Model Number
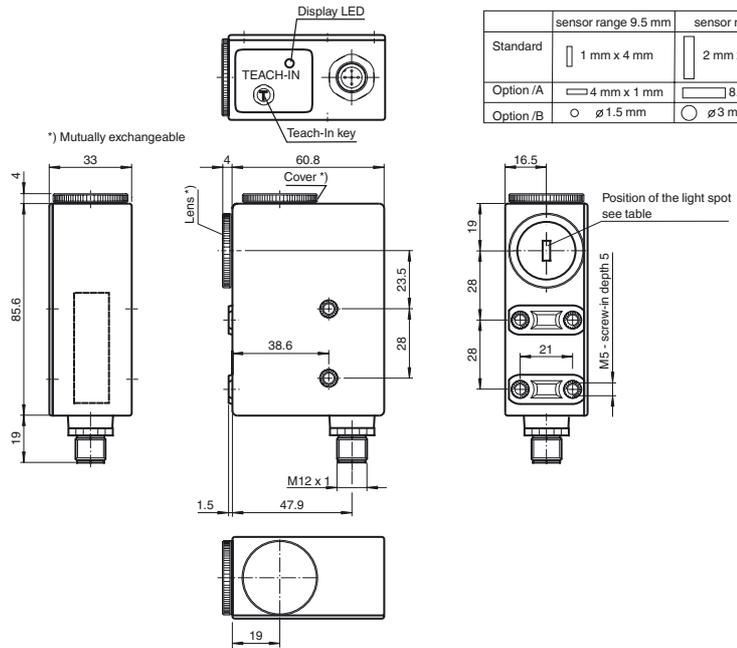
DF20/35A/49/124
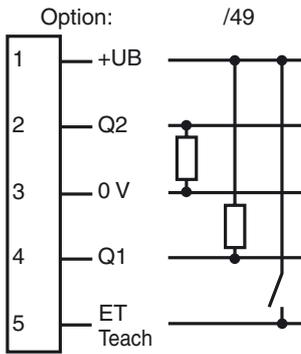
Print mark color sensor

with 5-pin, M12 x 1 connector

Features

- Diffuse mode sensor for recording colored print marks on backgrounds with different colors
- TEACH-IN procedure for automatic threshold value setting
- 3 emitter colors: green, red and blue
- Very short response time
- Optical system exchangeable by 90°
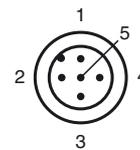- Sturdy, waterproof plastic housing

Dimensions

	sensor range 9.5 mm	sensor range 25 mm
Standard	1 mm x 4 mm	2 mm x 8.5 mm
Option /A	4 mm x 1 mm	8.5 mm x 2 mm
Option /B	⌀ 1.5 mm	⌀ 3 mm

Electrical connection

Option: /49

1	+UB
2	Q2
3	0 V
4	Q1
5	ET Teach

Pinout

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

Pepperl+Fuchs Group   USA: +1 330 486 0001   Germany: +49 621 776 4411   Singapore: +65 6779 9091
www.pepperl-fuchs.com   fa-info@us.pepperl-fuchs.com   fa-info@de.pepperl-fuchs.com   fa-info@sg.pepperl-fuchs.com

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Technical data

General specifications

Sensor range	25 mm ± 4mm
Light source	3 LEDs (R,G,B)
Light type	Visible green/red/blue, modulated light
Light spot representation	rectangular 2 mm x 8.5 mm
Angle deviation	max. ± 3°

Functional safety related parameters

$MTTF_d$	650 a
Mission Time (T_M)	20 a
Diagnostic Coverage (DC)	0 %

Indicators/operating means

Function indicator	LED yellow, lights up if print mark is detected flashes, if no safe operation is possible
Control elements	Teach-In key

Electrical specifications

Operating voltage	U_B	10 ... 30 V DC
Ripple		10 %
No-load supply current	I_0	≤ 55 mA

Input

Function input	Teach-In input

Output

Switching type	PNP switches according to +U_B, NPN according to 0 V for detected mark
Signal output	1 PNP and 1 NPN short-circuit protected, open collector, synchronized-switching
Switching voltage	PNP: ≥ (+U_B -2.5 V) , NPN: ≤ 1.5 V
Switching current	max. 200 mA
Switching frequency	f	1.65 kHz
Response time	300 µs

Standard conformity

|	
Standards	EN 60947-5-2

Ambient conditions

Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Storage temperature	-20 ... 75 °C (-4 ... 167 °F)

Mechanical specifications

Protection degree	IP67
Connection	M12 x 1 connector, 5-pin
Material	
Housing	PC (glass-fiber-reinforced Makrolon)
Optical face	glass
Mass	200 g

Approvals and certificates

CCC approval	CCC approval / marking not required for products rated ≤36 V
Approvals	CE
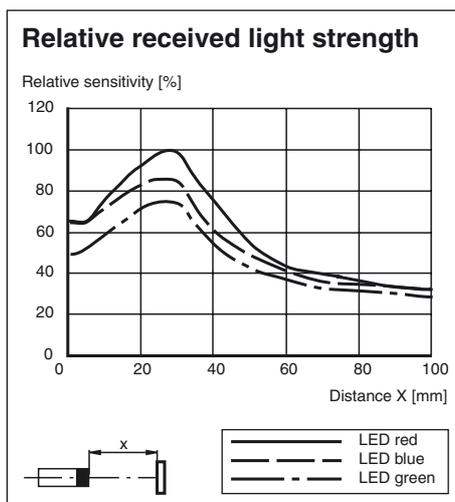
Accessories

V15-G-2M-PUR
Female cordset, M12, 5-pin, PUR cable

V15-W-2M-PUR
Female cordset, M12, 5-pin, PUR cable

Other suitable accessories can be found at www.pepperl-fuchs.com

Relative received light strength

Relative sensitivity [%]

Distance X [mm]

- —— LED red
- – – – LED blue
- –·–·– LED green

Function

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The colour sensor DF 20 operates according to the „active three-range procedure". This means that its three transmission LEDs are switched one after the other and are evaluated individually. The light of the three different emitters is reflected from colored objects with different intensities. The reflected light of the individual emitters causes three different reception signals that are compared with the programmed (teach-in) values. Only if all three values (red, green and blue transmission light) correspond with the teach-in values both the switching outputs and the indicator LED will be activated. The reference values are stored in non-volatile memory and are thus available each time the DF20 is put into operation.

Arrangement

The device is equipped with an exchangeable optical system that can be screwed onto the front or the side of the print mark sensor depending on the application.

Setting

TEACH-IN procedure
Align the light spot to the print mark. For reflective or shiny objects, the sensor should be inclined to the surface of the material by 10° to 15°.
The TEACH-IN key on the device confirms whether a positive pulse (UB+) was present on the external TEACH-In input for at least 50 ms, the DF20 evaluates the reception signals of the individual transmitters and saves these in non-volatile memory.
After the TEACH-IN signal is complete, the DF20 detects the programmed print mark and activates the two switching outputs. The display LED lights statically.

Alarm function
The display-LED of the DF20 flashes if no evaluation of the colour programmed with TEACH-IN is possible. You can return to switching operation by pressing a key or by using an external TEACH-IN signal.

Emitter test function
If an emitter test function needs to be performed, the TEACH-IN key must be held down while voltage is applied and then re-leased again.
If the TEACH-IN key is pressed again, the green LED lights up, then the red LED during the next TEACH-IN and after that the blue LED. After testing the 3 transmission LEDs, the TEACH-IN key is pressed one more time and the device is back in switching operation with the last TEACH-IN values. Switching of outputs is suppressed in direct detection mode.

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