

# Print mark contrast sensor

## DK10-LAS/9S50/76a/110/124



- Laser print mark contrast sensor for recording very small print marks
- Large focus depth range from 3 mm ... 300 mm
- Laser class 2, eyesafe
- Adjustable sensitivity
- 30 µs response time, suitable for extremely rapid scanning processes
- Time function

Print mark contrast sensor, 300 mm detection range, red laser light, laser class 2, light/dark on, sensitivity adjuster, push-pull output, emitter switch-off, timer function, 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).

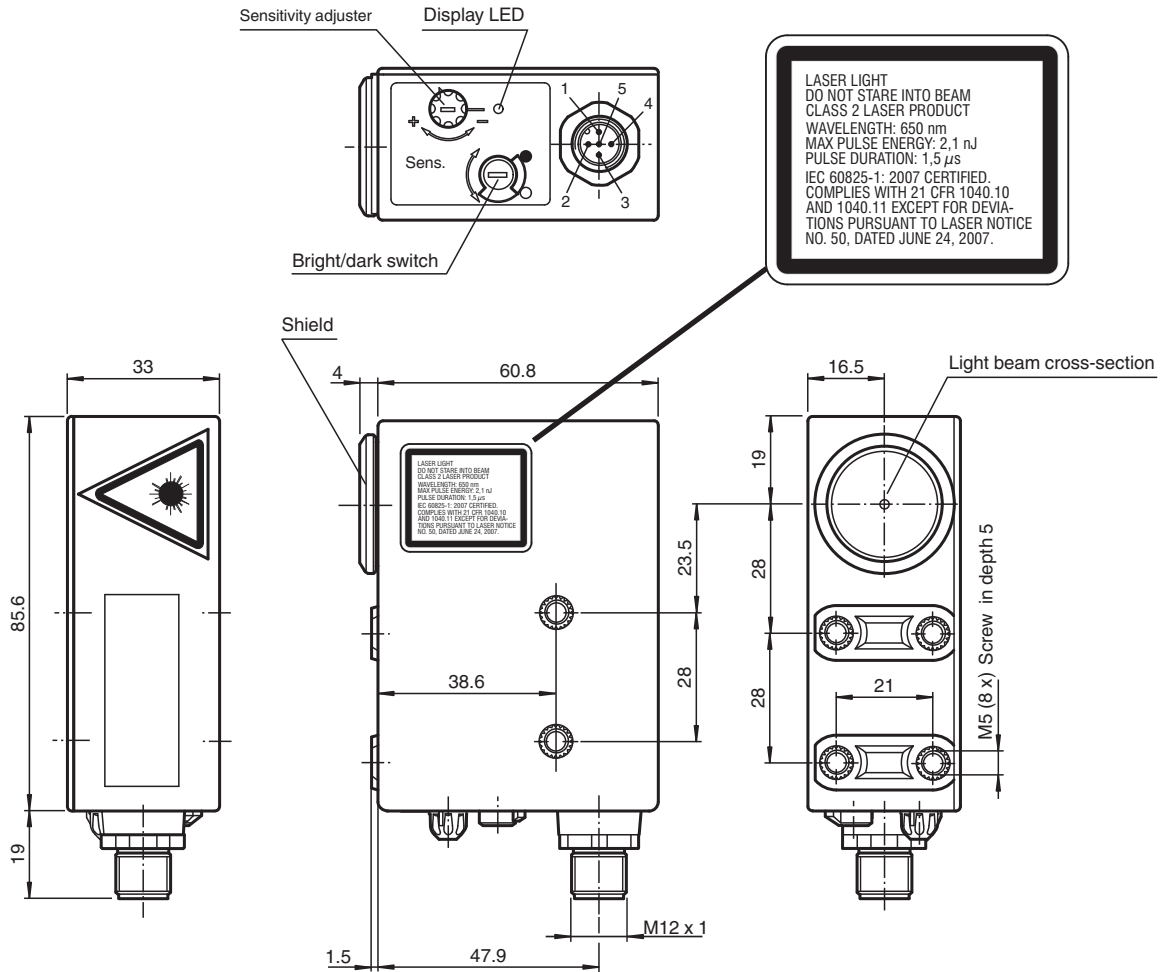
The DK10 sensor series offers laser and LED light sources, a manual sensitivity adjustment and high sensing ranges up to 800 mm.

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	300 mm
Detection range	3 ... 300 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. 0.8 mm at a distance of 300 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)

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## 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	$I_0$	≤ 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		Push-pull output, short-circuit protected, reverse polarity protected
Switching voltage		PNP: $U_B - 2.5 \text{ V}$ / NPN: $U_{\text{Rest}} 1.5 \text{ V}$
Switching current		max. 200 mA
Switching frequency	f	16.5 kHz
Response time		30 μs
Timer function		rising edge , mono stable
Pulse length		50 ms
<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 ≤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

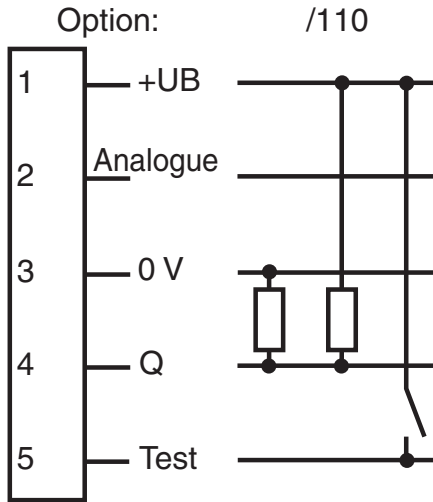
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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

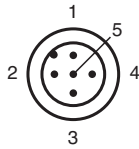
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**PEPPERL+FUCHS**

**Connection Assignment**



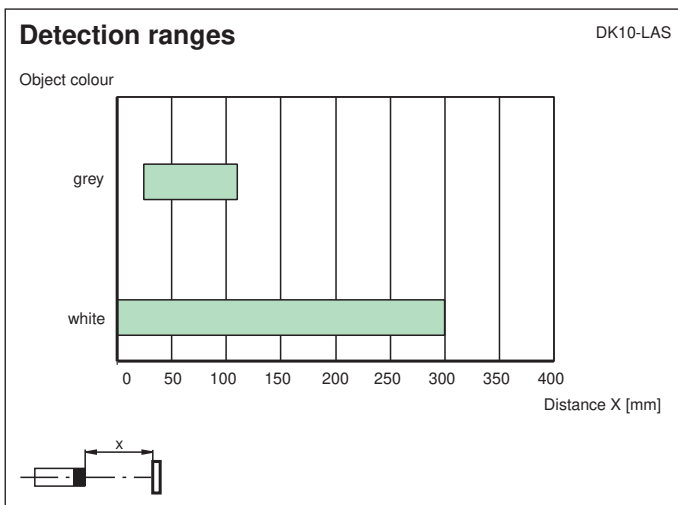
**Connection Assignment**



Wire colors in accordance with EN 60947-5-2

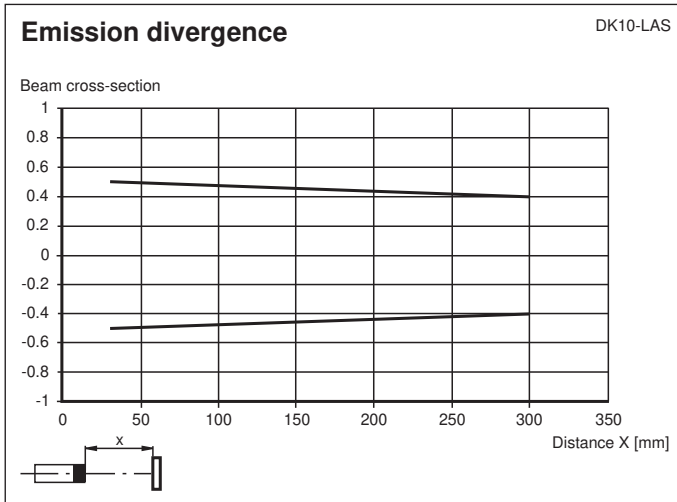
1	BN	(brown)
2	WH	(white)
3	BU	(blue)
4	BK	(black)
5	GY	(gray)

**Characteristic Curve**



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## Characteristic Curve



## 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

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

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