

# Print mark contrast sensor

## DK20/49



- Diffuse mode sensor for recording any print mark
- Static TEACH-IN: automatic switching threshold adaptation
- Optical system exchangeable by 90°
- 30 µs response time, suitable for extremely rapid scanning processes
- 3 emitter colors: green, red and blue

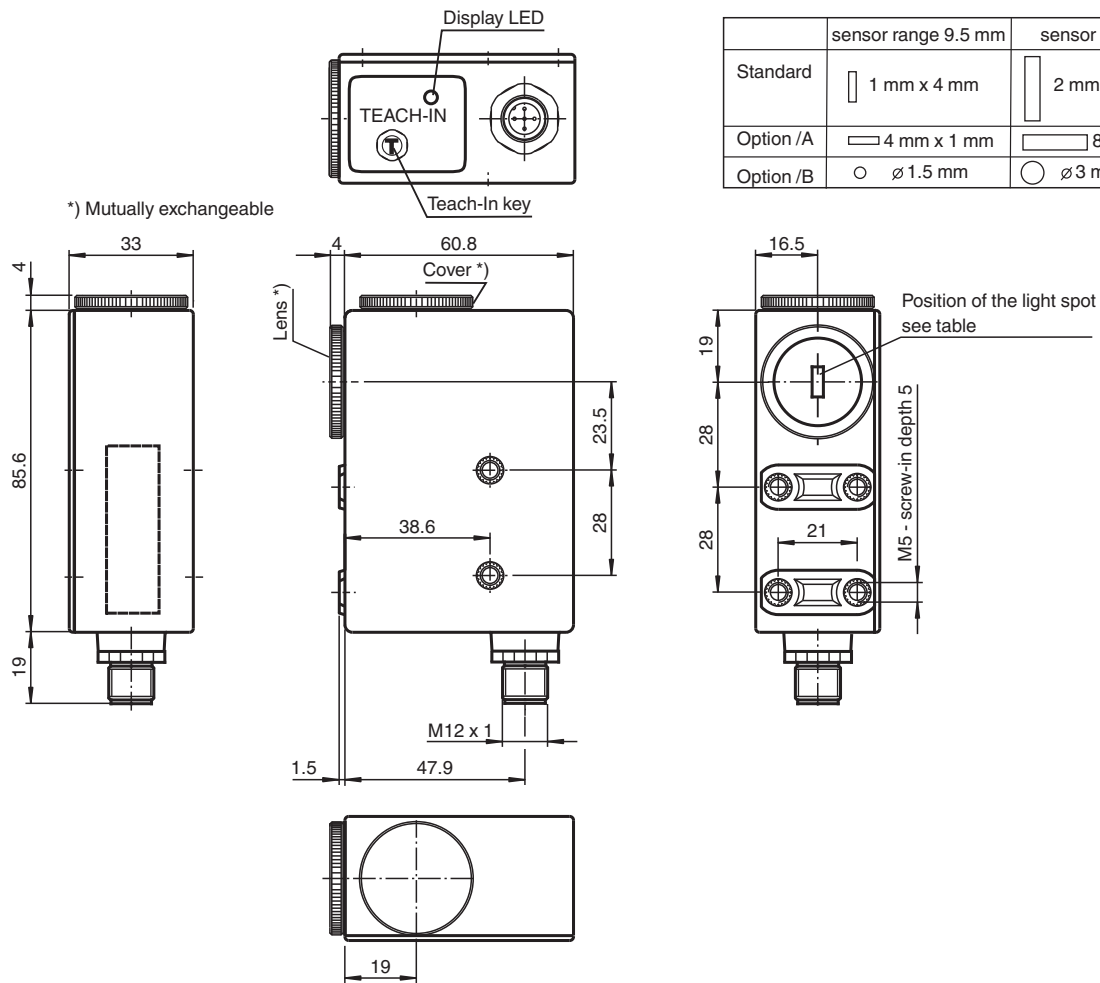
Print mark contrast sensor, 9.5 mm detection range, RGB light, light/dark on, external Teach-in, NPN output, PNP output, M12 plug



### Function

The contrast sensor series DK10, DK2X, DKE2X and DK3X have an extreme robust and IP67 tight industrial standard housing with eight M5 metal reinforced inserts for sensor mounting. The lenses are made of high grade glass. All sensors offer different light spot shapes and orientations and have powerful push-pull outputs (NPN/PNP/push-pull).  
The DK10 sensor series offers laser and LED light sources, a manual sensitivity adjustment and high sensing ranges up to 800 mm.  
The DK20/DK21/DKE2X standard contrast sensor series offers a very good contrast recognition and are available in extreme robust stainless-steel housings (DKE).  
The DK31/DK34/DK35 sensor series is designed for cutting edge contrast recognition at highest sensitivity level.  
The series DK20/DK34 offer a static Teach-In, the DK21/DKE21/DK31/DK35 series offer a dynamic Teach-In.

## Dimensions



## Technical Data

### General specifications

|                           |                                         |
|---------------------------|-----------------------------------------|
| Sensor range              | 9.5 mm ± 3 mm                           |
| Light source              | LED                                     |
| Light type                | Visible green/red/blue, modulated light |
| Light spot representation | rectangular 1 mm x 4 mm ,               |
| Angle deviation           | max. ± 3°                               |
| Ambient light limit       |                                         |
| Continuous light          | 7000 Lux                                |
| Teach-In                  | static Teach-In                         |

### Functional safety related parameters

|                                |       |
|--------------------------------|-------|
| MTTF <sub>d</sub>              | 650 a |
| Mission Time (T <sub>M</sub> ) | 20 a  |
| Diagnostic Coverage (DC)       | 0 %   |

### Indicators/operating means

|                    |                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Function indicator | LED yellow; switching operation: lights up if print mark is detected<br>Teach-In operation: flashing slowly<br>alarm display: flashing quickly, if no safe operation is possible |
| Control elements   | Teach-In key                                                                                                                                                                     |

### Electrical specifications

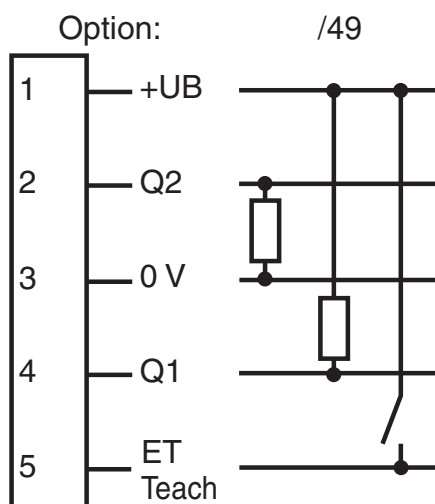
|                        |                |                |
|------------------------|----------------|----------------|
| Operating voltage      | U <sub>B</sub> | 10 ... 30 V DC |
| Ripple                 |                | 10 %           |
| No-load supply current | I <sub>0</sub> | ≤ 70 mA        |

### Input

## Technical Data

|                                                 |                                                                                 |
|-------------------------------------------------|---------------------------------------------------------------------------------|
| Function input                                  | Teach-In input                                                                  |
| <b>Output</b>                                   |                                                                                 |
| Switching type                                  | light/dark on switchable, results from the order of the Teach-In                |
| Signal output                                   | 1 PNP and 1 NPN short-circuit protected, open collector, synchronized-switching |
| Switching voltage                               | PNP: $\geq (+U_B - 2.5 \text{ V})$ , NPN: $\leq 1.5 \text{ V}$                  |
| Switching current                               | max. 200 mA                                                                     |
| Switching frequency                             | f 16.5 kHz                                                                      |
| Response time                                   | 30 $\mu\text{s}$                                                                |
| <b>Conformity</b>                               |                                                                                 |
| Product standard                                | EN 60947-5-2                                                                    |
| <b>Compliance with standards and directives</b> |                                                                                 |
| Standard conformity                             |                                                                                 |
| Shock and impact resistance                     | IEC / EN 60068. half-sine, 40 g in each X, Y and Z directions                   |
| Vibration resistance                            | IEC / EN 60068-2-6. Sinus. 10 -150 Hz, 5 g in each X, Y and Z directions        |
| <b>Approvals and certificates</b>               |                                                                                 |
| EAC conformity                                  | TR CU 020/2011                                                                  |
| UL approval                                     | cULus Listed , Class 2 power source                                             |
| CCC approval                                    | CCC approval / marking not required for products rated $\leq 36 \text{ V}$      |
| <b>Ambient conditions</b>                       |                                                                                 |
| Ambient temperature                             | -20 ... 60 °C (-4 ... 140 °F)                                                   |
| Storage temperature                             | -20 ... 75 °C (-4 ... 167 °F)                                                   |
| <b>Mechanical specifications</b>                |                                                                                 |
| Housing width                                   | 33 mm                                                                           |
| Housing height                                  | 85.6 mm                                                                         |
| Housing depth                                   | 60.8 mm                                                                         |
| Degree of protection                            | IP67                                                                            |
| Connection                                      | 5-pin, M12 x 1 connector                                                        |
| Material                                        |                                                                                 |
| Housing                                         | PC (glass-fiber-reinforced Makrolon)                                            |
| Optical face                                    | glass                                                                           |
| Mass                                            | 200 g                                                                           |

## Connection Assignment



Release date: 2022-03-30 Date of issue: 2022-03-30 Filename: 418085\_eng.pdf

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

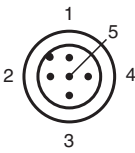
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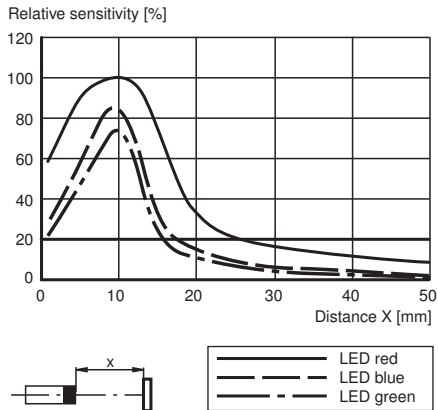
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Connection Assignment



Relative received light strength



Accessories

|  |              |                                                                         |
|--|--------------|-------------------------------------------------------------------------|
|  | V15-G-5M-PVC | Female cordset single-ended M12 straight A-coded, 5-pin, PVC cable grey |
|  | V15-W-5M-PVC | Female cordset single-ended M12 angled A-coded, 5-pin, PVC cable grey   |
|  | OMH-DK       | Right-Angled Mounting Bracket                                           |
|  | OMH-DK-1     | Flat Mounting Bracket                                                   |

## Additional Information

### Construction

This device is supplied with a changeable Lens. By interchanging Lens and cover the sensor is able to be modified from a side-looker to a top-looker and vice versa.

### Adjustment

1. Point the light spot to the print mark. With mirroring or shiny object surface the sensor has to be tilt by  $10^\circ \dots 15^\circ$ .
2. Press Teach-In key at the device or apply a positive pulse (UB+) for at least 50 ms to the external Teach-In input. After finishing this first step, the indicator LED flashes slowly (approx. 1 Hz).
3. Point light spot to the underground/background.
4. Press Teach-In key or apply Teach-In signal once more.
5. If Teach-In successful: sensor in switching mod, LED off.  
Alarme-Function: insufficient contrast. No reliable switching operation possible. Indicator LED flashes fast (approx. 4 Hz)
6. Return to switching mode when pressing key

The switching signal level is set automatically to the middle between print mark and background.

If there is the same contrast between mark and background for various transmitter colours, the sensor selects a transmitter colour by random.

For exact contrast evaluation the DK... , as an option, can be delivered with an additional analogue output.