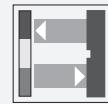




## Print mark contrast sensor

### DK12-11/124/136

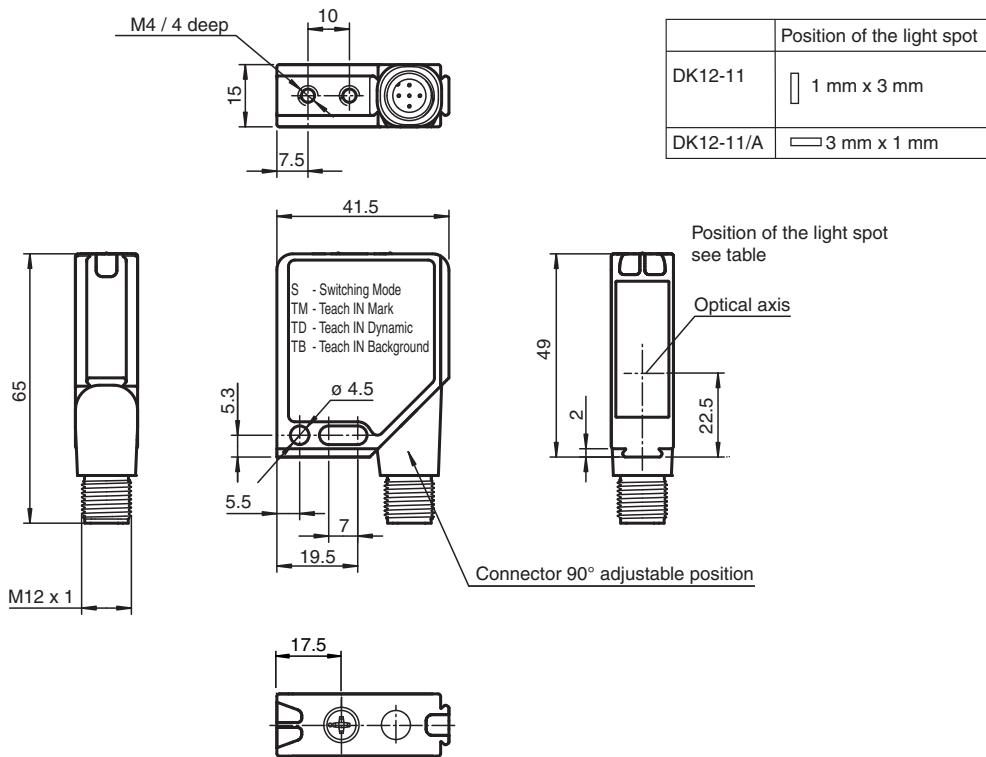


- Diffuse mode sensor for recording any print mark
- TEACH-IN, static and dynamic
- 50  $\mu$ s response time, suitable for extremely rapid scanning processes
- 3 emitter colors: green, red and blue

Print mark contrast sensor, 11 mm detection range, RGB light parallel with the longitudinal direction of the housing, light/dark ON, external Teach-In, 2 push-pull outputs, M12 plug



## Dimensions



## Technical Data

### General specifications

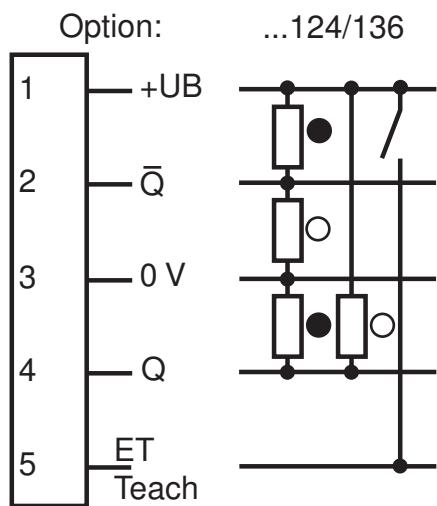
Sensor range

11 mm  $\pm$  2 mm

## Technical Data

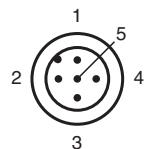
Light source	3 LEDs (R,G,B)
Light type	Visible green/red/blue, modulated light
Light spot representation	1 mm x 3 mm , light spot parallel to housing
Angle deviation	max. $\pm 3^\circ$
Teach-In	static and dynamic Teach-In
<b>Functional safety related parameters</b>	
MTTF <sub>d</sub>	750 a
Mission Time (T <sub>M</sub> )	20 a
Diagnostic Coverage (DC)	60 %
<b>Indicators/operating means</b>	
Operation indicator	LED green, statically lit Power on , short-circuit : LED green flashing (approx. 4 Hz)
Function indicator	2 LEDs yellow, light up in case of detection
Teach-In indicator	Teach-In mark: LED green/yellow equiphase flashing; 2,5 Hz . Teach-In background: LED green/yellow non equiphase flashing; 2,5 Hz . Teach-In dynamic: LED green/yellow equiphase flashing; 1.0 Hz . Teach Error:LED green/yellow non equiphase flashing; 8.0 Hz .
Control elements	Teach-In rotary switch for Switching operation, Teach-In mark, Teach-In background and dynamic Teach-In
<b>Electrical specifications</b>	
Operating voltage	U <sub>B</sub> 10 ... 30 V DC
Ripple	10 %
No-load supply current	I <sub>0</sub> $\leq$ 80 mA
<b>Input</b>	
Function input	Ext. Teach-In input (ET)
<b>Output</b>	
Switching type	light/dark on
Signal output	2 push-pull (4 in 1) outputs, complementary, short-circuit proof, reverse polarity protected
Switching voltage	max. 30 V DC
Switching current	max. 100 mA
Switching frequency	f 10 kHz
Response time	50 $\mu$ s
<b>Conformity</b>	
Product standard	EN 60947-5-2
<b>Approvals and certificates</b>	
EAC conformity	TR CU 020/2011
Protection class	II, rated voltage $\leq$ 250 V AC with pollution degree 1-2 according to IEC 60664-1
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	-20 ... 60 °C (-4 ... 140 °F)
Storage temperature	-40 ... 75 °C (-40 ... 167 °F)
<b>Mechanical specifications</b>	
Housing width	41.5 mm
Housing height	49 mm
Housing depth	15 mm
Degree of protection	IP67
Connection	Metal connector, M12, 5-pin, 90° rotatable
Material	
Housing	Frame: nickel plated, die cast zinc, Laterals: glass-fiber reinforced plastic PC
Optical face	Plastic pane
Mass	60 g

## Connection Assignment



○ = Background  
● = Mark

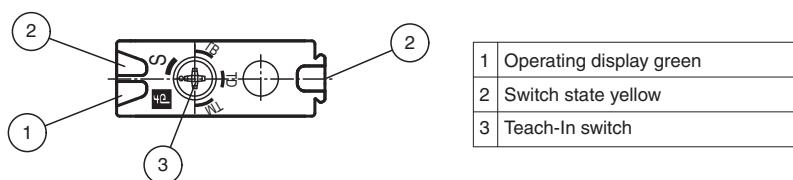
## Connection Assignment

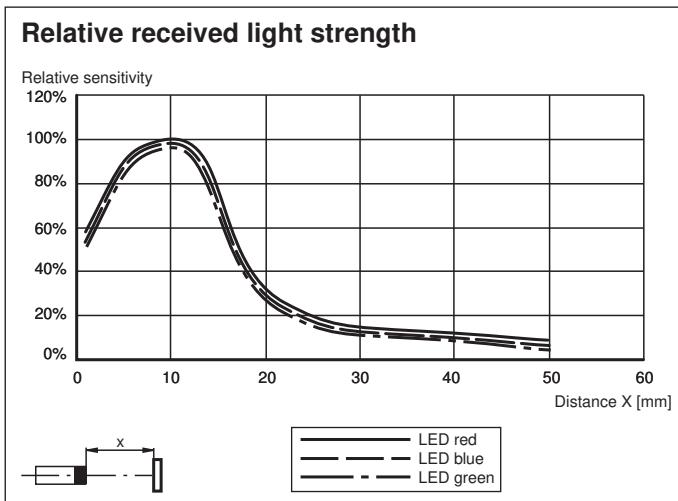


Wire colors in accordance with EN 60947-5-2

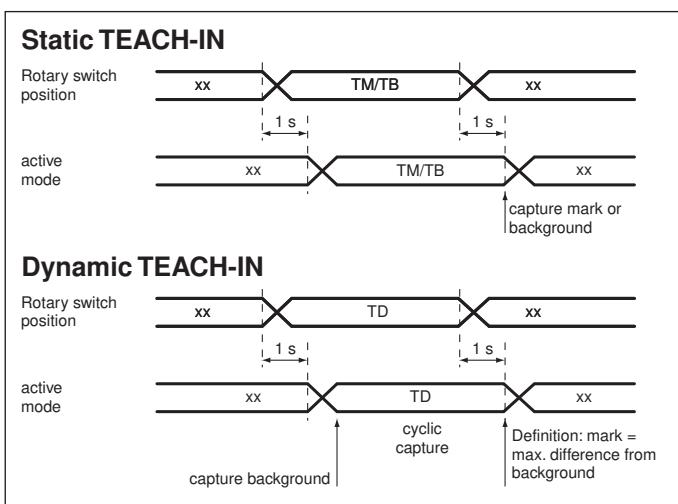
1	BN	(brown)
2	WH	(white)
3	BU	(blue)
4	BK	(black)
5	GY	(gray)

## Assembly





## Characteristic Curve



## Teach-In

If the object surfaces are reflective or shiny, tilt the sensor approximately 10° toward the surface of the material.

**Teach-in via rotary switch:** Teach-in via rotary switch is possible in four positions.

- TM position: Teach-in mark
- TB position: Teach-in background
- TD position: Teach-in dynamic
- S position: Switching mode

To change the switch position, a time lock of approximately 1 second must be adhered to in each case. This means that the rotary switch must remain in a new position constantly for 1 second in order for the sensor to accept the required mode. The mode can be identified by the how the flashing function of the signal indicators changes.

**Static teach-in (TM/TB):** The mark or the background can be taught-in in static teach-in mode, either together (in any order) or separately. Therefore it is not mandatory to always teach-in the mark and the background.

- **TM position:** The teach-in procedure starts. Continuous value transfer takes place, and the color of the scanned object can be changed. When leaving TM position, the sensor assumes the last value. In "teach-in mark" mode, the green and yellow signal indicators flash simultaneously at  $f = 2.5$  Hz.
- **TB position:** Same functionality as in TM position. In "teach-in background" mode, the green and yellow signal indicators flash alternately at  $f = 2.5$  Hz.

**Teach-in dynamic (TD/S)**

- **TD position:** The teach-in process starts. Continuous value transfer takes place, and the sensor interprets the first recorded signals as a background after entering "dynamic teach-in" mode. For the duration of "dynamic teach-in" mode, the sensor indicates the greatest deviation from the background as a mark. In "teach-in dynamic" mode, the green and yellow signal indicators flash simultaneously at  $f = 1.0$  Hz.
- **S position:** The current teach-in mode is terminated. The received signals of all three emitter light colors for the mark and background are evaluated.

**External teach-in input:** The desired operating mode can be set to switch position S by applying a high pulse with a specific width.

- Teach-in dynamic (TD): 420 ms ... 450 ms
- Teach-in background (TB): 320 ms ... 350 ms
- Teach-in mark (TM): 220 ms ... 250 ms
- Switching mode (S): 120 ms ... 150 ms

The descriptions of the individual operating modes correspond to the teach-in via rotary switch. The function of the rotary switch is deactivated during external teach-in. An external teach-in procedure must be completed with a signal to request switching mode (S).