2M-B-M12-PROF	Cable 2 m, female connector 5-pol. M12, open ends
K5P2M-SB-M12-PROF	Cable 2 m, female 5-pol. M12, male 5-pol. M12
K5P2M-B-M12-PROF	Cable 2 m, male connector 5-pol. M12, open ends
K5P5M-B-M12-PROF	Cable 5 m, female connector 5-pol. M12, open ends
K5P5M-SB-M12-PROF	Cable 5 m, female 5-pol. M12, male 5-pol. M12
K5P5M-S-M12-PROF	Cable 5 m, male connector 5-pol. M12, open ends
K5P10M-B-M12-PROF	Cable 10 m, female connector 5-pol. M12, open ends
K5P10M-SB-M12-PROF	Cable 10 m, female 5-pol. M12, male 5-pol. M12
K5P10M-S-M12-PROF	Cable 10 m, male connector 5-pol. M12, open ends

94133	Profibus OUT M12 connector, male
94136	Profibus IN M12 connector, female
94145	Profibus M12 terminating resistance



### General safety instructions

Attention radiation laser.

Do not stare into beam.

Do not point the laser beam towards someone's eye.

It is recommended to stop the beam by a matte object or matte metal shield.

Laser regulations require the power to the sensor be switched off when turning off the whole system this sensor is part off.

Subject to change without prior notice.

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