

# Original Operating Manual:

## Light barriers series LBS/LBN/LBD-100-SIR/SDI/EFP/EVP(-OP)

### LBD-100-SIR/SDI/EFP/EVP-OP



IECEx BVS 14.0108X


 IECEx designation  
 Ex d [op is Ga] IIC T6 Gb  
 Ex tb [op is Da] IIIB T100°C Db IP67

ATEX designation:

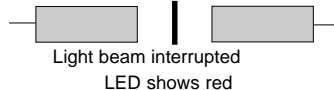
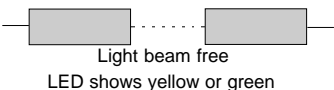
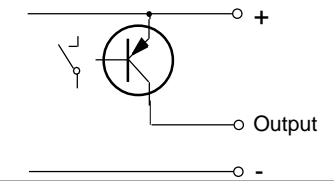
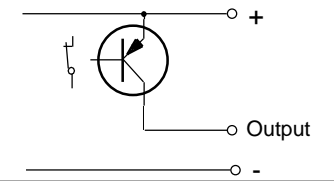
 II 2(1)G Ex d [op is Ga] IIC T6 Gb  
 II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67

### Housing M18

- Range 100m
- Series LBD: ATEX and IECEx certified
- LBD: For use in Ex zones (0), 1, 2, (20), 21, 22  
optical radiation can operate into Ex Zones 0, 20
- LBN: For use in Ex zones 2, 22
- Optimal alignment by status visualization by 3-color LED at the rear side
- With optional pollution indication output VA
- With optional emitter disable input (Test input)

### LBN-100-SIR/SDI/EFP/EVA-OP

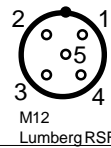

 II 3G Ex nA op is IIB T4 Gc  
 II 3D Ex tc op is IIIA T135°C Dc IP67

Type designation emitter	LBS-100-S**-S***	LBN-100-SIR/SDI-OP-S***	LBD-100-SIR/SDI-OP-S***
Type designation receiver	LBS-100-E**-S***	LBN-100-EFP/EVP-OP-S***	LBD-100-EFP/EVP-OP-S***
<b>Technical data</b>	(S***: Designation for different options)		
Type of Ex protection Gas, according to 2014/34/EU	None	II 3G Ex nA op is IIB T4 Gc	II 2(1)G Ex d [op is Ga] IIC T6 Gb
Type of Ex protection Dust, according to 2014/34/EU	none	II 3D Ex tc op is IIIA T135°C Dc IP67	II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67
For use in Ex Zones	None	Zones 2, 22	Zones (0), 1, 2, (20), 21, 22
Optical range	100m		
Minimum detectable object size	12mm (Avoid mirror effects)		
Light source	Infrared 870nm		
Maximum radiant intensity	not limited	<=5mW/m <sup>2</sup>	<=5mW/m <sup>2</sup>
Maximum radiant power	not limited	< 35mW	< 15mW
Optical angle of aperture (at a distance of 10m)	Emitter: appr.17° / Receiver: appr.15°		
Response time	5ms		
Power up delay time	500ms		
Supply voltage	24VDC +10%		
Absolute maximum supply voltage Um	30VDC		
Current consumption, emitter	50mA	55mA	55mA
Current consumption, receiver	50mA		
Power dissipation	Emitter: max. 1.52W / Receiver: 1.38W		
Output	PNP type, 100mA, short circuit protected		
Pollution indication output VA, optional, only LB*-100-EVP	PNP type, 100mA, short circuit protected		
Housing	M18, brass Ms 58, nickel plated		
Enclosure rating, according to EN 60529	IP 65	IP 67	IP67
Working temperature range Tamb	-20°C < Tamb < +50°C		
Storage temperature range	-20°C ... +70°C		
Relative humidity	15% ... 90%, noncondensing		
Vibration and shock resistance	Vibration: 30g over 20Hz to 2kHz. Shock: 100g for 3ms		
Pollution degree, in accordance with EN 60664-1:2007	4		
Device designation, in accordance with EN 60947-5-2	LB*-100-SIR/EFP/EVA(-OP): T3A18BP1 / LB*-100-SIR/EFP/EVP(-OP)-S099: T3A18BP2		
Connection cable, type	2/3/4 + PE x AWG24/0.25mm <sup>2</sup> , Special-PVC/PVC, shielded		
Connection cable, length	5m	10m	10m
Male connector M12, only LBS/LBN-100-***(-OP)-S099	Male connector M12, Lumberg RSF 5, 5-pin		--
Cable wit connector M12, LBS/LBN-100(-OP)-S096/S170	Cable 10cm with male connector M12 type RSTS 5-298, 5-pin		--
Accessories, all types, included	- 4x nuts M18 (or 2x clamps, on request)		
Accessories, only LBN-100-***-OP-S099, included	- 2x Safety lock device, mount at the cable connection, for locking the connection. - 2x Warning plate "Do not open/close when supply voltage connected", self-sealing, for gluing on the cable connector. - 2x Protection cap for the sensor socket.		
Accessories, LBS/LBN-100-***(-OP)-S096/S099/S170, not included	- Cord set M12, types Lumberg RKTS 5-298/xx (straight or RKWTH 5-298/xx (right angle)		
Options	Cable length, up to 100m, on request Response time 1ms, on request Receiver with pollution indication output VA Emitter with disable input DI - LBS/LBN-100-***(-OP)-S096: Cable length 10cm, with male connector M12 / 5-pin, Lumberg type RSTS 5-298 - LBS/LBN-100-***(-OP)-S099: Male connector M12: Lumberg type RSF 5, 5-pin - LB*-100-***(-OP)-S112: Cable: TPU, 3/4/5 x 0.5mm <sup>2</sup> , shielded, leads numbering marked, cable for trailing, halogen-free, length: 10m - LB*-100-***(-OP)-S116: Cable: TPU, 3/4/5 x 0.5mm <sup>2</sup> , shielded, leads numbering marked, cable for trailing, halogen-free - LBS/LBN-100-***(-OP)-S170: Cable length 10cm, with male connector M12 / 5-pin, Lumberg type RSTS 5-298. With potentiometer at the emitter for fine adjustment - LB*-100-EFP/EVA(-OP)-S179: Inverted output function, dark switching - LB*-100-S**/E**(-OP)-S183: Cable: TPU, 3/4/5 x 0.5mm <sup>2</sup> , shielded, leads numbering marked, cable for trailing, halogen-free, length: 3m - Additional "Tubus M18/90/8": Aperture tube, open by 8mm. type: "Tubus M18/90/8"		
LED indication and function			
Output function (Wiring see next page)			
LB*-100-EVP with pollution indication output VA	PNP = OFF		PNP=ON, if LED=yellow
Alignment and controlling by LED display (Status visualization by LED at the rear side of the receiver)	LED red: Light beam interrupted / not aligned		LED yellow: Polluted lenses / bad aligned
	LED green: Light beam free / well aligned		

**Wiring LB\*-100-SIR/SDI/EFP/EVP(-OP):**

Standard cable:	Special cable:	Receiver:	Emitter:
brown	1	+24VDC	+24VDC
black	2	0V	0V
red	3	Output	DI (optional)
orange	4	Output VA	-
Housing	green-yellow	PE/PA	PE/PA
white	white	Cable shield	Cable shield

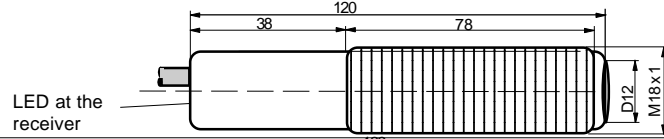
**Wiring LBS/LBN-100-SIR/SDI/EFP/EVP(-OP)-S099:**



Receiver:	Emitter:
1 +24VDC	+24V
2 Pollution indication output VA	DI (Disable)
3 0V	0V
4 Output	NC
5 PE	PE

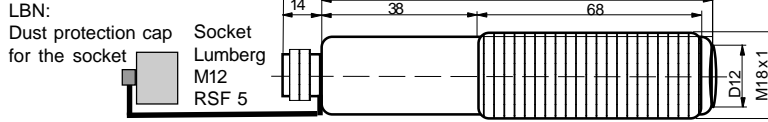
**Dimensions: LB\*-100-\*\*\*(-OP):**

Same dimensions for emitter and receiver



**Dimensions: LBS/LBN-100-\*\*\*(-OP)-S099:**

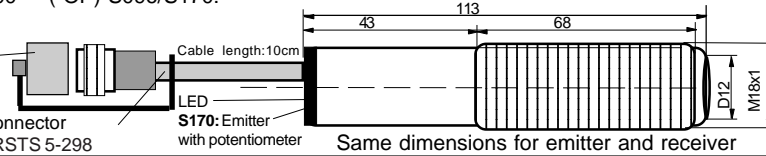
Same dimensions for emitter and receiver



**Dimensions: LBS/LBN-100-\*\*\*(-OP)-S096/S170:**

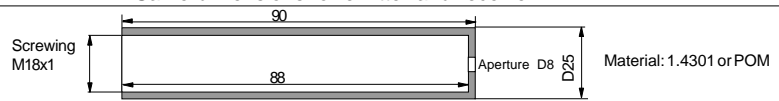
LBN: Dust protection cap for the socket

Cord set with connector M12, Lumberg RSTS 5-298



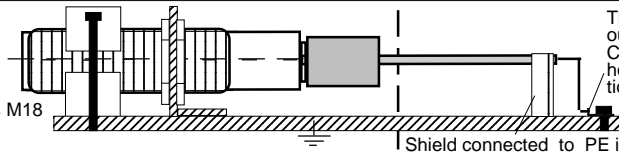
**Dimensions: Tubus M18/90/8:**

(Optional accessory for reduction the directional angle)



**Safe equipotential Bonding for Ex Devices:**

The local equipotential bonding have to be done with conductive corrosion-resistant clamps or nuts M18



The end of the cable must be connected outside the hazardous locations. Check the reliable, noncorrosive holding of the protection earth connection.

Shield connected to PE in a wide area

**EX related markings**

CE 0158	Manufacturer with address
Type LBD: II 2(1)G Ex d [op is Ga] IIC T6 Gb,	II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67
Type LBN: II 3G Ex nA op is IIB T4 Gc,	II 3D Ex tc op is IIIA T135°C Dc IP67
Type LBD: ATEX Certification	No: BVS 10 ATEX E130 X DEKRA
Type LBD: IECEx Certification	IECEx BVS 14.0108X
Type LBN: ATEX declaration by manufacturer	According to the ATEX directive 2014/34/EU
T <sub>amb</sub> : -20°C < T <sub>amb</sub> < +50°C	Electrical data according to the table "Technical data"
Date of production: Numerals 5 to 8 of the serial number (year/calendar week)	

(X designation of the certification number: Fibre optics must only be used with sensors with certificated limited optical power)

**Operating Manual, EU - Declaration of Conformity:**

**General regulations for all types of Ex devices:**  
It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The maximum rated supply voltage U<sub>m</sub> = 30VDC must not be exceeded. The local equipotential bonding have to be done. The protective earth (PE) is solid connected with the housing. At devices without PE terminal, the local equipotential bonding have to be done with conductive corrosion-resistant clamps or nuts M18 over the housing. The cable have to be installed and protected against damages. The cable with termination fittings, or in cable tray systems and installed in a manner to avoid tensile stress at the termination fittings. To connect cables inside hazardous locations only use certificated Ex housings. All cable terminals must be connected outside hazardous locations. Other than original manufacturer, additional optical lenses are not allowed in hazardous locations.  
**Emitter: LBD-100-SIR/SDI-OP-S\*\*\*, Receiver: LBD-100-EFP/EVP-OP-S\*\*\*:** For use in Ex zones 1, 2, 21, 22. The limited optical radiation can operate into hazardous locations 0 or 20 over through a viewing glass.  
**Emitter: LBN-100-SIR/SDI-OP-S\*\*\*, Receiver: LBN-100-EFP/EVP-OP-S\*\*\*:** For use only in Ex zones 2, 22.  
**Emitter: LBN-100-SIR/SDI-OP-S096/S099/S170, Receiver: LBN-100-EFP/EVP-OP-S096/S099/S170:** For use only in Ex zones 2, 22. **WARNING!** Do not separate the connector when the supply voltage is connected to the cable. When installing the sensor, the safety lock device must be fitted at the cable connector. The additional adhesive warning label must be fixed to the connector housing at the connection cable. Lumberg cordsets RSTS 5-298/xx (Straight type) or RKWTH 5-298/xx (Right angle type) are allowed ONLY. It is necessary to take into consideration the mounting prescription of the connector manufacturer. In dusty locations, the socket protection cap must be fitted, when the connection cable is not connected.

**General mounting 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 should be connected to the protection earth, large-surfaced. Connection cables must not be installed parallel to high voltage cables.

**Function**  
If the light beam between emitter and receiver is free, the output switches ON (+24V). If the light beam is interrupted the output switches OFF. The load (Relay or other loads) must be connected at 0V\* (minus).

**Function, LB\*-100-\*\*\*(-OP)-S179**  
If the light beam between emitter and receiver is free, the output switches OFF. If the light beam is interrupted the output switches ON (+24V). The load (Relay or other loads) must be connected at 0V\* (minus).

**Optional pollution indication output. Only LB\*-100-EVP(-OP)-S\*\*\*:**  
The VA output will be activated by polluted lenses or a bad alignment. If the lenses are polluted, the LED shows yellow and the VA output switches to ON (+24V). This function gives the possibility to recognize pollutions in a short time.

**Optional Emitter Disable Input DI. Only LB\*-100-SDI(-OP)-S\*\*\*:**  
If several light barriers are installed close to another, it is necessary to use light barriers with emitters with disable input. By using the disable input DI, each emitter can be controlled in a short reaction time. If only one emitter is activated in the same time, a mutual influence is precluded.

DI= 0V or not connected = emitter enabled  
DI= High (24VDC) = emitter disabled  
The Disable Input SDI must be activated for >= 7ms. The SDI input is PNP compatible. The Emitter-Disable-Input DI can also be used for testing the associated receiver. By a short-time shut-off of the emitter, the switching off of the receiver output and with it the correct function of the receiver will be checked.

**Alignment of the Light Barrier**  
The three color indication at the rear side of the receiver allows an optimal alignment. 1. The emitter beam must hit the receiver lens in an angle near to 90°.

2. The receiver should be moved, until the LED (from the receiver) shows "green". Search the middle of the green range. If the receiver LED shows yellow, the light barrier is bad aligned, or the lenses are polluted.

**Maintenance:**  
No special maintenance is required. If the lenses becomes dirty, they should be cleaned with a non-aggressive solvents. Equipment must only be repaired by the manufacturer.

**General safety instructions:**  
The operating manual provide the machine manufacturer's or machine operator's technical personnel instructions on the safe mounting, configuration, electrical installation, commissioning, and on the operation and maintenance of the light barrier. Please read the operating instructions carefully. Types: Emitter: LBN-100-SIR/SDI-OP-S096/S099/S170, Receiver: LBN-100-EFP/EVP-OP-S096/S099/S170: "WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES. DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS". The mounting of the sensor in dusty locations without fixed cordset or protection cap results in a high ignition risk. In worst case of breakdown, the output can change to any state! The light barriers must not be used for fail-safe applications! In worst case the output can change to any state! When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations: EN 60079-14, single directive 1999/92/EC. The sensors are conform to the following standards:

The sensors are conform to the following standards:  
IEC/EN 60079-0:2012+A11:2013, IEC/EN 60079-1:2007, EN 60079-15:2010, IEC/EN 60079-28:2007, 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 local waste disposal regulations.

**EU-Declaration of conformity:**  
IECEx certification, types LBD: Ex d [op is Ga] IIC T6 Gb, Ex tb [op is Da] IIIB T100°C Db IP67. Certification No. IECEx BVS 14.0108X.

<http://iecex.iec.ch/iecex/iecexweb.nsf/0FE79714C0BAEF6F5C1257D7E0044F6A9?opendocument>  
ATEX certification, types LBD: II 2(1)G Ex d [op is Ga] IIC T6 Gb, II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67. Certification No. BVS 10 ATEX E 130 X, DEKRA EXAM GmbH, Zertifizierungsstelle, Carl-Beyling-Haus, Dinen Dahlstrasse 9, D-44809 Bochum, Kennnummer: 0158.

ATEX certification, types LBN: II 3G Ex d op is IIB T4 Gc, II 3D Ex tc op is IIIA T135°C Dc IP67. ATEX declaration by manufacturer in accordance to 2014/34/EU.  
ATEX certification of quality type production of Ex devices in accordance to the directive 2014/34/EU, CE 0158. Certification No: BVS 15 ATEX ZQS/E118. The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001:2008 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG

LBD-100-OP-IECEX\_e3.2016-09-22/HB

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