



- *'Teach-in', 'Remote' setting and models with 'Auto-Set'*
- *Red/green or white LED emission*
- *Various interchangeable lenses and fibre-optic versions*
- *Metal housing with orientable optics and connector*

## TLμ SERIES


The TLμ series offers the most reliable and innovative solutions for all detection applications of register marks and other neutral or coloured references.

The microprocessor-based setting can be either 'Teach-in' using two push-buttons or 'Remote' by cable with the possibility of rapidly memorising and recalling 4 different formats. The setting can also be dynamic and completely automatic in the models with the 'Auto-Set' function.

The LED emission can be red/green with automatic selection, or white offering the possibility of operating on all contrasts, also amongst same-coloured objects and backgrounds, presenting different surface treatments or workings.

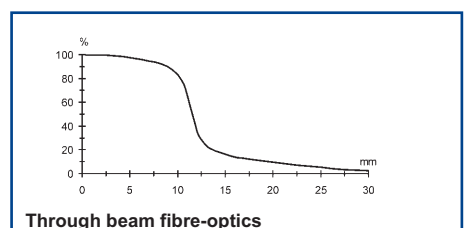
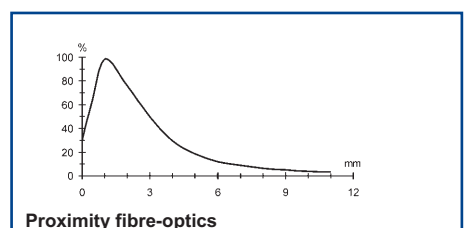
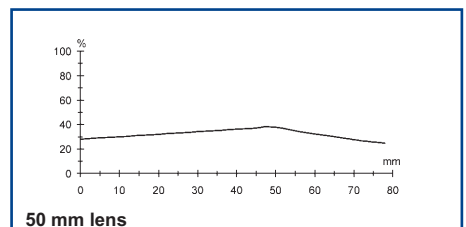
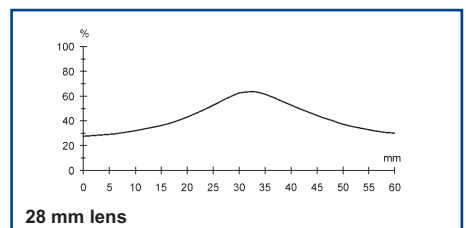
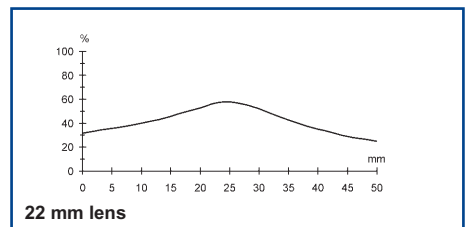
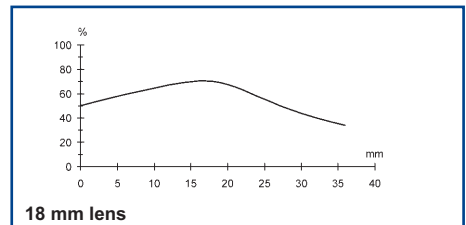
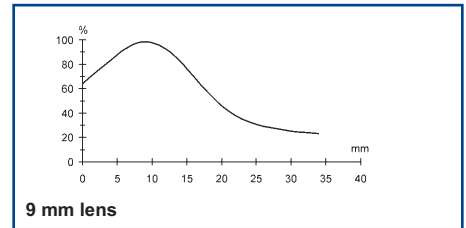
Models with interchangeable 9 mm or 18 mm lenses are available; 22, 28 and 50 mm lenses are supplied as accessories. Moreover many different fibre-optic models are available. The output is NPN or PNP according to the model, but is always selectable by means of an internal switch; an analog output proportional to the received light is also present.

## TECHNICAL DATA

<b>Power supply:</b> .....	10 ... 30 Vdc, reverse polarity protection
<b>Consumption:</b> .....	80 mA max.
<b>Light emission:</b> .....	red 630 nm / green 526 nm LED white LED (TL $\mu$ -4/5xx vers.)
<b>Spot dimension:</b> .....	1.5 x 5 mm (9 mm lens) $\varnothing$ 3 mm (9 lens - circular) 2 x 7 mm (18 mm lens)
<b>Operating distance:</b> .....	6 ... 12 mm (9 mm lens) 14 ... 22 mm (18 mm lens) 22 ... 34 mm (28 mm lens) 40 ... 60 mm (50 mm lens)
<b>Operating distance with fibre-optics:</b> .....	0 ... 3 mm proximity 0 ... 10 mm through beam
<b>Depth of field:</b> .....	$\pm$ 3 mm (9 mm lens) $\pm$ 4 mm (18 mm lens) $\pm$ 6 mm (28 mm lens) $\pm$ 10 mm (50 mm lens)
<b>Setting:</b> .....	Teach-in with 2 push-buttons Remote with 2 wires dynamic Auto-Set (vers.TL $\mu$ -417/517)
<b>Indicators:</b> .....	red OUTPUT LED green POWER LED (vers.TL $\mu$ -417/517) green READY LED
<b>Output type:</b> .....	NPN or PNP, Rpull-down/up 10 k $\Omega$
<b>Saturation voltage:</b> .....	1 V max. (NPN vers.) 2 V max. (PNP vers.)
<b>Output current:</b> .....	200 mA max., short-circuit protection
<b>Response time:</b> .....	50 $\mu$ s max., 25 $\mu$ s max. (TL $\mu$ -4/5xx vers.)
<b>Switching frequency:</b> .....	10 kHz max., 20 kHz max. (TL $\mu$ -4/5xx vers.)
<b>Operating mode:</b> .....	automatic dark/light selection
<b>Analog output range:</b> .....	0 ... 5.5 Vdc (2 Vdc on white 90%) 2.2 k $\Omega$ output resistance
<b>Timing function:</b> .....	20 ms minimum output ON
<b>Connection:</b> .....	M12 4-pole connector 3m $\varnothing$ 6.1 mm shielded cable
<b>Electrical protection:</b> .....	class 1
<b>Mechanical protection:</b> .....	IP67
<b>Housing material:</b> .....	ZAMA
<b>Lens material:</b> .....	glass
<b>Fibre-optic material:</b> .....	fibre in glass / sheath in metal fibre in PMMA / sheath in PE (OF-30)
<b>Weight:</b> .....	310 g max. (connector vers.) 450 g max. (cable vers.)
<b>Operating temperature:</b> .....	-10 ... +55 $^{\circ}$ C
<b>Storage temperature:</b> .....	-25 ... +70 $^{\circ}$ C
<b>Fibre operating temperature:</b> .....	-30 ... +150 $^{\circ}$ C (glass OF vers.) -30 ... +60 $^{\circ}$ C (OF-30)
<b>Reference standard:</b> .....	EN 60947-5-2
<b>Certifications:</b> .....	CE  I13D

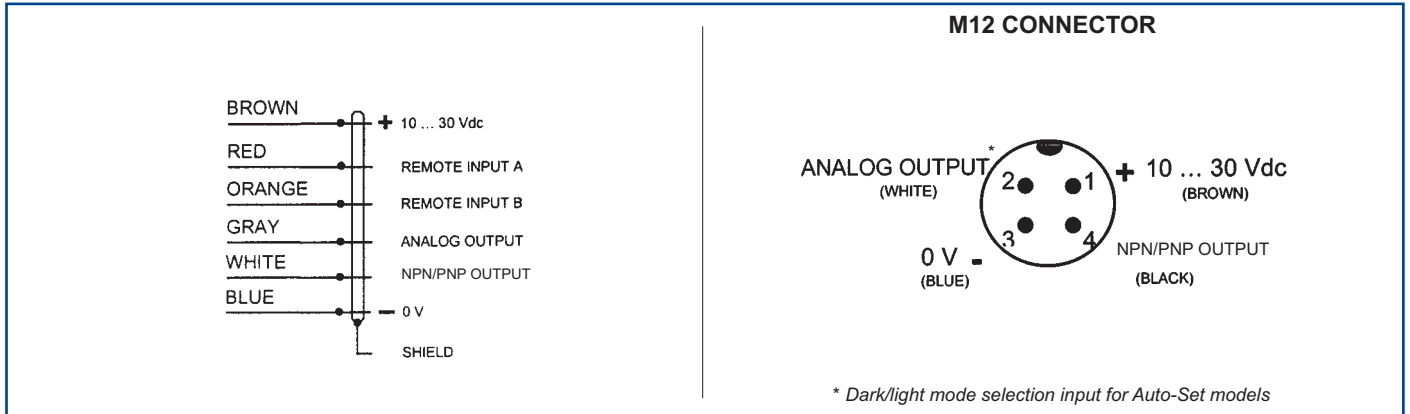
The operating distances indicate the typical detection distance.

## DETECTION DIAGRAMS

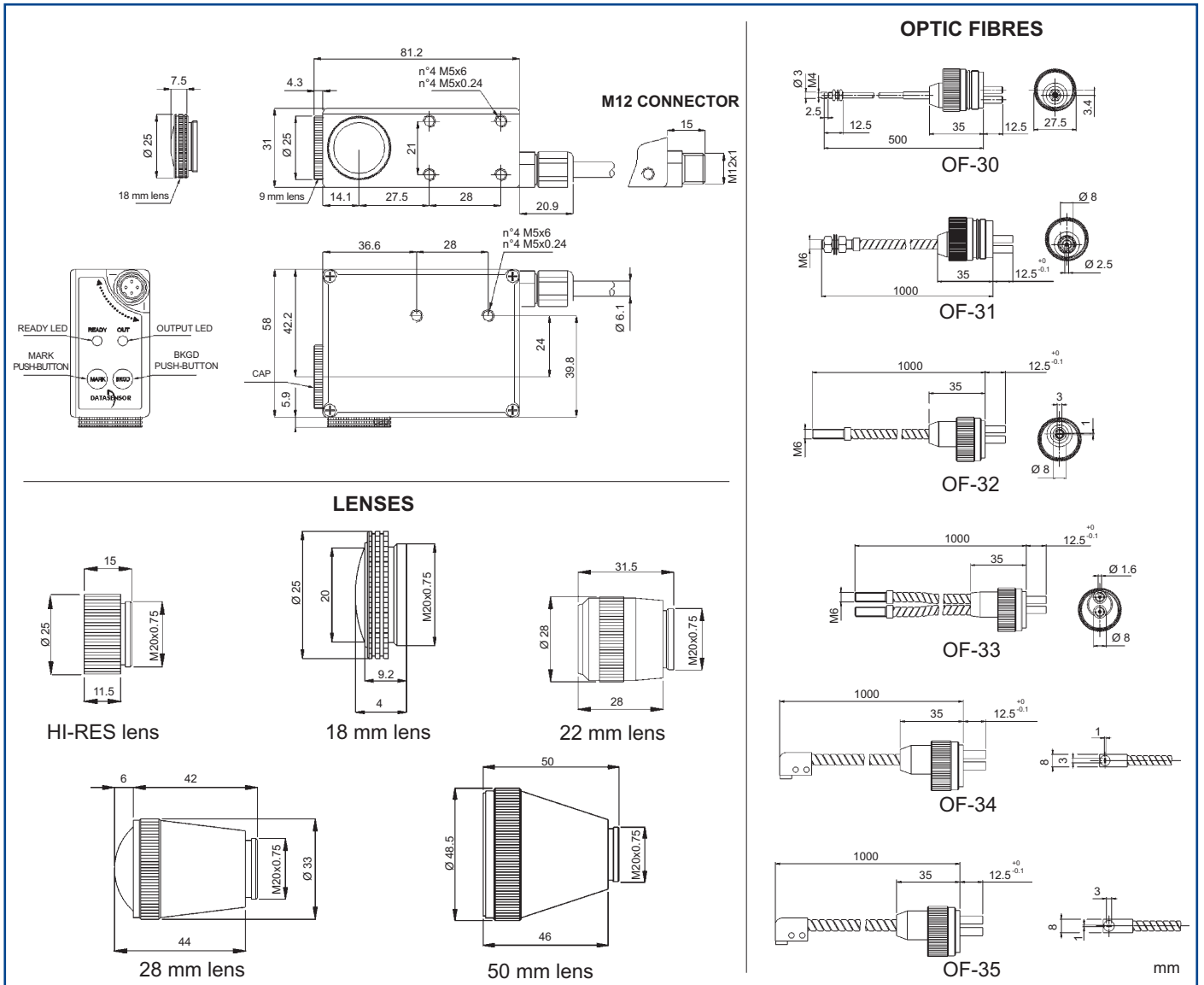


The detection diagrams indicate the typical operating distance.

## CONNECTIONS



## DIMENSIONS



## MODELS

MODEL	EMISSION	SPOT	OPTICS	CONNECTION	OUTPUT	CODE N°
TLμ-011	red/green	vertical	9 mm	cable	NPN	964401000
TLμ-011L	red/green	horizontal	9 mm	cable	NPN	964401010
TLμ-015	red/green	vertical	9 mm	M12 connector	NPN	964401020
TLμ-015L	red/green	horizontal	9 mm	M12 connector	NPN	964401030
TLμ-061	red/green	vertical	18 mm	cable	NPN	964401040
TLμ-065	red/green	vertical	18 mm	M12 connector	NPN	964401060
TLμ-111	red/green	vertical	9 mm	cable	PNP	964401080
TLμ-111L	red/green	horizontal	9 mm	cable	PNP	964401090
TLμ-115	red/green	vertical	9 mm	M12 connector	PNP	964401100
TLμ-115L	red/green	horizontal	9 mm	M12 connector	PNP	964401110
TLμ-161	red/green	vertical	18 mm	cable	PNP	964401120
TLμ-165	red/green	vertical	18 mm	M12 connector	PNP	964401140
TLμ-415C	white	circular	9 mm	M12 connector	NPN	954151330
TLμ-417C (*)	white	circular	9 mm	M12 connector	NPN	954151340
TLμ-445	white	<i>refer to fibres</i>	fibre-optic	M12 connector	NPN	954151350
TLμ-515C	white	circular	9 mm	M12 connector	PNP	954151360
TLμ-517C (*)	white	circular	9 mm	M12 connector	PNP	954151370
TLμ-545	white	<i>refer to fibres</i>	fibre-optic	M12 connector	PNP	954151380

\* Automatic dynamic setting with 'Auto-Set' function

## ACCESSORIES

MODEL	DESCRIPTION	CODE N°
Lens Hi-Res	lens with 9 mm focus (*)	95ACC1050
Lens No.18	lens with 18 mm focus	95ACC1030
Lens No.22	lens with 22 mm focus	95ACC1100
Lens No.28	lens with 28 mm focus	890000194
Lens No.50	lens with 50 mm focus	S73030511
OF-30-5	plastic fibre-optic L 50 cm - point-shaped spot proximity	96B001070
OF-31-10	glass fibre-optic L 100 cm - point-shaped spot proximity	96B201000
OF-32-10	glass fibre-optic L 100 cm - rectangular spot proximity	96B211000
OF-33-10	glass fibre-optic L 100 cm - through beam	96B221000
OF-34-10	glass fibre-optic L 100 cm - horizontal spot 90° proximity	96B231000
OF-35-10	glass fibre-optic L 100 cm - vertical spot 90° proximity	96B241000

\* focalising lens to screw between the sensor and the normal 9 mm lens

Please refer also to **Sensor Accessories**

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