

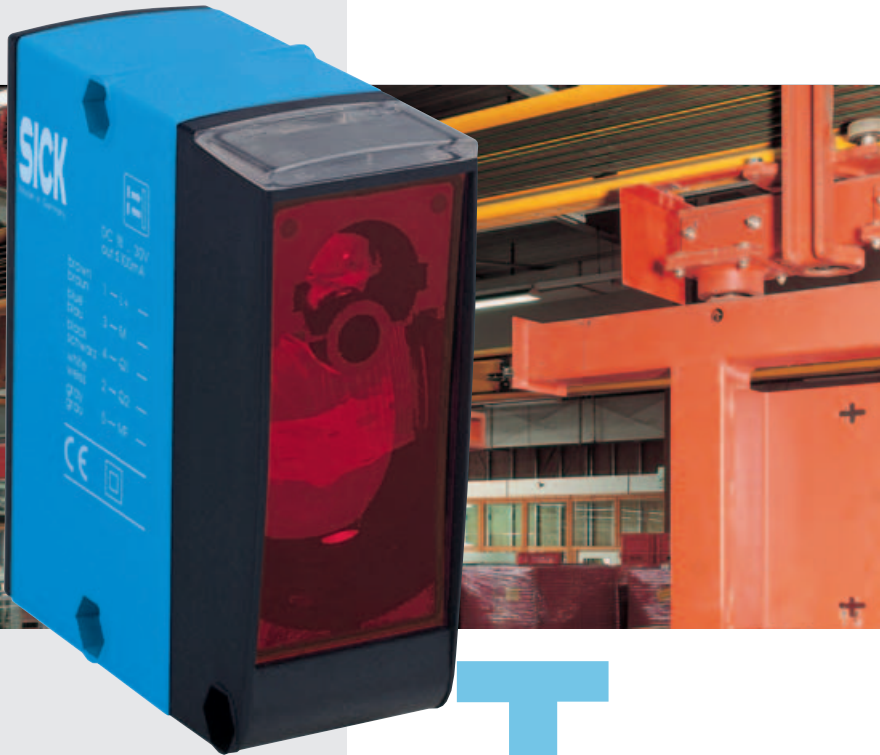


DS 60: The solution for large scanning distances

	Distance sensors Proximity mode
	Distance sensors Reflector mode



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.

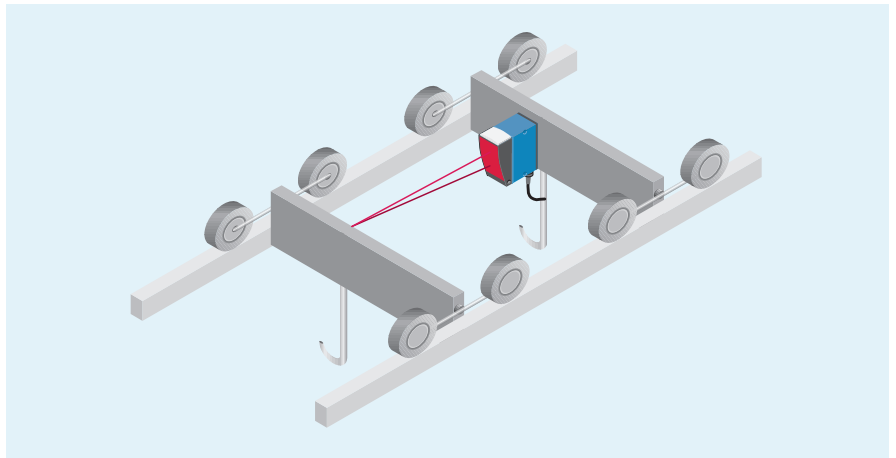
The prevention of collisions for cranes and vehicles or checking whether storage bays in warehousing systems are occupied are typical examples of applications in which compact triangulation scanners reach their technological limits and laser distance measuring systems become too expensive. The DS 60 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.

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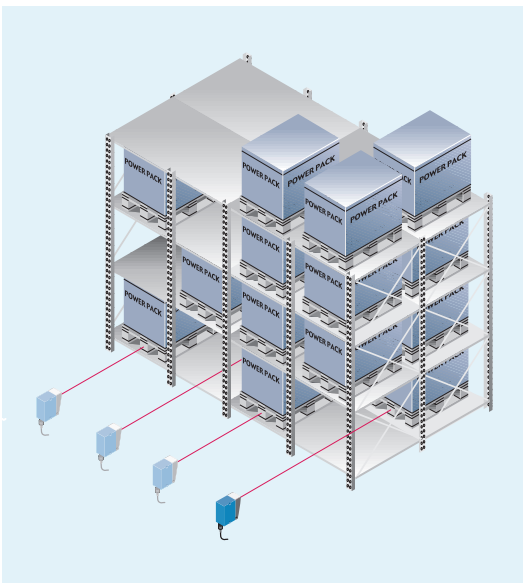
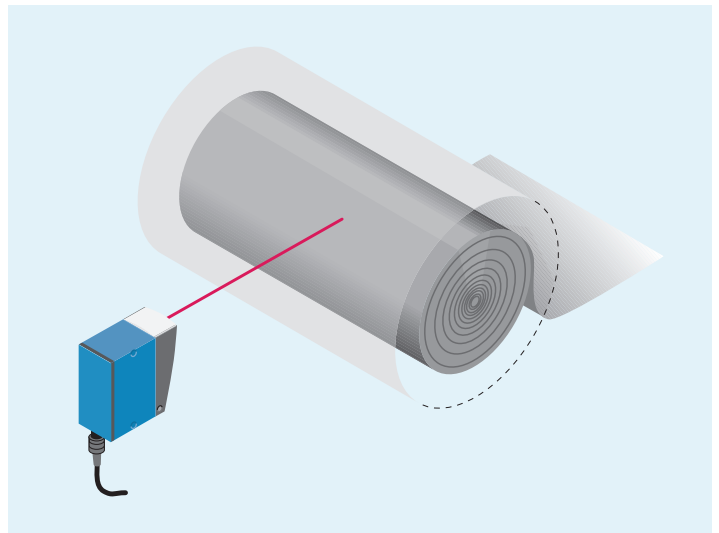
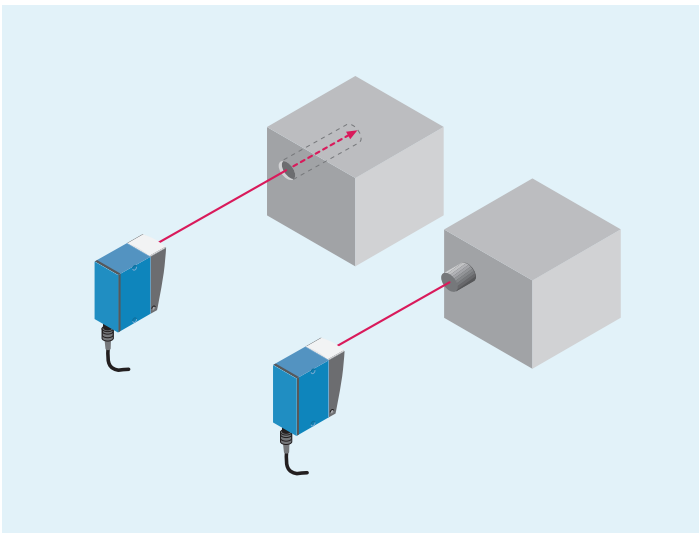
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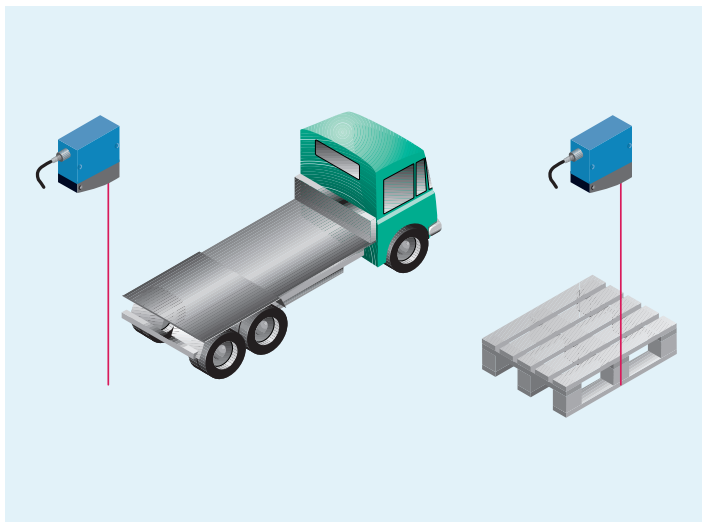
► Ensuring everything runs smoothly in warehousing/handling systems: The DS 60 distance sensor is used to make sure that a safe distance is maintained between overhead conveyors.



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



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



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

▲ 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.

Application Field

The DS 60 distance sensors operate according to the principle of time of flight measurement. The compact sensor makes large and adjustable scanning distances possible with very precise distance detection.

Almost any objects, including tilted ones, are detected dependably in front of a shiny background (e.g., zinc-coated steel sheets or window panes) within the scanning range.

A connectable pilot light simplifies precise alignment on the scanning object.

One sensor model with a red light laser and a small light spot makes the detection of even the smallest objects at large distances possible. Precise alignment is made using a visible, red laser beam.

Another sensor model operates using Diamond Grade reflective tape. This switches when the reflective tape falls short of the previously set distance (not comparable to a photoelectric switch during light path interruption).

Two switching outputs signal whether the set distances are reached.

DS 60 Dt0 IR Distance to Object, Infrared Light

Variant Dt0 IR – Application field

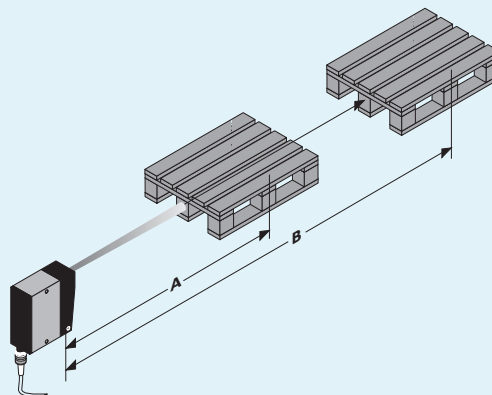
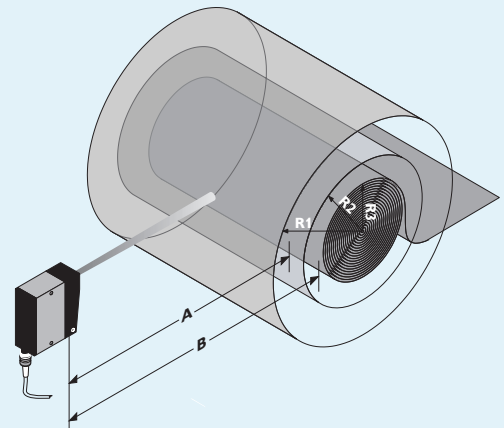
Detecting the distance between sensor and object.

The object can move toward the sensor during positioning.

Falling short of the previously set distance triggers the switching outputs.

► Task:

Determining the diameter of a (shining) aluminum or (dark) steel coil.
The distances A (switching output Q₁) and B (switching output Q₂) are taught in.
Radius R1 = switching distance A:
switching output Q₁ is actuated,
Radius R2 = switching distance B:
switching output Q₂ is actuated.



◀ Task:

Detecting whether a compartment is vacant or contains one or two Euro-pallets.
The sensor model with a 12 mm light spot measurement is especially suitable for precise detection of a pallet foot at a great distance. Problem-free alignment of the sensor using the pilot light.

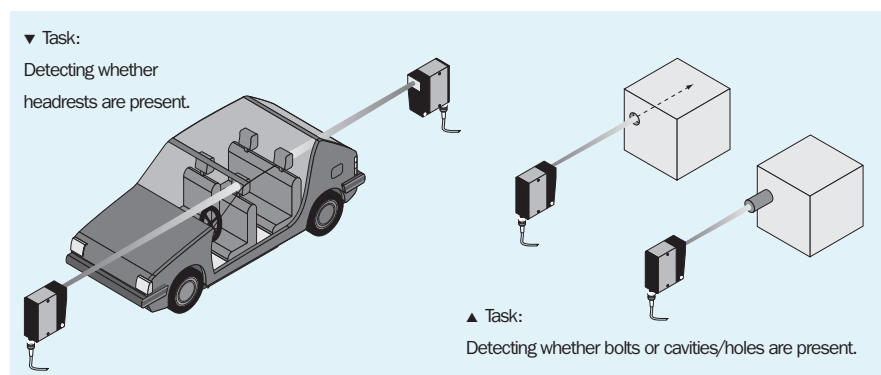
DS 60 DtO R

Distance to Object, Red Light

Variant DtO R – Application field

Detecting smaller objects and cavities or holes.

The object can move toward the sensor during positioning. Falling short of the previously set distance triggers the switching output.



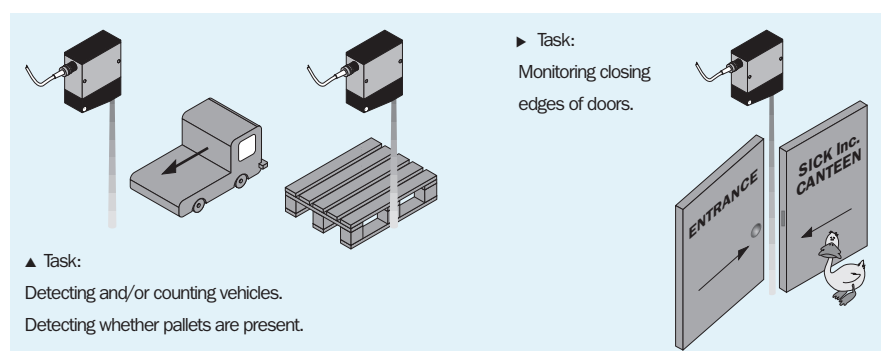
DS 60 ObSB IR

Object between Sensor and Back- ground, Infrared Light

Variant ObSB IR – Application field

Similar to a photoelectric reflex switch only that no reflector is required, but instead a stationary background (e.g., a 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.



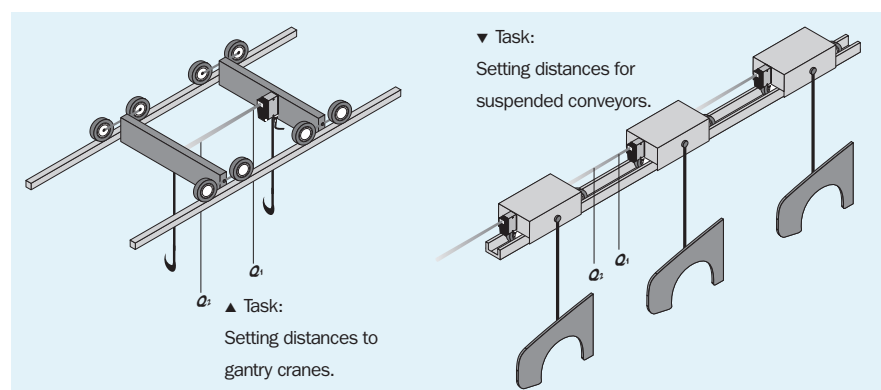
DS 60 DtR IR


Distance to Diamond Grade Reflective Tape, Infrared Light

Variant DtR IR – Application field

Setting distances from cranes, suspended conveyors and conveyors on the ground. The sensor function can be checked via a test input. 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 shorter than Q_1





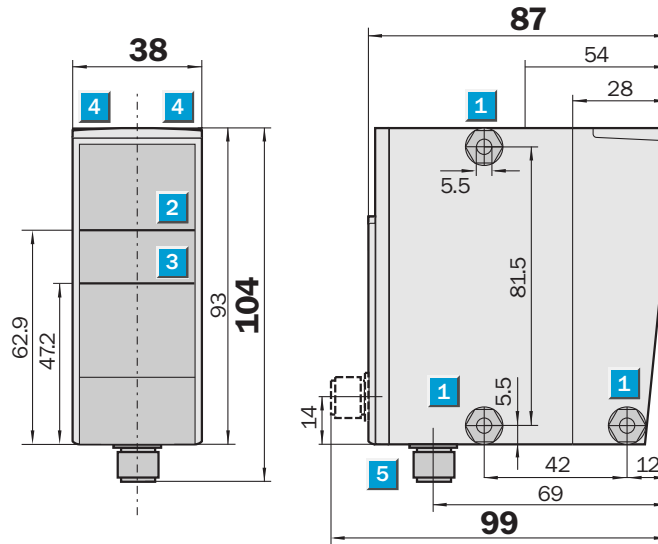
Scanning distance
200 ... 6000 mm

Distance Sensor

- Background suppression up to 100 m
- High target dynamic: black ... extremely shiny
- Two function LED
- Red Pilot Light
- Teach-in



Dimensional drawing



Adjustments possible

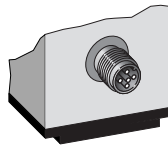
- DS 60-P/-N21111
- DS 60-P/-N21311
- DS 60-P/-N41111
- DS 60-P/-N41311
- DS 60-P41111-S03

- 1 Mounting hole \varnothing 5.2 mm
- 2 Optical axis – sender
- 3 Optical axis – receiver
- 4 Status indicator
- 5 M12 plug, 5-pin
- 6 Control panel

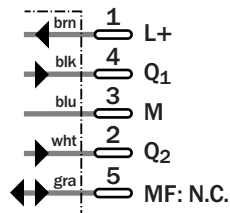


Connection type

- | | | |
|-----------------|-----------------|------------------|
| DS 60-P/-N21111 | DS 60-P/-N41111 | DS 60-P41111-S03 |
| DS 60-P/-N21311 | DS 60-P/-N41311 | |



5-pin, M12



See chapter Accessories

Cables and connectors
Mounting systems
Special accessories

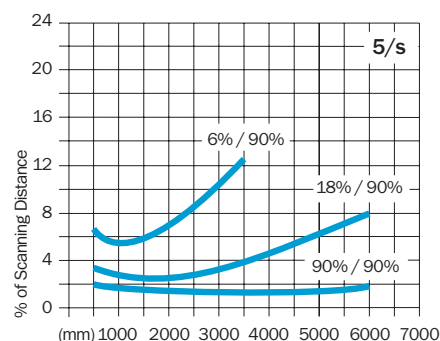
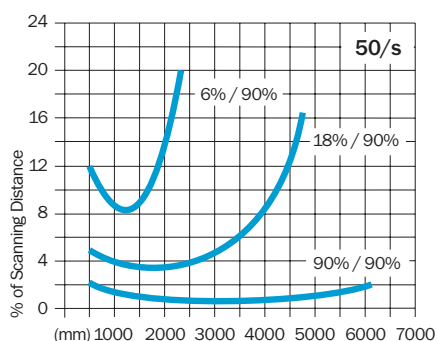
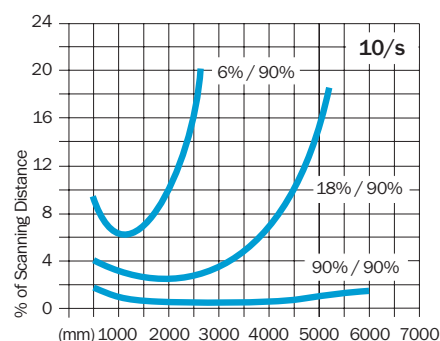
Technical data		DS 60		-P 21111	-N 21111	-P 21311	-N 21311	-P 41111	-N 41111	-P 41311	-N 41311	-P 41111- S03
Type of connection	M12 plug, 5-pin											
Scanning distance, adjustable	200 mm to 6000 mm											
Object with 3% remission	80 mm to 1400 mm											
	80 mm to 1600 mm											
	80 mm to 1750 mm											
Object with 6% remission	80 mm to 2400 mm											
	80 mm to 2600 mm											
	80 mm to 3000 mm											
Object with 18% remission	80 mm to 4600 mm											
	80 mm to 5000 mm											
	80 mm to 5650 mm											
Object with 90% remission ¹⁾	80 mm to 6000 mm											
Light source ²⁾	Laser diode, infrared											
Light spot at 6 m distance	Ø 60 mm											
	Ø 12 mm											
Supply voltage V_S ³⁾	18 to 30 V DC											
Power consumption ⁴⁾	< 3 W											
Ripple ⁵⁾	≤ 5 V _{PP}											
Switching outputs (invertable)	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											
Output current ⁶⁾	100 mA											
Switching frequency	50/s											
	10/s											
	5/s											
Switching limit Q ₁ /Q ₂	adjustable (Teach-in)											
Time delay	on request											
Multifunction MF	N.C./External Teach on request											
VDE protection class ⁷⁾	II											
Laser protection class	1 (EN 60 825-1)											
Enclosure rating	IP 67											
Ambient temperature ⁸⁾	Operation - 25 to + 50 °C											
	Storage - 25 to + 75 °C											
Weight	202 g											

1) Also shiny
 2) Average service life 100 000 h, at room temperature = + 25 °C
 3) Limit values, reverse polarity protected

4) Without load
 5) Must be within V_S tolerances
 6) Outputs Q₁ and Q₂ short-circuit protected


7) Withstand voltage 50 V DC
 8) Do not distort cable below 0 °C

Scanning distance



Ordering information

Type	Order 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
DS 60-P41111-S03	1 023 745



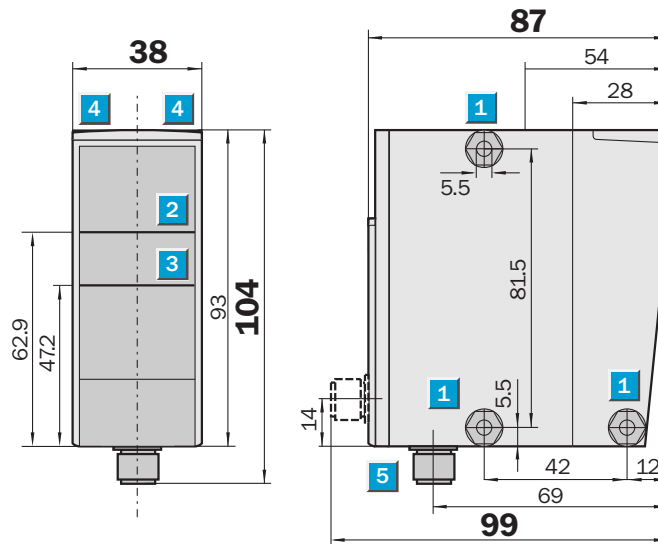
Scanning distance
200 ... 6000 mm

Distance Sensor

- Background suppression up to 100 m
- High target dynamic: black ... extremely shiny
- Two function LED
- Precise alignment by red laser light
- Teach-in



Dimensional drawing



Adjustments possible

DS 60-P/-N21211

DS 60-P/-N41211

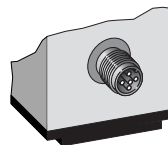


- 1 Mounting hole \varnothing 5.2 mm
- 2 Optical axis – sender
- 3 Optical axis – receiver
- 4 Status indicator
- 5 M12 plug, 5-pin
- 6 Control panel

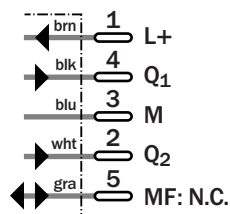
Connection type

DS 60-P/-N21211

DS 60-P/-N41211



5-pin, M12



See chapter Accessories

Cables and connectors

Mounting systems

Special accessories



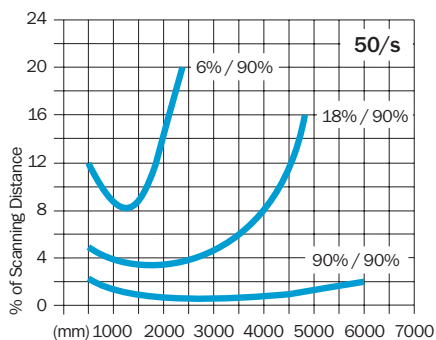
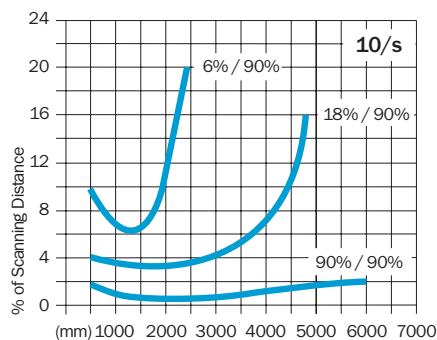
Technical data		DS 60	-P 21211	-N 21211	-P 41211	-N 41211					
Type of connection	M12 plug, 5-pin										
Scanning distance, adjustable	200 mm to 6000 mm										
Object with 3% remission	80 mm to 1400 mm										
	80 mm to 1600 mm										
Object with 6% remission	80 mm to 2400 mm										
	80 mm to 2600 mm										
Object with 18% remission	80 mm to 4600 mm										
	80 mm to 5000 mm										
Object with 90% remission ¹⁾	80 mm to 6000 mm										
Light source ²⁾	Laser diode, red										
Light spot at 4.5 m distance	∅ 9 mm										
Supply voltage V_S ³⁾	18 to 30 V DC										
Power consumption ⁴⁾	< 3 W										
Ripple ⁵⁾	≤ 5 V _{pp}										
Switching outputs (invertable)	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										
Output current ⁶⁾	100 mA										
Switching frequency	50/s										
	10/s										
Switching limit Q ₁ /Q ₂	adjustable (Teach-in)										
Time delay	on request										
Multifunction MF	N.C./External Teach on request										
VDE protection class ⁷⁾	II										
Laser protection class	2 (EN 60 825-1)										
Enclosure rating	IP 67										
Ambient temperature ⁸⁾	Operation - 25 to + 50 °C										
	Storage - 25 to + 75 °C										
Weight	202 g										

1) Also shiny
 2) Average service life 50 000 h, at room temperature = + 25 °C
 3) Limit values, reverse polarity protected

4) Without load
 5) Must be within V_S tolerances
 6) Outputs Q₁ and Q₂ short-circuit protected


7) Withstand voltage 50 V DC
 8) Do not distort cable below 0 °C

Scanning distance



Ordering information

Type	Order 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



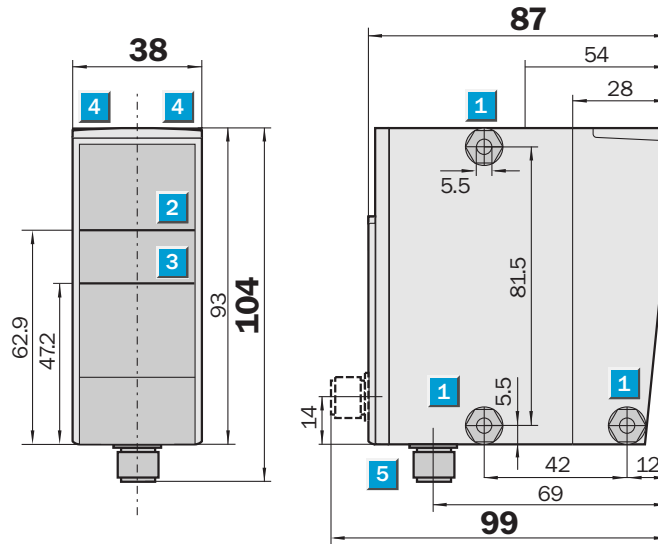
Scanning distance
200 ... 6000 mm

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

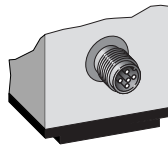
- DS 60-P/-N31111
- DS 60-P/-N31311
- DS 60-P/-N51111
- DS 60-P/-N51311

- 1 Mounting hole \varnothing 5.2 mm
- 2 Optical axis – sender
- 3 Optical axis – receiver
- 4 Status indicator
- 5 M12 plug, 5-pin
- 6 Control panel

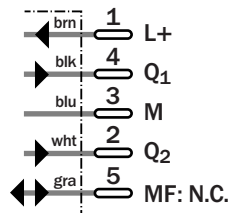


Connection type

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



5-pin, M12



See chapter Accessories

- Cables and connectors
- Mounting systems
- Special accessories

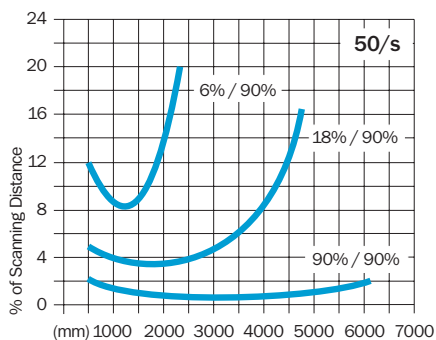
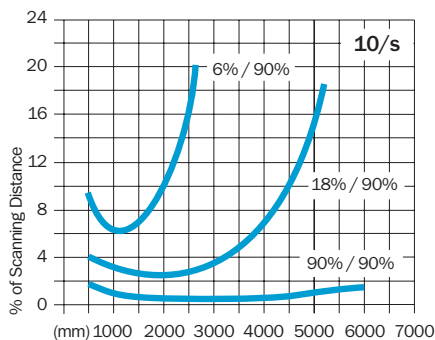
Technical data		DS 60		-P	-N	-P	-N	-P	-N	-P	-N		
				31111	31111	31311	31311	51111	51111	51311	51311		
Type of connection	M12 plug, 5-pin												
Scanning distance, adjustable	200 mm to 6000 mm												
Object with 3% remission	80 mm to 1400 mm												
	80 mm to 1600 mm												
Object with 6% remission	80 mm to 2400 mm												
	80 mm to 2600 mm												
Object with 18% remission	80 mm to 4600 mm												
	80 mm to 5000 mm												
Object with 90% remission ¹⁾	80 mm to 6000 mm												
Light source ²⁾	Laser diode, infrared/ Laser diode, red light on request												
Light spot at 6 m distance	Ø 60 mm Ø 12 mm												
Supply voltage V_S ³⁾	18 to 30 V DC												
Power consumption ⁴⁾	< 3 W												
Ripple ⁵⁾	≤ 5 V _{pp}												
Switching outputs (invertable)	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												
Output current ⁶⁾	100 mA												
Switching frequency	50/s 10/s												
Switching limit Q ₁ /Q ₂	adjustable (Teach-in)												
Time delay	on request												
Multifunction MF	N.C./External Teach on request												
VDE protection class ⁷⁾	II												
Laser protection class	1 (EN 60 825-1)												
Enclosure rating	IP 67												
Ambient temperature ⁸⁾	Operation - 25 to + 50 °C Storage - 25 to + 75 °C												
Weight	202 g												

1) Also shiny
2) Average service life 100 000 h, at room temperature = + 25 °C
3) Limit values, reverse polarity protected

4) Without load
5) Must be within V_S tolerances
6) Outputs Q₁ and Q₂ short-circuit protected


7) Withstand voltage 50 V DC
8) Do not distort cable below 0 °C

Scanning distance



Ordering information

Type	Order 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

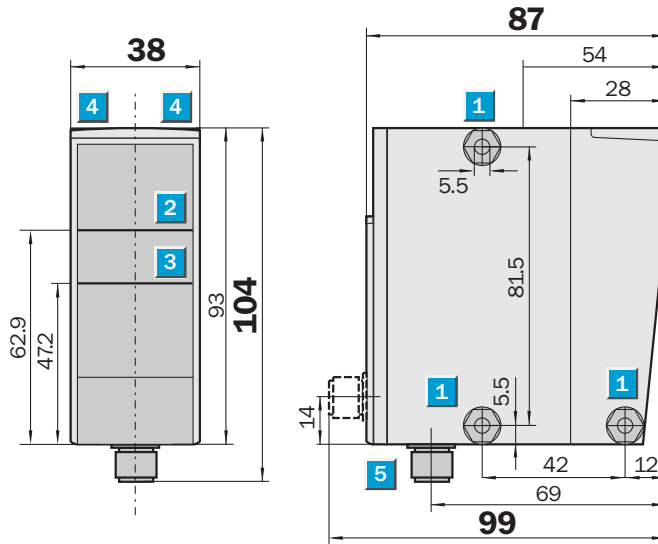
 **Scanning range**
200 ... 20000 mm

Distance Sensor

- Distance to reflective tape diamond grade
- Two switching outputs
- Two function LED
- Red Pilot Light
- Teach-in setup of switching outputs according to the distance of reflective tape



Dimensional drawing



Adjustments possible

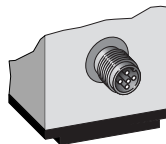
DS 60-P/-N11121



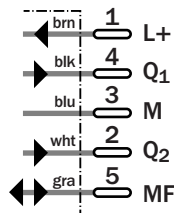
- 1 Mounting hole \varnothing 5.2 mm
- 2 Optical axis – sender
- 3 Optical axis – receiver
- 4 Status indicator
- 5 M12 plug, 5-pin
- 6 Control panel

Connection type

DS 60-P/-N11121



5-pin, M12



See chapter Accessories

Cables and connectors
Mounting systems
Special accessories

Technical data		DS 60		-P	-N								
				11121	11121								
Type of connection	M12 plug, 5-pin												
Scanning range, adjustable	200 mm to 20 000 mm												
Reflective tape	Diamond Grade												
Light source ¹⁾	Laser diode, infrared												
Light spot at 20 000 mm distance	Ø 200 mm												
Supply voltage V_S ²⁾	18 to 30 V DC												
Power consumption ³⁾	< 3 W												
Ripple ⁴⁾	≤ 5 V _{pp}												
Switching outputs (invertable)	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												
Output current ⁵⁾	100 mA												
Switching frequency	50/s												
Switching limit Q ₁ /Q ₂	adjustable (Teach-in)												
Time delay	on request												
Multifunction MF	Test-input/External Teach on request												
Sender on	< 2 V or open-circuit												
	V _S - (< 2 V) or open-circuit												
Sender off	> 12 V to < V _S												
	0 V to V _S - (> 12 V)												
VDE protection class ⁶⁾	II												
Laser protection class	1 (EN 60 825-1)												
Enclosure rating	IP 67												
Ambient temperature ⁷⁾	Operation - 25 to + 50 °C												
	Storage - 25 to + 75 °C												
Weight	202 g												

¹⁾ Average service life 100 000 h, at room temperature = + 25 °C

²⁾ Limit values, reverse polarity protected

³⁾ Without load

⁴⁾ Must be within V_S tolerances

⁵⁾ Outputs Q₁ and Q₂ short-circuit protected

⁶⁾ Withstand voltage 50 V DC

⁷⁾ Do not distort cable below 0 °C

Ordering information	
Type	Order no.
DS 60-P11121	1 016 397
DS 60-N11121	1 016 492