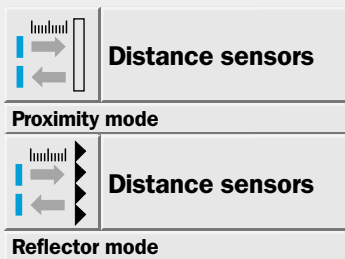


## DS 60: The solution for large scanning distances

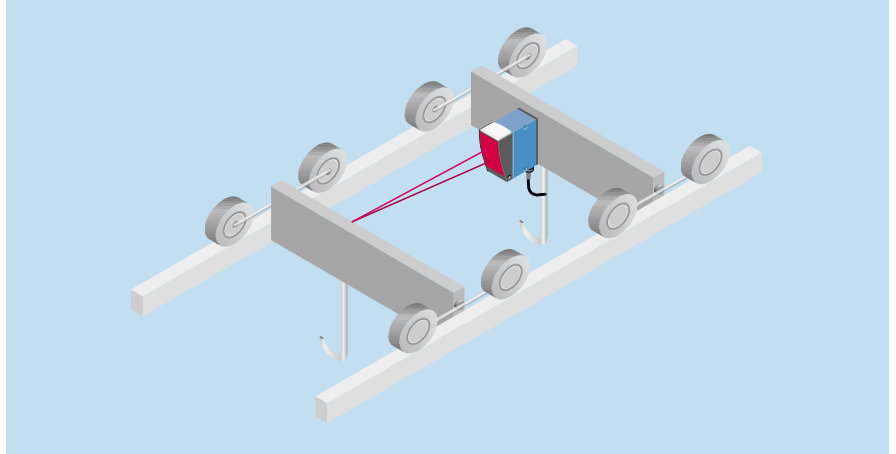


The prevention of collisions for cranes and vehicles or checking whether storage bays in warehousing systems are occupied are typical examples of applications in which compact triangulation scanners reach their technological limits and laser distance measuring systems become too expensive. The DS 60 fills this gap. Even under difficult ambient conditions and with a variety of target objects, the compact, optoelectronic distance sensor can detect them reliably and consistently at distances between 100 mm and 6,000 mm.

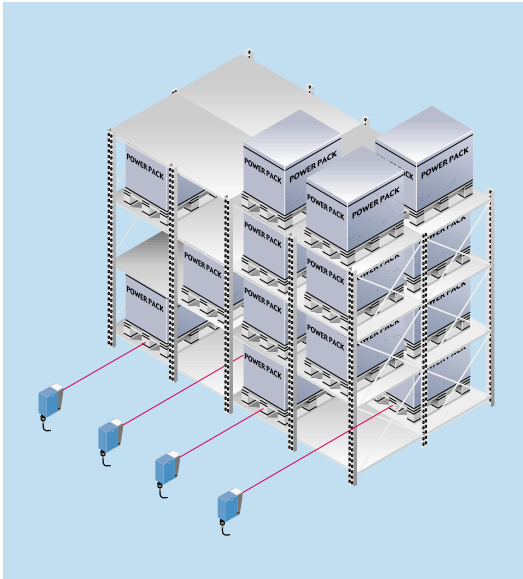
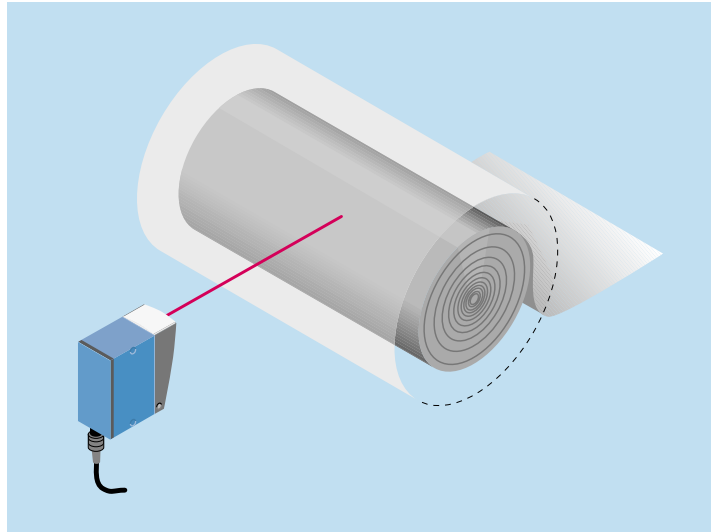
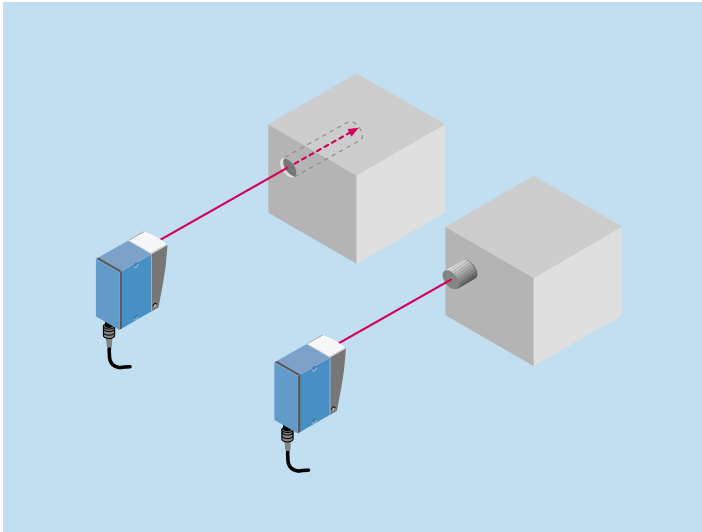
During development of the DS 60, emphasis was placed on satisfying user requirements such as, compact design, two invertable switching outputs, simple operation and adjustment as well as low maintenance requirements with a long service life.

The DS 60 is able to do much more than prevent collisions and check whether storage bays are full. By linking the two binary outputs, min./max. control operations in level gauging systems (bulk materials) can be implemented as combined protection against dry-running and overfilling. Another typical application would be two-point sag regulation in the paper and plastics industries. Further possible applications for distance measurement using two binary outputs are, for example, high/low speed regulation for overhead conveyors or assisting ground conveyors in docking manoeuvres.

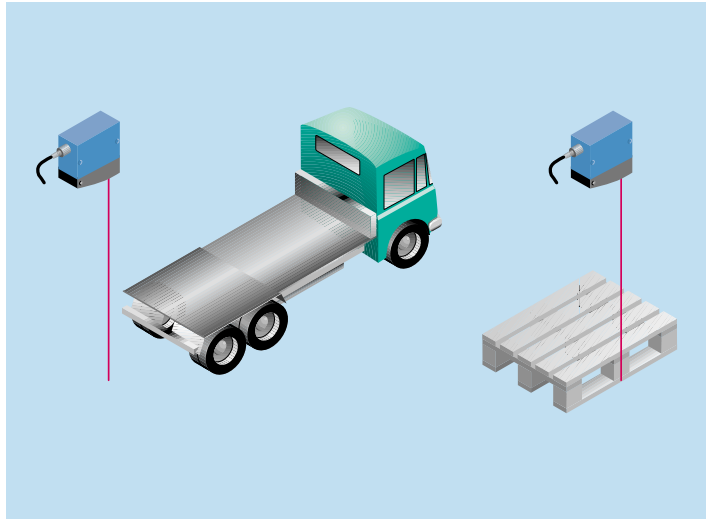
► Ensuring everything runs smoothly in warehousing/handling systems: The DS 60 distance sensor is used to make sure that a safe distance is maintained between overhead conveyors.



▼ Detection of bolts or recesses in workpieces – another speciality of the DS 60.



▲ Two storage bays can be monitored with just one sensor.



▲ Positioning and checking the diameters of rolled materials. The object can move closer to the DS 60 during positioning. The switching output is activated as soon as the taught-in distance is under-shot.

▲ A variant of the sensor, used to detect objects between the sensor and a fixed background.

## Applications

The DS 60 distance sensor works on the principle of time-of-flight measurement. The compact sensor makes large and teachable scanning distances possible.

Almost all objects – including those that are diagonally positioned – are detected within the scanning range against a firm background.

A supplementary pilot light simplifies precise alignment onto the material being scanned.

One sensor model, with red light laser and small light spot makes it possible to detect even small objects from a long distance. The visible, red laser beam helps fine adjustment.

Another sensor model operates using Diamond Grade reflective tape. This switches when the object carrying the reflective tape falls short of the previously taught-in distance.

Two switching outputs signal the distance between the sensor and the object.

## DS 60 Dt0 IR Distance to object, Infrared light

### The Dt0 IR variant - area of application

Detecting the distance between sensor and object

The object can move towards the sensor during positioning. Falling short of the previously taught-in distance triggers the switching output.

► Task:

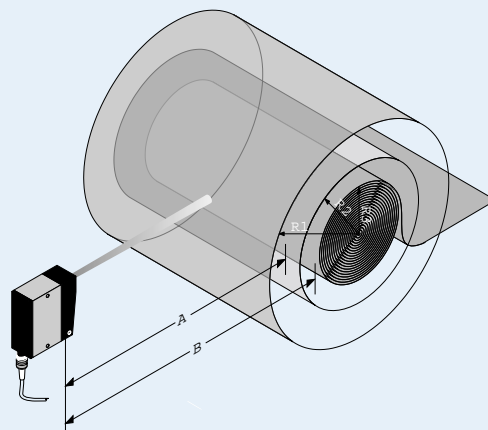
Determining the diameter of a steel coil. Distances A (switching output  $Q_1$ ) and B (switching output  $Q_2$ ) are taught-in.

Radius R1 = switching distance A:

Switching output  $Q_1$  switches

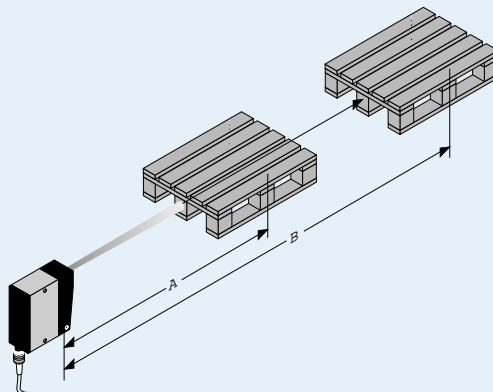
Radius R2 = switching distance B:

Switching output  $Q_2$  switches.



◀ Task:

Detecting whether a rack is empty or has one or two Euro pallets. The sensor model with a 12 mm light spot diameter is particularly suitable for detection of a pallet foot at a great distance. Simple alignment of the sensor using the pilot light.



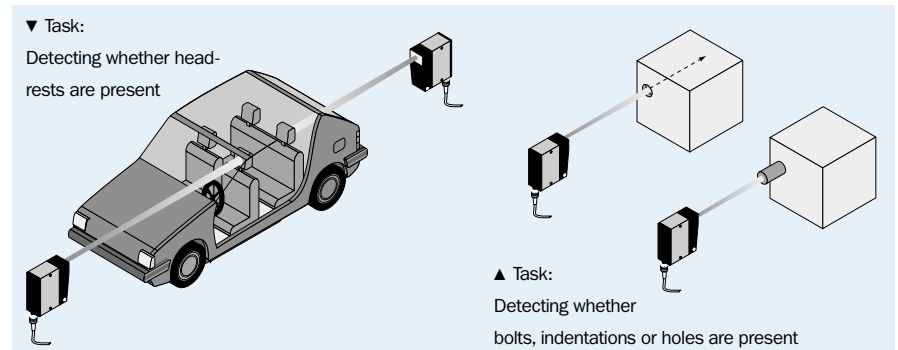
## DS 60 Dt0 R

### Distance to object, red light

#### The Dt0 R variant - area of application

Detecting small objects and indentations or holes.

The object can move towards the sensor during positioning. Falling short of the previously taught-in distance triggers the switching output



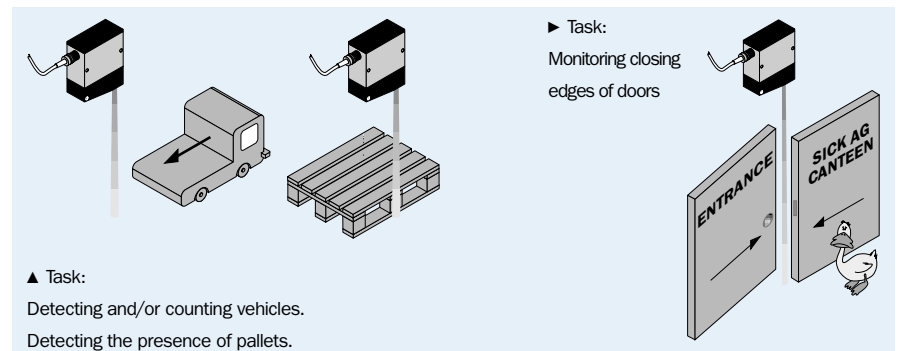
## DS 60 0bSB IR

### Object between sensor and back- ground, infrared light

#### The 0bSB IR variant - area of application

Similar to a photoelectric reflex switch, but instead of a reflector being required all that is necessary is a stationary background (e.g. floor).

The distance to the background is set (not the distance to the object). The switching output is triggered when an object is between the background and the sensor.



## DS 60 DtR IR

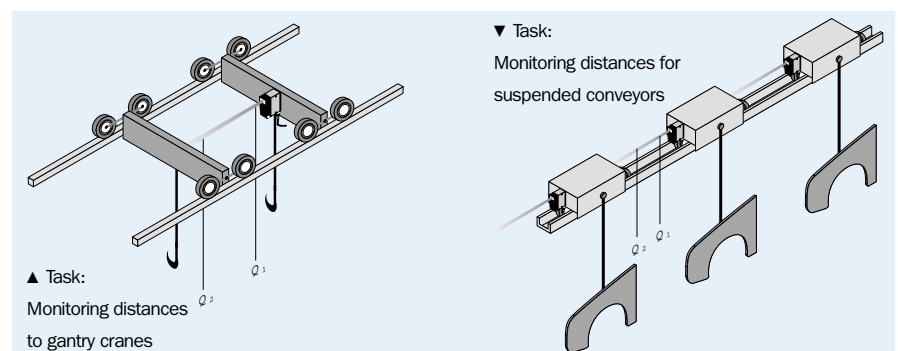
### Distance to Diamond Grade reflective tape, infrared light


#### The DtR IR variant - area of application

Determining distances from cranes, suspended conveyors and floor conveyors.

A distance of up to 20 m can be separated into three sectors on the diamond grade reflective tape:

- Distance to tape greater than the taught-in distances  $Q_1$  and  $Q_2$
- Distance to tape between  $Q_1$  and  $Q_2$
- Distance to tape less than  $Q_1$ .



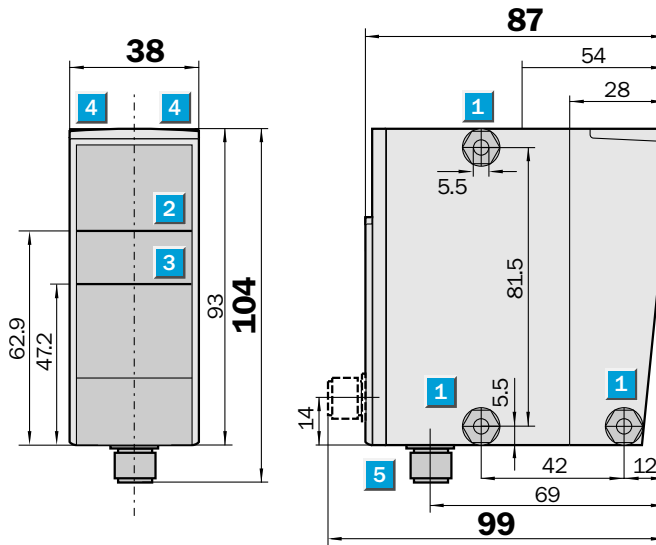
 **Scanning distance**  
200...6000 mm

**Distance sensors**

- Background suppression up to 100 mm (against shiny objects)
- High target dynamics:  
black ... extremely shiny
- Two-function LED
- Red pilot light
- Teach-in



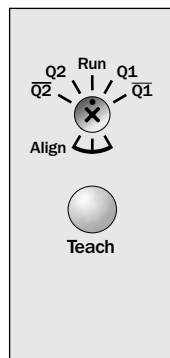
**Dimensional drawing**



**Adjustments possible**

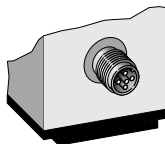
- DS 60-P/-N21111
- DS 60-P/-N21311
- DS 60-P/-N41111
- DS 60-P/-N41311

- 1 Mounting holes  $\varnothing$  5.2 mm
- 2 Optical axis – sender
- 3 Optical axis – receiver
- 4 Function indicator
- 5 M 12 plug, 5-pin
- 6 Control panel

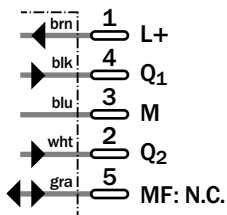


**Connection type**

- |                 |                 |
|-----------------|-----------------|
| DS 60-P/-N21111 | DS 60-P/-N41111 |
| DS 60-P/-N21311 | DS 60-P/-N41311 |



5-pin, M 12

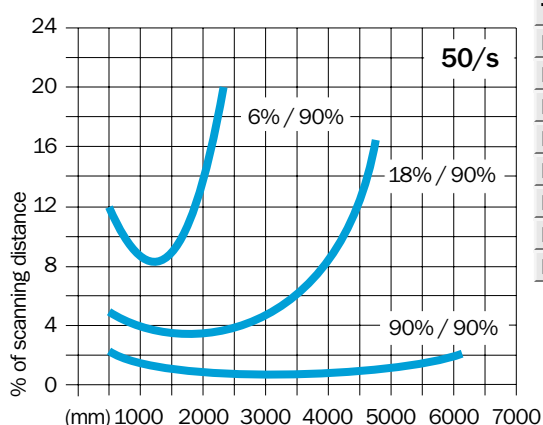
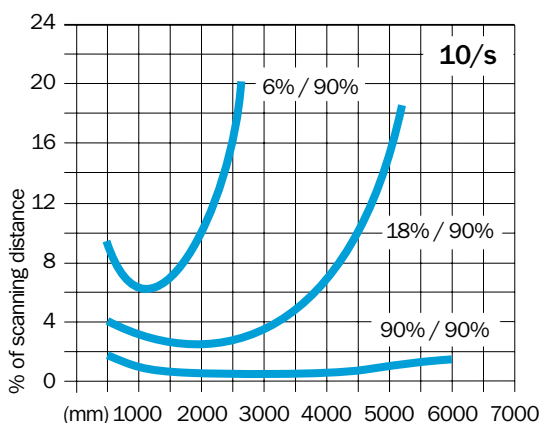


Accessories	page
Cable receptacles	496
Mounting brackets	510

Technical Data		DS 60-		P	N	P	N	P	N	P	N		
		21111	21111	21311	21311	41111	41111	41311	41311				
<b>Scanning distance, adjustable</b>	200 mm... 6000 mm												
Object with 3 % remission	80 mm...1400 mm												
	80 mm...1600 mm												
Object with 6 % remission	80 mm...2400 mm												
	80 mm...2600 mm												
Object with 18 % remission	80 mm...4600 mm												
	80 mm...5000 mm												
Object with 90 % remission <sup>1)</sup>	80 mm...6000 mm												
<b>Light source<sup>2)</sup></b>	Laser diode, infrared												
Light spot at 6 m	∅ 60 mm												
	∅ 12 mm												
<b>Supply voltage <math>V_S</math><sup>3)</sup></b>	18...30 V DC												
<b>Power consumption<sup>4)</sup></b>	< 3 W												
<b>Ripple<sup>5)</sup></b>	≤ 5 $V_{SS}$												
<b>Switching outputs (invertable)</b>	$Q_1, Q_2$												
DS 60-P: PNP	HIGH = $V_S - (< 2 V)$ /LOW = 0 V												
DS 60-N: NPN	HIGH = $V_S$ /LOW ≤ 2 V												
<b>Output current <math>I_A</math><sup>6)</sup></b>	100 mA												
<b>Switching frequency</b>	50/s												
	10/s												
Switching threshold $Q_1/Q_2$	Adjustable (teach-in)												
Time delay	On request												
<b>Multi-function MF</b>	N.C.												
<b>Connection type</b>	M 12 plug, 5-pin												
<b>VDE protection class<sup>7)</sup></b>	□												
<b>Laser protection class</b>	1 (EN 60 825-1)												
<b>Enclosure rating</b>	IP 67												
<b>Ambient temperature <math>T_A</math><sup>8)</sup></b>	Operation - 25 °C...+ 50 °C												
	Storage - 25 °C...+ 75 °C												
<b>Weight</b>	202 g												


- 1) Also shiny
- 2) Average service life 100,000 h at  $T_A = + 25 °C$
- 3) Limit values, reverse-polarity protected
- 4) Without load
- 5) May not exceed or fall short of  $V_S$  tolerances
- 6) Outputs  $Q_1$  and  $Q_2$  short-circuit protected
- 7) Reference voltage 50 V DC
- 8) Do not bend below 0 °C

**Scanning distance**



**Order information**

Type	Part no.
DS 60-P21111	1 016 361
DS 60-P21311	1 016 393
DS 60-P41111	1 016 687
DS 60-P41311	1 016 689
DS 60-N21111	1 016 394
DS 60-N21311	1 016 686
DS 60-N41111	1 016 688
DS 60-N41311	1 016 690

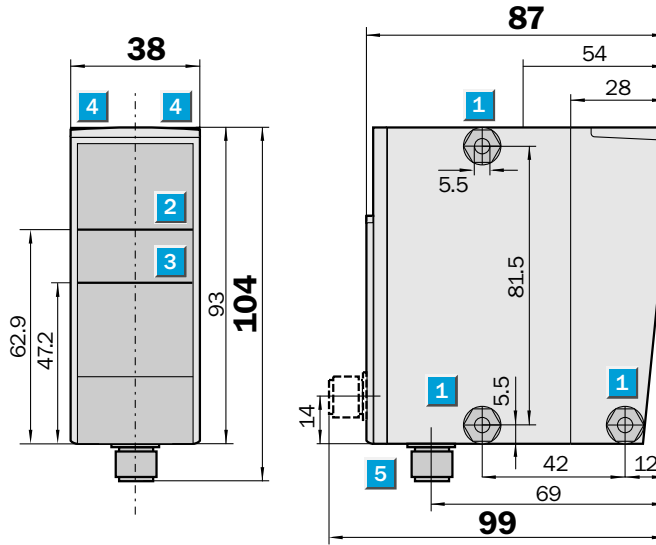
 **Scanning distance**  
200...6000 mm

**Distance sensors**

- Background suppression up to 100 mm (against shiny objects)
- High target dynamics:  
black ... extremely shiny
- Two-function LED
- Precise alignment via red light
- Teach-in



**Dimensional drawing**

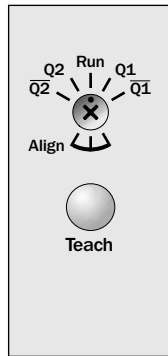


**Adjustments possible**

DS 60-P/-N21211

DS 60-P/-N41211

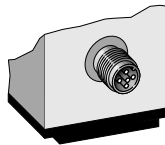
- 1** Mounting holes  $\varnothing$  5.2 mm
- 2** Optical axis – sender
- 3** Optical axis – receiver
- 4** Function indicator
- 5** M 12 plug, 5-pin
- 6** Control panel



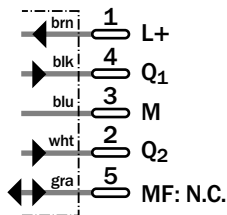
**Connection type**

DS 60-P/-N21211

DS 60-P/-N41211



5-pin, M 12



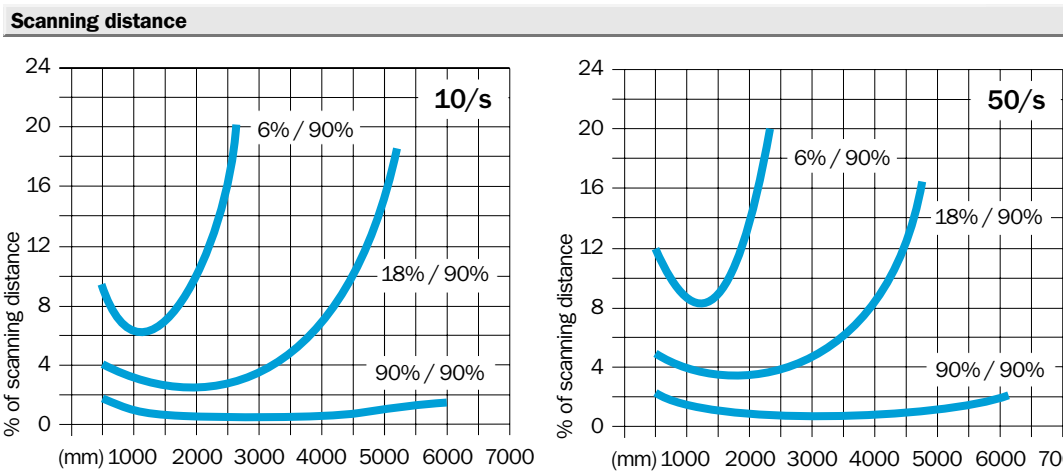
Accessories	page
Cable receptacles	496
Mounting brackets	510

Technical Data		DS 60-	P 21211	N 21211	P 41211	N 41211							
<b>Scanning distance, adjustable</b>	200 mm... 6000 mm												
Object with 3 % remission	80 mm...1400 mm												
	80 mm...1600 mm												
Object with 6 % remission	80 mm...2400 mm												
	80 mm...2600 mm												
Object with 18 % remission	80 mm...4600 mm												
	80 mm...5000 mm												
Object with 90 % remission <sup>1)</sup>	80 mm...6000 mm												
<b>Light source<sup>2)</sup></b>	Laser diode, red light												
Light spot at 6 m	∅ 12 mm												
<b>Supply voltage <math>V_S</math><sup>3)</sup></b>	18...30 V DC												
<b>Power consumption<sup>4)</sup></b>	< 3 W												
<b>Ripple<sup>5)</sup></b>	≤ 5 $V_{SS}$												
<b>Switching outputs (invertable)</b>	$Q_1, Q_2$												
DS 60-P: PNP	HIGH = $V_S - (< 2 V)$ /LOW = 0 V												
DS 60-N: NPN	HIGH = $V_S$ /LOW ≤ 2 V												
<b>Output current <math>I_A</math><sup>6)</sup></b>	100 mA												
<b>Switching frequency</b>	50/s												
	10/s												
Switching threshold $Q_1/Q_2$	Adjustable (teach-in)												
Time delay	On request												
<b>Multi-function MF</b>	N.C.												
<b>Connection type</b>	M 12 plug, 5-pin												
<b>VDE protection class<sup>7)</sup></b>	□												
<b>Laser protection class</b>	1 (EN 60 825-1)												
<b>Enclosure rating</b>	IP 67												
<b>Ambient temperature <math>T_A</math><sup>8)</sup></b>	Operation - 25 °C...+ 50 °C												
	Storage - 25 °C...+ 75 °C												
<b>Weight</b>	202 g												

1) Also shiny  
2) Average service life 50,000 h at  $T_A = + 25 °C$


3) Limit values, reverse-polarity protected  
4) Without load  
5) May not exceed or fall short of  $V_S$  tolerances

6) Outputs  $Q_1$  and  $Q_2$  short-circuit protected  
7) Reference voltage 50 V DC  
8) Do not bend below 0 °C



Order information	
Type	Part no.
DS 60-P21211	1 016 396
DS 60-N21211	1 016 491
DS 60-P41211	1 016 691
DS 60-N41211	1 016 692



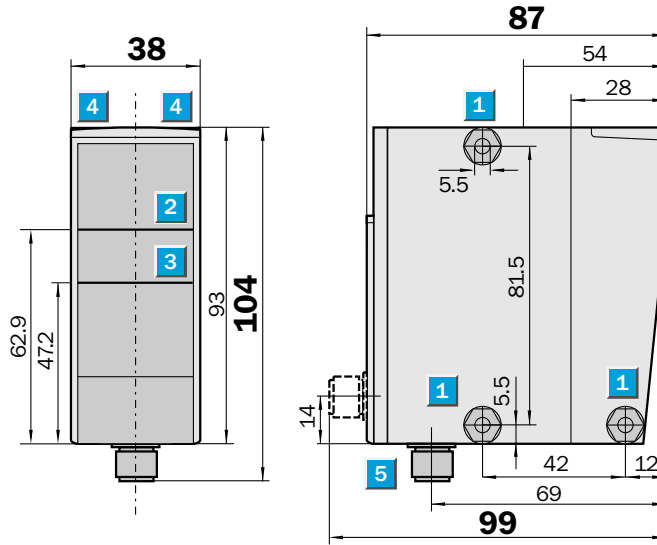
 **Scanning distance**  
200...6000 mm

**Distance sensor**

- Detection of extremely dark and shiny objects against a background
- High target dynamic: black ... extremely shiny
- Two-function LED
- Red pilot light
- Teach-in



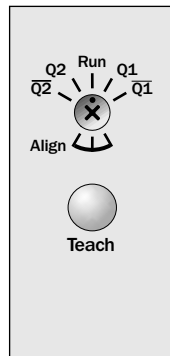
**Dimensional drawing**



**Adjustments possible**

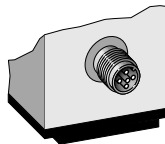
- DS 60-P/-N31111
- DS 60-P/-N31311
- DS 60-P/-N51111
- DS 60-P/-N51311

- 1 Mounting holes  $\phi$  5.2 mm
- 2 Optical axis – sender
- 3 Optical axis – receiver
- 4 Function indicator
- 5 M 12 plug, 5-pin
- 6 Control panel

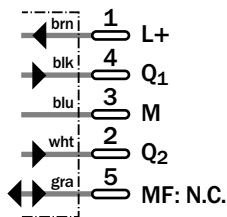


**Connection type**

- DS 60-P/-N31111    DS 60-P/-N51111
- DS 60-P/-N31311    DS 60-P/-N51311



5-pin, M 12

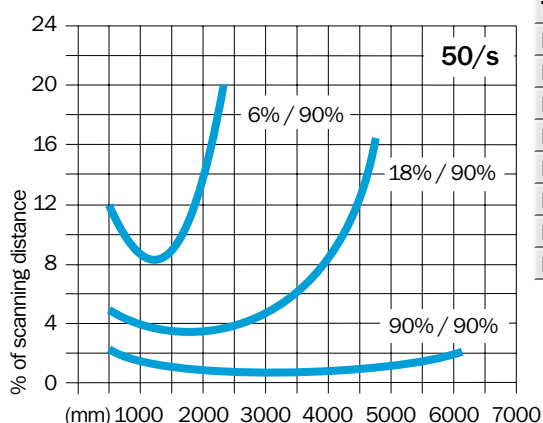
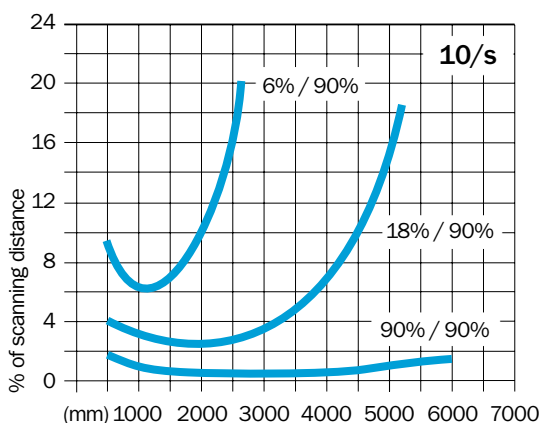


Accessories	page
Cable receptacles	496
Mounting brackets	510

Technical Data		DS 60-		P	N	P	N	P	N	P	N		
		31111	31111	31311	31311	51111	51111	51311	51311				
<b>Scanning distance, adjustable</b>	200 mm... 6000 mm												
Object with 3 % remission	80 mm...1400 mm												
	80 mm...1600 mm												
Object with 6 % remission	80 mm...2400 mm												
	80 mm...2600 mm												
Object with 18 % remission	80 mm...4600 mm												
	80 mm...5000 mm												
Object with 90 % remission <sup>1)</sup>	80 mm...6000 mm												
<b>Light source<sup>2)</sup></b>	Laser diode, infrared												
Light spot at 6 m	∅ 60 mm												
	∅ 12 mm												
<b>Supply voltage <math>V_S</math><sup>3)</sup></b>	18...30 V DC												
<b>Power consumption<sup>4)</sup></b>	< 3 W												
<b>Ripple<sup>5)</sup></b>	≤ 5 $V_{SS}$												
<b>Switching outputs (invertable)</b>	$Q_1, Q_2$												
DS 60-P: PNP	HIGH = $V_S - (< 2 V)$ /LOW = 0 V												
DS 60-N: NPN	HIGH = $V_S$ /LOW ≤ 2 V												
<b>Output current <math>I_A</math><sup>6)</sup></b>	100 mA												
<b>Switching frequency</b>	50/s												
	10/s												
Switching threshold $Q_1/Q_2$	Adjustable (teach-in)												
Time delay	On request												
<b>Multi-function MF</b>	N.C.												
<b>Connection type</b>	M 12 plug, 5-pin												
<b>VDE protection class<sup>7)</sup></b>	□												
<b>Laser protection class</b>	1 (EN 60 825-1)												
<b>Enclosure rating</b>	IP 67												
<b>Ambient temperature <math>T_A</math><sup>8)</sup></b>	Operation - 25 °C...+ 50 °C												
	Storage - 25 °C...+ 75 °C												
<b>Weight</b>	202 g												


- 1) Also shiny
- 2) Average service life 100,000 h at  $T_A = + 25 °C$
- 3) Limit values, reverse-polarity protected
- 4) Without load
- 5) May not exceed or fall short of  $V_S$  tolerances
- 6) Outputs  $Q_1$  and  $Q_2$  short-circuit protected
- 7) Reference voltage 50 V DC
- 8) Do not bend below 0 °C

**Scanning distance**



**Order information**

Type	Part no.
DS 60-P31111	1 016 493
DS 60-P31311	1 016 693
DS 60-P51111	1 016 695
DS 60-P51311	1 016 697
DS 60-N31111	1 016 494
DS 60-N31311	1 016 694
DS 60-N51111	1 016 696
DS 60-N51311	1 016 698

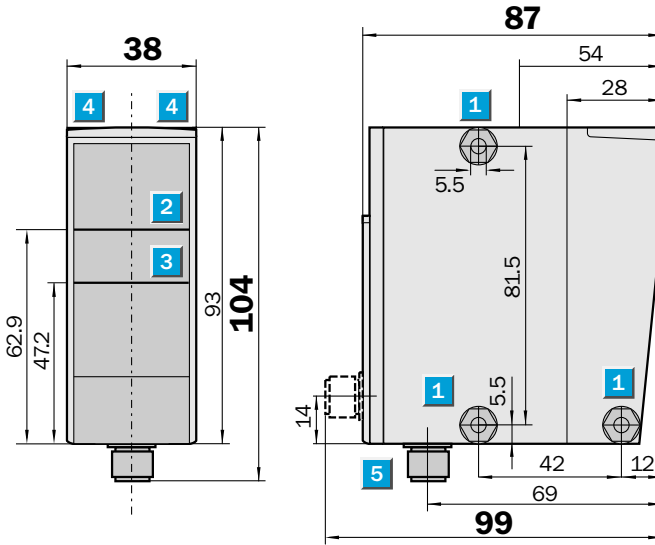
 **Scanning range**  
200...20,000 mm

**Distance sensors**

- Distance to Diamond Grade reflective tape
- Two switching outputs
- Two-function LED
- Red pilot light
- Teach-in setup of switching outputs according to the distance to Diamond Grade reflective tape

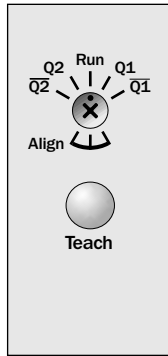


**Dimensional drawing**



**Adjustments possible**

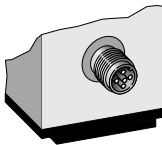
DS 60-P/-N11121



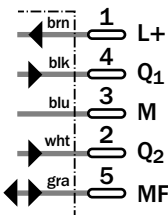
- 1 Mounting holes  $\varnothing$  5.2 mm
- 2 Optical axis – sender
- 3 Optical axis – receiver
- 4 Function indicator
- 5 M 12 plug, 5-pin
- 6 Control panel

**Connection type**

DS 60-P/-N11121



5-pin, M 12



Accessories	page
Cable receptacles	496
Mounting brackets	510
Reflective tape	527

Technical Data		DS 60-		P	N									
				11121	11121									
<b>Scanning distance, adjustable</b>	200 mm...20,000 mm													
Reflective tape	Diamond Grade													
<b>Light source</b> <sup>1)</sup>	Diode laser, infrared													
Light spot at 20,000 mm	∅ 200 mm													
<b>Supply voltage</b> $V_S$ <sup>2)</sup>	18...30 V DC													
<b>Power consumption</b> <sup>3)</sup>	< 3 W													
<b>Ripple</b> <sup>4)</sup>	≤ 5 $V_{SS}$													
<b>Switching outputs (invertable)</b>	$Q_1, Q_2$													
DS 60-P: PNP	HIGH = $V_S - (< 2 V)$ /LOW = 0 V													
DS 60-N: NPN	HIGH = $V_S$ /LOW ≤ 2 V													
<b>Output current</b> $I_A$ <sup>5)</sup>	100 mA													
<b>Switching frequency</b>	50/s													
Switching threshold $Q_1/Q_2$	Adjustable (teach-in)													
Time delay	On request													
<b>Multi-function MF</b>	Test input													
Sender on	< 2 V or unswitched													
	$V_S - (< 2 V)$ or unswitched													
Sender off	> 12 V to < $V_S$													
	0 V to $V_S - (> 12 V)$													
<b>Connection type</b>	M 12 plug, 5-pin													
<b>VDE protection class</b> <sup>6)</sup>	<input type="checkbox"/>													
<b>Laser protection class</b>	1 (EN 60 825-1)													
<b>Enclosure rating</b>	IP 67													
<b>Ambient temperature</b> $T_A$ <sup>7)</sup>	Operation - 25 °C...+ 50 °C													
	Storage - 25 °C...+ 75 °C													
<b>Weight</b>	202 g													

1) Average service life 100,000 h  
at  $T_A = + 25 °C$

2) Limit values, reverse-polarity protected

3) Without load

4) May not exceed or fall short of  
 $V_S$  tolerances

5) Outputs  $Q_1$  and  $Q_2$  short-circuit  
protected

6) Reference voltage DC 50 V

7) Do not bend below 0 °C

#### Order information

Type	Part no.
DS 60-P11121	1 016 397
DS 60-N11121	1 016 492