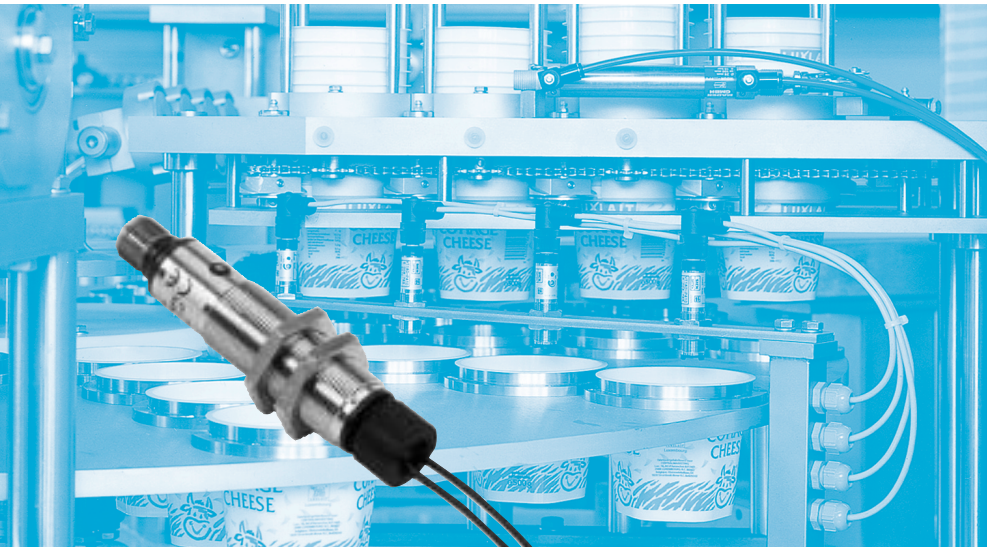


VLL 18T; M 18 photoelectric switches, for LL 3 fibre-optic cables: economic, flexible, functional



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, capacitive 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; $V_s = 10 \dots 30 \text{ V DC}$; 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.

	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.

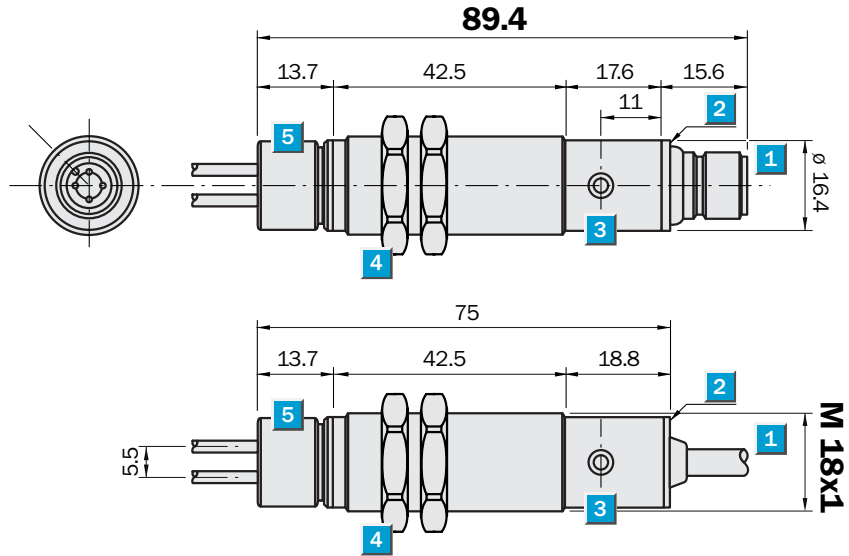
A strong team is created with a clever range of fibre-optic cables:

- VLL 18T and LL 3 fibre-optic cable series. Small mounting space,

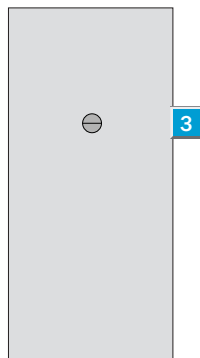
	Scanning range 0 ... 200 mm (1000 mm)
Through-beam system	
	Scanning distance 0 ... 50 mm
Proximity system	

- 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



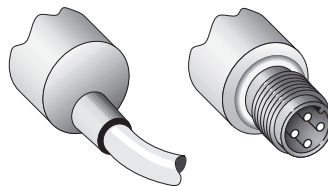
Setting options	
VLL 18T-4P 3212	VLL 18T-4N 3212
VLL 18T-4P 3240	VLL 18T-4N 3240



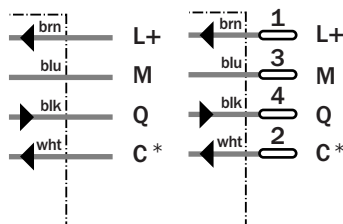
- 1** Connection cable or plug M 12, 4-pin
- 2** Yellow LED indicator:
 - lights continuously: reception signal > reserve factor 2
 - blinks: reception signal < reserve factor 2 but > switching threshold 1
- 3** Sensitivity control (Teach-in button)
- 4** Fastening nuts (2x); SW 24, metal
- 5** Locking 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 mm ²	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_G: 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 VDC 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 mm ² , 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



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.

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

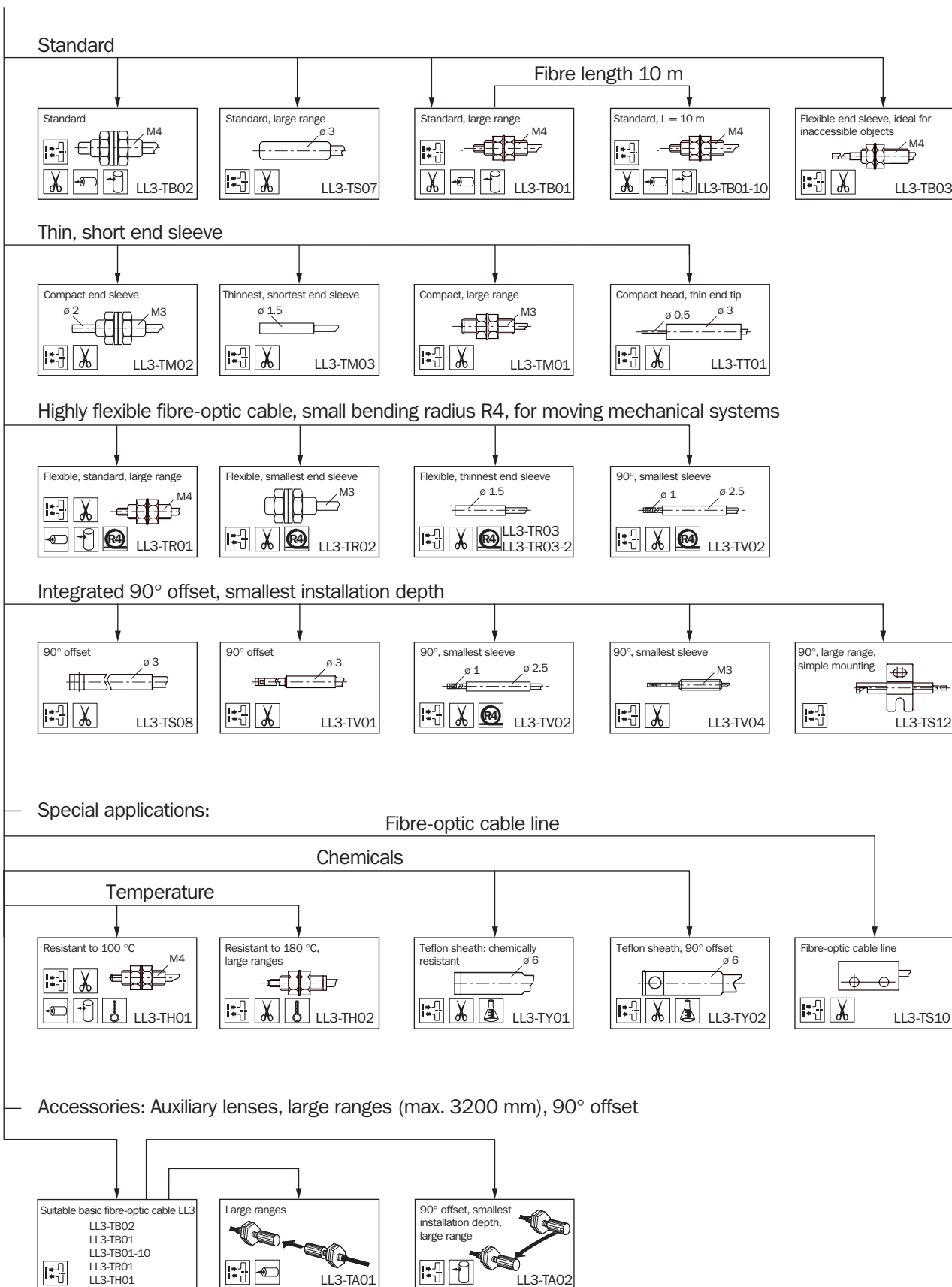
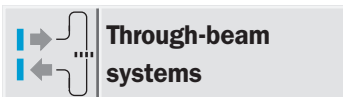
No assembly space – not even for miniature photoelectric cables, chemical corrosion or increased ambient temperatures are often decisive reasons for the use of LL 3 plastic fibre-optic cables. In connection with the photoelectric switch series WLL 160(T), LL 3 cables enable reliable object detection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

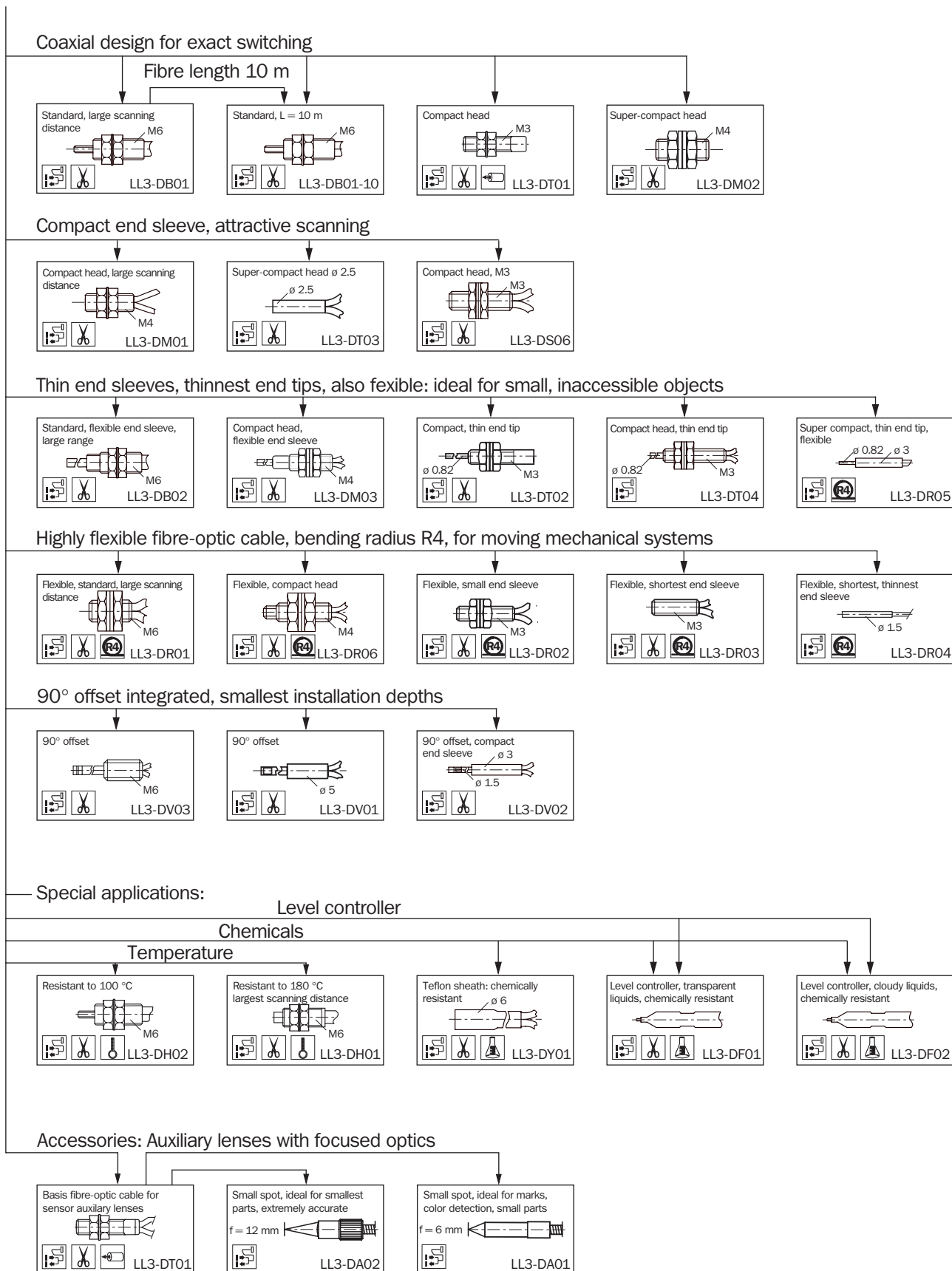
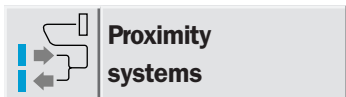
LL 3 options:

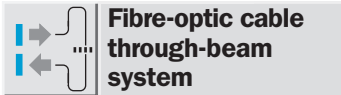
- Standard fibre-optic cables
- Large scanning ranges
- Tip adapters
- Small terminal sleeves
- Highly flexible with the smallest bending radii
- Integrated 90° offset
- Temperature resistant to 180 °C
- Teflon coating against aggressive environments
- Coaxial structure
- Pliable terminal sleeves
- 10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

Flow diagrams of fibre-optic cable selection



Flow diagrams of fibre-optic cable selection





Characteristics

- Highly flexible
- Small bending radii
- Fibre-optic cables can be shortened easily with cutting device (supplied with equipment)
- Ambient temperature $-40 \dots +70 \text{ }^\circ\text{C}$
Special models to $180 \text{ }^\circ\text{C}$

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

Through-beam systems

LL 3 Fibre-optic cables

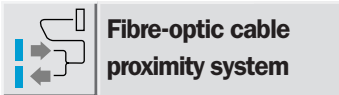
Description	Bend radius mm	Type	Part no.	VLL 18T Red light	
				SR	MD
Standard, M 4	25	LL 3-TB02	5 308 048	120/1100 ²⁾	0.2
Standard, Ø 3 mm, large scanning range	35	LL 3-TS07	5 308 049	200	0.5
Standard, M 4, large scanning range	25	LL 3-TB01	5 308 050	200/850 ²⁾	0.5
Standard, M 4, length 10 m	25	LL 3-TB01-10	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

Scanning ranges SR⁴⁾ and minimum object diameter MD⁶⁾ in mm in connection with VLL 18T

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 $-40 \dots +100 \text{ }^\circ\text{C}$
⁵⁾ Ambient operating temperature $-40 \dots +180 \text{ }^\circ\text{C}$
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



Characteristics



- Highly flexible
- Small bending radii
- Fibre-optic cables can be shortened easily with cutting device (supplied with equipment)
- Operation temperature $-40 \dots +70 \text{ }^\circ\text{C}$
Special models to $180 \text{ }^\circ\text{C}$

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

Proximity systems

LL 3 Fibre-optic cables

Scanning distances SD¹⁾ and minimum object diameter MD⁷⁾ in mm in connection with VLL 18T

		VLL 18T Red light	
		SD	MD
Compact sleeve, M 4, large scanning distance	25	50	0.015
Super compact sleeve, Ø 2.5 mm	15	15	0.015
Super compact, sleeve M 3	10	15	0.015
Large scanning distance, M 6, coaxial fibre-optic cable	25	50	0.015
Length 10 m, M 6, coaxial fibre-optic cable	25	25	0.015
For tip adapters, M 3	15	20/12 ²⁾	0.015
Thin, short sleeve, M 4, coaxial fibre-optic cable	25	20	0.015
Highly flexible, M 6, large scanning distance	4	45	0.015
Highly flexible, small sleeve, M 3	4	●	●
Highly flexible, Ø 3 mm, thin sleeve	4	13	0.015
Highly flexible, Ø 1.5 mm, thin sleeve	4	●	●
Highly flexible, M 4, compact sleeve	4	13	0.015
Flexible sleeve, M 6, large scanning distance	25/10 ³⁾	50	0.015
Flexible sleeve, M 4	25/10 ³⁾	15	0.015
Thin, long terminal tip, M 3	15	●	●
Thin, long terminal tip, M 3, coaxial fibre-optic cable	15	●	●
Ø 3.0 mm, thin terminal tip, Ø 0.82 mm	4	●	●
90° offset, Ø 5.0 mm	25	25	0.025
90° offset, small sleeve, Ø 3.0 mm	15	●	●
90° offset, M 6	25	25	0.025
Temp. resist. to 180 °C, M 6, large scanning distance	30	65	0.015
Temperature resistant to 100 °C, M 6	25	35	0.015
Teflon coating, chemically resistant, Ø 6.0 mm	40	30	0.02
Level switch, clear liquid, Ø 6.0 mm	50	●	●
Level switch, cloudy liquid, Ø 6.0 mm	50	●	●

Description	Bend radius	Type	Part no.
	mm		
Compact sleeve, M 4, large scanning distance	25	LL 3-DM01	5 308 071
Super compact sleeve, Ø 2.5 mm	15	LL 3-DT03	5 308 072
Super compact, sleeve M 3	10	LL 3-DS06	5 308 073
Large scanning distance, M 6, coaxial fibre-optic cable	25	LL 3-DB01	5 308 074
Length 10 m, M 6, coaxial fibre-optic cable	25	LL 3-DB01-10	5 308 075
For tip adapters, M 3	15	LL 3-DT01	5 308 076
Thin, short sleeve, M 4, coaxial fibre-optic cable	25	LL 3-DM02	5 308 077
Highly flexible, M 6, large scanning distance	4	LL 3-DR01	5 308 078
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
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
Flexible sleeve, M 6, large scanning distance	25/10 ³⁾	LL 3-DB02	5 308 083
Flexible sleeve, M 4	25/10 ³⁾	LL 3-DM03	5 308 084
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
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
Temp. resist. to 180 °C, M 6, large scanning distance	30	LL 3-DH01 ⁵⁾	5 308 091
Temperature resistant to 100 °C, M 6	25	LL 3-DH02 ⁶⁾	5 308 092
Teflon coating, chemically resistant, Ø 6.0 mm	40	LL 3-DY01	5 308 093
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

● not available

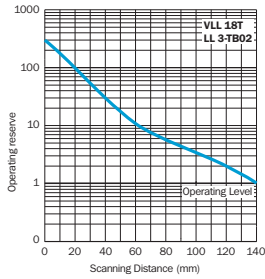
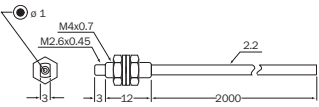
¹⁾ With reference to white scanned object, 90 % remission, minimum object diameter = light size (opening angle LL: approx. 65°) fibre-optic cable not shortened
²⁾ With proximity front lens for LL 3, see front lenses for LL 3
³⁾ Bend radius of the flexible terminal sleeve
⁴⁾ Cannot be shortened
⁵⁾ Ambient operating temperature $-40 \dots +180 \text{ }^\circ\text{C}$
⁶⁾ Ambient operating temperature $-40 \dots +100 \text{ }^\circ\text{C}$
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

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

Order information

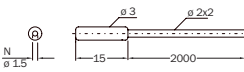
Type	Part no.
LL 3-TB02	5 308 048



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

Order information

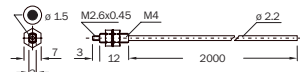
Type	Part no.
LL 3-TS07	5 308 049



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

Order information

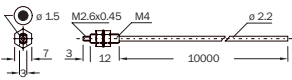
Type	Part no.
LL 3-TB01	5 308 050



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

Order information

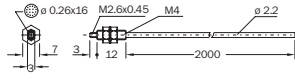
Type	Part no.
LL 3-TB01-10	5 308 051



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

Order information

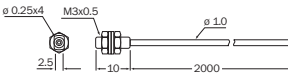
Type	Part no.
LL 3-TR01	5 308 052



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

Order information

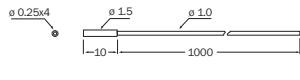
Type	Part no.
LL 3-TR02	5 308 053



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

Order information

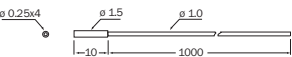
Type	Part no.
LL 3-TR03	5 308 054



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

Order information

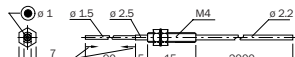
Type	Part no.
LL 3-TR03-2	5 308 055



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

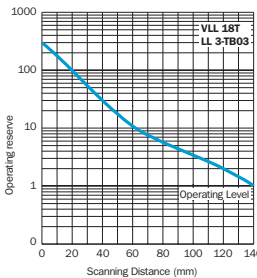
Order information

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

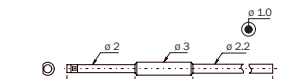
Type	Part no.
LL 3-TT01	5 308 057



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

Order information

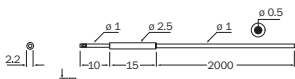
Type	Part no.
LL 3-TV01	5 308 058



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

Order information

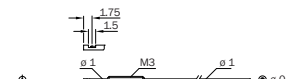
Type	Part no.
LL 3-TV02	5 308 059



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

Order information

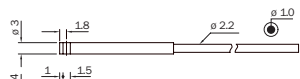
Type	Part no.
LL 3-TV04	5 308 060



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

Order information

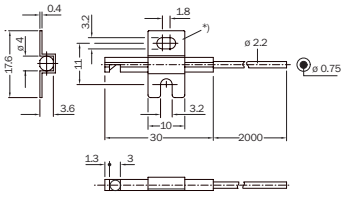
Type	Part no.
LL 3-TS08	5 308 061



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

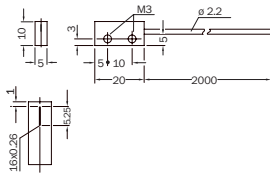
Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – through-beam systems

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



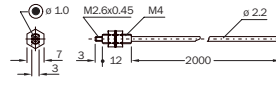
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids
*) Mounting bracket (enclosed unattached)

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



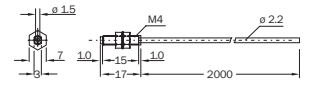
Material: Core: PMMA, Sheath: PE;
Sleeve: CuZn, nickel-plated brass

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



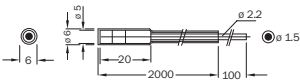
Material: Core: PC; Sheath: PE;
Sleeve: CuZn, nickel-plated brass

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



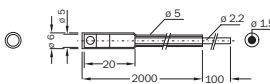
Material: Core: HPOF, Sheath: FEP;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

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



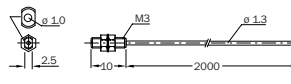
Material: Core: PMMA; Sheath: Teflon;
Sleeve: Teflon

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

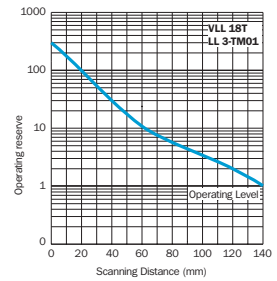


Material: Core: PMMA; Sheath: Teflon;
Sleeve: Teflon

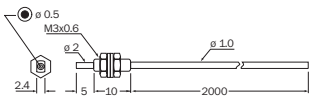
Order information	
Type	Part no.
LL 3-TM01	5 308 068



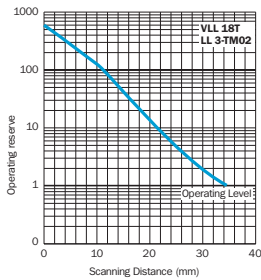
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids



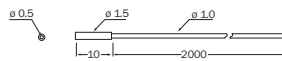
Order information	
Type	Part no.
LL 3-TM02	5 308 069



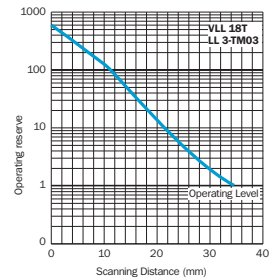
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids



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



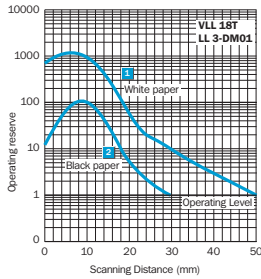
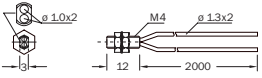
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids



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

Order information

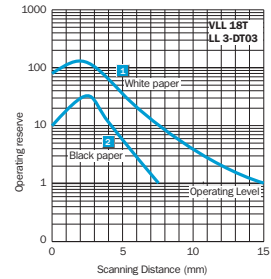
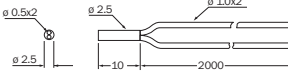
Type	Part no.
LL 3-DM01	5 308 071



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

Order information

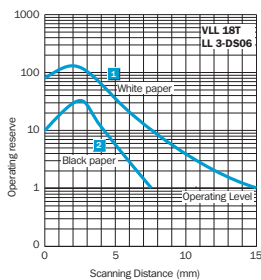
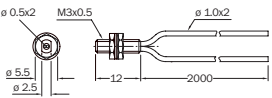
Type	Part no.
LL 3-DT03	5 308 072



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

Order information

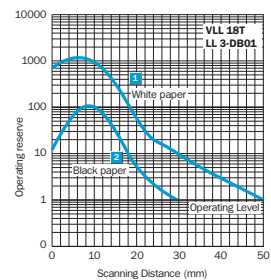
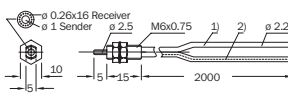
Type	Part no.
LL 3-DS06	5 308 073



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

Order information

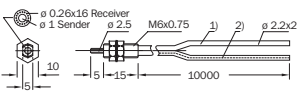
Type	Part no.
LL 3-DB01	5 308 074



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

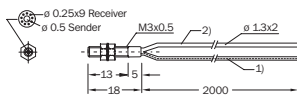


- 1) Sender
- 2) Receiver

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

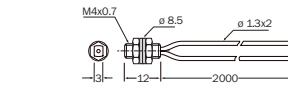


- 1) Sender
- 2) Receiver

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

Order information

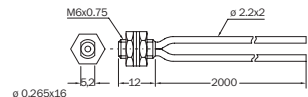
Type	Part no.
LL 3-DM02	5 308 077



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

Order information

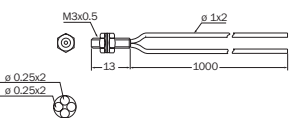
Type	Part no.
LL 3-DR01	5 308 078



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

Order information

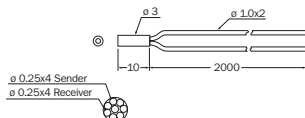
Type	Part no.
LL 3-DR02	5 308 079



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

Order information

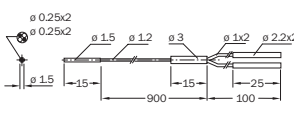
Type	Part no.
LL 3-DR03	5 308 080



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

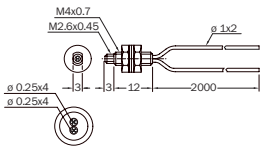
1) With reference to white scanning object, 90 % remission

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

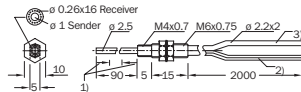
Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – proximity systems

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



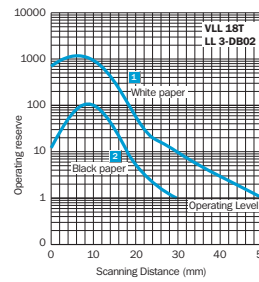
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

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

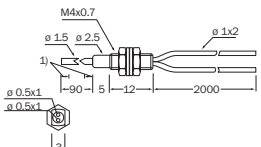


- 1) Flexible end sleeve, do not bend in this region (10 mm), bend radius R10
- 2) Sender (marked in blue)
- 3) Receiver

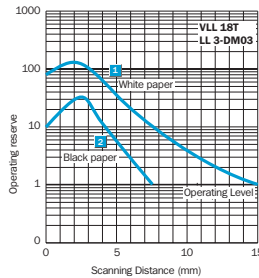
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids



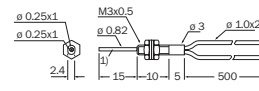
Order information	
Type	Part no.
LL 3-DM03	5 308 084



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

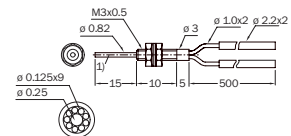


Order information	
Type	Part no.
LL 3-DT02	5 308 085



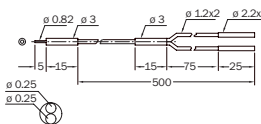
1) End sleeve cannot be bent
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

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



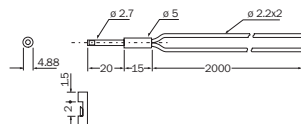
1) End sleeve cannot be bent
Material: Core: PMMA, Sheath: PE;
Sleeve: CuZn, nickel-plated brass

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



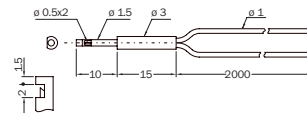
Material: Core: PMMA, Sheath: PE;
Sleeve: CuZn, nickel-plated brass

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



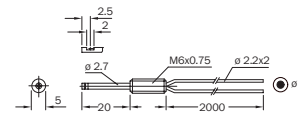
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

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



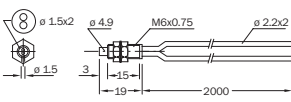
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

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



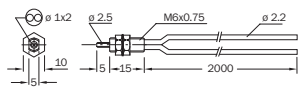
Material: Core: PMMA, Sheath: PE;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

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



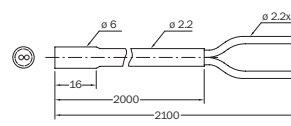
Material: Core: FEPH; Sheath: HPOF;
Sleeve: 1.4305 (German materials no.)
Stainless steel, resistant to rusting and acids

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

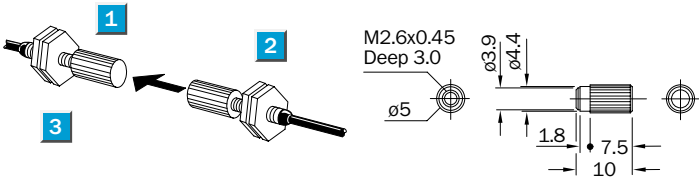
2 With reference to grey scanning object, 18 % remission

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:

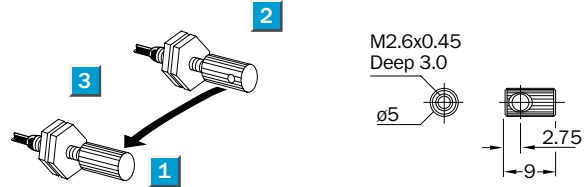
Operating ranges with front lens LL 3-TA01 ¹⁾		
LL 3-TB02	5 308 048	1100 mm
LL 3-TB01	5 308 050	850 mm
LL 3-TB01-10	5 308 051	450 mm
LL 3-TR01	5 308 052	850 mm
LL 3-TH01	5 308 064	850 mm

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

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

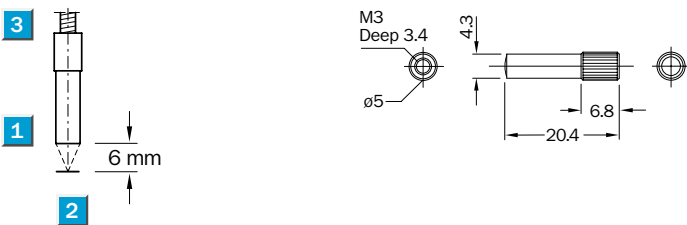
Front lenses appropriate for following LL 3:

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

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⁾

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

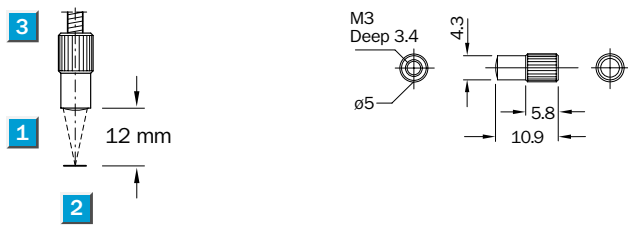
²⁾ Light spot diameter 0.25 mm focused at 6 mm

³⁾ Light spot diameter 3 mm focused at 12 mm

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⁾

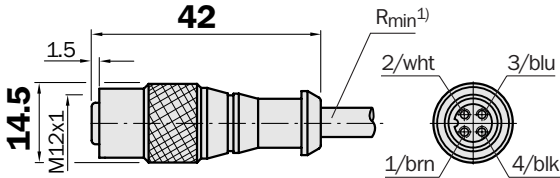
Dimensional drawings and order information

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

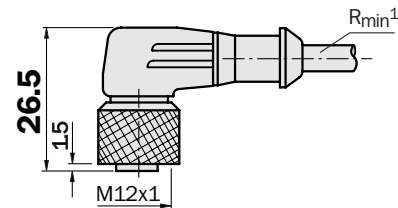
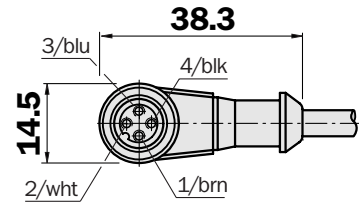
Type	Part no.	Contacts	Cable length
DOL-1204-G02M	6 009 382	4	2 m
DOL-1204-G05M	6 009 866	4	5 m
DOL-1204-G10M	6 010 543	4	10 m
DOL-1204-G15M	6 010 753	4	15 m



Female connector M 12, 4-pin, right angle

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

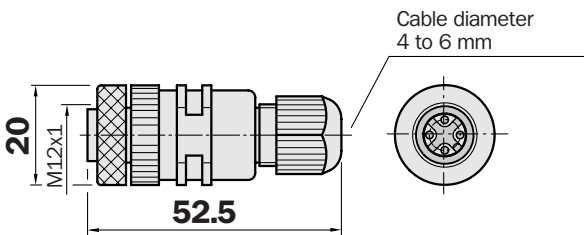
Type	Part no.	Contacts	Cable length
DOL-1204-W02M	6 009 383	4	2 m
DOL-1204-W05M	6 009 867	4	5 m
DOL-1204-W10M	6 010 541	4	10 m



1) Minimum bend radius in dynamic use
 $R_{min} = 20 \times \text{cable diameter}$

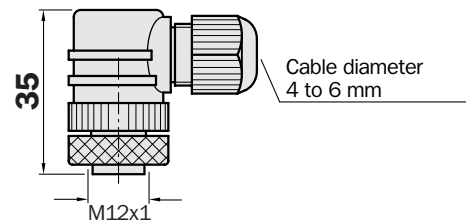
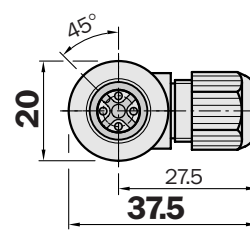
Female connector M 12, 4-pin, straight

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



Female connector M 12, 4-pin, right angle

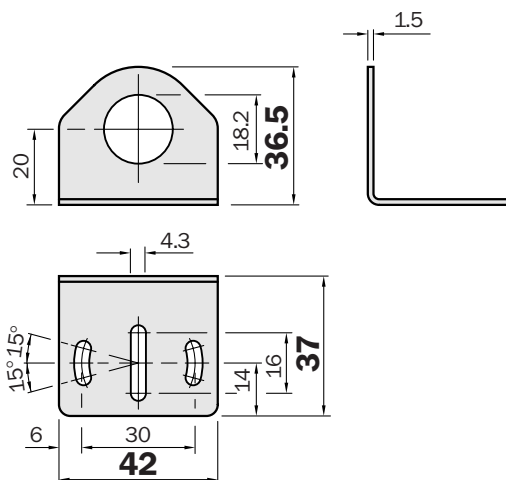
Type	Part no.	Contacts	Can be adapted for cables Ø 4.5 to 6.5 mm
DOS-1204-W	6 007 303	4	



Mounting bracket

Order information

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



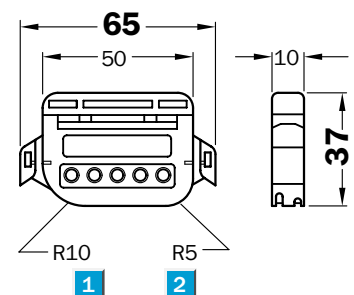
Cutter FC for fibre-optic cables

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



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SICK