



## Print mark contrast sensor DK10-LAS/35/49



- Laser print mark contrast sensor for recording very small print marks
- Laser class 2, eyesafe
- Adjustable sensitivity
- 30 µs response time, suitable for extremely rapid scanning processes

Print mark contrast sensor, 800 mm detection range, red laser light, laser class 2, light/dark on, sensitivity adjuster, 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).

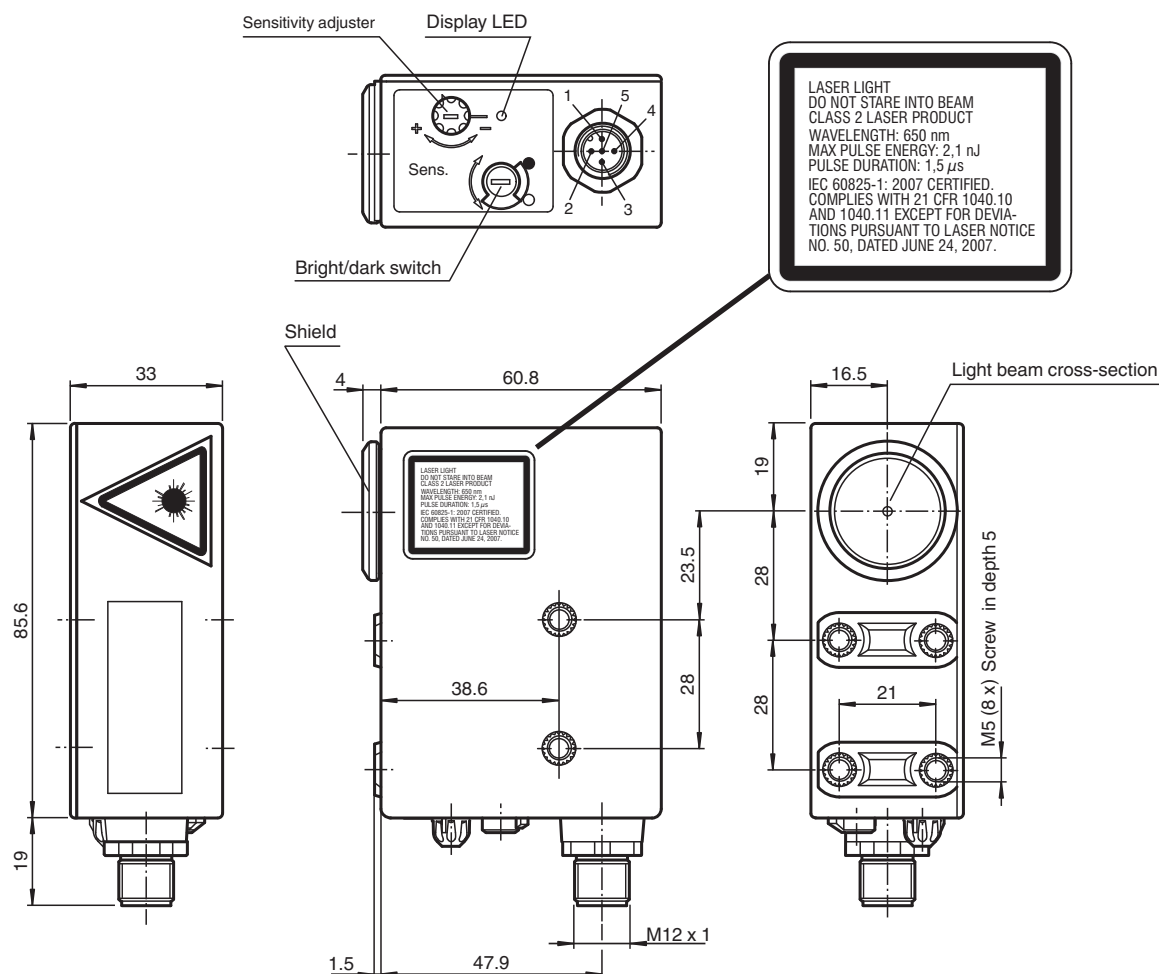
The DK10 sensor series offers laser and LED light sources, a manual sensitivity adjustment and high sensing ranges up to 800 mm.

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

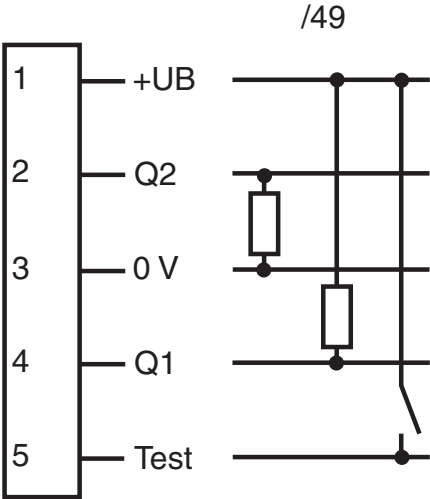
### General specifications

|                                      |                                                                                                 |
|--------------------------------------|-------------------------------------------------------------------------------------------------|
| Sensor range                         | 800 mm                                                                                          |
| Detection range                      | 3 ... 800 mm                                                                                    |
| Light source                         | laser diode                                                                                     |
| Light type                           | modulated visible red light                                                                     |
| Laser nominal ratings                |                                                                                                 |
| Note                                 | LASER LIGHT , DO NOT STARE INTO BEAM                                                            |
| Laser class                          | 2                                                                                               |
| Wave length                          | 650 nm                                                                                          |
| Beam divergence                      | < 1.5 mrad                                                                                      |
| Pulse length                         | 1.5 μs                                                                                          |
| Repetition rate                      | 108.7 kHz                                                                                       |
| max. pulse energy                    | 2.1 nJ                                                                                          |
| Light spot representation            | approx. 2 mm at a distance of 800 mm                                                            |
| Ambient light limit                  |                                                                                                 |
| Continuous light                     | 40000 Lux                                                                                       |
| Functional safety related parameters |                                                                                                 |
| MTTF <sub>d</sub>                    | 550 a                                                                                           |
| Mission Time (T <sub>M</sub> )       | 20 a                                                                                            |
| Diagnostic Coverage (DC)             | 60 %                                                                                            |
| Indicators/operating means           |                                                                                                 |
| Function indicator                   | LED yellow: lights up if receiver is lit (light on), lights up if receiver is not lit (dark on) |

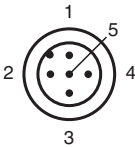
## Technical Data

|                                                 |       |                                                                                 |
|-------------------------------------------------|-------|---------------------------------------------------------------------------------|
| Control elements                                |       | Light-on/dark-on changeover switch, sensitivity adjuster                        |
| <b>Electrical specifications</b>                |       |                                                                                 |
| Operating voltage                               | $U_B$ | 10 ... 30 V DC                                                                  |
| Ripple                                          |       | 10 %                                                                            |
| No-load supply current                          | $I_0$ | $\leq 55$ mA                                                                    |
| <b>Input</b>                                    |       |                                                                                 |
| Test input                                      |       | emitter deactivation with +U <sub>B</sub>                                       |
| <b>Output</b>                                   |       |                                                                                 |
| Switching type                                  |       | light/dark on switchable                                                        |
| Signal output                                   |       | 1 PNP and 1 NPN short-circuit protected, open collector, synchronized-switching |
| Switching voltage                               |       | max. 30 V DC                                                                    |
| Switching current                               |       | max. 200 mA                                                                     |
| Switching frequency                             | f     | 16.5 kHz                                                                        |
| Response time                                   |       | 30 $\mu$ s                                                                      |
| <b>Conformity</b>                               |       |                                                                                 |
| Product standard                                |       | EN 60947-5-2                                                                    |
| Laser safety                                    |       | IEC 60825-1:2007                                                                |
| <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 $\leq 36$ V              |
| <b>Ambient conditions</b>                       |       |                                                                                 |
| Ambient temperature                             |       | -10 ... 50 °C (14 ... 122 °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

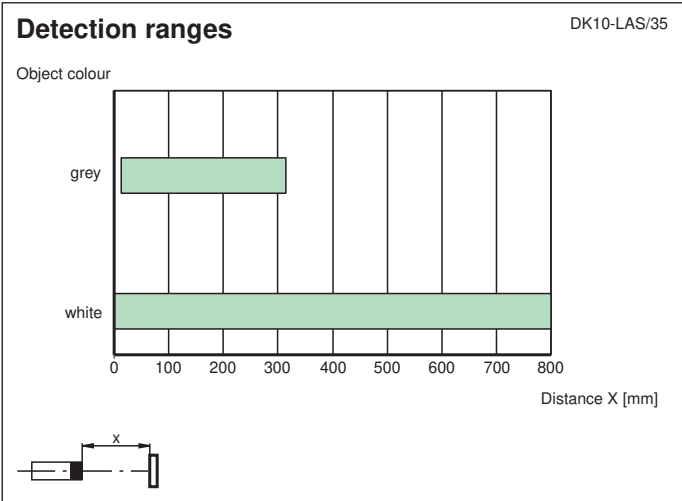


Connection Assignment

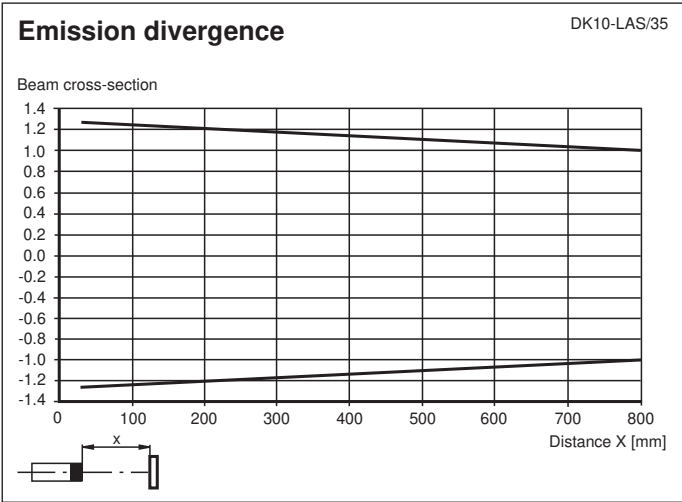


Wire colors in accordance with EN 60947-5-2

|   |    |         |
|---|----|---------|
| 1 | BN | (brown) |
| 2 | WH | (white) |
| 3 | BU | (blue)  |
| 4 | BK | (black) |
| 5 | GY | (gray)  |



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Safety Information

**Laser Class 2 Information**  
The irradiation can lead to irritation especially in a dark environment. Do not point at people!  
Caution: Do not look into the beam!  
Maintenance and repairs should only be carried out by authorized service personnel!  
Attach the device so that the warning is clearly visible and readable.  
Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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                                                   |

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## Adjustment instructions

### Switching threshold adjustment

The required switching threshold is adjusted with the sensitivity control. Please proceed as follows:

1. Switch the light/dark change-over switch to the light setting.
2. Point the light spot at the light part of the surface being scanned.
3. If the yellow indicator LED lights up, turn the sensitivity control to the left until the indicator LED goes off again.  
If the yellow indicator LED does not light up, miss out this step.
4. Turn the sensitivity control to the right until the indicator LED just lights up.
5. Point the light spot at the dark part of the surface being scanned.
6. The indicator LED must have gone off.
7. Turn the sensitivity control to the right again until the indicator LED lights up again. Counting the number of turns.
8. Turn the sensitivity control back to the left by half the number of counted turns.

Once the DK10 colour mark scanner has been adjusted in this way, the switching threshold is exactly in the middle of the measured light and dark values. The greater the number of times the sensitivity control is turned between the light and the dark marks, the greater the contrast.

**Recommendation:** The number of turns should be to  $> 0.5$ .

### Switching mode adjustment:

| Setting of light/dark switch | Receiver  | Output PNP | Output NPN |
|------------------------------|-----------|------------|------------|
| H                            | exposed   | inactive   | active     |
|                              | unexposed | active     | inactive   |
| D                            | exposed   | active     | inactive   |
|                              | unexposed | inactive   | active     |