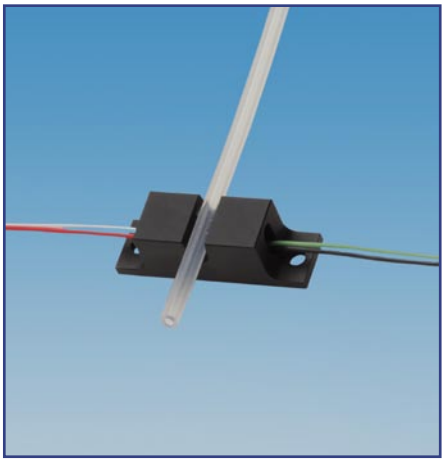
TSB-L

- **Precision tube sensors from STM detect liquid media in transparent tubes with high accuracy**
- **The built-in STM microoptics guarantee very good resolution and extraordinary repeatability for volume determination**
- **With open wire ends - for use on individual electronics**
- **High precision without extensive optical adjustment**
- **Also applicable for small bubbles detection**
- **Customizing to individual dimensions possible**



PRECISION TUBE SENSOR for liquid detection

TECHNICAL DATA

Type	TSB-L16R	TSB-L32R	TSB-L46R	TSB-L62R
Tube diameter	1,6mm (1/16")	3,2mm (1/8")	4,8mm (3/16")	6,4mm (1/4")
Light type	visible red 665nm			
Functional principle	refraction			
Housing material	aluminium, black anodized			
Operating temperature	-10°C / +60°C			
Protection class	IP54			
Connection	4 x AWG26, PTFE coated, 100mm length			

ELECTRONICAL VALUES LED (at T=25°C)

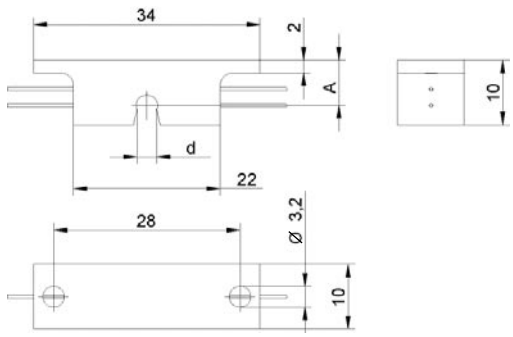
Parameter	Test conditions	typ. values	Unit
Max. forward current		100	mA
Forward voltage (V_F)	I_F = 20mA	2,4	V
Pulse current (I_{FM})	t_P = 70µs, t_P/T = 0,143	180 - 200	mA
Reverse current (I_R)	V_R = 5V	10	µA
Rise- and fall time	I_F = 20mA	25 15	ns

ELECTRONICAL VALUES PHOTOTRANSISTOR (at T=25°C)

Parameter	Test conditions	typ. values	Unit
Dark current (I_{ceo})	V_{ce} = 20V	< 25	nA
Current gain (hfe)		650	
Collector-emitter-Voltage (V_{ce})		35	V
Max. collector current (I_{cmax})		10	mA
Capacitance (C_{ce})	U_{ce} = 0, E = 0, f = 1MHz	8	pF

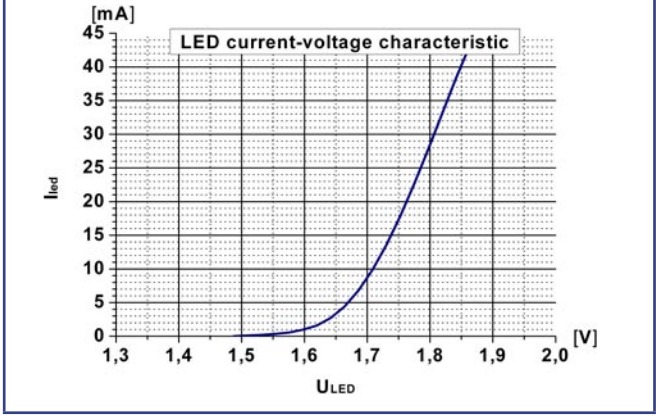
TSB-L

DIMENSIONS Measurements in mm. Subject to technical change.



	TSB-L16R	TSB-L32R	TSB-L46R	TSB-L62R
d :	1,6mm	3,2mm	4,8mm	6,4mm
A :	4mm	4mm	4mm	4mm

GRAPHS



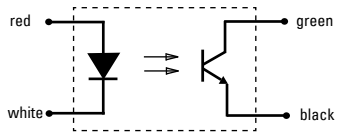
MODE OF OPERATION

STM precision tube sensors type TSB utilize primarily the different refraction of light in the air or liquid column inside of the tube. They therefore work very reliably with transpartent liquids.

The intergrated STM microoptics allow a very accurate detection of the air-liquid boundary surface. Due to the high repeatability of the signal the TSB tube sensors are the perfect device for exact volume determination in tubes and pipes.

The optical properties of the tube and its wall thickness can influence the range of the emerging signal strengths.

EQUIVALENT CIRCUIT DIAGRAM



PART DESIGNATION

Wires
T : PTFE coated, AWG 26
special on request

Wire ends
99 : stripped, tinned
special on request

Length
Standard 0,1m (emitter and receiver side)
for special wire lengths (specification in [m])

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ORDERING EXAMPLE

TSB - L32R - T - 99 : 0,1m = Tube sensor TSB - tube diameter 3,2mm - PTFE coated wires - standard length 0,1m