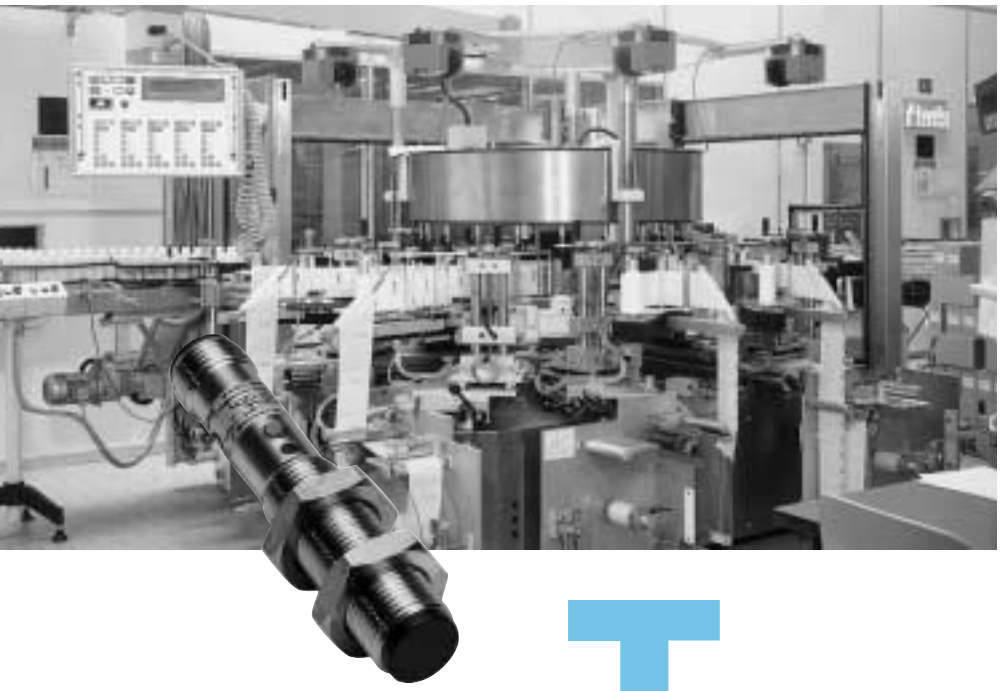
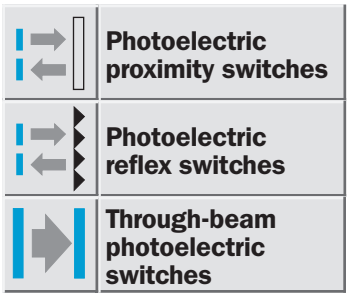
DATA SHEET

V 12 Miniature photoelectric switches: innovations in M 12 housings





	Photoelectric proximity switches
	Photoelectric reflex switches
	Through-beam photoelectric switches

The V 12 photoelectric switch series in round miniature housings provides more than "just" extensive scanning ranges.

V 12 sensors are the ideal option for standard applications where space is restricted. In addition, V 12 photoelectric switches are the perfect complement to inductive or capacitive sensors in M 12 housings.

Special focal points are applications in:

- the packaging and printing industries,
- assembly and handling systems,
- conveyor systems, and
- the construction of special-purpose machines.

SICK

The V 12 optic sensors and their ranges in overview:

- VS/VE 12 through-beam photoelectric switch: 5 m,
- VL 12 photoelectric reflex switch: 2.8 m (PL 80 A), switching reliability even with reflecting objects thanks to polarization filter and red LED transmitter.
- VT 12 photoelectric proximity switch, energetic: two scanning ranges scr. 300 mm and scr. 100 mm (90 % remission), manual sensitivity setting per Teach-in button and electronically per control input C.

Two Teach-in modes provide simple optimization options for VT 12T-2:

- substantial operating reserve for standard applications,
- precise switching point and small hysteresis for special tasks,
- optical display of the operating reserve (alarm display) by blinking LED indicator.

Flexible and minimum variants in spite of this: Freely selectable switching type light-switching (L.ON) or dark-switching (D.ON) per control line.

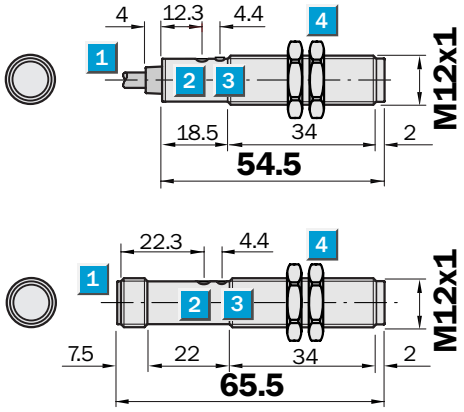
V_S = 10 ... 30 V DC; switching output Q either in PNP or NPN; M 12 plug or cable, IP 67 and sturdy metal housing are additional V 12 system strengths.

Scanning distance
0 ... 115 mm
0 ... 340 mm

Photoelectric proximity switches

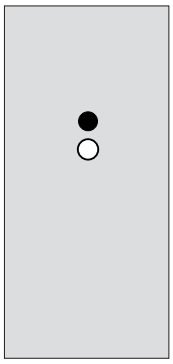
- Sensitivity (scanning range) can be set per Teach-in at the “push of a button” or per control input C
- Minimum number of variants: Switching type L.ON or D.ON selectable per control input C
- Optic pre-failure message via operating reserve display

Dimensional drawing



Adjustments possible VT 12T-2

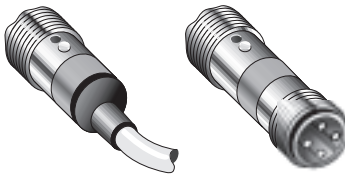
VT 12T-2P 112	VT 12T-2N 112
VT 12T-2P 410	VT 12T-2N 410
VT 12T-2P 132	VT 12T-2N 132
VT 12T-2P 430	VT 12T-2N 430



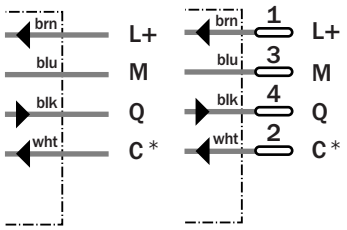
1 Cable or plug M 12, 4-pin
2 Sensitivity adjustment (Teach-in button)
3 Yellow LED indicator:
– lights continuously:
reception signal > reserve factor 2
– blinks: Reception signal < reserve factor 2
but > switching threshold 1
4 Mounting nuts (2x), SW 17, metal

Connection types

VT 12T-2P 112	VT 12T-2P 410
VT 12T-2N 112	VT 12T-2N 410
VT 12T-2P 132	VT 12T-2P 430
VT 12T-2N 132	VT 12T-2N 430



4 x 0.14 mm²	4-pin, M 12



* Control input C, programming:
– Switching type L.ON/D.ON and
– External Teach-in
C = open (not assigned)
light-switching L.ON
C = + V_S: dark-switching D.ON
C = 0 V: sensitivity setting per
“external Teach-in” active

Accessories
Connectors
Mounting systems

Technical data		VT 12T-2	P 112	P 410	N 112	N 410	P 132	P 430	N 132	N 430
Scanning distance, max. typical [1]		0 ... 115 mm	■	■	■	■				
		0 ... 340 mm					■	■	■	■
Operating distance [1]		2 ... 100 mm	■	■	■	■				
		2 ... 300 mm					■	■	■	■
Sensitivity setting		Manual, per Teach-in button	■	■	■	■	■	■	■	■
		Electronic, per control input C (0 V) [2]	■	■	■	■	■	■	■	■
Light source [3], light type		LED, infrared light	■	■	■	■	■	■	■	■
Light spot diameter		Approx. 20 mm at 100 mm	■	■	■	■				
		Approx. 28 mm at 300 mm					■	■	■	■
Angle of dispersion of sender		Approx. 11.4° (SD = max.),	■	■	■	■				
		Approx. 22.6° (SD = 1/2 max.)	■	■	■	■				
		Approx. 5.3° (SD = max.),					■	■	■	■
		Approx. 11.2° (SD = 1/2 max.)					■	■	■	■
Supply voltage V_S		10 ... 30 V DC [4]	■	■	■	■	■	■	■	■
Ripple [5]		≤ 10 %	■	■	■	■	■	■	■	■
Current consumption [6]		≤ 20 mA	■	■	■	■	■	■	■	■
Switching outputs		Q: PNP	■	■			■	■		
		Q: NPN			■	■			■	■
Output current I_A max.		≤ 100 mA	■	■	■	■	■	■	■	■
Switching mode		Light-/Dark-switching selectable [2]	■	■	■	■	■	■	■	■
Response time [7]		≤ 1.25 ms	■	■	■	■	■	■	■	■
Switching frequency max. [8]		400/s	■	■	■	■	■	■	■	■
Connection types	Cable [9]	PVC, 2 m, 4 x 0.14 mm², Ø 3.75 mm	■		■		■		■	
	Plug	M 12, 4-pin		■		■		■		■
VDE protection class [10]		⧈	■	■	■	■	■	■	■	■
Circuit protection [11]		A, B, C, D	■	■	■	■	■	■	■	■
Enclosure rating		IP 67	■	■	■	■	■	■	■	■
Ambient temperature T_A		Operation – 25 °C ... + 70 °C	■	■	■	■	■	■	■	■
		Storage – 25 °C ... + 70 °C	■	■	■	■	■	■	■	■
Weight	With cable	Approx. 54 g	■		■		■		■	
	With plug	Approx. 18 g		■		■		■		■
Housing material	Housing:	Nickel-coated brass/PA	■	■	■	■	■	■	■	■
	Optics:	PC	■	■	■	■	■	■	■	■

1) Object to be detected with 90 % remission (relating to standard white in acc. with DIN 5033); 100 x 100 mm

2) Controll input C
– L.ON/D.ON and
– external Teach-in
C = open: light-switching L.ON
C = + V_S: dark-switching D.ON
C = 0 V: Sensitivity setting per "external Teach-in" active

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

4) Limit values

5) May not exceed or fall short of V_S tolerances

6) Without load

7) Signal transit time with resistive load

8) With light/dark ratio 1:1

9) Do not bend below 0 °C

10) Reference voltage 50 V DC

11) A = V_S connections reverse-polarity protected
B = Inputs and output reverse-polarity protected
C = Interference pulse suppression
D = Outputs overload and short-circuit protected

Order information	
Type	**Part no.**
VT 12T-2P 112	6 026 211
VT 12T-2P 410	6 026 212
VT 12T-2N 112	6 026 209
VT 12T-2N 410	6 026 210
VT 12T-2P 132	6 026 215
VT 12T-2P 430	6 026 216
VT 12T-2N 132	6 026 213
VT 12T-2N 430	6 026 214

Sensitivity setting per Teach-in function

- **Programming optionally**
  – manually per Teach-in button or
  – electronically per control input C
- **Very simple programming:**
  Always position the scanning object at the target position in the light path.
- **Press the Teach-in button 1 x or activate control input C (0 V) 1 x:**
  Sensitivity setting has been completed.
- **Feedback: yellow LED indicator**
- **Permanent storage of the "taught-in switching threshold and hysteresis",**
  even if power is interrupted for longer times.
- **Two programming types for your sensitivity adjustment.**
  Two easy-to-operate Teach-in modes are available to let you adjust sensitivity optimally.

Sensitivity setting
Always position the scanning object at the target position in the light path.

1 Sensitivity setting 1, applications: substantial operating reserve

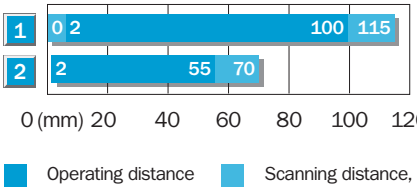
- **For all standard applications:**
  – Large operating reserve, factor > 2 above switching threshold:
  Short "Teach-in time" > 2 s ... < 7 s.
  Press the Teach-in button 1 x or activate control input C (0 V) = > 2 s ... < 7 s.
  Yellow LED indicator → goes off → lights after > 2 s again → deactivate Teach-in signal → **sensitivity setting completed!** → Check application.
  Yellow LED indicator lights after Teach-in process has been completed.

2 Sensitivity setting 2, applications: precise switching point

- **For slight differences between scanning object and background**
- **For positioning tasks**
- **For simple contrast detection:**
  – Small switching hysteresis, smaller operating reserve, factor > 1 < 2 above switching threshold: Long "Teach-in time" > 8 s
  Press the Teach-in button 1 x or activate control input C (0 V) = > 8 s
  Yellow LED indicator → goes off → lights after > 2 s again → Blinks after > 8 s → deactivate Teach-in signal → **sensitivity setting completed!** → Check application.
  Yellow LED indicator blinks permanently after Teach-in process has been completed.

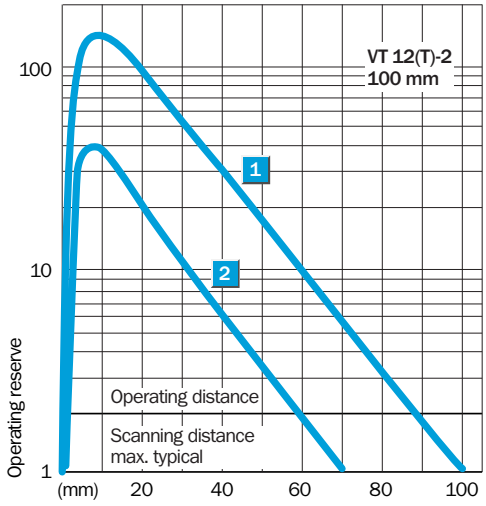
Scanning distance VT 12T-2

Scanning distance 115 mm

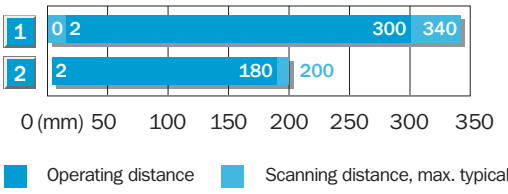


Operating distance Scanning distance, max. typical

1 Scanning distance on white, 90 % remission
2 Scanning distance on grey, 18 % remission

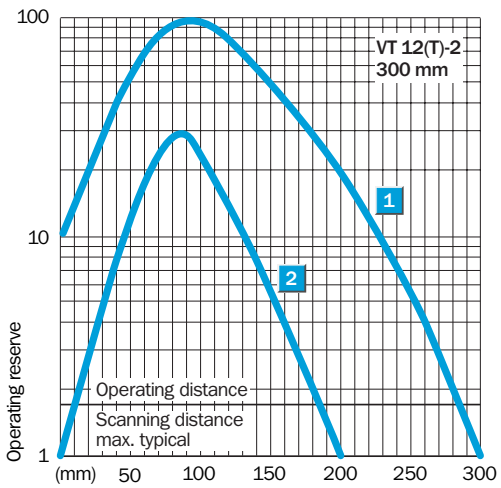


Scanning distance 340 mm

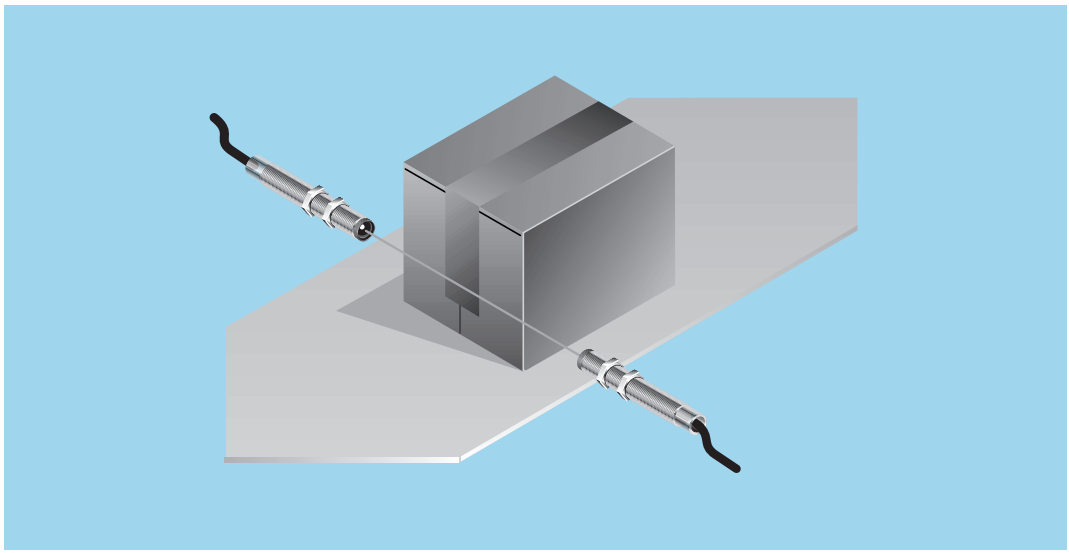


Operating distance Scanning distance, max. typical

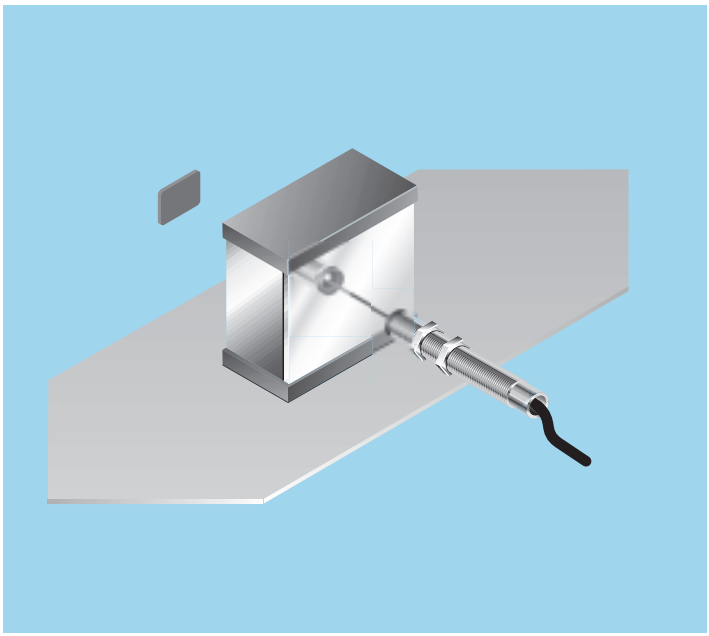
1 Scanning distance on white, 90 % remission
2 Scanning distance on grey, 18 % remission

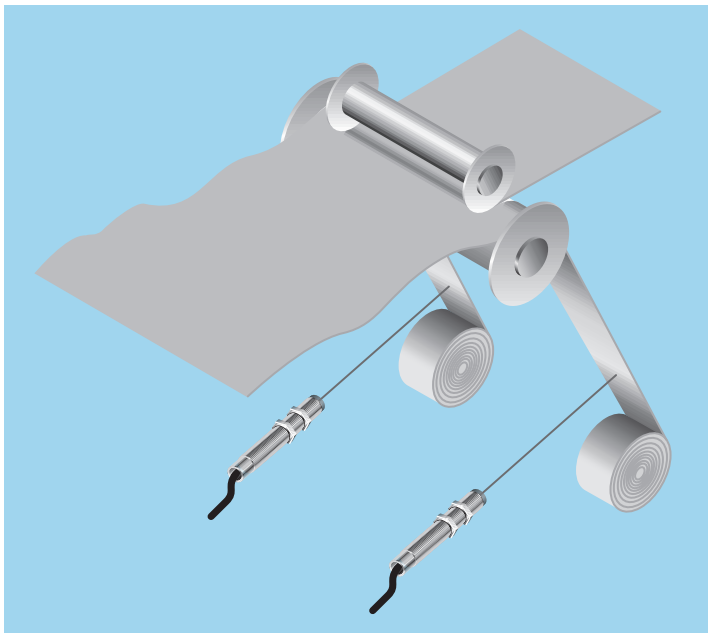


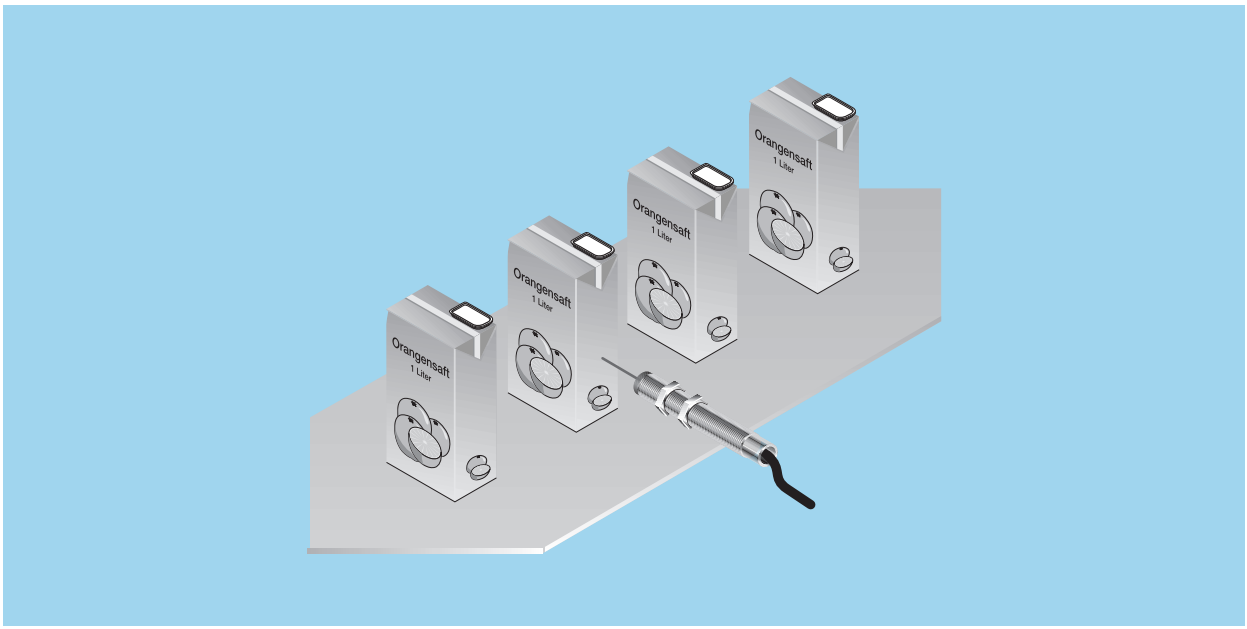
▶ Detecting objects on conveyor belts using VS/VE 12 through-beam photoelectric switches.



▼ VL 12 photoelectric reflex switches can also be used for the reliable detection of reflective surfaces, for example film-wrapped cardboard boxes.







▲ VT 12 photoelectric proximity switches used to ensure that waste is rolled up correctly when paper and film strips are cut.

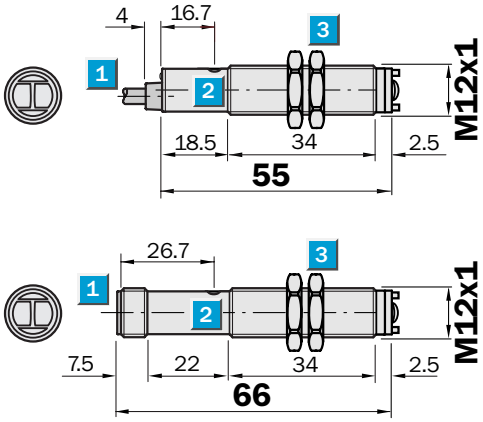
◀ Is an object present or not? The VT 12 photoelectric proximity switch provides the answer.

Scanning range
0.03 ... 2.8 m

Photoelectric reflex switches

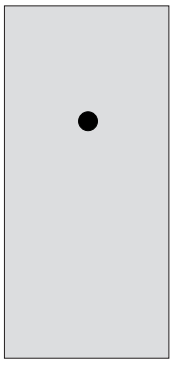
- Switching reliability even with reflecting objects thanks to polarization filter and red light
- Minimum number of variants: Switching type L.ON or D.ON selectable per control line L/D
- Optic pre-failure message via operating reserve display

Dimensional drawing



Adjustments possible

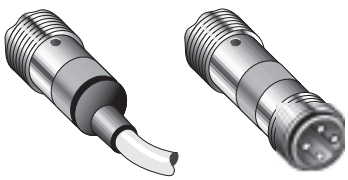
VL 12-2P 132	VL 12-2N 132
VL 12-2P 430	VL 12-2N 430



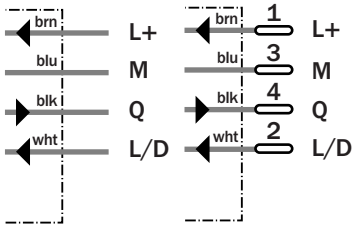
1 Cable or plug M 12, 4-pin
2 Yellow LED indicator:
– lights continuously:
reception signal > reserve factor 2
– blinks: Reception signal < reserve factor 2
but > switching threshold 1
3 Mounting nuts (2x), SW 17, metal

Connection types

VL 12-2P 132	VL 12-2P 430
VL 12-2N 132	VL 12-2N 430



4 x 0.14 mm²	4-pin, M 12

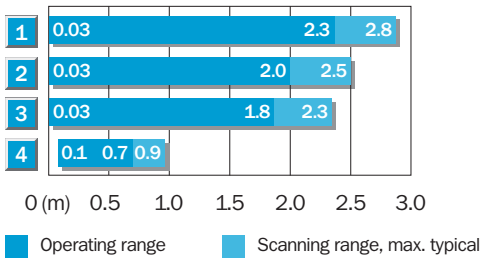


Accessories
Connectors
Mounting systems

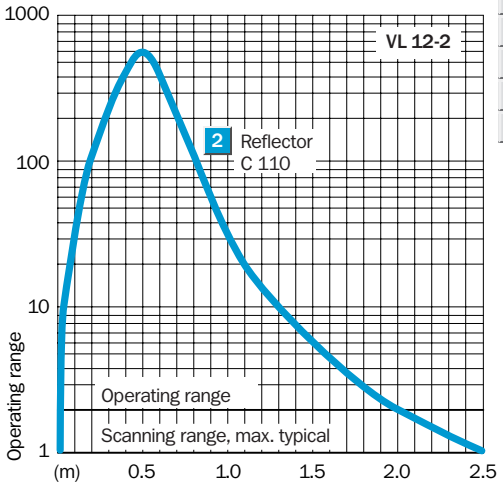
Technical data		VL 12-2	P 132	P 430	N 132	N 430
Scanning range, max. typ./reflector		0.03 ... 2.8 m/PL 80 A	■	■	■	■
Operating range		0.03 ... 2.3 m/PL 80 A	■	■	■	■
Sensitivity setting		Not available	■	■	■	■
Light source [1], light type		LED, red light, with polarization filter	■	■	■	■
Light spot diameter		Approx. 80 mm at 2 m	■	■	■	■
Angle of dispersion of sender		Approx. 2.3° (SR = max.),	■	■	■	■
		Approx. 6.3° (SR = 1/2 max.)	■	■	■	■
Supply voltage V_S		10 ... 30 V DC [2]	■	■	■	■
Ripple [3]		≤ 10 %	■	■	■	■
Current consumption [4]		≤ 20 mA	■	■	■	■
Switching outputs		Q: PNP	■	■		
		Q: NPN			■	■
Output current I_A max.		≤ 100 mA	■	■	■	■
Switching mode		Light-/Dark-switching selectable [5]	■	■	■	■
Response time [6]		≤ 1.25 ms	■	■	■	■
Switching frequency max. [7]		400/s	■	■	■	■
Connection types	Cable [8]	PVC, 2 m, 4 x 0.14 mm², Ø 3.75 mm	■		■	
	Plug	M 12, 4-pin		■		■
VDE protection class [9]		⧈	■	■	■	■
Circuit protection [10]		A, B, C, D	■	■	■	■
Enclosure rating		IP 67	■	■	■	■
Ambient temperature T_A		Operation – 25 °C ... + 70 °C	■	■	■	■
		Storage – 25 °C ... + 70 °C	■	■	■	■
Weight	With cable	Approx. 54 g	■		■	
	With plug	Approx. 18 g		■		■
Housing material	Housing:	Nickel-coated brass/PA	■	■	■	■
	Optics:	PC	■	■	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) L/D switching type control line
L/D = open (not assigned) dark-switching D.ON
L/D = + V_S: light-switching L.ON
L/D = 0 V: dark-switching D.ON
6) Signal transit time with resistive load
7) With light/dark ratio 1:1
8) Do not bend below 0 °C
9) Reference voltage 50 V DC
10) A = V_S connections reverse-polarity protected
B = Inputs and output reverse-polarity protected
C = Interference pulse suppression
D = Outputs overload and short-circuit protected

Scanning range and operating reserve



	Reflector type	Operating range
1	PL 80 A	0.03 ... 2.3 m
2	C 110	0.03 ... 2.0 m
3	PL 50 A/PL 40 A/ P 250	0.03 ... 1.8 m
4	Reflective tape Diamond Grade	0.01 ... 0.7 m



Order information

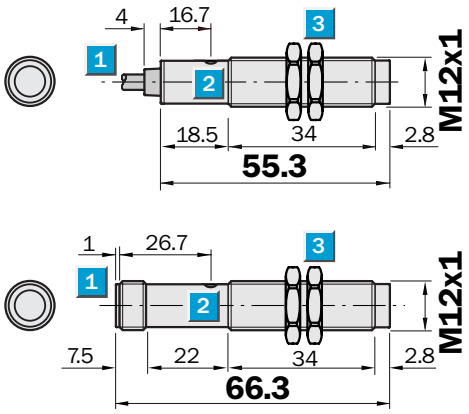
Type	Part no.
VL 12-2P 132	6 026 219
VL 12-2P 430	6 026 220
VL 12-2N 132	6 026 217
VL 12-2N 430	6 026 218

Scanning range
0 ... 5.0 m

Through-beam photoelectric switches

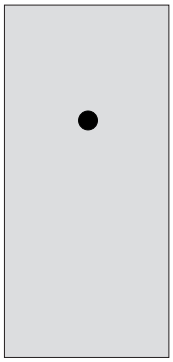
- Minimum number of variants: Switching type L.ON or D.ON selectable per control line L/D
- Sturdy M 12 metal housing, connection cable or M 12 plug, 4-pin

Dimensional drawing



Adjustments possible

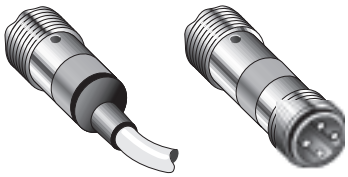
VS/VE 12-2P 132	VS/VE 12-2N 132
VS/VE 12-2P 430	VS/VE 12-2N 430



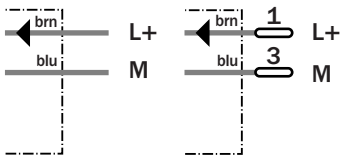
1 Cable or plug M 12, 4-pin
2 Yellow LED indicator (continuously):
Sender VS 12-2:
– power on, sender active
receiver VE 12-2:
– light reception > switching threshold 1
3 Mounting nuts (2x), SW 17, metal

Connection types

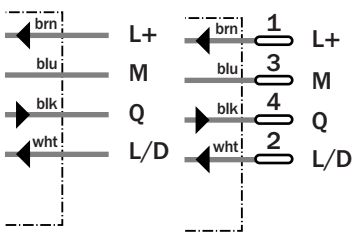
VS/VE 12-2P 132	VS/VE 12-2P 430
VS/VE 12-2N 132	VS/VE 12-2N 430



Sender	2 x 0.14 mm²	4-pin, M 12



Receiver	4 x 0.14 mm²	4-pin, M 12

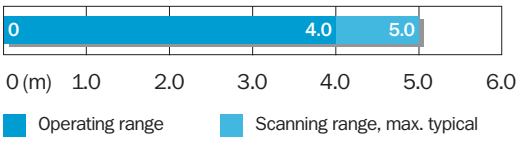


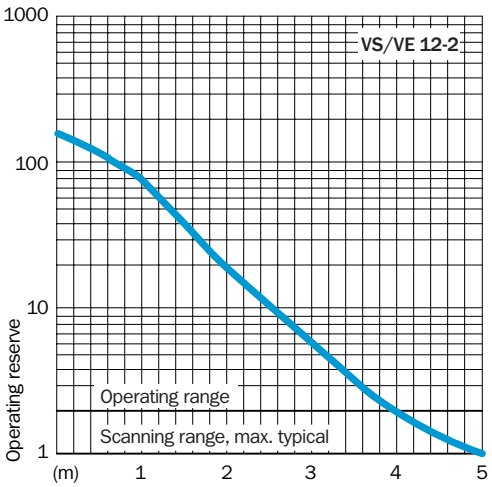
Accessories
Connectors
Mounting systems

Technical data		VS/VE 12-2	P 132	P 430	N 132	N 430
Scanning range, max. typ.		0 ... 5.0 m	■	■	■	■
Operating range		0 ... 4.0 m	■	■	■	■
Sensitivity setting		Not available	■	■	■	■
Light source [1], light type		LED, infrared light	■	■	■	■
Light spot diameter		Approx. 100 mm at 4 m	■	■	■	■
Angle of dispersion of sender		Approx. 1.4° (SR = max.),	■	■	■	■
Angle of dispersion of receiver		Approx. 4.5° (SR = 1/2 max.)	■	■	■	■
Supply voltage V_S		10 ... 30 V DC [2]	■	■	■	■
Ripple [3]		≤ 10 %	■	■	■	■
Current consumption [4]		≤ 20 mA	■	■	■	■
Switching outputs		Q: PNP	■	■		
		Q: NPN			■	■
Output current I_A max.		≤ 100 mA	■	■	■	■
Switching mode		Light-/Dark-switching selectable [5]	■	■	■	■
Response time [6]		≤ 2.0 ms	■	■	■	■
Switching frequency max. [7]		250/s	■	■	■	■
Connection types						
Cable [8] sender VS 12-2		PVC, 2 m, 2 x 0.14 mm², Ø 3.75 mm	■		■	
Cable [8] receiver VE 12-2		PVC, 2 m, 4 x 0.14 mm², Ø 3.75 mm	■		■	
Plug		M 12, 4-pin		■		■
VDE protection class [9]		⧈	■	■	■	■
Circuit protection [10]		A, B, C, D	■	■	■	■
Enclosure rating		IP 67	■	■	■	■
Ambient temperature T_A		Operation – 25 °C ... + 70 °C	■	■	■	■
		Storage – 25 °C ... + 70 °C	■	■	■	■
Weight	With cable	VS and VE each approx. 54 g	■		■	
	With plug	VS and VE each approx. 18 g		■		■
Housing material	Housing:	Nickel-coated brass/PA	■	■	■	■
	Optics:	PC	■	■	■	■

1) Average service life 100,000 h at T_A = + 25 °C
2) Limit values
3) May not exceed or fall short of V_S tolerances
4) Without load
5) L/D switching type control line
L/D = open (not assigned) dark-switching D.ON
L/D = + V_S: light-switching L.ON
L/D = 0 V: dark-switching D.ON
6) Signal transit time with resistive load
7) With light/dark ratio 1:1
8) Do not bend below 0 °C
9) Reference voltage 50 V DC
10) A = V_S connections reverse-polarity protected
B = Inputs and output reverse-polarity protected
C = Interference pulse suppression
D = Outputs overload and short-circuit protected

Scanning range and operating reserve





Order information

Type [11]	Part no. [11]
VS/VE 12-2P 132	6 026 223
VS/VE 12-2P 430	6 026 224
VS/VE 12-2N 132	6 026 221
VS/VE 12-2N 430	6 026 222

11) The part no. contains transmitter and receiver (= pair).

Dimensional drawings and order information

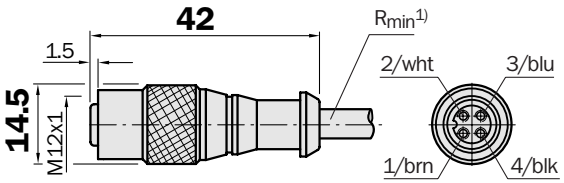
SENSICK screw-in system M 12, 4-pin, enclosure rating IP 67

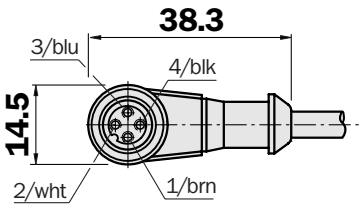
Female connector M 12, 4-pin, straight
Cable diameter 5 mm, 4 x 0.25 mm², sheath PVC

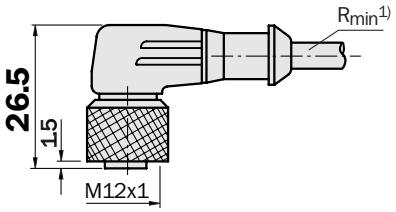
Type	Part no.	Contacts	Cable length
DOL-1204-G02M	6 009 382	4	2 m
DOL-1204-G05M	6 009 866	4	5 m
DOL-1204-G10M	6 010 543	4	10 m
DOL-1204-G15M	6 010 753	4	15 m

Female connector M 12, 4-pin, right angle
Cable diameter 5 mm, 4 x 0.25 mm², sheath PVC

Type	Part no.	Contacts	Cable length
DOL-1204-W02M	6 009 383	4	2 m
DOL-1204-W05M	6 009 867	4	5 m
DOL-1204-W10M	6 010 541	4	10 m







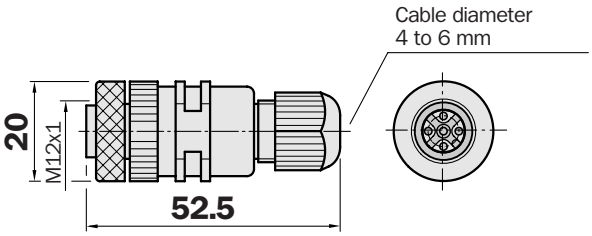
SENSICK screw-in system M 12, 4-pin, enclosure rating IP 67

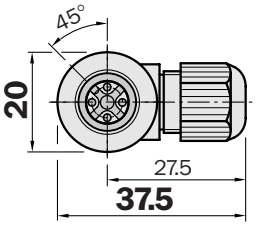
Female connector M 12, 4-pin, straight

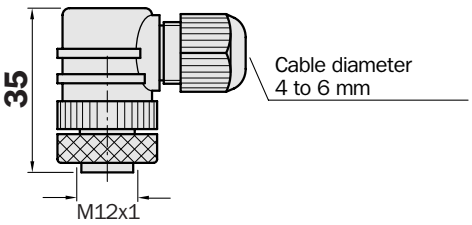
Type	Part no.	Contacts
DOS-1204-G	6 007 302	4

Female connector M 12, 4-pin, right angle

Type	Part no.	Contacts
DOS-1204-W	6 007 303	4





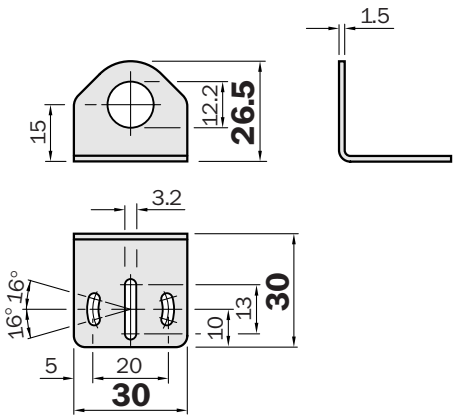


Dimensional drawings and order information

Mounting bracket

Mounting bracket, for V 12

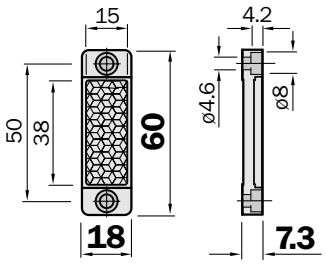
Type	Part no.
BEF-WN-M 12	5 308 447



Plastic design for temperatures up to 65 °C

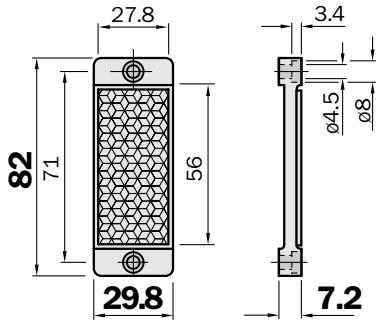
Reflector 20 x 40 mm

Type	Part no.
PL 20 A	1 012 719



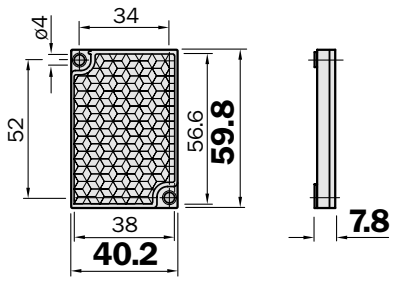
Reflector 30 x 50 mm

Type	Part no.
PL 30 A	1 002 314



Reflector 40 x 60 mm

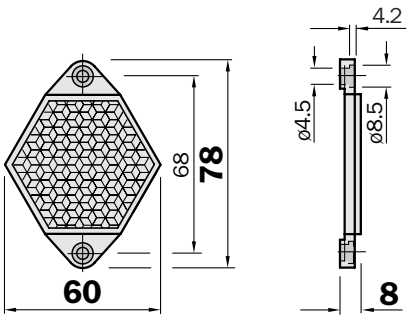
Type	Part no.
PL 40 A	1 012 720



Reflector, 6-sided

Width across flats 48 mm

Type	Part no.
PL 50 A	1 000 132

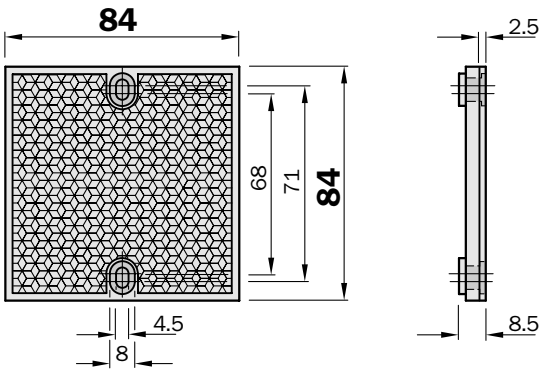


Also available in heatable model:
Permanent heating: PL 50 HK
Part no. 1 001 545
Controlled heating: PL 50 HS,
Part no. 1 009 871

Dimensional drawings and order information

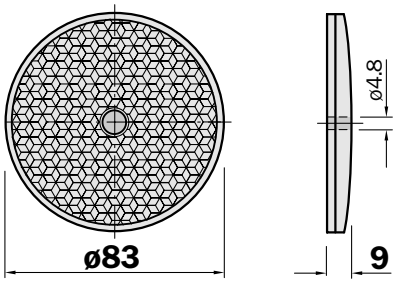
Reflector 80 x 80 mm

Type	Part no.
PL 80 A	1 003 865



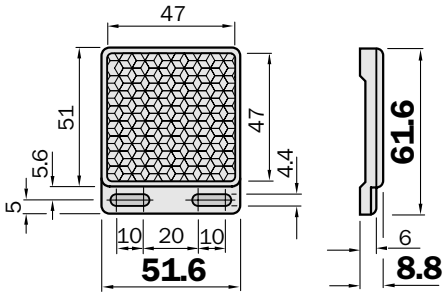
Reflector, diameter 83 mm, centre hole mounting

Type	Part no.
C 110	5 304 549



Reflector

Type	Part no.
P 250	5 304 812



Reflective tape “Diamond Grade”

Type	Part no.	
REF-DG-K	4 019 634	Cut to size
REF-DG	5 304 334	Sheet 749 x 914 mm

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