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# D-LAS Series

## ► D-LAS1-...

- Visible laser beam (<0.4 mW, 670 nm), **laser class 1**
- Various apertures available
- Big working range (up to 70 m, with type -M up to 150 m)
- High reproducibility (in  $\mu\text{m}$  range)
- High switching frequency (5 kHz)
- Analog output 0V...+10V
- Switching output (npn or pnp)
- Optics cover made of glass
- Sturdy metal housing (brass, nickel-plated)
- Compact design (M18)



## Design

### Product name:

**Transmitter:** D-LAS1-(aperture)\*-T  
 D-LAS1-(aperture)\*-i-T  
 D-LAS1-M-(aperture)\*-T

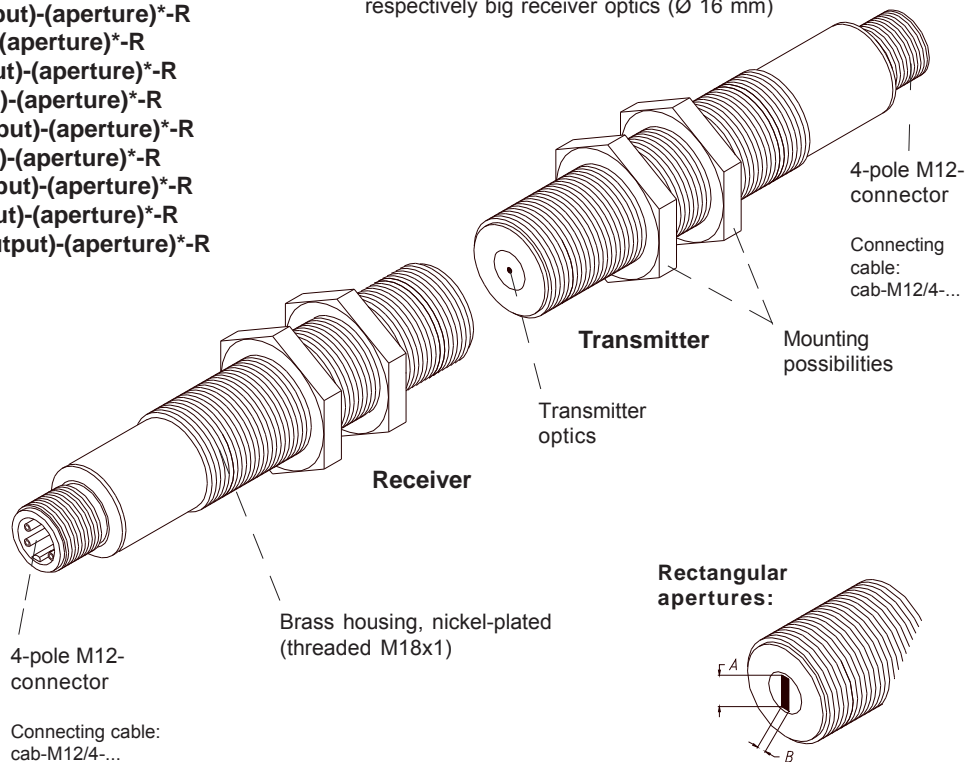
**Receiver:** D-LAS1-(switching output)-(aperture)\*-R  
 D-LAS1-TC-(switching output)-(aperture)\*-R  
 D-LAS1-D-(switching output)-(aperture)\*-R  
 D-LAS1-DTC-(switching output)-(aperture)\*-R  
 D-LAS1-P-(switching output)-(aperture)\*-R  
 D-LAS1-PTC-(switching output)-(aperture)\*-R  
 D-LAS1-PD-(switching output)-(aperture)\*-R  
 D-LAS1-PDTC-(switching output)-(aperture)\*-R  
 D-LAS1-M-(switching output)-(aperture)\*-R  
 D-LAS1-MTC-(switching output)-(aperture)\*-R  
 D-LAS1-MD-(switching output)-(aperture)\*-R  
 D-LAS1-MDTC-(switching output)-(aperture)\*-R  
 D-LAS1-MP-(switching output)-(aperture)\*-R  
 D-LAS1-MPTC-(switching output)-(aperture)\*-R  
 D-LAS1-MPD-(switching output)-(aperture)\*-R  
 D-LAS1-MPDTC-(switching output)-(aperture)\*-R

- Q = Switching output:  
 npn dark-switching (npn n.o.)/pnp bright-switching (npn n.c.)
- Qinv = Switching output:  
 pnp dark-switching (pnp n.o.)/npn bright-switching (npn n.c.)
- TC = Threshold correction
- i = Integrated adjustment unit
- P = Potentiometer for comparator threshold adjustment  
 incl. red LED for switching state display integrated in the receiver housing
- D = Dynamic output with 10 ms pulse length
- M = Big transmitter optics ( $\varnothing$  18 mm)  
 respectively big receiver optics ( $\varnothing$  16 mm)

### \*Available apertures:

(aperture size at transmitter side  
 = aperture size at receiver side):

Rectangular apertures (AxB in mm):	Round apertures ( $\varnothing$ in mm):
0.3x1	d0.15
0.3x1.5	d0.3
0.3x3	d0.5
0.5x0.3	d0.7
0.5x1	d1.0
0.5x4	d2.0
0.5x6.5	d3.0
0.75x2	
0.75x3	
0.8x6	For type „M“:
0.8x6.5	9.5x1.5
1x2	9.5x2
1x4	10x0.3
7x3 (= no aperture)	16x0.5
	16x1

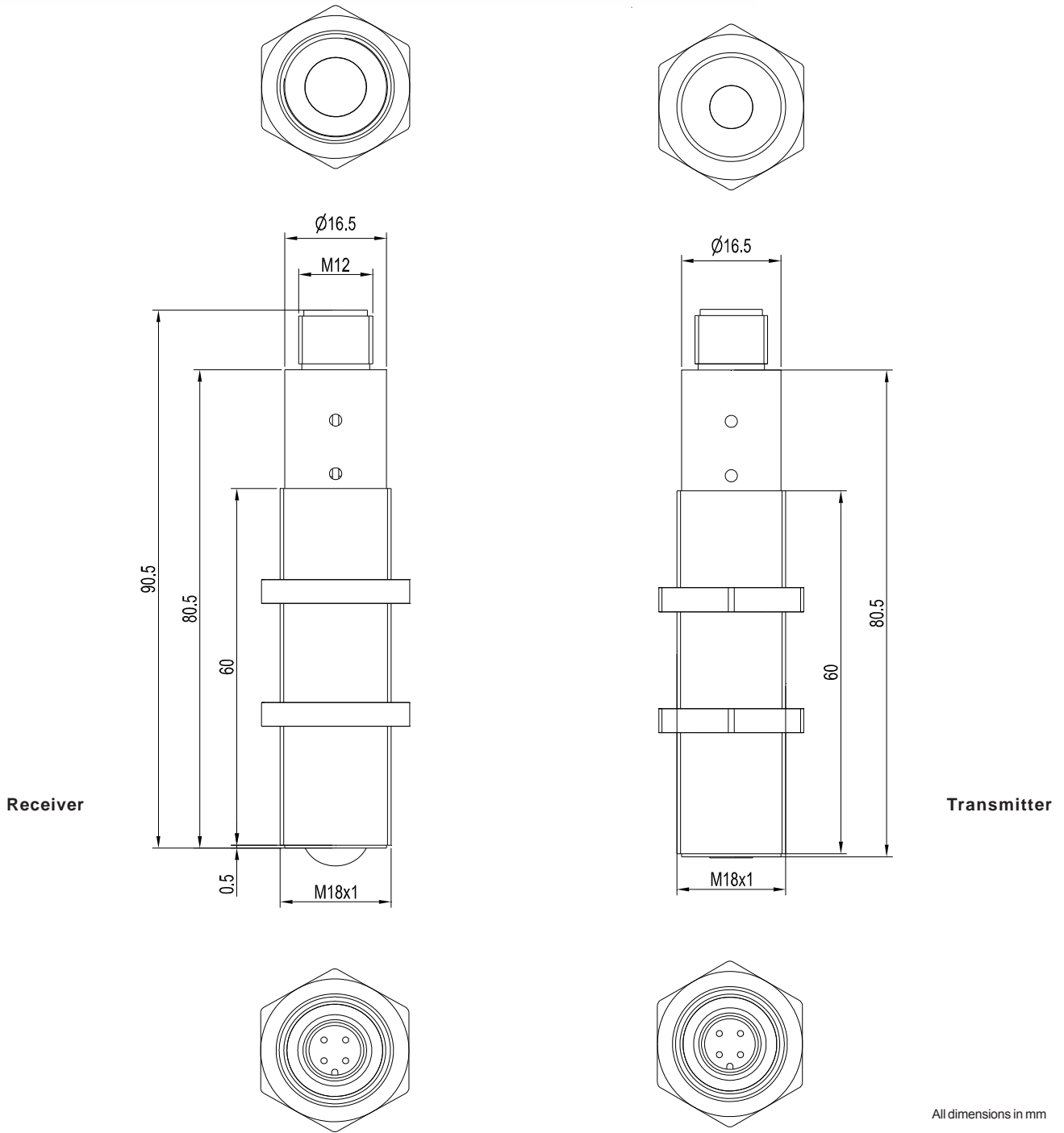




**Technical Data**

Type	D-LAS1	D-LAS1-TC	D-LAS1-P	D-LAS1-D	D-LAS1-M
Laser	Solid state laser, 670 nm, AC operation, <0.4 mW opt. power, laser class 1 acc. to DIN EN 60825-1. The use of these laser transmitters therefore requires no additional protective measures.				
Max. range	70 m (depends on the aperture used)				150 m
Min. detectable object	With aperture size up to 5 mm: Analog typ. 2% of aperture size, digital typ. 1% of aperture size, with aperture size up to 10 mm: Analog typ. 1% of aperture size, digital typ. 0.5% of aperture size, with aperture size 16 mm: Analog typ. 0.5% of aperture size, digital typ. 0.2% of aperture size				
Reproducibility	With aperture size up to 5 mm: Analog typ. 2% of aperture size, digital typ. 1% of aperture size, with aperture size up to 10 mm: Analog typ. 1% of aperture size, digital typ. 0.5% of aperture size, with aperture size 16 mm: Analog typ. 0.5% of aperture size, digital typ. 0.2% of aperture size, with threshold correction "TC": typ. 0.1% of aperture size				
Optical filter	Interference filter with aperture size A or B respectively $d > 3$ mm				Interference filter
Threshold correction	---	yes	---	---	---
Dynamic output	---	---	---	Pulse length 10 ms	---
Voltage supply	+24VDC ( $\pm 10\%$ , reverse-polarity protection, overload protection)				
Alternating current/ direct current supply	AC operation (45 kHz)				
Ambient light	up to 5000 Lux				up to 10000 Lux
Current consumption	Transmitter: typ. 50 mA		Receiver: typ. 40 mA		
Max. insertable aperture size	with integr. adjustment unit: A,B or $d < 3$ mm without adjustment unit: 6.5 mm x 0.8 mm		A $\leq 6.5$ mm, B $\leq 2$ mm $d \geq 2$ mm		A $\leq 16$ mm, B $\leq 3$ mm, $d \leq 3$ mm
Current control input I-CONTROL	0V...+5V: Laser power decreases linearly with increasing voltage +5V...+24V: Laser OFF				
Monitor output	Analog output 0V...+10V				
Enclosure rating	IP64 with integrated adjustment unit, otherwise IP67		IP67		
Operating temperature range	-20°C ... +50°C				
Storage temperature range	-20°C ... +85°C				
Housing material	Brass, nickel-plated				
Housing dimensions	Transmitter respectively receiver: M18x1, length approx. 90 mm (incl. M12 plug)				
Connector type	4-pole M12-connector				
Max. switching current	100 mA, short-circuit-proof				
EMC test acc. to	DIN EN 60947-5-2				
Switching frequency	typ. 5 kHz				

Dimensions



All dimensions in mm

Laser Information

The laser transmitters of D-LAS series comply with laser class 1 according to EN 60825-1. Under reasonably foreseeable conditions a class 1 laser is safe. The reasonably foreseeable conditions are kept during specified normal operation. The use of these laser transmitters therefore requires no additional protective measures.

The laser transmitters of D-LAS series are supplied with an information label „CLASS 1 Laser Product“.

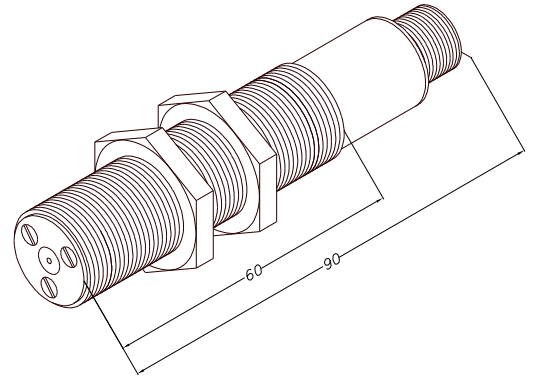
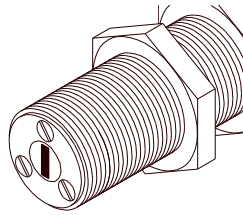
**CLASS 1 Laser Product**  
IEC 60825-1: 2008-05  
THIS LASER PRODUCT COMPLIES  
WITH 21 CFR 1040 AS APPLICABLE



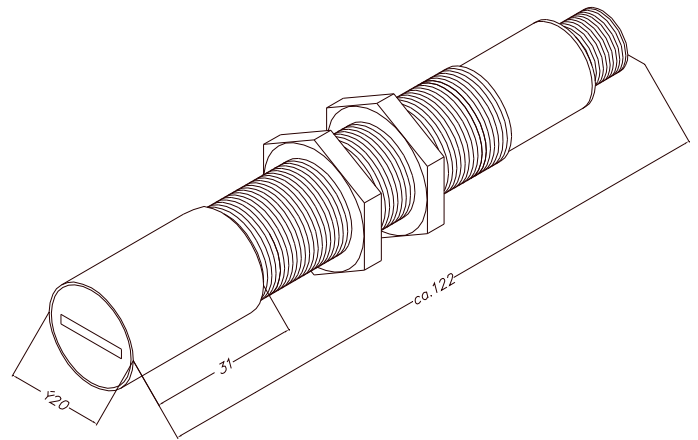
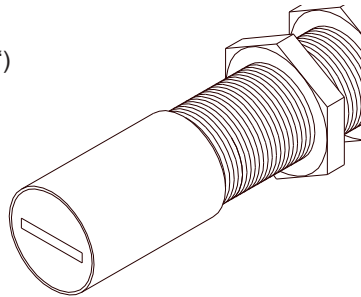


Dimensions

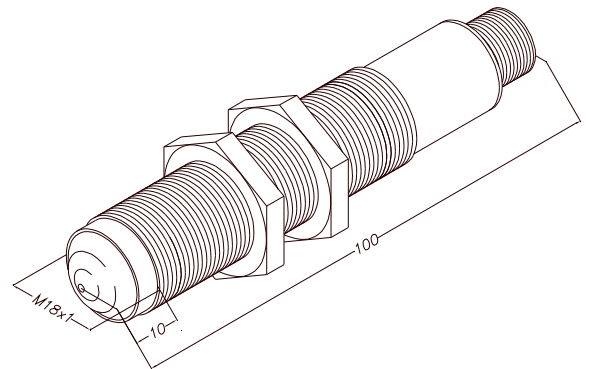
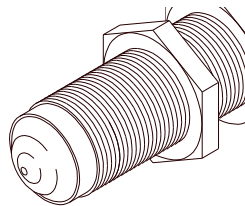
D-LAS1 transmitter with integrated adjustment unit („i“)



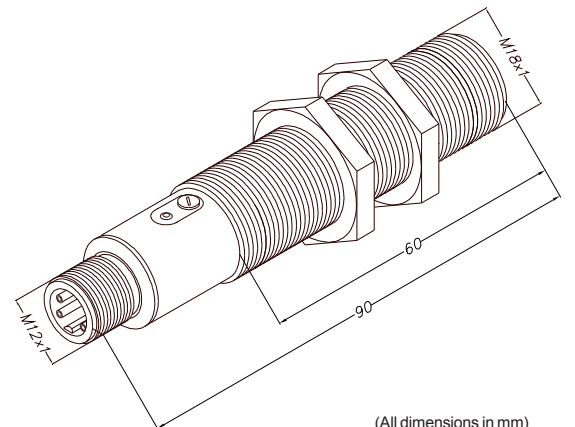
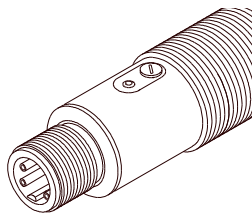
D-LAS1 transmitter with big transmitter optics („M“)



D-LAS1 receiver with big receiver optics („M“)



D-LAS1 receiver with integrated potentiometer („P“)



(All dimensions in mm)

**Connector Assignment**

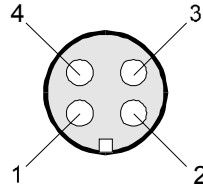
**Connector assignment:**

**Receiver**

(4-pin M12-plug, shielded)

**Type Q (npn dark-switching / pnp bright-switching):**

Pin No.:	Color:	Assignment:
1	brn	+24VDC (± 10%)
2	wht	ANALOG (0V...+10V)
3	blu	GND (0V)
4	blk	OUTPUT



**Transmitter**

(4-pin M12-plug, shielded)

Pin No.:	Color:	Assignment:
1	brn	+24VDC (± 10%)
2	wht	I-CONTROL (0...+24V)
3	blu	GND (0V)
4	blk	Shield - Housing

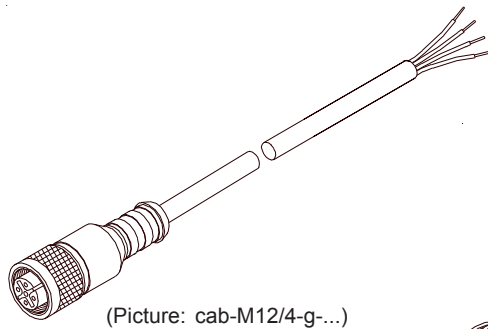
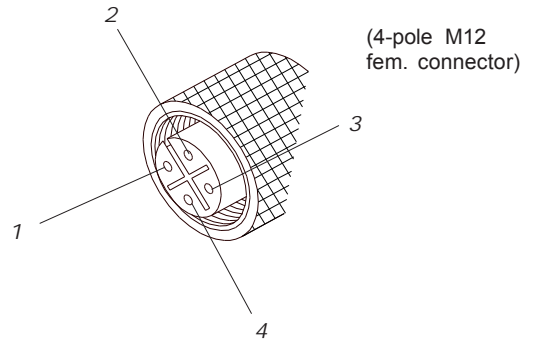
**Type Qinv (pnp dark-switching / npn bright-switching):**

Pin No.:	Color:	Assignment:
1	brn	+24VDC (± 10%)
2	wht	ANALOG (0V...+10V)
3	blu	GND (0V)
4	blk	OUTPUT INV

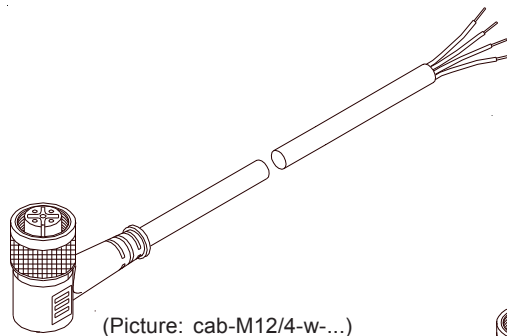
**Connecting Cables**

**Available connecting cables:**

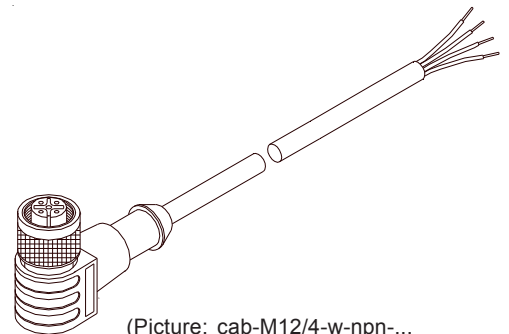
<b>cab-M12/4-g-2m</b>	Length: 2m	Outer jacket: PUR	
<b>cab-M12/4-g-5m</b>	Length: 5m	Outer jacket: PUR	
<b>cab-M12/4-w-2m</b>	Length: 2m	Outer jacket: PUR	angle type
<b>cab-M12/4-w-5m</b>	Length: 5m	Outer jacket: PUR	angle type
<b>cab-M12/4-w-npn-2m</b>	Length: 2m	Outer jacket: PUR	angle type, with LED
<b>cab-M12/4-w-npn-5m</b>	Length: 5m	Outer jacket: PUR	angle type, with LED
<b>cab-M12/4-w-pnp-2m</b>	Length: 2m	Outer jacket: PUR	angle type, with LED
<b>cab-M12/4-w-pnp-5m</b>	Length: 5m	Outer jacket: PUR	angle type, with LED



(Picture: cab-M12/4-g-...)



(Picture: cab-M12/4-w-...)



(Picture: cab-M12/4-w-npn-... or cab-M12/4-w-pnp-...)



**Special Versions**

**D-LAS1 special version for detection of smoke:**

D-LAS1-PLL-T (transmitter)  
 D-LAS1-M-Q-PLL-R-HAMP (receiver)

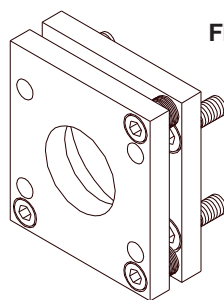


**Accessories**

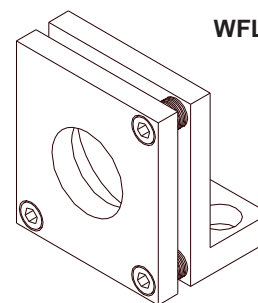
**Mounting flanges:**

(please order separately, cf. separate data sheets):

**FL-18** (plain flange )  
**WFL-18** (angle flange)



**FL-18**

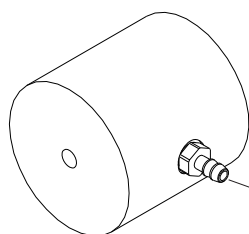


**WFL-18**

**Blast air top-parts:**

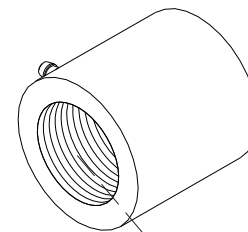
(please order separately, cf. separate data sheets):

**ABL-M18-3** (air outlet  $\varnothing$  3 mm)  
**ABL-M18-5** (air outlet  $\varnothing$  5 mm)  
**ABL-M18-10** (air outlet  $\varnothing$  10 mm)

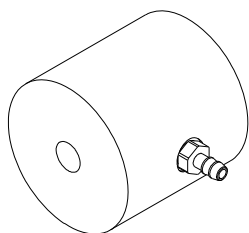


**ABL-M18-3**

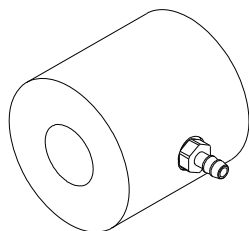
Pressed-air  
 connector



Inner thread  
 M18x1



**ABL-M18-5**



**ABL-M18-10**



**Characteristics**

**D-LAS Series - Laser Digital Light Barriers**

The laser digital light barriers of D-LAS Series work with visible parallel laser light. The use of round or rectangular apertures ensures a homogeneous light distribution in the laser beam. Smallest objects are detected even in case of a large transmitter/receiver distance. Dynamic correction of the switching threshold compensates the effect of dirt accumulation (with D-LAS1, D-LAS2, D-LAS34, D-LAS-34/90).

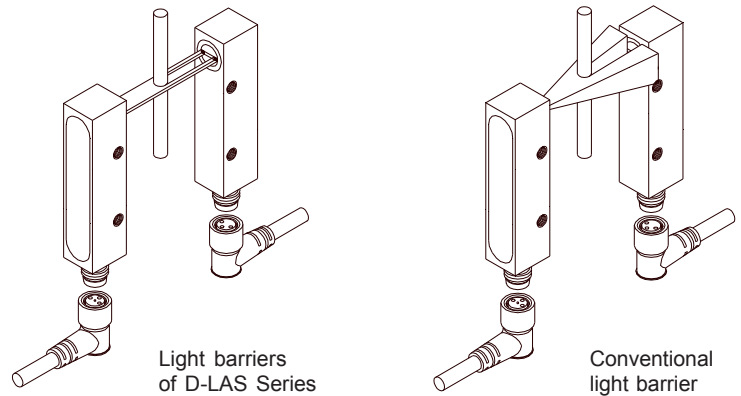
These light barriers are ideal for positioning tasks.

**Collimated laser beam**

The laser light beam that is emitted by a high-precision optics unit (aspherical surface made of glass) allows the detection of smallest objects (e.g. threads) even in case of a large transmitter/receiver distance (distances up to 100 m, depending on the light barrier type and aperture size).

Advantages:

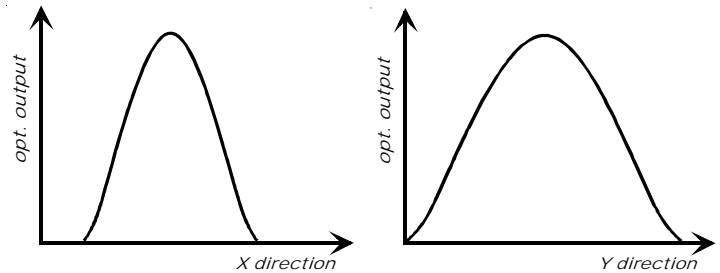
- Telecentric design
- Exact shadow projection onto the receiver
- The distance of measuring object to the transmitter or receiver has no influence on the measuring signal over a wide range



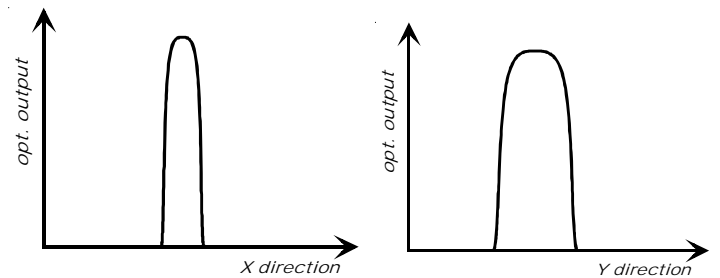
**Homogeneous light distribution**

The use of high-precision apertures in the transmitter ensures optimum adaptation to the respective application. Apart from a large variety of standard apertures special apertures can also be realized.

The aperture ensures a homogeneous light distribution in the beam and a sharp beam limitation.



Conventional design: Beam profile in the two main axes



D-LAS series: Beam profile in the two main axes

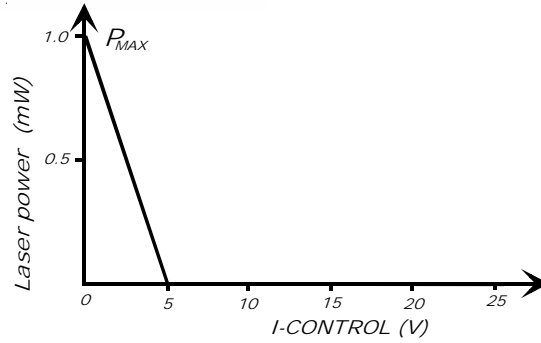




Characteristics

Adjustable laser power

In case of types D-LAS1, D-LAS2, and D-LAS90 the laser power can be adjusted with the current control input. The voltage at the I-CONTROL current control input can be varied between 0V and +24V. The maximum laser power is reached at 0V; the laser power then decreases linearly with increasing voltage, and at +5V it reaches the 0 mW value (LASER OFF). The current control input therefore can also be used as a test input for switching the laser light barrier ON or OFF (0V = ON, +5V or +24V = OFF). If a receiver with a fixed comparator threshold is used, the I-CONTROL input is used for setting the sensitivity.



High positioning accuracy

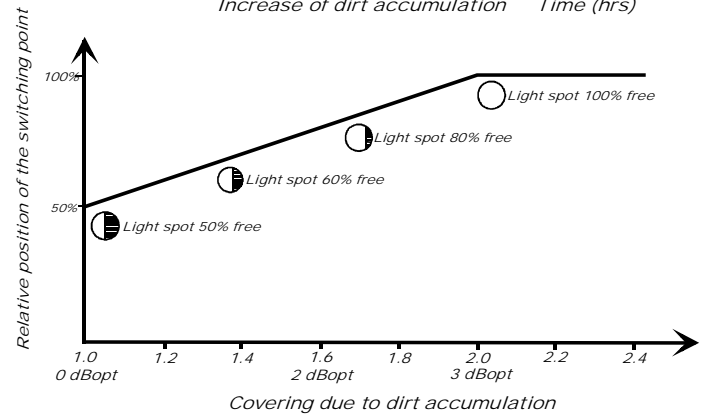
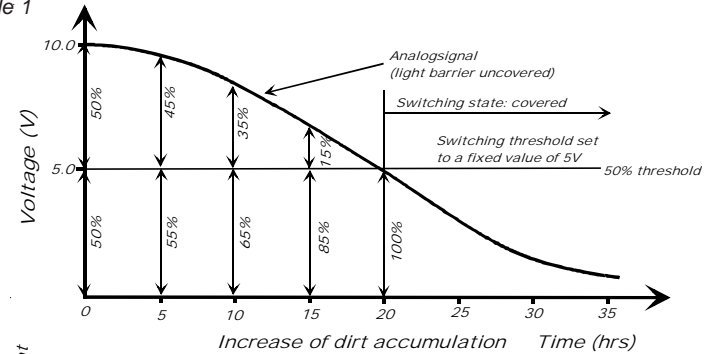
In conventional light barriers the switching threshold, which depends on a fixed voltage (absolute value), is adjusted by means of a potentiometer. As a consequence the switching point shifts with increasing dirt accumulation.

Example 1 (cf. illustration):

The switching threshold is set to a fixed value of 5V, which in case of a 10V analog signal (without dirt accumulation and covering) leads to a change of the switching state at 50% light spot covering.

The analog signal decreases with increasing dirt accumulation, while the switching threshold remains constant. This means that the light spot no longer needs to be covered by 50% to cause switching of the light barrier.

Example 1

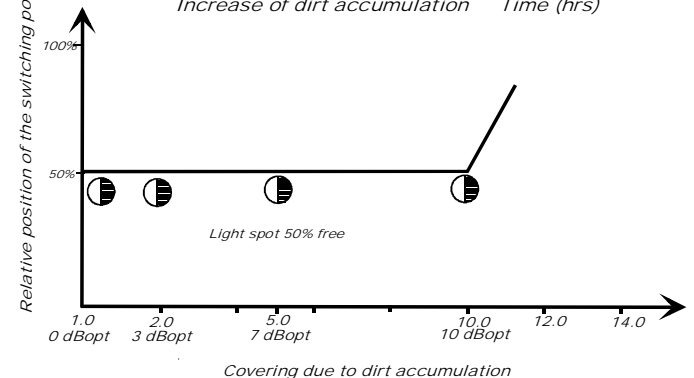
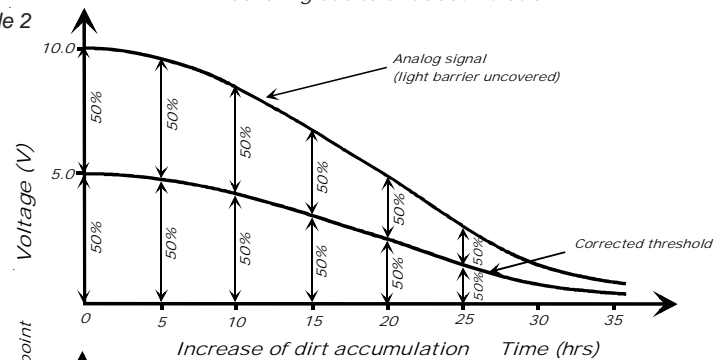


By way of continuous monitoring of the maximum value at the receiver a dynamic correction of the switching threshold compensates the effect of dirt accumulation. This means that increased dirt accumulation does not lead to a shift of the switching point.

Example 2 (cf. illustration):

In clean condition the laser light barriers of D-LAS Series indicates a value of 10 V at the analog output, the switching threshold adjusts itself to 50% of the analog signal, i.e. the switching state changes at 50% covering of the light spot. In case of increasing dirt accumulation the value of the analog signal decreases, but the 50% distance to the switching threshold is maintained.

Example 2



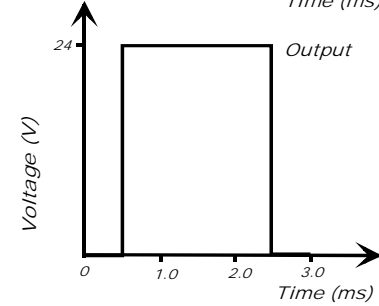
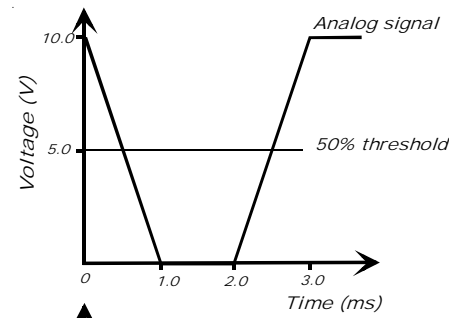
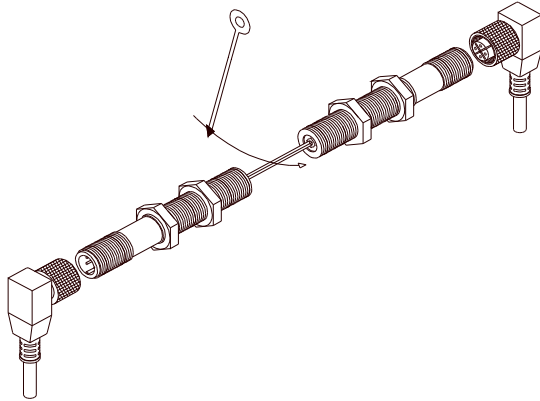




Characteristics

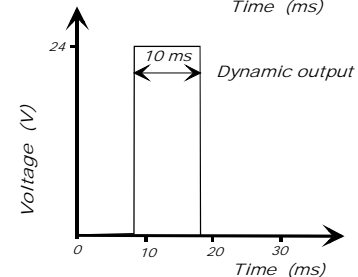
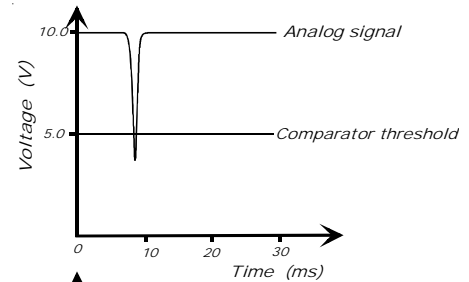
Monitor signal

In addition to the switching signal the laser light barriers **D-LAS1** and **D-LAS2** also provide an analog signal. This "monitoring" of the analog voltage allows improved evaluation of the switching signal. The output also is suitable for measuring tasks.



Dynamic measurement

When a measuring object passes through the laser light beam of a **D-LAS1-D** light barrier it triggers a voltage pulse, the pulse duration of which is independent of the time the measuring object stays in the laser beam. The pulse duration is set to a fixed value of 10 ms.



Pulsating-light operation

If intensive external light sources must be expected in a laser light barrier application, it is recommendable for safety reasons to use a pulsed system (**D-LAS1**, **D-LAS3**, **D-LAS90**, **D-LAS90-VACU**). Due to the use of narrow-band electronic filters only the modulated light of the transmitter is detected. Even pulsed light sources such as fluorescent lamps have no influence on the switching reliability.

Constant-light operation

In case of high switching frequency requirements a non-pulsed system can be used. Here external light suppression is ensured by means of narrow-band optical filtering. Therefore constant-light light barriers are suitable for fast processes or for measuring objects moving at high speed. With the help of the analog output constant-light barriers of series **D-LAS2**, **D-LAS-34**, **D-LAS-34/90**, **D-LAS-ED1** can also be used for measuring tasks.

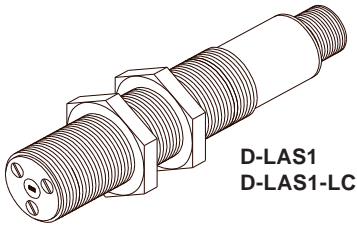
Compact and sturdy housing

With their sturdy metal housing and their high type of protection the laser light barriers of series D-LAS are designed for demanding applications in machine construction.

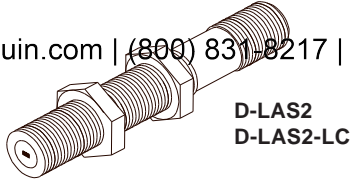


Product Line

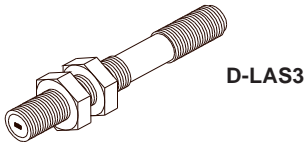
Type summary D-LAS Series



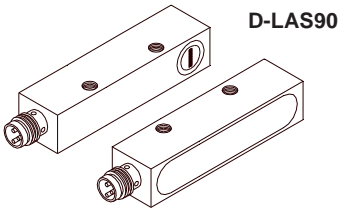
D-LAS1  
D-LAS1-LC



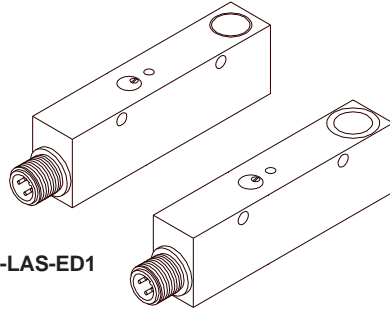
D-LAS2  
D-LAS2-LC



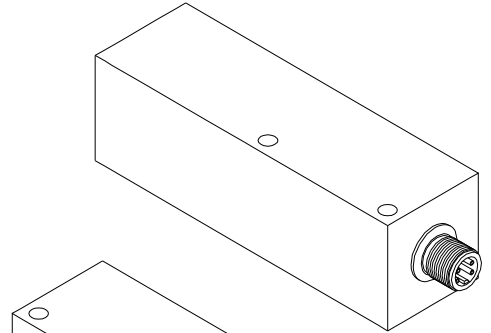
D-LAS3



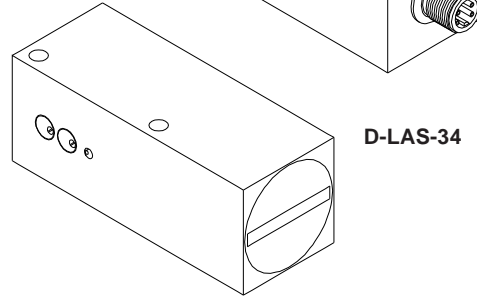
D-LAS90



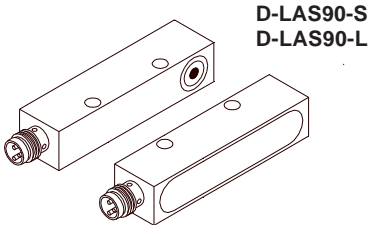
D-LAS-ED1



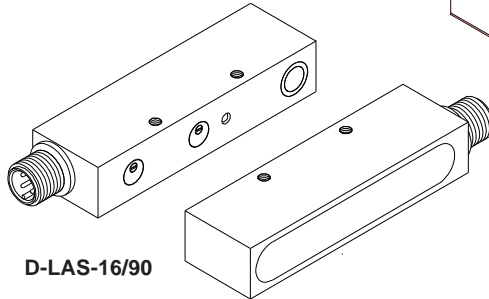
D-LAS-34/90



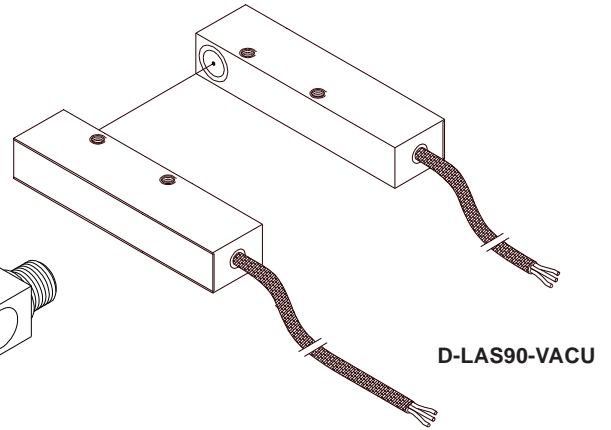
D-LAS-34



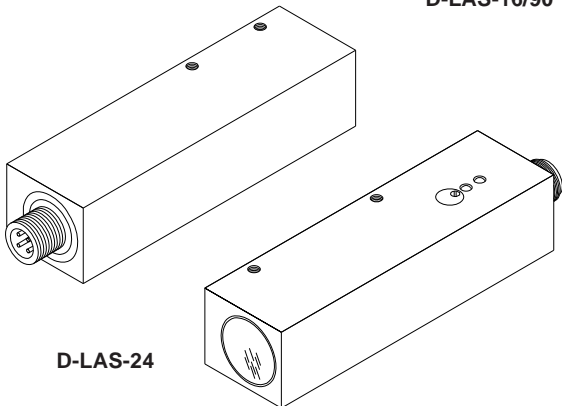
D-LAS90-S  
D-LAS90-L



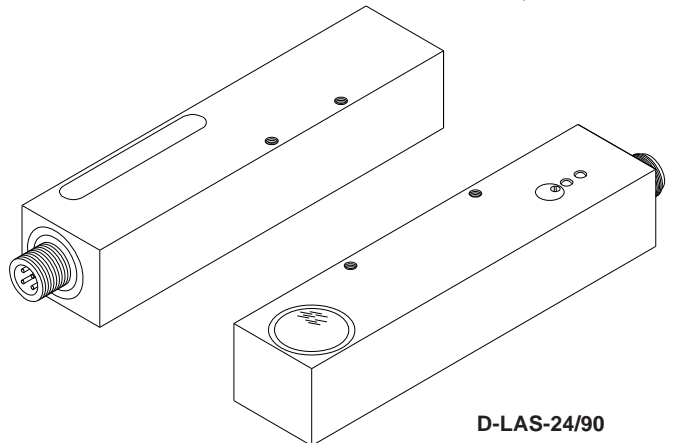
D-LAS-16/90



D-LAS90-VACU



D-LAS-24



D-LAS-24/90

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