

# TL $\mu$



## ALL REGISTRATION MARK DETECTION APPLICATIONS

- Teach-in, Remote settings
- Red/green or white LED emission
- Various interchangeable lenses and fiber-optic models
- Metal housing with orientable optics and connector

### APPLICATIONS

- Packaging and labeling machinery
- Beverage/Food/Cosmetic/Pharmaceutical industries
- Printing machinery

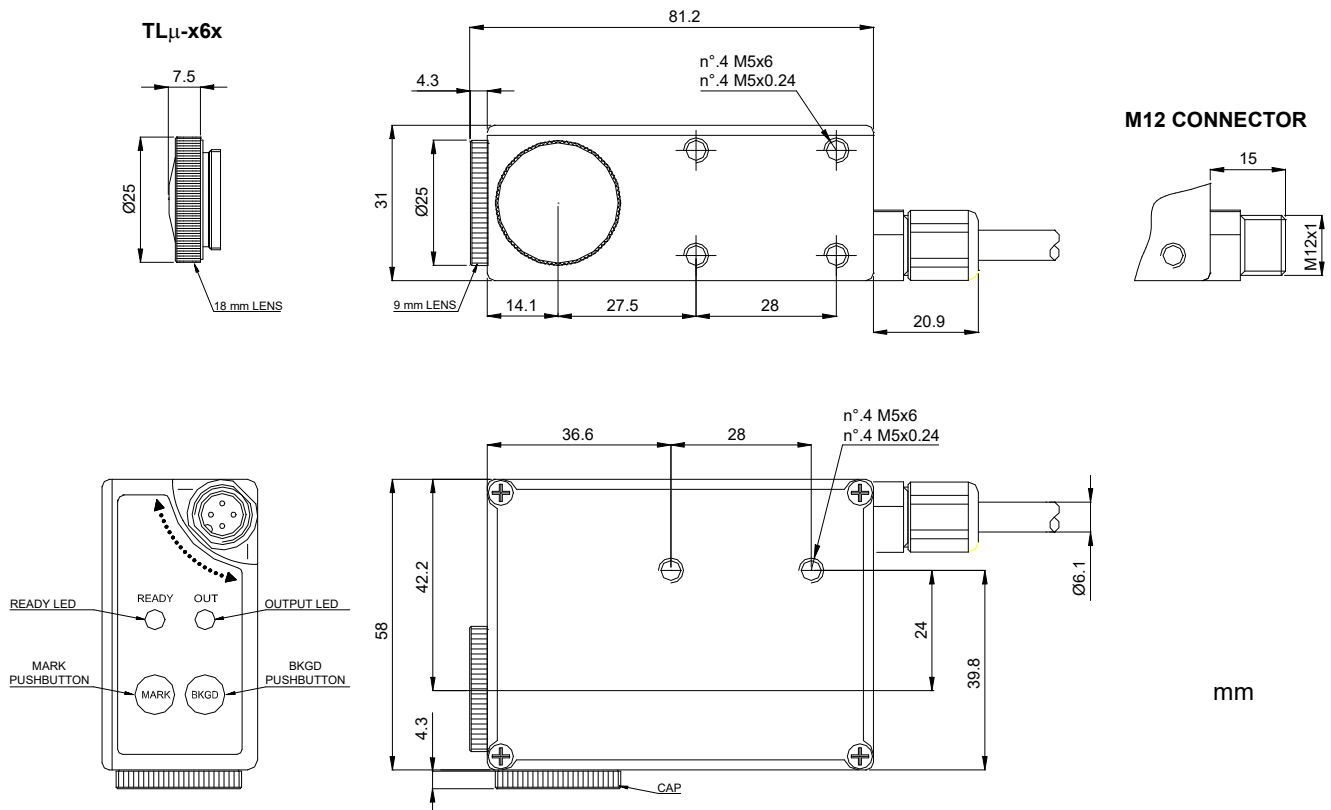


TL $\mu$		
<b>Contrast sensor</b>	6...12 mm (9 mm lens)	
	14...22 mm (18 mm lens)	
	22...34 mm (28 mm lens)	
	40...60 mm (50 mm lens)	
<b>Contrast sensor with fiber optic</b>	0...3 mm (proximity)	
	0...10 mm (through beam)	
<b>Switching frequency</b>	10 kHz	
	20 kHz	
<b>Light emission</b>	red/green LED	
	white LED	
<b>Setting</b>	push buttons	
	remote	
	10...30 V	
<b>Power supply</b>	Vdc	
	Vac	
	Vac/dc	
<b>Output</b>	PNP	•
	NPN	•
	NPN/PNP	
	relay	
	other	0...5 V Analog Output
<b>Connection</b>	cable	•
	connector	•
	pig-tail	
<b>Approximate dimensions (mm)</b>	31x81x58	
<b>Housing material</b>	Zama	
<b>Mechanical protection</b>	IP67	

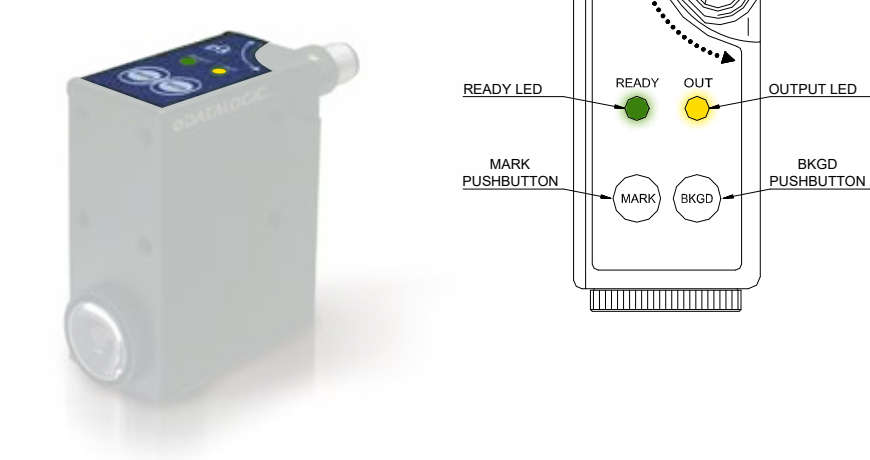
# TECHNICAL DATA

<b>Power supply</b>	10 ... 30 Vdc (limit values; reverse polarity protection)
<b>Ripple</b>	2 Vpp max.
<b>Consumption (output current excluded)</b>	80 mA max.
<b>Light emission</b>	green LED 526 nm/red LED 630 nm (mod. TLμ-0/1xx) white LED 400-700 nm (mod. TLμ-4/5xx)
<b>Setting</b>	teach-in push-buttons/remote by 2 wires, 4 settings storage cable version
<b>Operating mode</b>	Light/Dark automatic setting with teach-in procedure
<b>Indicators</b>	red OUTPUT LED green READY LED
<b>Output</b>	PNP or NPN; analog output
<b>Output current</b>	200 mA max.
<b>Saturation voltage</b>	1 V max. NPN vers., 2 V max. PNP vers.
<b>Response time</b>	50 μs max. (mod. TLμ-4xx) 25 μs max. (mod. TLμ-5xx)
<b>Switching frequency</b>	10 kHz max. (mod. TLμ-4xx) 20 kHz max. (mod. TLμ-5xx)
<b>Connection</b>	3 m shielded cable Ø 6.1 mm, M12 4-pole connector
<b>Dielectric strength</b>	500 Vac, 1 min between electronics and housing
<b>Insulating resistance</b>	>20 MΩ, 500 Vdc between electronics and housing
<b>Electrical protection</b>	class 1
<b>Mechanical protection</b>	IP67
<b>Ambient light rejection</b>	according to EN 60947-5-2
<b>Vibrations</b>	0,5 mm amplitude, 10 ... 55 Hz frequency, for every axis (EN60068-2-6)
<b>Shock resistance</b>	11 ms (30 G) 6 shock for every axis (EN60068-2-27)
<b>Minimum spot dimension</b>	1,5 x 5 mm (TLμ-x1x), 2 x 7 mm (TLμ-x6x), Ø 3 mm (TLμ-4xx/5xx)
<b>Depth of field</b>	± 3 mm (TLμ-x1x/4xx/5xx) / ± 4 mm (TLμ-x6x)
<b>Housing material</b>	ZAMA
<b>Lens material</b>	glass
<b>Operating temperature</b>	-10 ... 55 °C
<b>Storage temperature</b>	-20 ... 70 °C
<b>Weight</b>	450 g max. cable vers., 310 g max. connector vers.

# DIMENSIONS

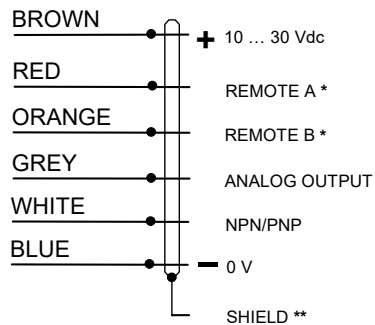


# INDICATORS AND SETTINGS



# CONNECTIONS

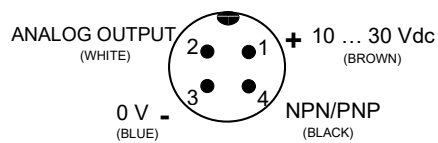
## CABLE



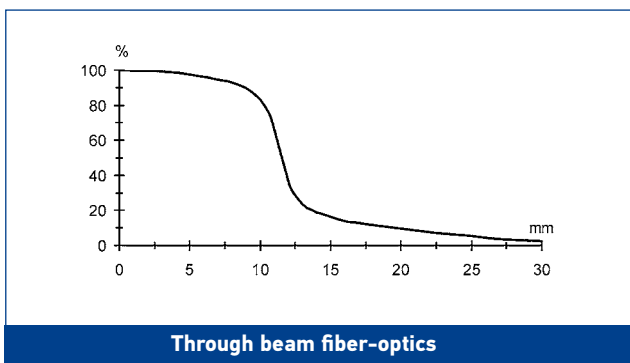
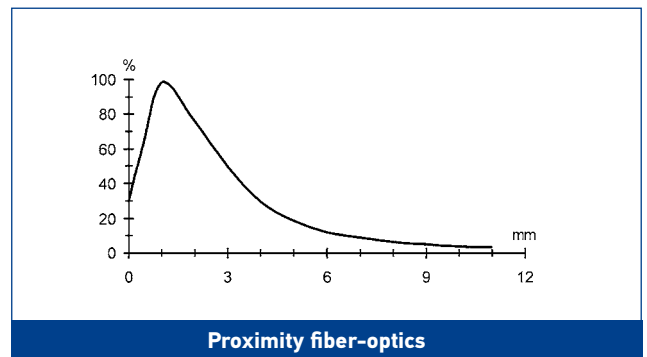
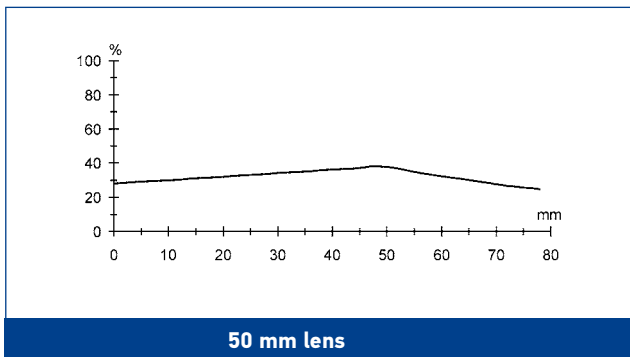
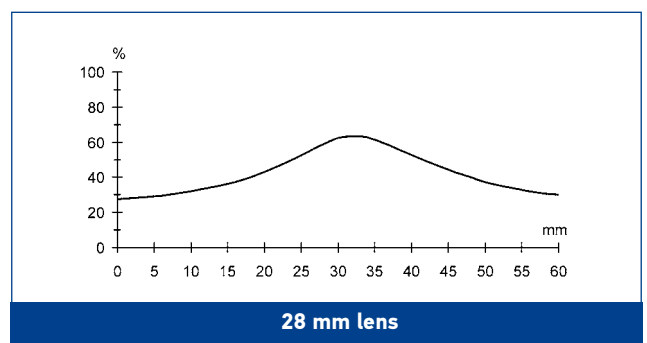
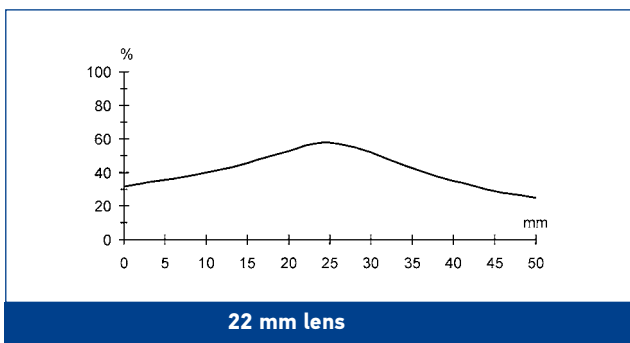
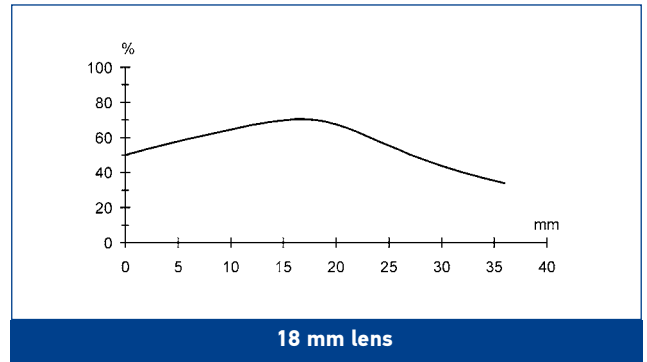
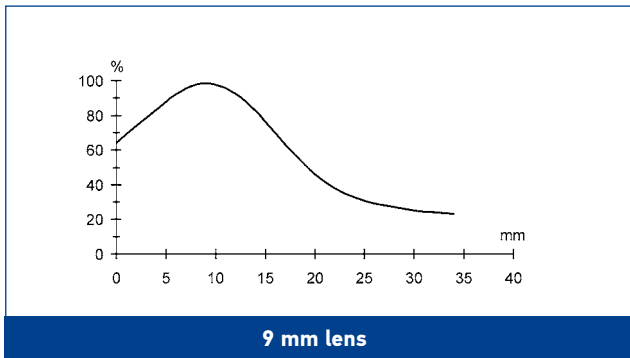
\* = Connect the unused REMOTE wires to 0 V.

\*\* = The cable shield is insulated from the sensor housing; it is recommended to connect the shield to 0 V.

## M12 CONNECTOR



# DETECTION DIAGRAMS



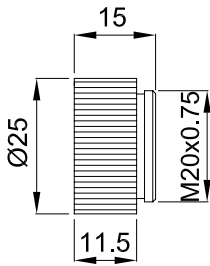
The detection diagrams indicate the typical operating distance.

# MODEL SELECTION AND ORDER INFORMATION

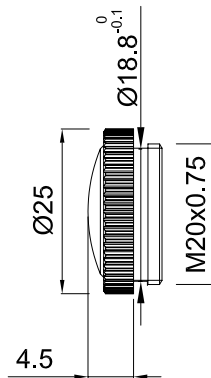
OPTIC FUNCTION	EMISSION	OPTICS	CONNECTION	OUTPUT	MODEL	ORDER No.
Contrast sensor	Red/Green (Vertical spot)	9 mm	3m Cable	NPN	TLμ-011	964401000
				PNP	TLμ-111	964401080
			M12 Connector	NPN	TLμ-015	964401020
				PNP	TLμ-115	964401100
			3m Cable	NPN	TLμ-011L	964401010
				PNP	TLμ-111L	964401090
	M12 Connector	NPN	TLμ-015L	964401030		
		PNP	TLμ-115L	964401110		
	Red/Green (Horizontal spot)	18 mm	M12 Connector	NPN	TLμ-065	964401060
				PNP	TLμ-165	964401140
	White (Circular spot)	9 mm	M12 Connector	NPN	TLμ-415C	954151330
				PNP	TLμ-515C	954151360
3m Cable			NPN	TLμ-411C	954151410	
			PNP	TLμ-511C	954151420	
M12 Connector			PNP	TLμ-545	954151380	
			NPN	TLμ-445	954151350	
Fiber optic contrast sensor	White	Fiber optics	M12 Connector			

## ACCESSORIES

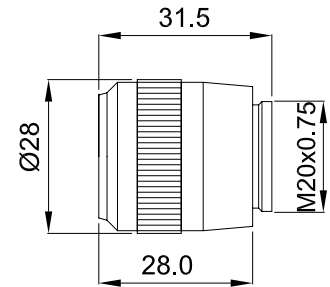
HI-RES LENS



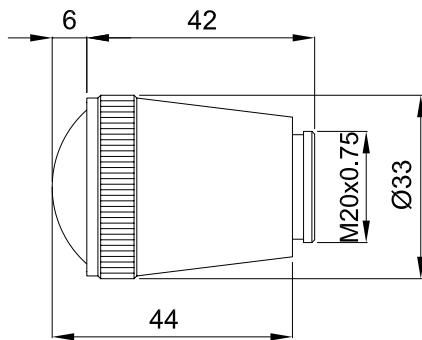
18 mm LENS



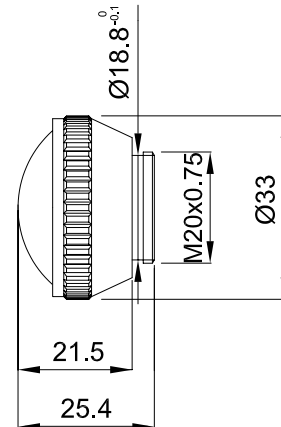
22 mm LENS



28 mm LENS



40 mm LENS



MODEL	DESCRIPTION	ORDER No.
Lens Hi-Res	additional focussing glass lens with 9 mm focus (*)	95ACC1050
Lens No.18	glass lens with 18 mm focus	95ACC2680
Lens No.22	glass lens with 22 mm focus	95ACC1100
Lens No.28	glass lens with 28 mm focus	890000194
Lens No.40	glass lens with 40 mm focus	95ACC2740
Lens No.50	glass lens with 50 mm focus	S73030511
OF -30-5	plastic fiber-optic L 50 cm - point-shaped spot proximity	96B001070
OF -31-10	glass fiber-optic L 100 cm - point-shaped spot proximity	96B201000
OF -32-10	glass fiber-optic L 100 cm - rectangular spot proximity	96B211000
OF -33-10	glass fiber-optic L 100 cm - through beam	96B221000
OF -34-10	glass fiber-optic L 100 cm - horizontal spot 90° proximity	96B231000
OF -35-10	glass fiber-optic L 100 cm - vertical spot 90° proximity	96B24100

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

## CABLES

TYPE	DESCRIPTION	LENGTH	MODEL	ORDER No.
Axial M12 Connector	4-pole, grey, P.V.C.	3 m	CS-A1-02-G-03	95A251380
		5 m	CS-A1-02-G-05	95A251270
		7 m	CS-A1-02-G-07	95A251280
		10 m	CS-A1-02-G-10	95A251390
	4-pole, P.U.R.	2 m	CS-A1-02-R-02	95A251540
		5 m	CS-A1-02-R-05	95A251560
Radial M12 Connector	4-pole, grey, P.V.C.	3 m	CS-A2-02-G-03	95A251360
		5 m	CS-A2-02-G-05	95A251240
		7 m	CS-A2-02-G-07	95A251245
		10 m	CS-A2-02-G-10	95A251260
	4-pole, P.U.R.	2 m	CS-A2-02-R-02	95A251550
		5 m	CS-A2-02-R-05	95A251570
Axial M12 Connector	4-pole, shielded, black, P.V.C.	3 m	CV-A1-22-B-03	95ACC1480
		5 m	CV-A1-22-B-05	95ACC1490
		10 m	CV-A1-22-B-10	95ACC1500
		15 m	CV-A1-22-B-15	95ACC2070
25 m		CV-A1-22-B-25	95ACC2090	
Radial M12 Connector		3 m	CV-A2-22-B-03	95ACC1540
		5 m	CV-A2-22-B-05	95ACC1550
		10 m	CV-A2-22-B-10	95ACC1560
Axial M12 Connector	4-pole, U.L., black, P.V.C.	3 m	CS-A1-02-U-03	95ASE1120
		5 m	CS-A1-02-U-05	95ASE1130
		10 m	CS-A1-02-U-10	95ASE1140
		15 m	CS-A1-02-U-15	95ASE1150
		25 m	CS-A1-02-U-25	95ASE1160
Radial M12 Connector	4-pole, black	Connector- not cabled	CS-A1-02-B-NC	G5085002
		Connector- not cabled	CS-A2-02-B-NC	G5085003

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