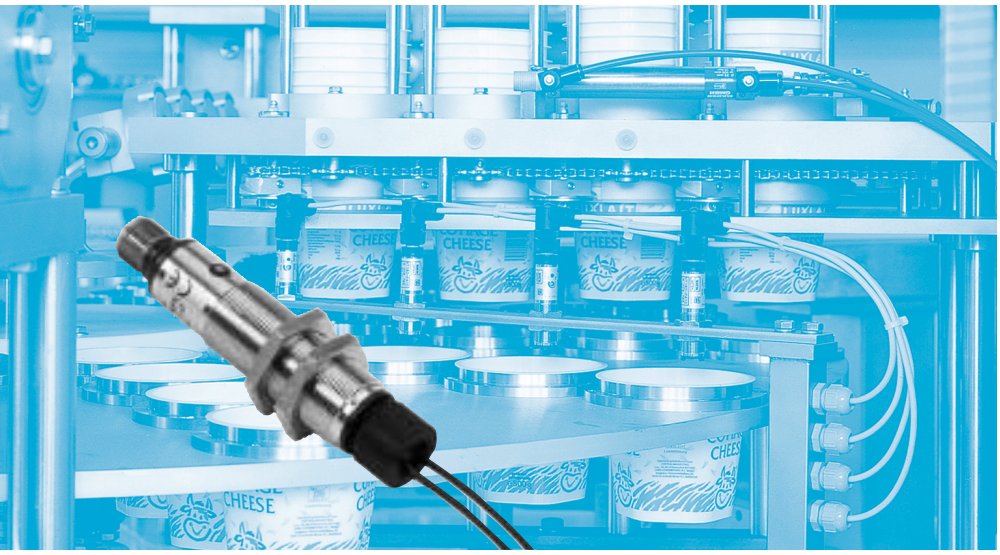
DATA SHEET

VLL 18T; M 18 photoelectric switches, for LL 3 fibre-optic cables: economic, flexible, functional



Photoelectric switches with fibre-optic cable	Proximity mode
Photoelectric switches with fibre-optic cable	Through-beam mode

The VLL 18T photoelectric switches are suitable for our LL 3 series. They provide strong performance and simple handling.

The features in brief:

- Large ranges (throughput system to 200 mm (1000 mm), scanner system 55 mm (90 % remission)),
- simple sensitivity setting,
- flexible, simple and dependable fibre-optic cable adaptation.

A strong team is created with a clever range of fibre-optic cables:

- VLL 18T and LL 3 fibre-optic cable series. Small mounting space, smallest assembly dimensions, flexible positioning, increased temperatures, chemical resistance, etc. – a suitable plastic LL 3 fibre-optic cable is the solution. M 18, compatible housing for many solutions with appropriate basic principles in terms of physics: optoelectronic, inductive, capacitative and magnetic.

A few details about the VLL 18T:

Sensitivity setting

- manual per Teach-in button
- electronic per control input C.

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

Visible red light; 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 VLL 18T system strengths.

Special focal points are applications in the branches:

- Packaging industry,
- semiconductor and electronics assembling,
- assembly and handling technologies,
- special mechanical engineering tasks.

SICK

Scanning range
0 ... 200 mm
(1000 mm)

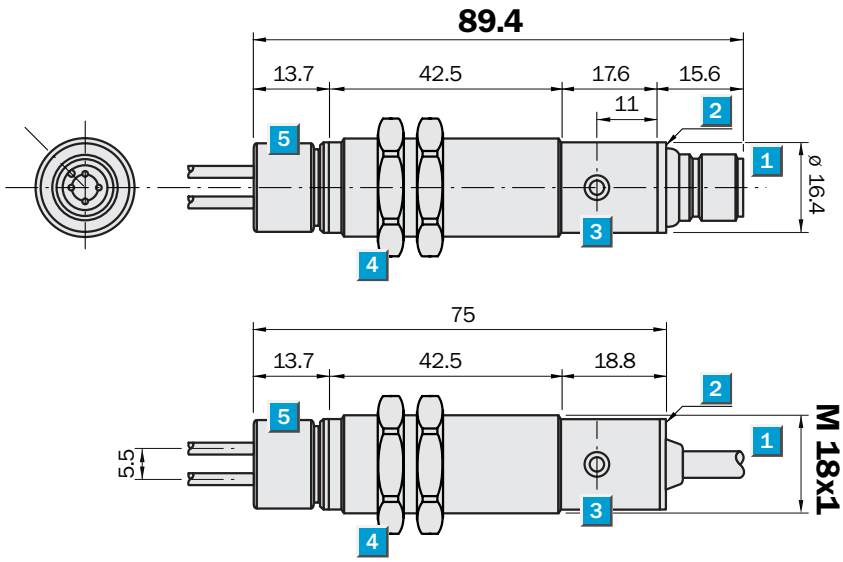
Through-beam system

Scanning distance
0 ... 50 mm

Proximity system

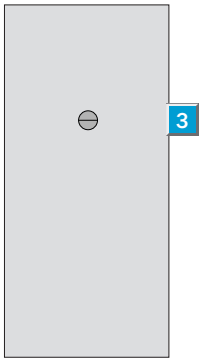
- Appropriate for the LL 3 fibre-optic cable series
- Adjustable sensitivity: per Teach-in at the “push of a button” or per control input C
- Simplest handling

Dimensional drawing



Setting options

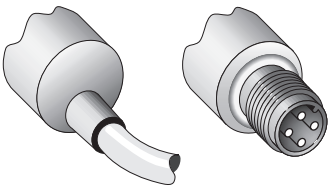
VLL 18T-4P 3212	VLL 18T-4N 3212
VLL 18T-4P 3240	VLL 18T-4N 3240



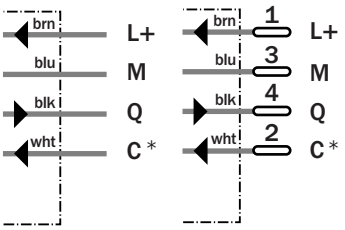
1 Connection cable or plug M 12, 4-pin
2 Yellow LED indicator:
– lights continuously:
reception signal > reserve factor 2
– blinks: reception signal < reserve factor 2
but > switching threshold 1
3 Sensitivity control (Teach-in button)
4 Fastening nuts (2x); SW 24, metal
5 Locking nut, fibre-optic cable mounting:
turn left = unlock; turn right = lock.
Insert LL 3 fibre-optic cable until it catches.
Caution: Only loosen nut; do not remove it.
IP protection only with adapted fibre-optic cable!

Connection types

VLL 18T-4P 3212	VLL 18T-4P 3240
VLL 18T-4N 3212	VLL 18T-4N 3240



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
- LL 3 fibre-optic cables

Technical data		VLL 18T-4	P 3212	P 3240	N 3212	N 3240
Suitable fibre-optic cables		LL3 plastic fibre-optic cable series	■	■	■	■
Scanning ranges SR		Dependent on fibre-optic cable used	■	■	■	■
Recommended operating range		0 ... 200 mm (through-beam system) [1]	■	■	■	■
Recommended operating distance [2]		0 ... 50 mm (proximity system)	■	■	■	■
Sensitivity setting		Manual, per Teach-in button	■	■	■	■
		Electronic, per control input C (0 V) [3]	■	■	■	■
Light source [4], light type		LED, visible red light	■	■	■	■
Light spot diameter LL 3		Dependent on scanning range SR	■	■	■	■
Dispersion angle LL 3 fibre-optic cable		Approx. 65° [5]	■	■	■	■
Supply voltage V_S		10 ... 30 V DC [6]	■	■	■	■
Ripple [7]		≤ 10 %	■	■	■	■
Current consumption [8]		≤ 20 mA	■	■	■	■
Switching outputs		Q: PNP	■	■		
		Q: NPN			■	■
Output current I_A max.		≤ 100 mA	■	■	■	■
Switching mode [3]		Light-/dark-switching, selectable	■	■	■	■
Response time [9]		≤ 625 µs	■	■	■	■
Switching frequency max. [10]		800/s	■	■	■	■
Connection type	cable [11]	PVC, 2 m, 4 x 0.34 mm², Ø 4.7 mm	■		■	
	plug	M 12, 4-pin		■		■
VDE protection class [12]		⧈	■	■	■	■
Enclosure rating [13]		IP 67	■	■	■	■
Circuit protection [14]		A, B, C, D	■	■	■	■
Ambient temperature T_A		Operation –25 °C ... +70 °C	■	■	■	■
		Storage –25 °C ... +70 °C	■	■	■	■
Weight	with cable	Approx. 140 g	■		■	
	with plug	Approx. 65 g		■		■
Housing material		Nickel-plated brass/PBT	■	■	■	■

1) With front lenses 0 ... 2000 mm
2) Object with 90 % remission (based on standard white to DIN 5033); 100 x 100 mm
3) 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
4) Average service life 100.000 h at T_A = +25 °C
5) See LL 3 data for deviations
6) Limit values
7) May not exceed or fall short of V_S tolerances
8) Without load
9) With resistive load
10) With light/dark ratio 1:1
11) Do not bend below 0 °C
12) Reference voltage 50 V
13) Only with correct adaptation of the LL 3 fibre-optic cable
14) A = V_S connections reverse-polarity protected
B = Inputs and outputs reverse-polarity protected
C = Interference pulse suppression
D = Outputs overcurrent and short-circuit protected

See the specifications for the LL 3 fibre-optic cable series for ranges and scanning distances (from page 5)

Order information

Type	Part no.
VLL 18T-4P 3212	6 026 482
VLL 18T-4P 3240	6 026 483
VLL 18T-4N 3212	6 026 480
VLL 18T-4N 3240	6 026 481

Sensitivity setting per Teach-in function

Programming

- **Programming optionally**
  – manually per Teach-in button or
  – electronically per control input C
- **Very simple programming:**
  – Through-beam system: always position transmitter and reception fibres across from one another.
  – Proximity system: 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

– Through-beam system: always position transmitter and reception fibres across from one another.

– Proximity system: Always position the scanning object at the target position in the light path.

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.

Sensitivity setting 2, applications: precise switching point (reduced light reception with Teach-in)

Proximity system

- **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.

Through-beam system

- **For transparent objects**
- **For small objects (< fibre-optic cable diameter)**
- **For positioning tasks**

LL 3
Plastic Fibre-Optic Cables – Flexible in Every Sense of the Word

	Fibre-optic cable through-beam systems
	Fibre-optic cable proximity systems

No assembly space – not even for miniature photoelectric cables, chemical corrosion or increased ambient temperatures are often decisive reasons for the use of LL 3 plastic fibre-optic cables. In connection with the photoelectric switch series WLL 160(T), LL 3 cables enable reliable object detection even under difficult conditions.

Their multifaceted flexibility says a lot about the LL 3: small bending radii, simple shortening to the required length and different terminal sleeves make it possible to connect and lay them easily.

Their great variety is another factor: a total of approximately 50 different models of the LL 3 provide optimum alternatives for almost all applications from optical, mechanical and chemical standpoints. Various tip adapters make additional applications possible. The LL 3 fibre-optic cables and the corresponding photoelectric fibre-optic switches from SICK create a strong team. They are especially useful in the semi-conductor, electronics assembly, packaging, handling and assembly systems, special mechanical engineering and precision engineering.

LL 3 options:
- Standard fibre-optic cables
- Large scanning ranges
- Tip adapters
- Small terminal sleeves
- Highly flexible with the smallest bending radii
- Integrated 90° offset
- Temperature resistant to 180 °C
- Teflon coating against aggressive environments
- Coaxial structure
- Pliable terminal sleeves
- 10 m length
- Fibre-optic lines
- Level switch ...

Flow diagrams of fibre-optic cable selection

Through-beam systems

Standard

- Standard — M4 — LL3-TB02
- Standard, large range — ø 3 — LL3-TS07
- Fibre length 10 m
  - Standard, large range — M4 — LL3-TB01
  - Standard, L = 10 m — M4 — LL3-TB01-10
  - Flexible end sleeve, ideal for inaccessible objects — M4 — LL3-TB03

Thin, short end sleeve

- Compact end sleeve — ø 2 — M3 — LL3-TM02
- Thinnest, shortest end sleeve — ø 1.5 — LL3-TM03
- Compact, large range — M3 — LL3-TM01
- Compact head, thin end tip — ø 0,5 — ø 3 — LL3-TT01

Highly flexible fibre-optic cable, small bending radius R4, for moving mechanical systems

- Flexible, standard, large range — M4 — R4 — LL3-TR01
- Flexible, smallest end sleeve — M3 — R4 — LL3-TR02
- Flexible, thinnest end sleeve — ø 1.5 — R4 — LL3-TR03 / LL3-TR03-2
- 90°, smallest sleeve — ø 1 — ø 2.5 — R4 — LL3-TV02

Integrated 90° offset, smallest installation depth

- 90° offset — ø 3 — LL3-TS08
- 90° offset — ø 3 — LL3-TV01
- 90°, smallest sleeve — ø 1 — ø 2.5 — R4 — LL3-TV02
- 90°, smallest sleeve — M3 — LL3-TV04
- 90°, large range, simple mounting — LL3-TS12

Special applications:

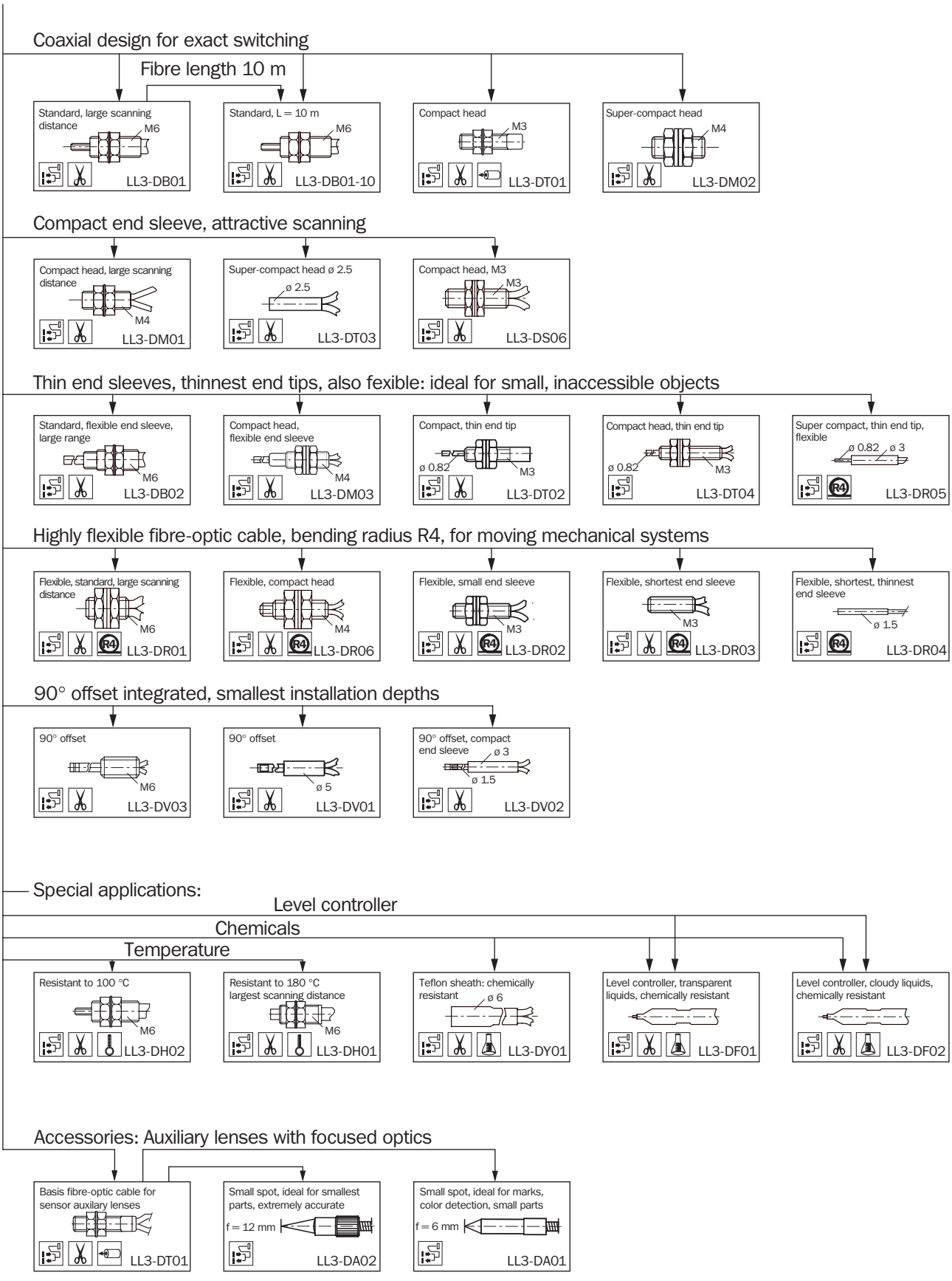
- Temperature
  - Resistant to 100 °C — M4 — LL3-TH01
  - Resistant to 180 °C, large ranges — LL3-TH02
- Chemicals
  - Teflon sheath: chemically resistant — ø 6 — LL3-TY01
  - Teflon sheath, 90° offset — ø 6 — LL3-TY02
- Fibre-optic cable line — LL3-TS10

Accessories: Auxiliary lenses, large ranges (max. 3200 mm), 90° offset

- Suitable basic fibre-optic cable LL3
  - LL3-TB02
  - LL3-TB01
  - LL3-TB01-10
  - LL3-TR01
  - LL3-TH01
- Large ranges — LL3-TA01
- 90° offset, smallest installation depth, large range — LL3-TA02

Flow diagrams of fibre-optic cable selection

Proximity systems



Fibre-optic cable through-beam system

Characteristics

- Highly flexible
- Small bending radii
- Fibre-optic cables can be shortened easily with cuting device (supplied with equipment)
- Ambient temperature –40...+70 °C Special models to 180 °C

Selection table: sensors, fibre-optic cables, scanning ranges

Through-beam systems

Scanning ranges SR[1] and minimum object diameter MD[6] in mm in connection with VLL 18T

LL 3 Fibre-optic cables				VLL 18T Red light	
Description	**Bend radius mm**	**Type**	**Part no.**	SR	MD
Standard, M 4	25	LL 3-TB02	5 308 048	120/1100 [2]	0.2
Standard, Ø 3 mm, large scanning range	35	LL 3-TS07	5 308 049	200	0.5
Standard, M 4, large scanning range	25	LL 3-TB01	5 308 050	200/850 [2]	0.5
Standard, M 4, length 10 m	25	LL 3-TB01-10	5 308 051	250/450 [2]	0.5
Highly flexible, M 4, large scanning range	4	LL 3-TR01	5 308 052	100/850 [2]	0.3
Highly flexible, M 3	4	LL 3-TR02	5 308 053	25	0.1
Small sleeve, Ø 1.5 mm, highly flexible, length 1 m	4	LL 3-TR03	5 308 054	25	0.1
Small sleeve, Ø 1.5 mm, highly flexible, length 2 m	4	LL 3-TR03-2	5 308 055	25	0.1
Flexible terminal sleeve, M 4	25/10[3]	LL 3-TB03	5 308 056	120	0.2
Compact, M 3, terminal piece 1.0 m	15	LL 3-TT01	5 308 057	●	0.1
90° offset, standard, Ø 3 mm	25	LL 3-TV01	5 308 058	70	0.2
90° offset, compact, Ø 2.5 mm	15	LL 3-TV02	5 308 059	20	0.1
90° offset, compact, M 3	15	LL 3-TV04	5 308 060	20	0.1
90° offset, standard, Ø 3 mm	25	LL 3-TS08	5 308 061	85	0.2
90° offset, large scanning range	25	LL 3-TS12	5 308 062	350	0.5
Fibre-optic line	25	LL 3-TS10	5 308 063	100	0.1
Temperature resistant, M 4	25	LL 3-TH01[4]	5 308 064	80/850 [2]	0.2
Temperature resistant to 180 °C, M 4	30	LL 3-TH02[5]	5 308 065	170	0.5
Teflon coating, Ø 6.0 mm, chemically resistant	40	LL 3-TY01	5 308 066	350	0.3
Teflon coating, Ø 6.0 mm, chemically resistant, 90° offset	40	LL 3-TY02	5 308 067	120	0.3
Small terminal sleeve, M 3, large scanning range	25	LL 3-TM01	5 308 068	120	0.2
Small terminal sleeve, M 3	15	LL 3-TM02	5 308 069	30	0.1
Small terminal sleeve, Ø 1.5 mm	15	LL 3-TM03	5 308 070	30	0.1

[1] Fibre-optic cable not shortened
[2] With front lenses for LL 3, also see front lenses for LL 3
[3] Bend radius of the flexible terminal sleeve
[4] Ambient operating temperature –40 ... +100 °C
[5] Ambient operating temperature –40 ... +180 °C
[6] Minimum object diameter: scanning range reduction!

Fibre-optic cable diameter 1.0 mm and 1.3 mm:
Adapter sleeves supplied in shipment for Ø 2.2 mm.
Spare Parts:
Ø 1.0 mm: BEF-LL3-10/5 305 479
Ø 1.3 mm: BEF-LL3-13/5 306 094

● not available

Fibre-optic cable proximity system

Characteristics

- Highly flexible
- Small bending radii
- Fibre-optic cables can be shortened easily with cuting device (supplied with equipment)
- Operation temperature –40 … +70 °C Special models to 180 °C

Selection table: sensors, fibre-optic cables, scanning distances

Proximity systems

Scanning distances SD[1] and minimum object diameter MD[7] in mm in connection with VLL 18T

LL 3 Fibre-optic cables				VLL 18T Red light	
Description	Bend radius mm	Type	Part no.	SD	MD
Compact sleeve, M 4, large scanning distance	25	LL 3-DM01	5 308 071	50	0.015
Super compact sleeve, Ø 2.5 mm	15	LL 3-DT03	5 308 072	15	0.015
Super compact, sleeve M 3	10	LL 3-DS06	5 308 073	15	0.015
Large scanning distance, M 6, coaxial fibre-optic cable	25	LL 3-DB01	5 308 074	50	0.015
Length 10 m, M 6, coaxial fibre-optic cable	25	LL 3-DB01-10	5 308 075	25	0.015
For tip adapters, M 3	15	LL 3-DT01	5 308 076	20/12 [2]	0.015
Thin, short sleeve, M 4, coaxial fibre-optic cable	25	LL 3-DM02	5 308 077	20	0.015
Highly flexible, M 6, large scanning distance	4	LL 3-DR01	5 308 078	45	0.015
Highly flexible, small sleeve, M 3	4	LL 3-DR02	5 308 079	●	●
Highly flexible, Ø 3 mm, thin sleeve	4	LL 3-DR03	5 308 080	13	0.015
Highly flexible, Ø 1.5 mm, thin sleeve	4	LL 3-DR04[4]	5 308 081	●	●
Highly flexible, M 4, compact sleeve	4	LL 3-DR06	5 308 082	13	0.015
Flexible sleeve, M 6, large scanning distance	25/10[3]	LL 3-DB02	5 308 083	50	0.015
Flexible sleeve, M 4	25/10[3]	LL 3-DM03	5 308 084	15	0.015
Thin, long terminal tip, M 3	15	LL 3-DT02	5 308 085	●	●
Thin, long terminal tip, M 3, coaxial fibre-optic cable	15	LL 3-DT04[4]	5 308 086	●	●
Ø 3.0 mm, thin terminal tip, Ø 0.82 mm	4	LL 3-DR05[4]	5 308 087	●	●
90° offset, Ø 5.0 mm	25	LL 3-DV01	5 308 088	25	0.025
90° offset, small sleeve, Ø 3.0 mm	15	LL 3-DV02	5 308 089	●	●
90° offset, M 6	25	LL 3-DV03	5 308 090	25	0.025
Temp. resist. to 180 °C, M 6, large scanning distance	30	LL 3-DH01[5]	5 308 091	65	0.015
Temperature resistant to 100 °C, M 6	25	LL 3-DH02[6]	5 308 092	35	0.015
Teflon coating, chemically resistant, Ø 6.0 mm	40	LL 3-DY01	5 308 093	30	0.02
Level switch, clear liquid, Ø 6.0 mm	50	LL 3-DF01	5 308 094	●	●
Level switch, cloudy liquid, Ø 6.0 mm	50	LL 3-DF02	5 308 095	●	●

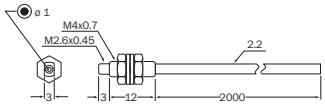
[1] With reference to white scanned object, 90 % remission, minimum object diameter = light size (opening angle LL: approx. 65°) fibre-optic cable not shortened
[2] With proximity front lens for LL 3, see front lenses for LL 3
[3] Bend radius of the flexible terminal sleeve
[4] Cannot be shortened
[5] Ambient operating temperature –40 ... +180 °C
[6] Ambient operating temperature –40 ... +100 °C
[7] Minimum object diameter: scanning distance reduction!

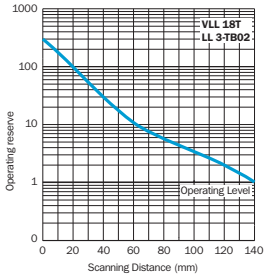
Fibre-optic cable diameter 1.0 mm and 1.3 mm:
Adapter sleeves supplied in shipment for Ø 2.2 mm.
Spare Parts:
Ø 1.0 mm: BEF-LL3-10/5 305 479
Ø 1.3 mm: BEF-LL3-13/5 306 094

● not available

Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – through-beam systems

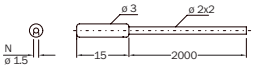
Order information	
Type	**Part no.**
LL 3-TB02	5 308 048





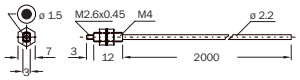
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TS07	5 308 049



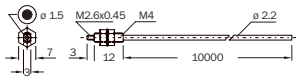
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TB01	5 308 050



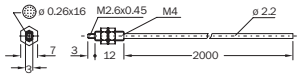
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TB01-10	5 308 051



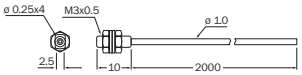
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TR01	5 308 052



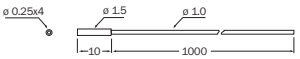
Material: Core: PMMA, Sheath: PE;
Sleeve: CuZn, nickel-plated brass

Order information	
Type	**Part no.**
LL 3-TR02	5 308 053



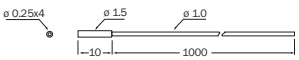
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TR03	5 308 054



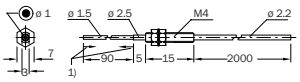
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TR03-2	5 308 055



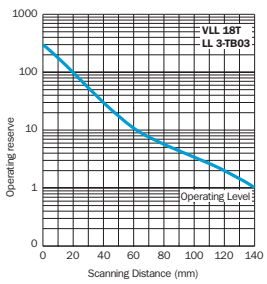
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TB03	5 308 056

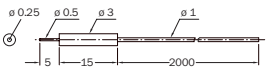


[1] Flexible end sleeve, do not bend in this area (10 mm), radius of curvature R10

Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

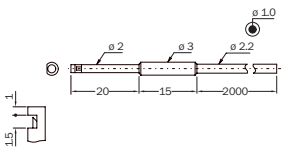


Order information	
Type	**Part no.**
LL 3-TT01	5 308 057



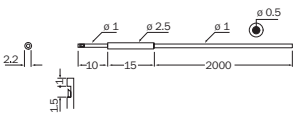
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TV01	5 308 058



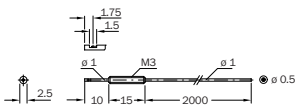
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TV02	5 308 059



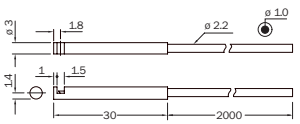
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TV04	5 308 060



Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

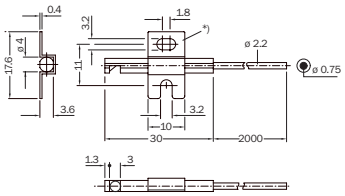
Order information	
Type	**Part no.**
LL 3-TS08	5 308 061



Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

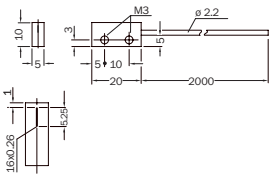
Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – through-beam systems

Order information	
Type	**Part no.**
LL 3-TS12	5 308 062



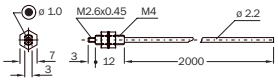
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids
*) Mounting bracket (enclosed unattached)

Order information	
Type	**Part no.**
LL 3-TS10	5 308 063



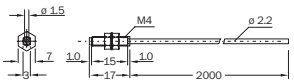
Material: Core: PMMA, Sheath: PE;
Sleeve: CuZn, nickel-plated brass

Order information	
Type	**Part no.**
LL 3-TH01	5 308 064



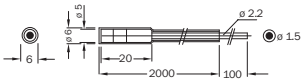
Material: Core: PC; Sheath: PE;
Sleeve: CuZn, nickel-plated brass

Order information	
Type	**Part no.**
LL 3-TH02	5 308 065



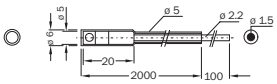
Material: Core: HPOF, Sheath: FEP;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-TY01	5 308 066



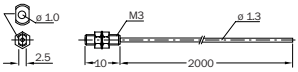
Material: Core: PMMA; Sheath: Teflon;
Sleeve: Teflon

Order information	
Type	**Part no.**
LL 3-TY02	5 308 067

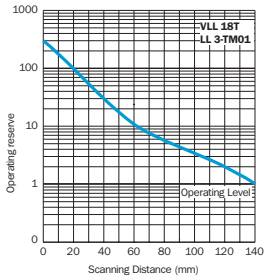


Material: Core: PMMA; Sheath: Teflon;
Sleeve: Teflon

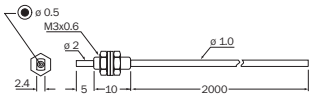
Order information	
Type	**Part no.**
LL 3-TM01	5 308 068



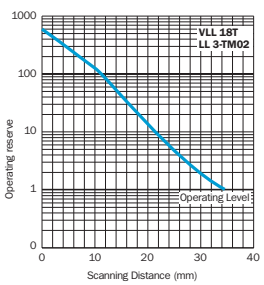
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids



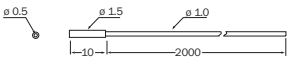
Order information	
Type	**Part no.**
LL 3-TM02	5 308 069



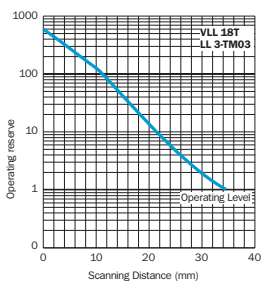
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids



Order information	
Type	**Part no.**
LL 3-TM03	5 308 070



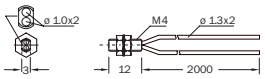
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

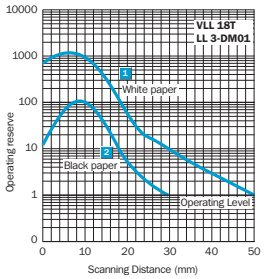


Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – proximity systems

Order information

Type	Part no.
LL 3-DM01	5 308 071

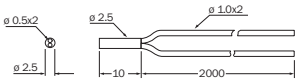


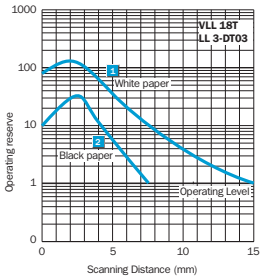


Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

Type	Part no.
LL 3-DT03	5 308 072

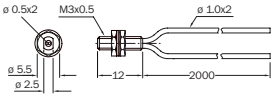


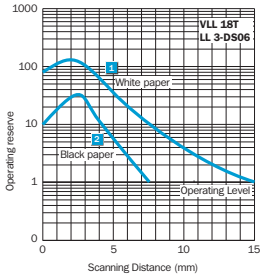


Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

Type	Part no.
LL 3-DS06	5 308 073

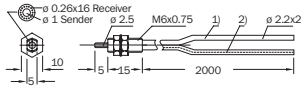




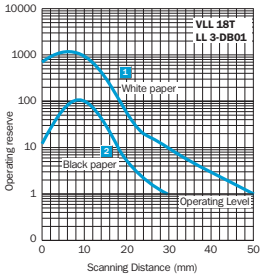
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

Type	Part no.
LL 3-DB01	5 308 074



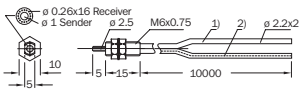
1) Sender
2) Receiver



Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

Type	Part no.
LL 3-DB01-10	5 308 075

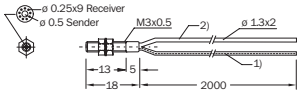


1) Sender
2) Receiver

Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

Type	Part no.
LL 3-DT01	5 308 076

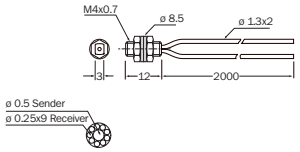


1) Sender
2) Receiver

Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

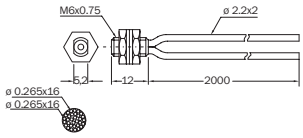
Type	Part no.
LL 3-DM02	5 308 077



Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

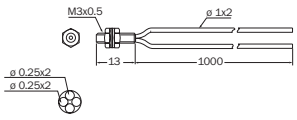
Type	Part no.
LL 3-DR01	5 308 078



Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

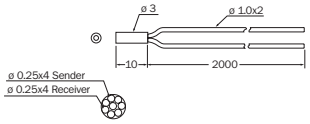
Type	Part no.
LL 3-DR02	5 308 079



Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

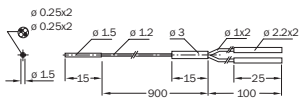
Type	Part no.
LL 3-DR03	5 308 080



Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information

Type	Part no.
LL 3-DR04	5 308 081



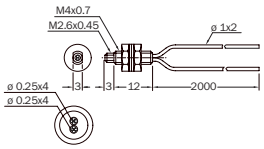
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

1 With reference to white scanning object, 90 % remission
2 With reference to grey scanning object, 18 % remission

Minimum object diameter = light spot diameter
(LL acceptance angle: approx. 65°) fibre-optic cable not shortened

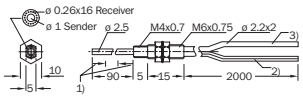
Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – proximity systems

Order information	
Type	**Part no.**
LL 3-DR06	5 308 082



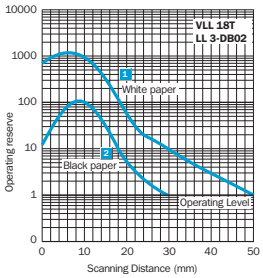
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-DB02	5 308 083

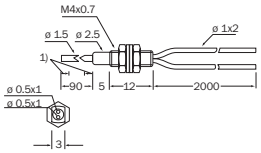


1) Flexible end sleeve, do not bend in this region (10 mm), bend radius R10
2) Sender (marked in blue)
3) Receiver

Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

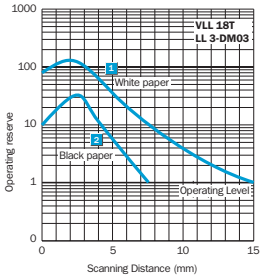


Order information	
Type	**Part no.**
LL 3-DM03	5 308 084

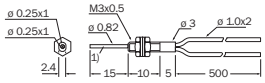


1) Flexible end sleeve, do not bend in this region (10 mm), bend radius R10

Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids



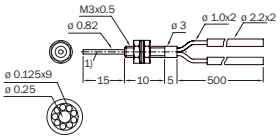
Order information	
Type	**Part no.**
LL 3-DT02	5 308 085



1) End sleeve cannot be bent

Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

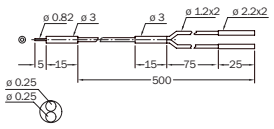
Order information	
Type	**Part no.**
LL 3-DT04	5 308 086



1) End sleeve cannot be bent

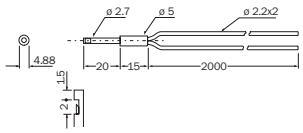
Material: Core: PMMA, Sheath: PE;
Sleeve: CuZn, nickel-plated brass

Order information	
Type	**Part no.**
LL 3-DR05	5 308 087



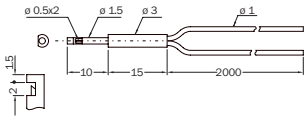
Material: Core: PMMA, Sheath: PE;
Sleeve: CuZn, nickel-plated brass

Order information	
Type	**Part no.**
LL 3-DV01	5 308 088



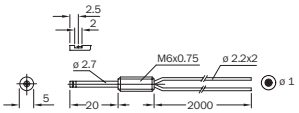
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-DV02	5 308 089



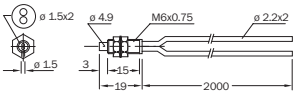
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-DV03	5 308 090



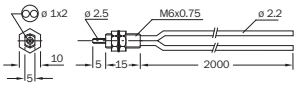
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-DH01	5 308 091



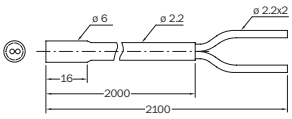
Material: Core: FEPH; Sheath: HPOF;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-DH02	5 308 092



Material: Core: PC; Sheath: PVC;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

Order information	
Type	**Part no.**
LL 3-DY01	5 308 093



Material: Core: PMMA, Sheath: Teflon
Sleeve: Teflon

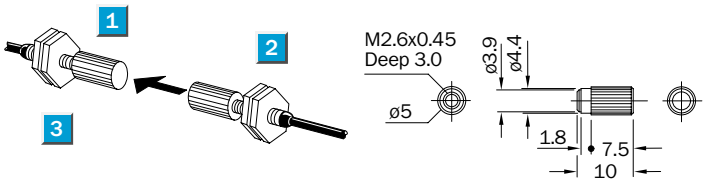
1 With reference to white scanning object, 90 % remission
2 With reference to grey scanning object, 18 % remission

Minimum object diameter = light spot diameter
(LL acceptance angle: approx. 65°) fibre-optic cable not shortened

Front lenses for through-beam systems

Long ranges

1 Light spot diameter: approx. 170 mm at 1000 mm
2 Aperture approx. 15°
3 Material: CuZn (nickel-plated)/glass



Order information	
Type	**Part no.**
LL 3-TA01	5 308 128

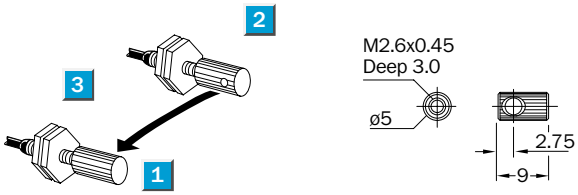
Front lenses appropriate for following LL 3:

Operating ranges with front lens LL 3-TA01 [1]		
LL 3-TB02	5 308 048	1100 mm
LL 3-TB01	5 308 050	850 mm
LL 3-TB01-10	5 308 051	450 mm
LL 3-TR01	5 308 052	850 mm
LL 3-TH01	5 308 064	850 mm

Front lenses for through-beam systems

Compact 90° offset

1 Light spot diameter: X-axis approx. 110 mm
Y-axis: approx. 170 mm, for 200 mm range in each case
2 Aperture, X-axis approx. 30°, Y-axis: approx. 40°
3 Material: CuZn (nickel-plated)/glass



Order information	
Type	**Part no.**
LL 3-TA02	5 308 129

Front lenses appropriate for following LL 3:

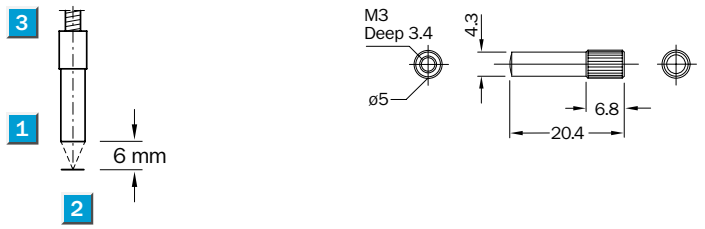
Operating ranges with front lens LL 3-TA02 [1]		
LL 3-TB02	5 308 048	170 mm
LL 3-TB01	5 308 050	200 mm
LL 3-TB01-10	5 308 051	100 mm
LL 3-TR01	5 308 052	110 mm
LL 3-TH01	5 308 064	110 mm

[1] Fibre-optic cable not shortened, scanner fibre-optic cable: Material to be scanned with 90 % remission (according to DIN 5033)

Front lenses for proximity systems

For detection of very small parts
Focused, very small light spot diameter
High sensitivity (6 % remission)
For suppressing interference – causing backgrounds

1 Light spot diameter: approx. 0.25 mm at the focal point = 6 mm
2 Aperture: focus = 6 mm
3 Material: Al (aluminium)/glass



Order information	
Type	**Part no.**
LL 3-DA01	5 308 127

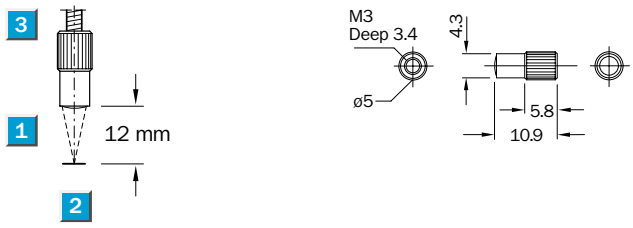
Front lenses appropriate for following LL 3:

Operating distances with front lens LL 3-DA01 [1]		
LL 3-DT01	5 308 076	6 ± 1 mm [2]

Front lenses for proximity systems

Suitable as a “mark sensor” for colour marks
Focused, very small light spot diameter
High sensitivity (6 % remission)
For suppressing interference – causing backgrounds

1 Light spot diameter: approx. 3 mm at the focal point = 12 mm
2 Aperture: focus = 12 mm
3 Material: Al (aluminium)/glass



Order information	
Type	**Part no.**
LL 3-DA02	5 308 130

Front lenses appropriate for following LL 3:

Operating distances with front lens LL 3-DA02 [1]		
LL 3-DT01	5 308 076	12 ± 1 mm [3]

[1] Fibre-optic cable not shortened, scanner fibre-optic cable: Material to be scanned with 90 % remission (according to DIN 5033)
[2] Light spot diameter 0.25 mm focused at 6 mm
[3] Light spot diameter 3 mm focused at 12 mm

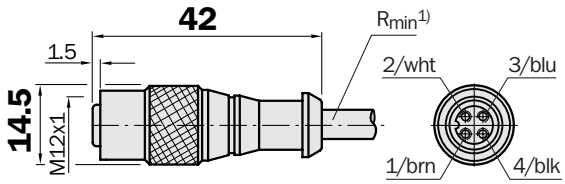
Dimensional drawings and order information

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

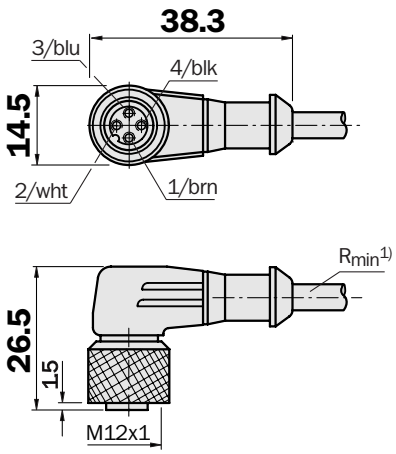
Type	Part no.	Contacts	Cable length
DOL-1204-G02M	6 009 382	4	2 m
DOL-1204-G05M	6 009 866	4	5 m
DOL-1204-G10M	6 010 543	4	10 m
DOL-1204-G15M	6 010 753	4	15 m



Female connector M 12, 4-pin, right angle

Cable diameter 5 mm, 4 x 0.25 mm², sheath PVC

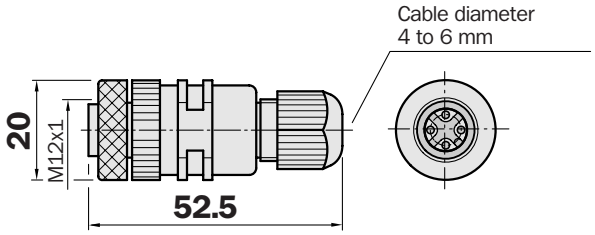
Type	Part no.	Contacts	Cable length
DOL-1204-W02M	6 009 383	4	2 m
DOL-1204-W05M	6 009 867	4	5 m
DOL-1204-W10M	6 010 541	4	10 m



1) Minimum bend radius in dynamic use
R_{min} = 20 x cable diameter

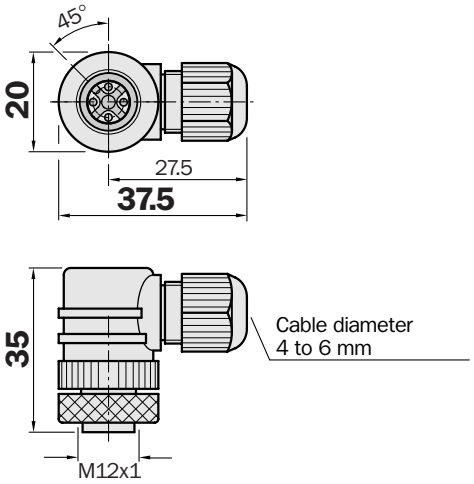
Female connector M 12, 4-pin, straight

Type	Part no.	Contacts	
DOS-1204-G	6 007 302	4	Can be adapted for cables Ø 4.5 to 6.5 mm



Female connector M 12, 4-pin, right angle

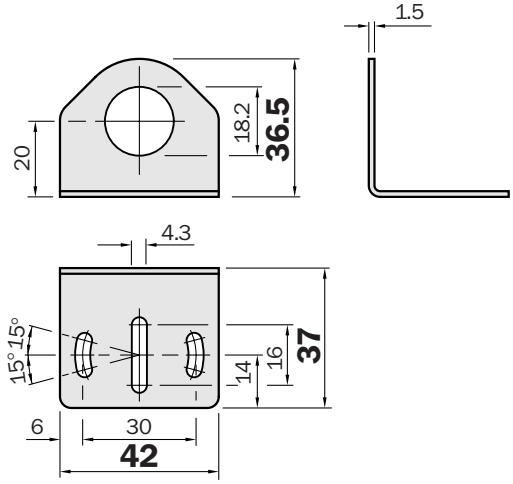
Type	Part no.	Contacts	
DOS-1204-W	6 007 303	4	Can be adapted for cables Ø 4.5 to 6.5 mm



Mounting bracket

Order information

Type	Part no.
BEF-WN-M 18	5 308 446



Cutter FC for fibre-optic cables

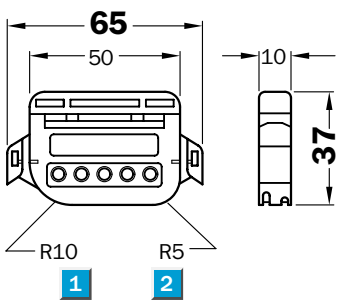
Order information

Type	Part no.
FC	5 304 141

The cutting device is supplied with the LL 3. Follow operating instructions in the packaging.

1 Template for bend radius R 10 mm, for sensing tip Ø 1.5 mm and Ø 2.5 mm

2 Bend radius R 5 mm



GB 9.01 TB/BK

Your contacts:

Australia
Phone +61 3 94 97 41 00
008 33 48 02 – toll free
Fax +61 3 94 97 11 87

Austria
Phone +43 2 23 66 22 88-0
Fax +43 2 23 66 22 88-5

Belgium/Luxembourg
Phone +32 24 66 55 66
Fax +32 24 63 31 04

Brazil
Phone +55 11 55 61 26 83
Fax +55 11 55 35 41 53

China
Phone +8 52 27 63 69 66
Fax +8 52 27 63 63 11

Czech Republik
Phone +42 02 578 10 561
Fax +42 02 578 10 559

Denmark
Phone +45 45 82 64 00
Fax +45 45 82 64 01

Finland
Phone +3 58 9-728 85 00
Fax +3 58 9-72 88 50 55

France
Phone +33 1 64 62 35 00
Fax +33 1 64 62 35 77

Germany
Phone +49 2 11 53 01 0
Fax +49 2 11 53 01 100

Great Britain
Phone +44 17 27-83 11 21
Fax +44 17 27-85 67 67

Italy
Phone +39 02 92 14 20 62
Fax +39 02 92 14 20 67

Japan
Phone +813 33 58 13 41
Fax +813 33 58 05 86

Korea
Tel. +82 27 86 63 21/4
Fax +82 27 86 63 25

Netherlands
Phone +31 30 229 25 44
Fax +31 30 229 39 94

Norway
Phone +47 67 56 75 00
Fax +47 67 56 66 10

Poland
Phone +48 22 8 37 40 50
Fax +48 22 8 37 43 88

Singapore
Phone +65 67 44 37 32
Fax +65 68 41 77 47

Spain
Phone +34 93 4 80 31 00
Fax +34 93 4 73 44 69

Sweden
Phone +46 8 6 80 64 50
Fax +46 8 7 10 18 75

Switzerland
Phone +41 4 16 19 29 39
Fax +41 4 16 19 29 21

Taiwan
Phone +88 62 23 65 62 92
Fax +88 62 23 68 73 97

USA/Canada/Mexico
Phone +1(952) 9 41-67 80
Fax +1(952) 9 41-92 87

Representatives and agencies
in all major industrial nations.

SICK AG · Automatisierungstechnik · P.O. Box 310 · 79177 Waldkirch · Deutschland
Phone +49 76 81 2 02 0 · Fax +49 76 81 2 02 36 09 · www.sick.com

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