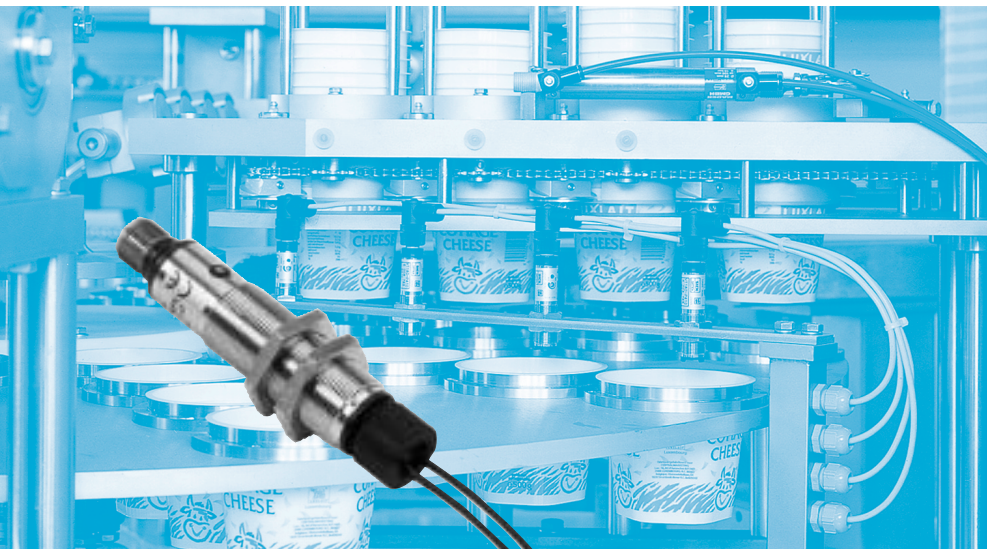


# VLL 18T; M 18 photoelectric switches, for LL 3 fibre-optic cables: economic, flexible, functional



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.

	<b>Photoelectric switches with fibre-optic cable</b>
<b>Proximity mode</b>	
	<b>Photoelectric switches with fibre-optic cable</b>
<b>Through-beam mode</b>	

**T**he 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:

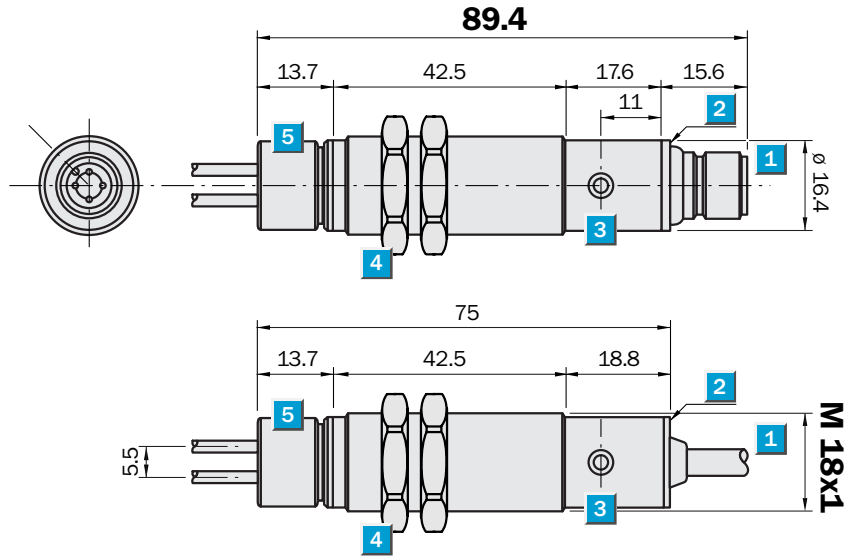
- VLL 18T and LL 3 fibre-optic cable series. Small mounting space,



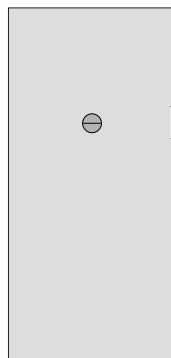
	<b>Scanning range</b> 0 ... 200 mm (1000 mm)
<b>Through-beam system</b>	
	<b>Scanning distance</b> 0 ... 50 mm
<b>Proximity system</b>	

- 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**



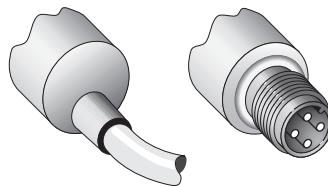
Setting options	
VLL 18T-4P 3212	VLL 18T-4N 3212
VLL 18T-4P 3240	VLL 18T-4N 3240



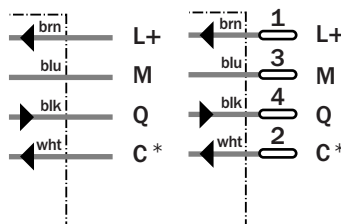
- 1** Connection cable or plug M 12, 4-pin
- 2** Yellow LED indicator:
  - lights continuously: reception signal > reserve factor 2
  - blinks: reception signal < reserve factor 2 but > switching threshold 1
- 3** Sensitivity control (Teach-in button)
- 4** Fastening nuts (2x); SW 24, metal
- 5** Locking 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 <sup>2</sup>	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<sub>S</sub>: dark-switching D.ON
  - C = 0 V: sensitivity setting per “external Teach-in” active



<b>Accessories</b>
Connectors
Mounting systems
LL 3 fibre-optic cables

<b>Technical data</b>	VLL 18T-4	P 3212	P 3240	N 3212	N 3240						
-----------------------	-----------	--------	--------	--------	--------	--	--	--	--	--	--

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

<sup>1)</sup> With front lenses 0 ... 2000 mm  
<sup>2)</sup> Object with 90% remission (based on standard white to DIN 5033); 100 x 100 mm  
<sup>3)</sup> Control input C, programming:  
 - Switching type L.ON/D.ON and  
 - External Teach-in  
 C = open (not assigned): light-switching L.ON  
 C = + V<sub>s</sub>: dark-switching D.ON  
 C = 0 V: sensitivity setting per "external Teach-in" active  
<sup>4)</sup> Average service life 100.000 h at T<sub>A</sub> = +25 °C  
<sup>5)</sup> See LL 3 data for deviations  
<sup>6)</sup> Limit values  
<sup>7)</sup> May not exceed or fall short of V<sub>s</sub> tolerances  
<sup>8)</sup> Without load  
<sup>9)</sup> With resistive load  
<sup>10)</sup> With light/dark ratio 1:1  
<sup>11)</sup> Do not bend below 0 °C  
<sup>12)</sup> Reference voltage 50 V  
<sup>13)</sup> Only with correct adaptation of the LL 3 fibre-optic cable  
<sup>14)</sup> A = V<sub>s</sub> 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.

	<b>Fibre-optic cable through-beam systems</b>
	<b>Fibre-optic cable proximity systems</b>

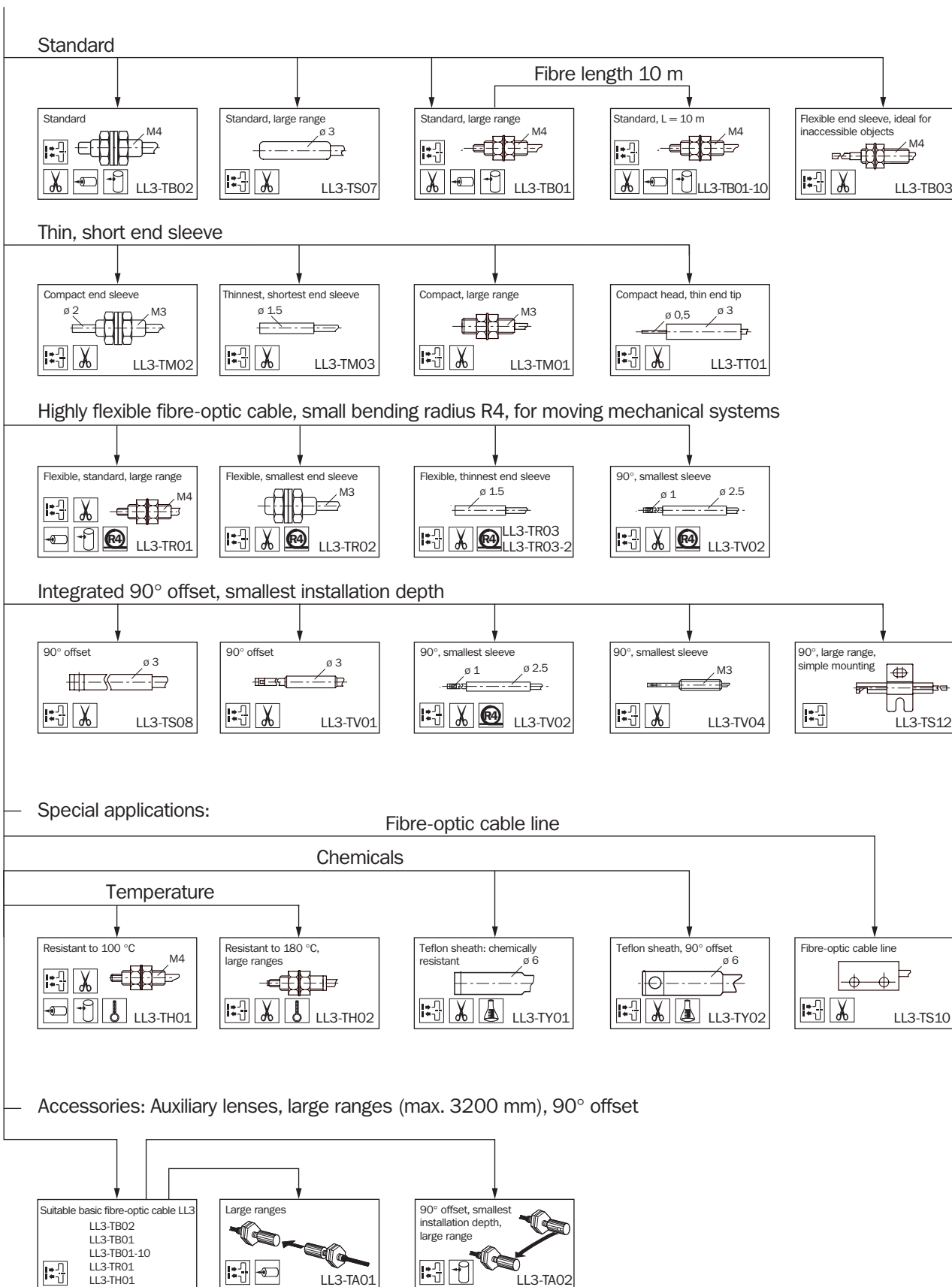
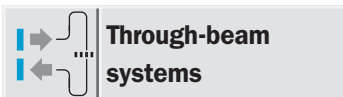
No assembly space – not even for miniature photoelectric cables, chemical corrosion or increased ambient temperatures are often decisive reasons for the use of LL 3 plastic fibre-optic cables. In connection with the photoelectric switch series WLL 160(T), LL 3 cables enable reliable object detection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

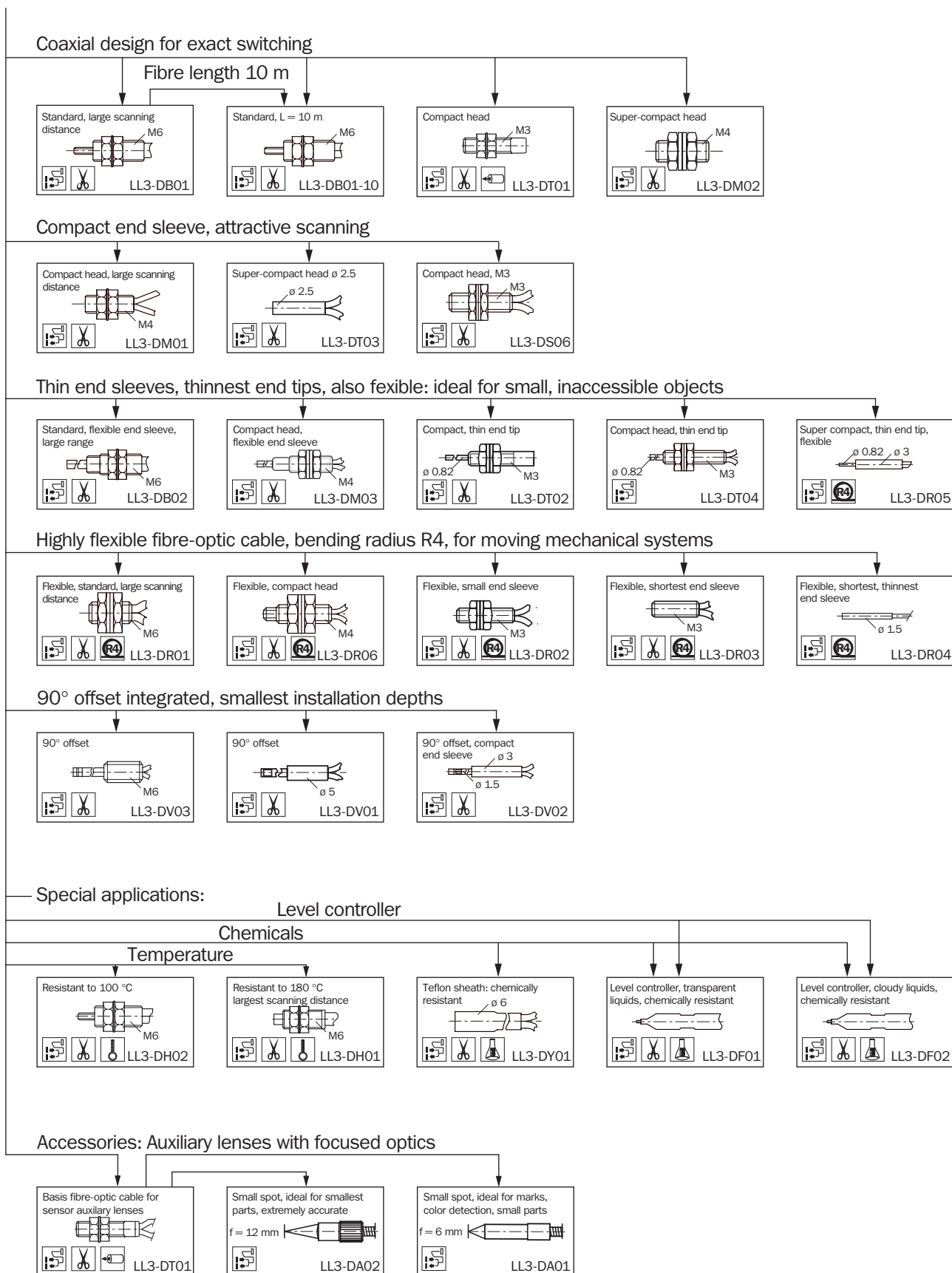
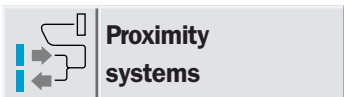
LL 3 options:

- 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

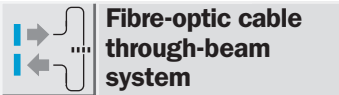


Flow diagrams of fibre-optic cable selection





## LL 3 Plastic fibre-optic cables



Fibre-optic cable through-beam system



### 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

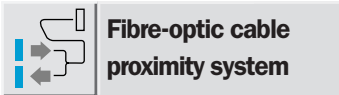
Description	Bend radius mm	Type	Part no.	Scanning ranges SR <sup>1)</sup> and minimum object diameter MD <sup>6)</sup> in mm in connection with VLL 18T	
				SR	MD
				<b>VLL 18T Red light</b>	
Standard, M 4	25	LL 3-TB02	5 308 048	120/1100 <sup>2)</sup>	0.2
Standard, Ø 3 mm, large scanning range	35	LL 3-TS07	5 308 049	200	0.5
Standard, M 4, large scanning range	25	LL 3-TB01	5 308 050	200/850 <sup>2)</sup>	0.5
Standard, M 4, length 10 m	25	LL 3-TB01-10	5 308 051	250/450 <sup>2)</sup>	0.5
Highly flexible, M 4, large scanning range	4	LL 3-TR01	5 308 052	100/850 <sup>2)</sup>	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 <sup>3)</sup>	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 <sup>4)</sup>	5 308 064	80/850 <sup>2)</sup>	0.2
Temperature resistant to 180 °C, M 4	30	LL 3-TH02 <sup>5)</sup>	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

<sup>1)</sup> Fibre-optic cable not shortened  
<sup>2)</sup> With front lenses for LL 3, also see front lenses for LL 3  
<sup>3)</sup> Bend radius of the flexible terminal sleeve  
<sup>4)</sup> Ambient operating temperature  $-40 \dots +100 \text{ }^\circ\text{C}$   
<sup>5)</sup> Ambient operating temperature  $-40 \dots +180 \text{ }^\circ\text{C}$   
<sup>6)</sup> 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 ... +70 °C  
Special models to 180 °C

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

**Proximity systems**

**LL 3 Fibre-optic cables**

**Scanning distances SD<sup>1)</sup> and minimum object diameter MD<sup>7)</sup> in mm in connection with VLL 18T**

		VLL 18T Red light	
Description	Bend radius mm	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 <sup>2)</sup>	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 <sup>3)</sup>	50	0.015
Flexible sleeve, M 4	25/10 <sup>3)</sup>	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	●	●

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

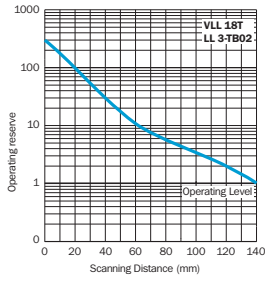
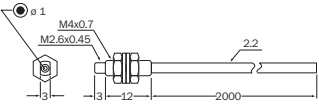
Fibre-optic cable diameter 1.0 mm and 1.3 mm:  
 Adapter sleeves supplied in shipment for Ø 2.2 mm.  
 Spare Parts:  
 Ø 1.0 mm: BEF-LL3-10/5 305 479  
 Ø 1.3 mm: BEF-LL3-13/5 306 094

● not available

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

### Order information

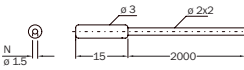
Type	Part no.
LL 3-TB02	5 308 048



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

### Order information

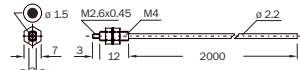
Type	Part no.
LL 3-TS07	5 308 049



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

### Order information

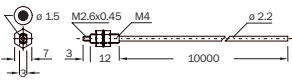
Type	Part no.
LL 3-TB01	5 308 050



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

### Order information

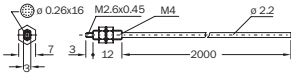
Type	Part no.
LL 3-TB01-10	5 308 051



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

### Order information

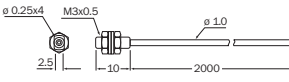
Type	Part no.
LL 3-TR01	5 308 052



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

### Order information

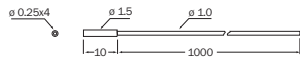
Type	Part no.
LL 3-TR02	5 308 053



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

### Order information

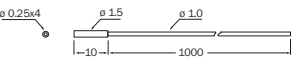
Type	Part no.
LL 3-TR03	5 308 054



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

### Order information

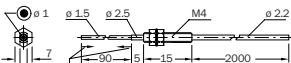
Type	Part no.
LL 3-TR03-2	5 308 055



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

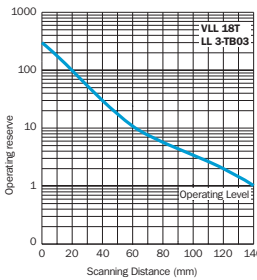
### Order information

Type	Part no.
LL 3-TB03	5 308 056



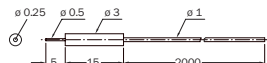
1) Flexible end sleeve, do not bend in this area (10 mm), radius of curvature R10

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



### Order information

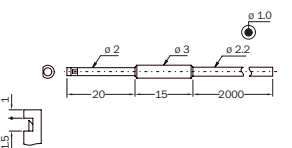
Type	Part no.
LL 3-TT01	5 308 057



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

### Order information

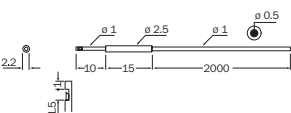
Type	Part no.
LL 3-TV01	5 308 058



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

### Order information

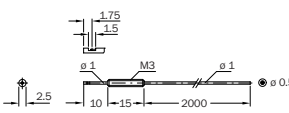
Type	Part no.
LL 3-TV02	5 308 059



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

### Order information

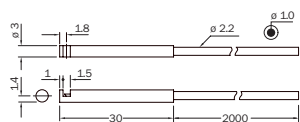
Type	Part no.
LL 3-TV04	5 308 060



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

### Order information

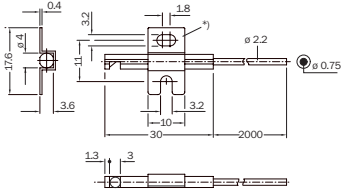
Type	Part no.
LL 3-TS08	5 308 061



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

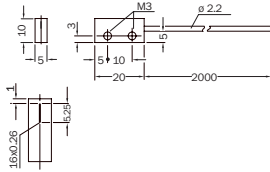
Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – through-beam systems

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



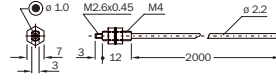
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids  
\*) Mounting bracket (enclosed unattached)

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



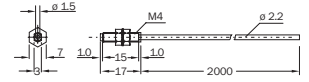
Material: Core: PMMA, Sheath: PE;  
Sleeve: CuZn, nickel-plated brass

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



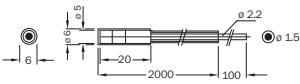
Material: Core: PC; Sheath: PE;  
Sleeve: CuZn, nickel-plated brass

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



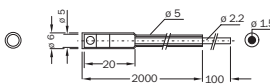
Material: Core: HPOF, Sheath: FEP;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids

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



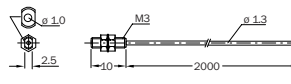
Material: Core: PMMA; Sheath: Teflon;  
Sleeve: Teflon

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

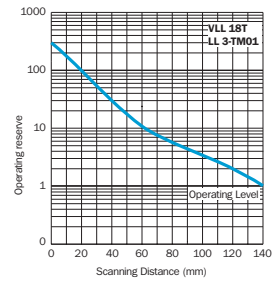


Material: Core: PMMA; Sheath: Teflon;  
Sleeve: Teflon

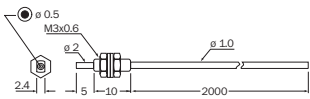
Order information	
Type	Part no.
LL 3-TM01	5 308 068



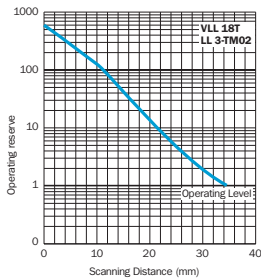
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids



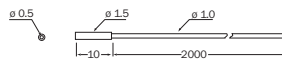
Order information	
Type	Part no.
LL 3-TM02	5 308 069



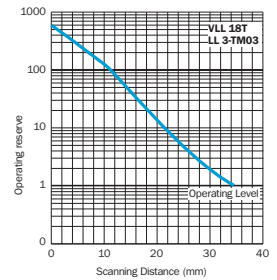
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids



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



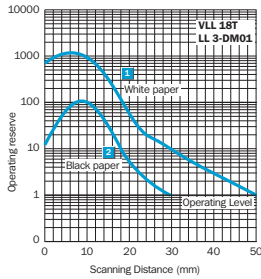
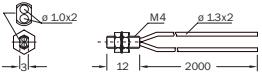
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids



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

### Order information

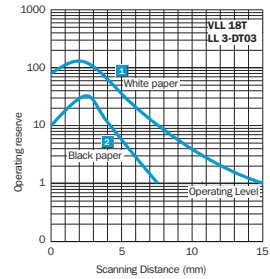
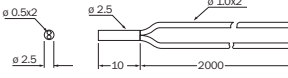
Type	Part no.
LL 3-DM01	5 308 071



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

### Order information

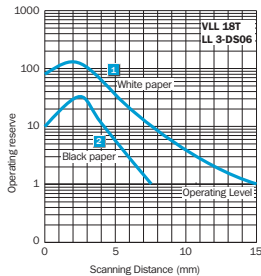
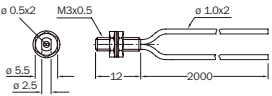
Type	Part no.
LL 3-DT03	5 308 072



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

### Order information

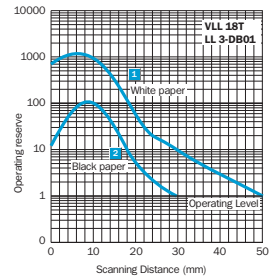
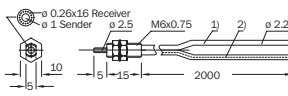
Type	Part no.
LL 3-DS06	5 308 073



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

### Order information

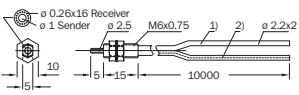
Type	Part no.
LL 3-DB01	5 308 074



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

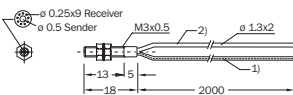


1) Sender  
2) Receiver

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

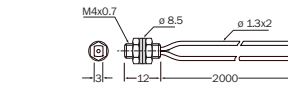


1) Sender  
2) Receiver

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

### Order information

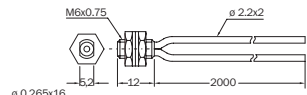
Type	Part no.
LL 3-DM02	5 308 077



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

### Order information

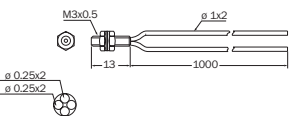
Type	Part no.
LL 3-DR01	5 308 078



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

### Order information

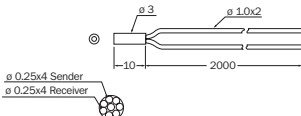
Type	Part no.
LL 3-DR02	5 308 079



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

### Order information

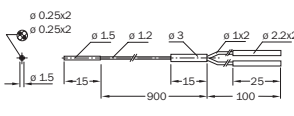
Type	Part no.
LL 3-DR03	5 308 080



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

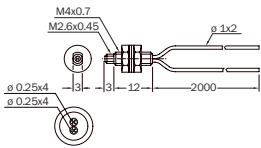
1) With reference to white scanning object, 90 % remission

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

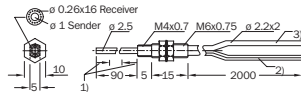
Dimensional drawings and characteristic curves for LL 3 fibre-optic cables – proximity systems

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



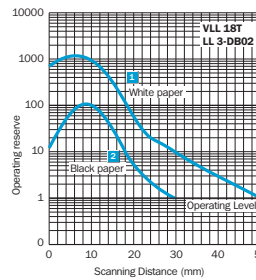
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids

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

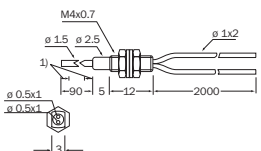


- 1) Flexible end sleeve, do not bend in this region (10 mm), bend radius R10
- 2) Sender (marked in blue)
- 3) Receiver

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

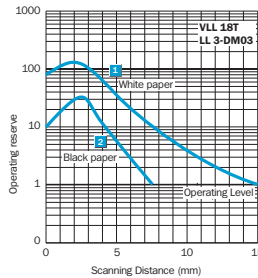


Order information	
Type	Part no.
LL 3-DM03	5 308 084

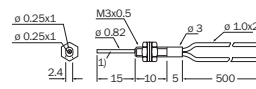


- 1) Flexible end sleeve, do not bend in this region (10 mm), bend radius R10

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



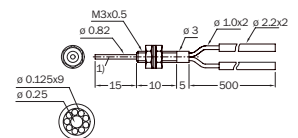
Order information	
Type	Part no.
LL 3-DT02	5 308 085



- 1) End sleeve cannot be bent

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

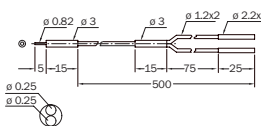
Order information	
Type	Part no.
LL 3-DT04	5 308 086



- 1) End sleeve cannot be bent

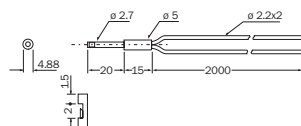
Material: Core: PMMA, Sheath: PE;  
Sleeve: CuZn, nickel-plated brass

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



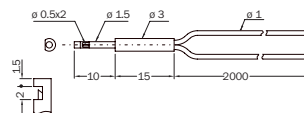
Material: Core: PMMA, Sheath: PE;  
Sleeve: CuZn, nickel-plated brass

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



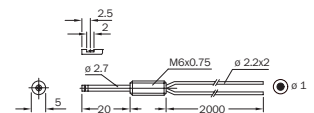
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids

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



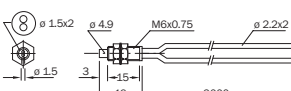
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids

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



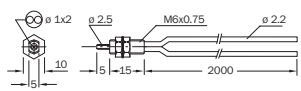
Material: Core: PMMA, Sheath: PE;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids

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



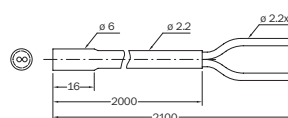
Material: Core: FEPH; Sheath: HPOF;  
Sleeve: 1.4305 (German materials no.)  
Stainless steel, resistant to rusting and acids

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

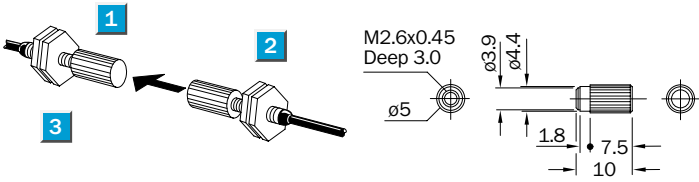
2 With reference to grey scanning object, 18 % remission

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

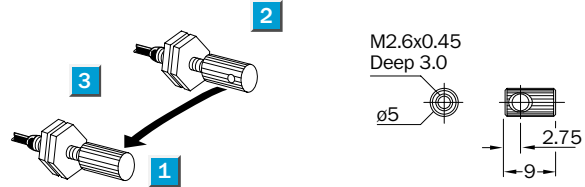
Front lenses appropriate for following LL 3:

Operating ranges with front lens LL 3-TA01 <sup>1)</sup>		
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:

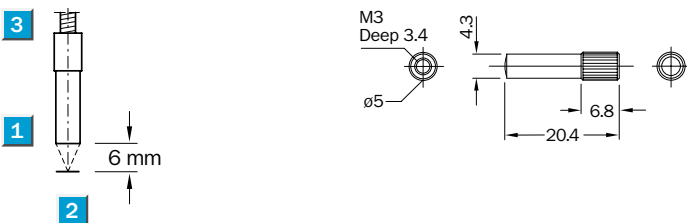
Operating ranges with front lens LL 3-TA02 <sup>1)</sup>		
LL 3-TB02	5 308 048	170 mm
LL 3-TB01	5 308 050	200 mm
LL 3-TB01-10	5 308 051	100 mm
LL 3-TR01	5 308 052	110 mm
LL 3-TH01	5 308 064	110 mm

<sup>1)</sup> 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:

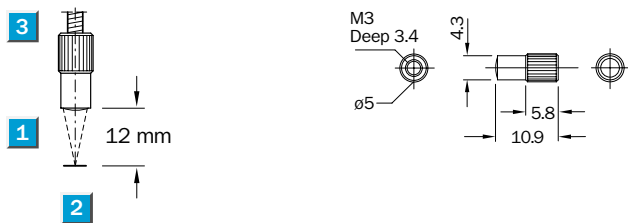
Operating distances with front lens LL 3-DA01 <sup>1)</sup>		
LL 3-DT01	5 308 076	6 ± 1 mm <sup>2)</sup>

<sup>1)</sup> Fibre-optic cable not shortened, scanner fibre-optic cable: Material to be scanned with 90 % remission (according to DIN 5033)  
<sup>2)</sup> Light spot diameter 0.25 mm focused at 6 mm  
<sup>3)</sup> 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 <sup>1)</sup>		
LL 3-DT01	5 308 076	12 ± 1 mm <sup>3)</sup>

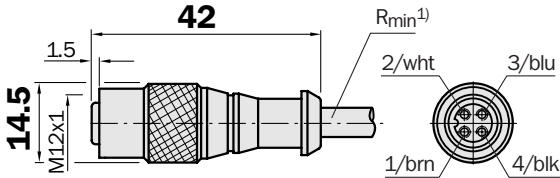
**Dimensional drawings and order information**

**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 mm<sup>2</sup>, sheath PVC

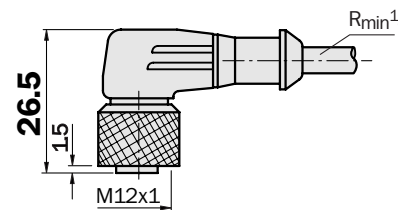
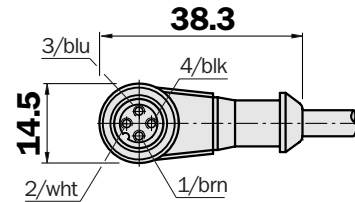
Type	Part no.	Contacts	Cable length
DOL-1204-G02M	6 009 382	4	2 m
DOL-1204-G05M	6 009 866	4	5 m
DOL-1204-G10M	6 010 543	4	10 m
DOL-1204-G15M	6 010 753	4	15 m



**Female connector M 12, 4-pin, right angle**

Cable diameter 5 mm, 4 x 0.25 mm<sup>2</sup>, sheath PVC

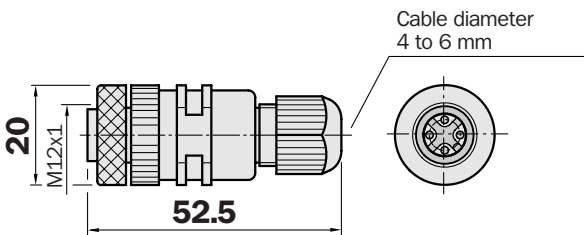
Type	Part no.	Contacts	Cable length
DOL-1204-W02M	6 009 383	4	2 m
DOL-1204-W05M	6 009 867	4	5 m
DOL-1204-W10M	6 010 541	4	10 m



1) Minimum bend radius in dynamic use  
R<sub>min</sub> = 20 x cable diameter

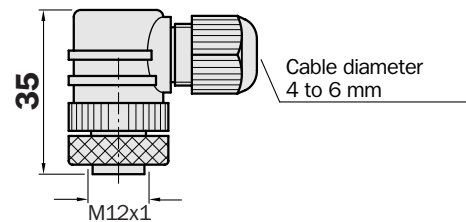
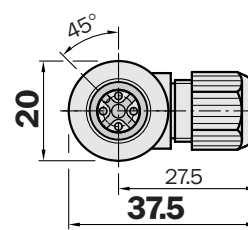
**Female connector M 12, 4-pin, straight**

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**

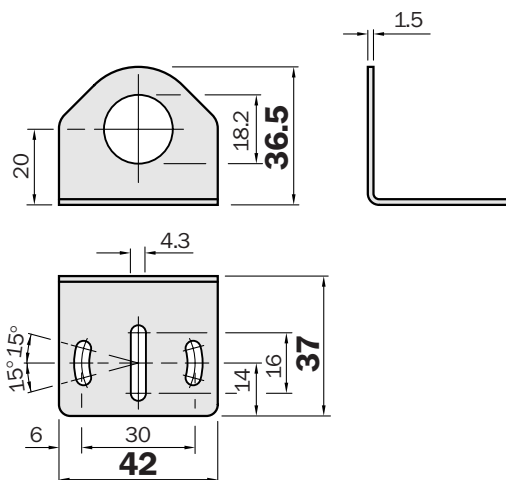
Type	Part no.	Contacts	Can be adapted for cables Ø 4.5 to 6.5 mm
DOS-1204-W	6 007 303	4	



**Mounting bracket**

**Order information**

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



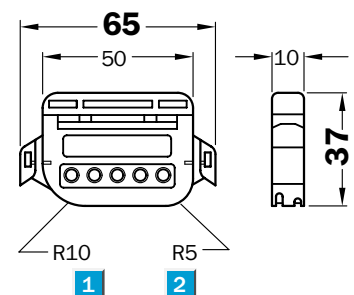
**Cutter FC for fibre-optic cables**

**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





**SICK**