

# D-LAS Series

## ► D-LAS2-...

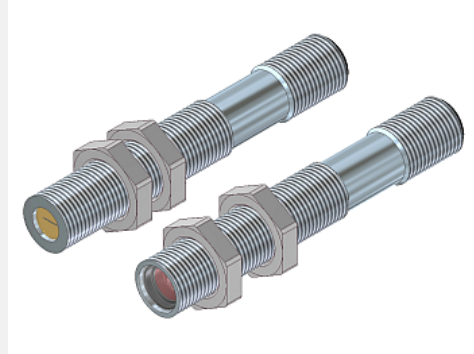
- Visible laser beam (<0.4 mW, 670 nm), **laser class 1**
- Various apertures available
- Receiver aperture alternatively with collecting lens or with particular lens for more accurate switching point
- Interference filter
- Switching output (npn + pnp)
- Analog output (0V...+10V)
- High reproducibility (in µm-range)
- High switching frequency (typ. 25 kHz)
- Optics cover made of glass
- Sturdy housing made of brass, nickel-plated
- Compact design (M12)

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## Design

### Product name:

#### Transmitter:

D-LAS2-(aperture)\*-T

#### Receiver (standard version):

= with collecting lens, aligned to transmitter aperture

D-LAS2-Q-(aperture)\*-R

D-LAS2-Qinv-(aperture)\*-R

D-LAS2-TC-Q-(aperture)\*-R

D-LAS2-TC-Qinv-(aperture)\*-R

#### Receiver (special version A):

= with particular receiver aperture (max. AxB = 3x0.75), aligned to reference transmitter aperture

D-LAS2-Q-A-(receiver aperture)\*-(reference transm. aperture)-R

D-LAS2-Qinv-A-(receiver aperture)\*-(reference transm. aperture)-R

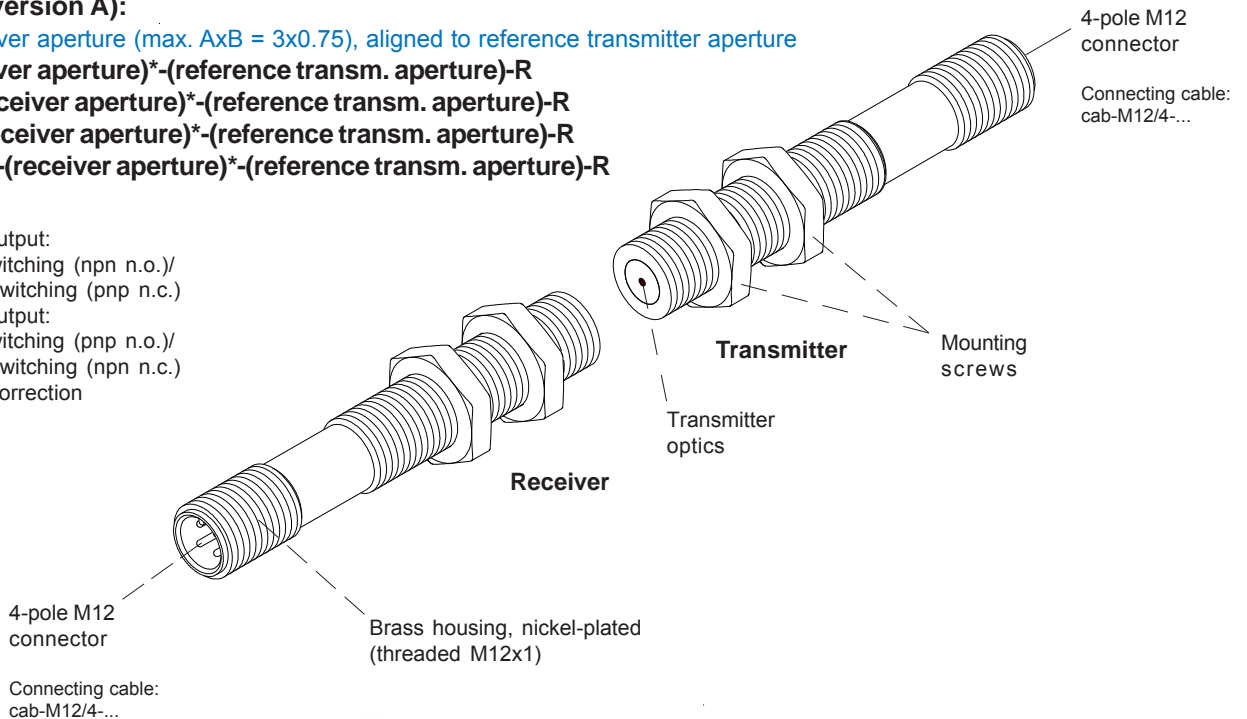
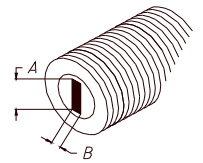
D-LAS2-TC-Q-A-(receiver aperture)\*-(reference transm. aperture)-R

D-LAS2-TC-Qinv-A-(receiver aperture)\*-(reference transm. aperture)-R

- Q = Switching output:  
npn dark-switching (npn n.o.)/  
pnp bright-switching (pnp n.c.)
- Qinv = Switching output:  
pnp dark-switching (pnp n.o.)/  
npn bright-switching (npn n.c.)
- TC = Threshold correction

### \*Available apertures:

Round (Ø in mm):	Rectangular (AxB in mm):
d0.15	0.5x0.3
d0.2	1x0.3
d0.3	1x0.5
d0.5	1.5x0.3
d0.7	2x0.75
d1.0	2x1
d2.0	3x0.3
d3.0	3x0.75
	4x0.5 (available only with standard type)





**Technical Data**

Type	D-LAS2
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	30 m (depends on the aperture used)
Min. detectable object	Analog typ. 2% of aperture size, digital typ. 1% of aperture size
Reproducibility	Analog typ. 2% of aperture size, digital typ. 1% of aperture size, with threshold correction "TC": typ. 0.1% of aperture size
Optical filter	Interference filter
Threshold correction	with type "TC"
Voltage supply	+24VDC (± 10%), protected against polarity reversal, overload protected
Alternating current/ direct current supply	DC operation
Ambient light	up to 5000 Lux (depends on the aperture used)
Current consumption	Transmitter: typ. 50 mA      Receiver: typ. 30 mA
Max. size of aperture	Round aperture: max. Ø 3.0 mm Rectangular aperture: max. 4 mm x 0.5 mm  Receiver special version A: Receiver aperture max. 3 mm x 0.75 mm (is aligned to reference transmitter aperture)
Current control input I-CONTROL	0V...+5V: Laser power decreases linearly with increasing voltage +5V...+24V: Laser OFF (max. modulation/frequency: 2 kHz)
Monitoring output	Analog output 0V...+10V (typ. 100 kHz band width)
Digital output	Q = npn dark-switching (nnp n.o.) / pnp bright-switching (pnp n.c.)    or Qin = pnp dark-switching (pnp n.o.) / npn bright-switching (nnp n.c.)
Type of protection	IP67
Operating temperature range	-20°C up to +50°C
Storage temperature range	-20°C up to +85°C
Housing material	Brass, nickel-plated
Housing dimensions	Transmitter: M12x1, length approx. 76 mm Receiver standard version with collecting lense: M12x1, length approx. 80 mm Receiver special version A with particular aperture: M12x1, length approx. 76 mm
Connector type	M12, 4-pole (V2A-plug)
Connecting cables available	cab-M12/4-g-... (length 2m or 5m) cab-M12/4-w-... (length 2m or 5m, angle type) cab-M12/4-w-npn-... (length 2m or 5m, angle type, with LED) cab-M12/4-w-pnp-... (length 2m or 5m, angle type, with LED)
Max. switching current	100 mA, short-circuit-proof
EMC test acc. to	DIN EN 60947-5-2
Switching frequency	typ. 25 kHz

Aperture Ranges

Max. ranges of D-LAS2 transmitter and receiver depending in the selected aperture:

Round aperture (Ø mm):

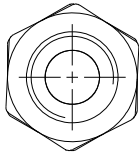
Aperture (Ø mm)	Working range:
d0.15	max. 1 m
d0.2	max. 1.5 m
d0.3	max. 2 m
d0.5	max. 4 m
d0.7	max. 7 m
d1.0	max. 8 m
d2.0	max. 18 m
d3.0	max. 30 m

Rectangular aperture (AxB mm):

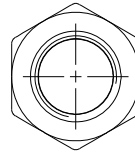
Aperture (AxB mm)	Working range:
0.5 x 0.3	max. 0.3 m
1 x 0.3	max. 0.4 m
1 x 0.5	max. 0.5 m
1.5 x 0.3	max. 0.5 m
2 x 0.75	max. 2 m
2 x 1	max. 3 m
3 x 0.3	max. 0.5 m
3 x 0.75	max. 2 m
4 x 0.5	max. 1 m

Dimensions

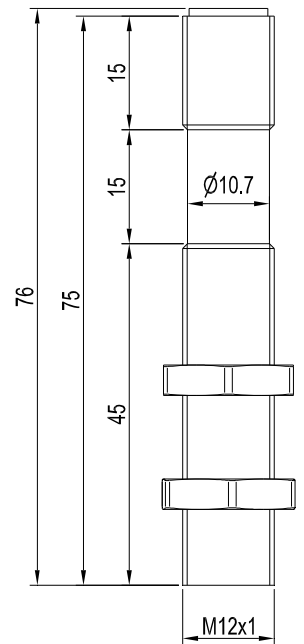
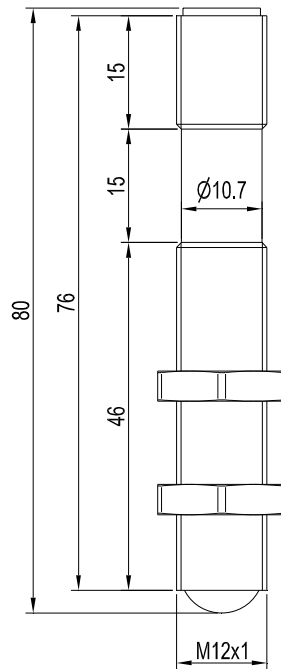
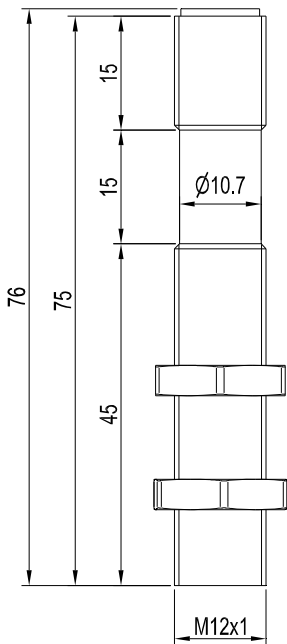
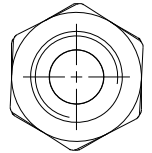
D-LAS2-...-T  
Transmitter



D-LAS2-...-R  
Receiver  
(with collecting  
lense)



D-LAS2-...-A-...-R  
Receiver  
(with particular  
receiver aperture)

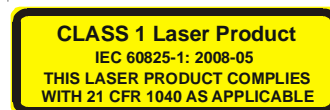


(All dimensions in mm)

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“.



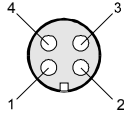
**Connector Assignment**

**Receiver** (4-pole M12 connector, shielded)

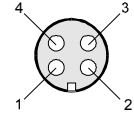
**Transmitter** (4-pole M12 connector, shielded)

**Type Q (npn 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

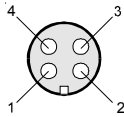


Pin No.:	Color:	Assignment:
1	brn	+24VDC (± 10%)
2	wht	I-CONTROL (0...+24V)
3	blu	GND (0V)
4	blk	Shield - Housing



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

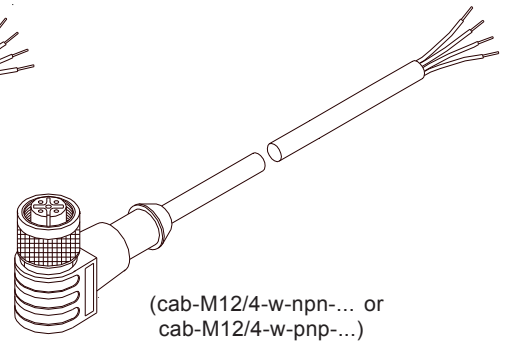
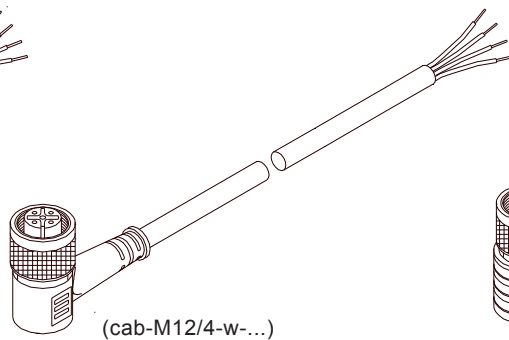
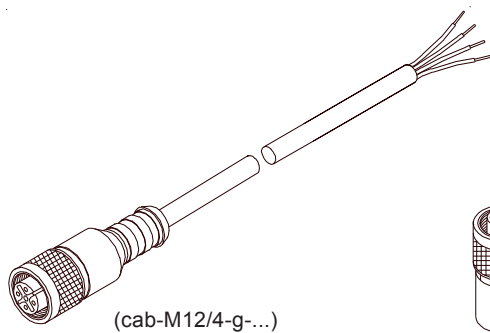
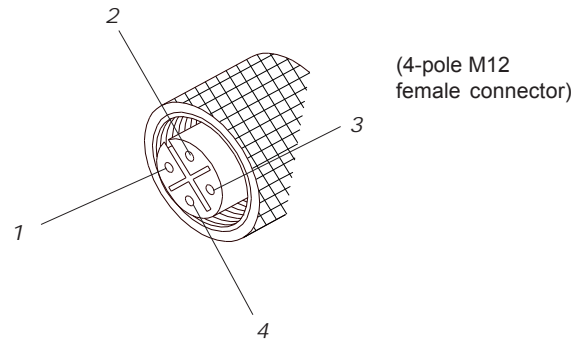
Pin No.:	Color:	Assignment:
1	brn	+24VDC (± 10%)
2	wht	ANALOG (0V...+10V)
3	blu	GND (0V)
4	blk	OUTPUT INV



**Connecting Cables**

**Available connecting cables:**

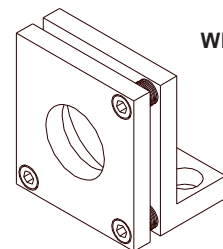
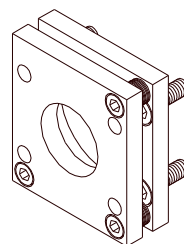
<b>cab-M12/4-g-2m</b>	Length: 2m	Outer jacket: PUR	
<b>cab-M12/4-g-5m</b>	Length: 5m	Outer jacket: PUR	
<b>cab-M12/4-w-2m</b>	Length: 2m	Outer jacket: PUR	angle type
<b>cab-M12/4-w-5m</b>	Length: 5m	Outer jacket: PUR	angle type
<b>cab-M12/4-w-npn-2m</b>	Length: 2m	Outer jacket: PUR	angle type, with LED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



**Mounting**

**Mounting accessories** (please order separately):

**Mounting flange FL-12**  
**Mounting flange WFL-12**



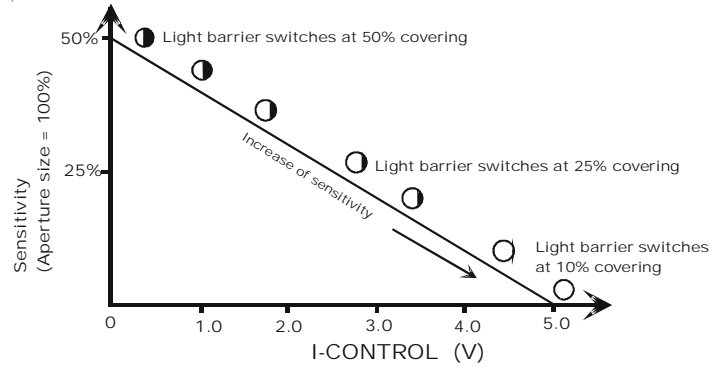
**Characteristics**

**Adjustment of laser power**

At the D-LAS2 transmitter 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).

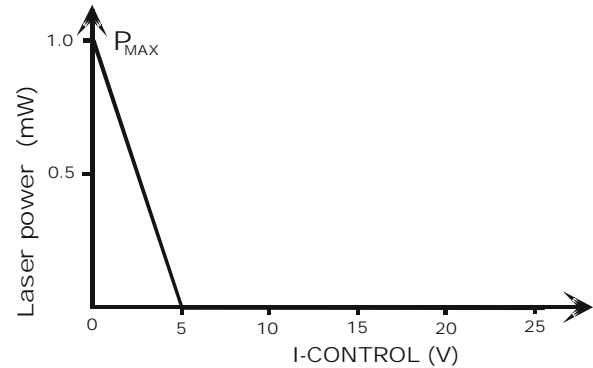
The current control input therefore can also be used as a test input for switching the laser light barrier on or off (0V = ON, +5V or +24V = OFF).



**Adjustment of sensitivity**

If a receiver with a fixed comparator threshold is used, the I-CONTROL input is used for setting the sensitivity.

Drawing at the right: Sensitivity increase in case of a receiver with fixed threshold (threshold set to a fixed value of 5V, which in case of an analog signal of 10V (with I-CONTROL = 0V) requires a 50% covering of the laser beam for a change of the switching state.



**Monitoring Output**

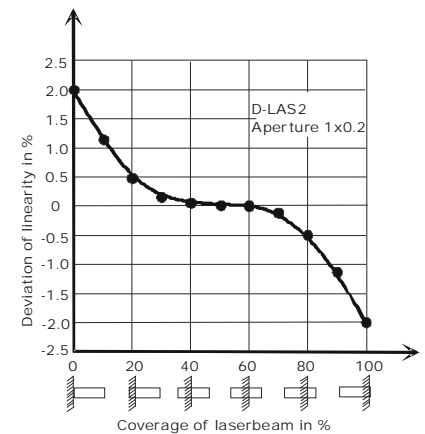
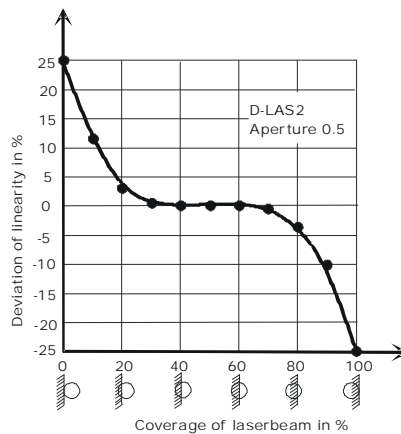
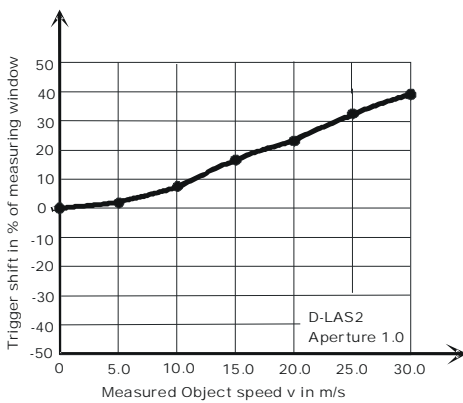
**Dirt accumulation and cleaning**

The monitor output of the receiver provides information on the dirt accumulation status of the laser light barrier. The lower the value of the analog signal (without measuring object in the beam path), the higher the dirt accumulation.

If possible, a dry cleaning method should be used for cleaning the glass covers and/or the glass lenses, preferably with a spectacles cleaning cloth, or a similar cloth.

The formation of drops on the glass cover or the glass lens might impair the measuring result (refraction of light at the convex drop surface). Drops should be removed with a dry cloth, preferably with a spectacles cleaning cloth, or a similar cloth.

**Graphs**





**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).

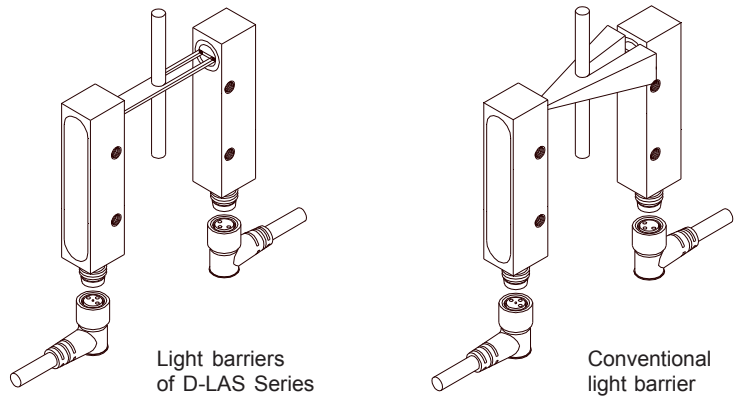
These light barriers are ideal for positioning tasks.

**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:

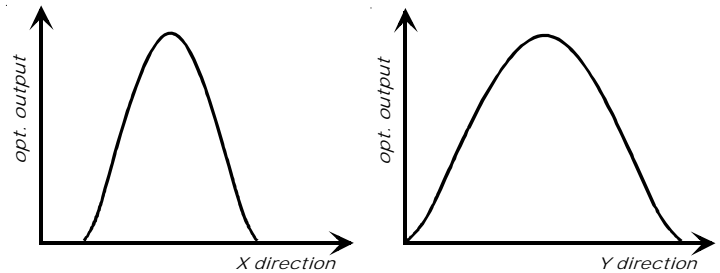
- Telecentric design
- Exact shadow projection onto the receiver
- The distance of measuring object to the transmitter or receiver has no influence on the measuring signal over a wide range



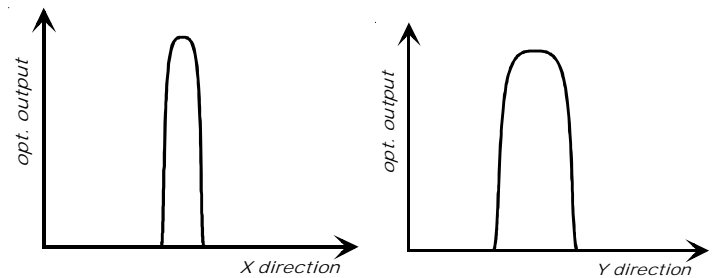
**Homogeneous light distribution**

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



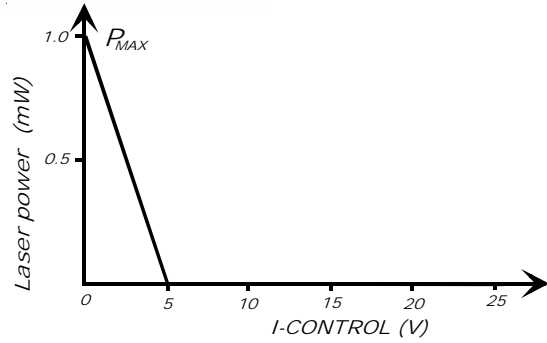
D-LAS series: Beam profile in the two main axes



**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.

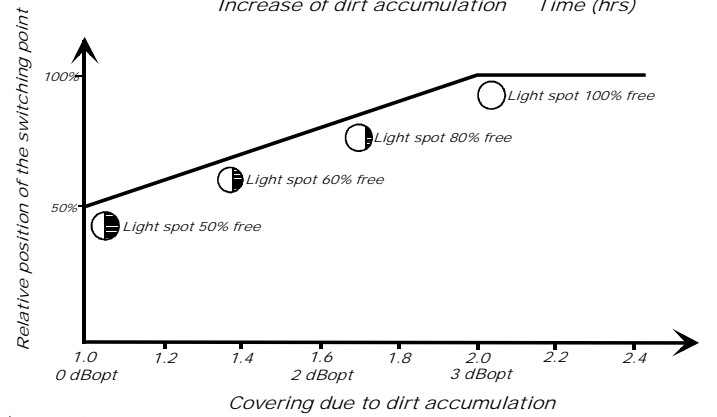
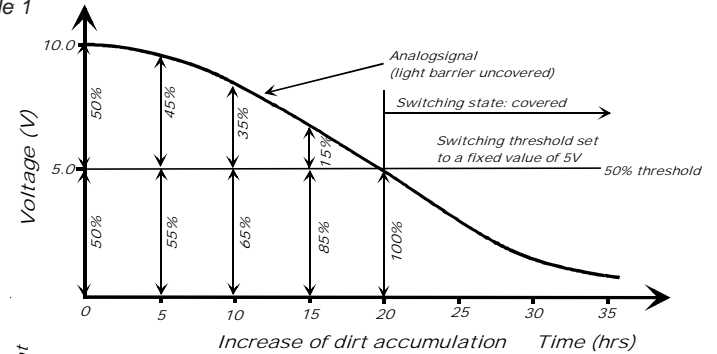


**High positioning accuracy**

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.

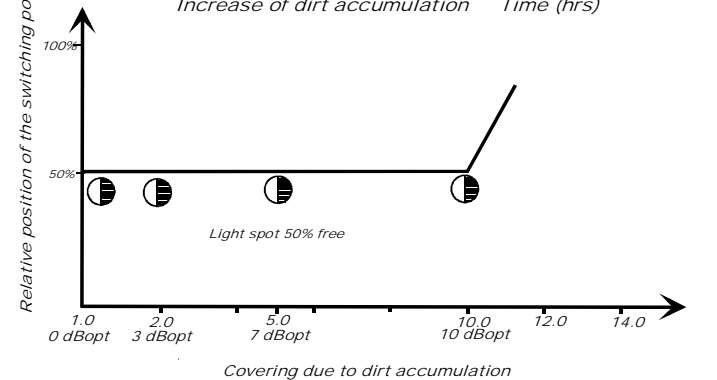
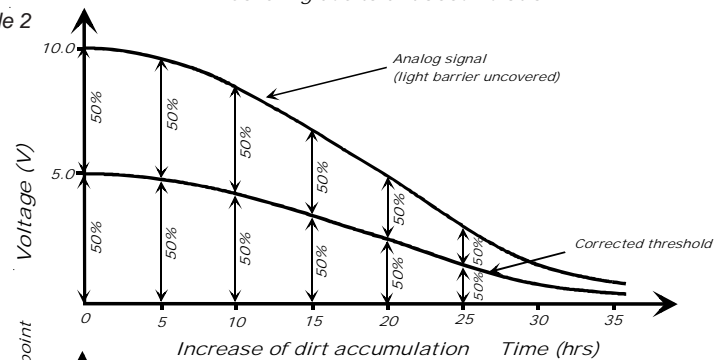
Example 1



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

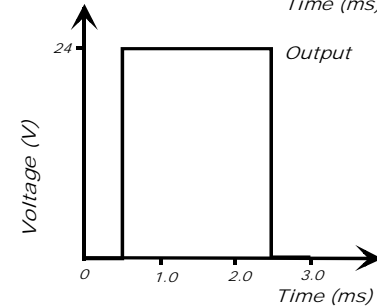
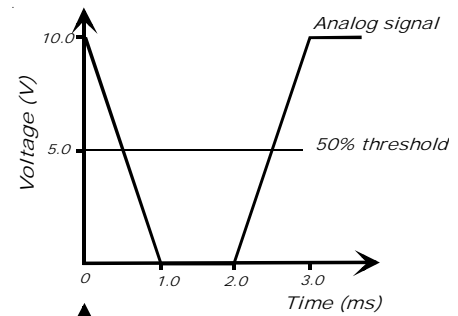
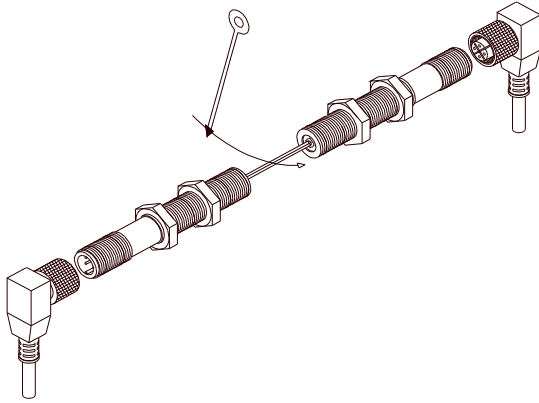




## Characteristics

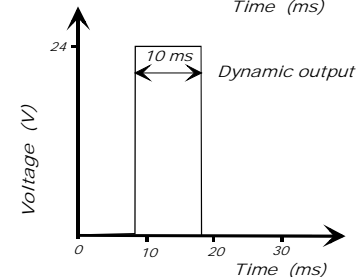
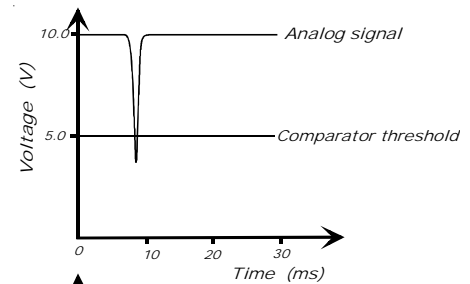
### Monitor signal

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

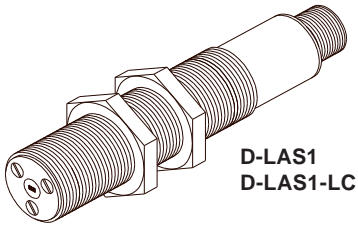
With their sturdy metal housing and their high type of protection the laser light barriers of series D-LAS are designed for demanding applications in machine construction.



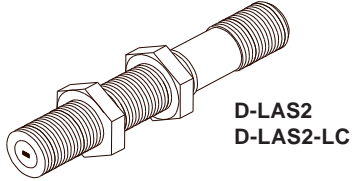


Product Line

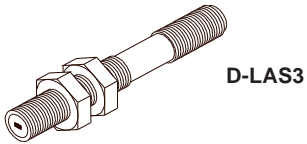
Type summary D-LAS Series



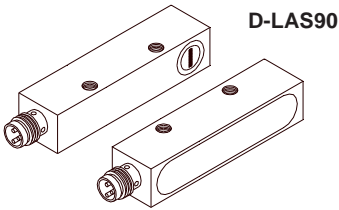
D-LAS1  
D-LAS1-LC



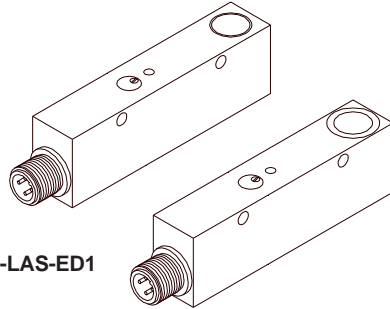
D-LAS2  
D-LAS2-LC



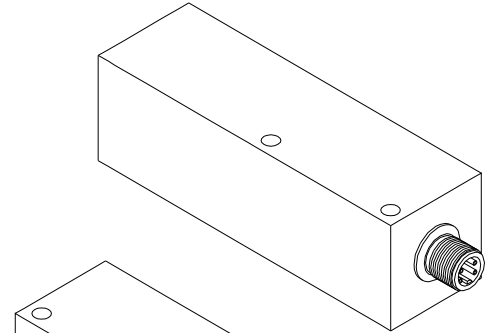
D-LAS3



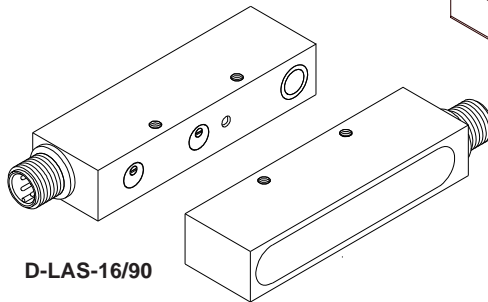
D-LAS90



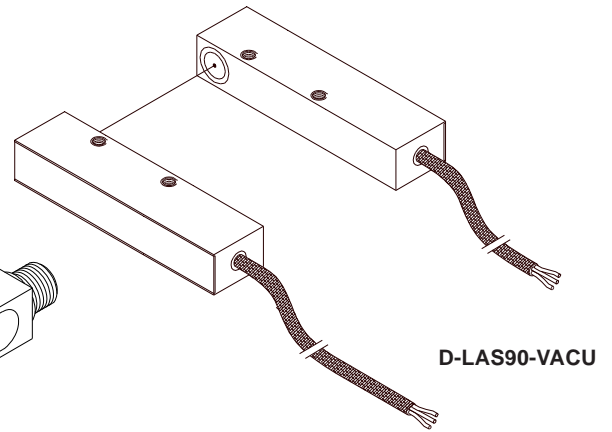
D-LAS-ED1



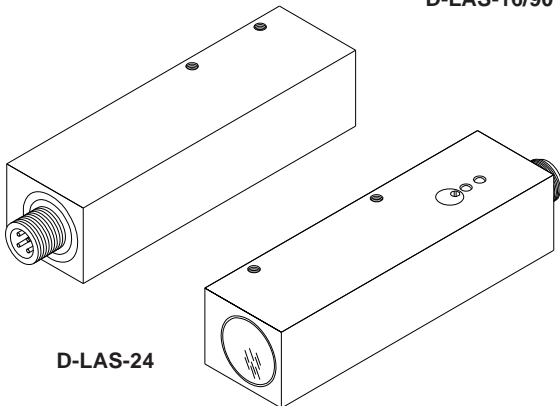
D-LAS-34



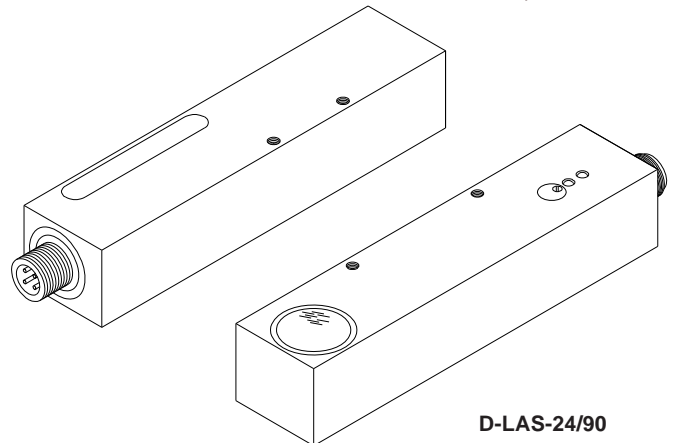
D-LAS-16/90



D-LAS90-VACU



D-LAS-24



D-LAS-24/90

