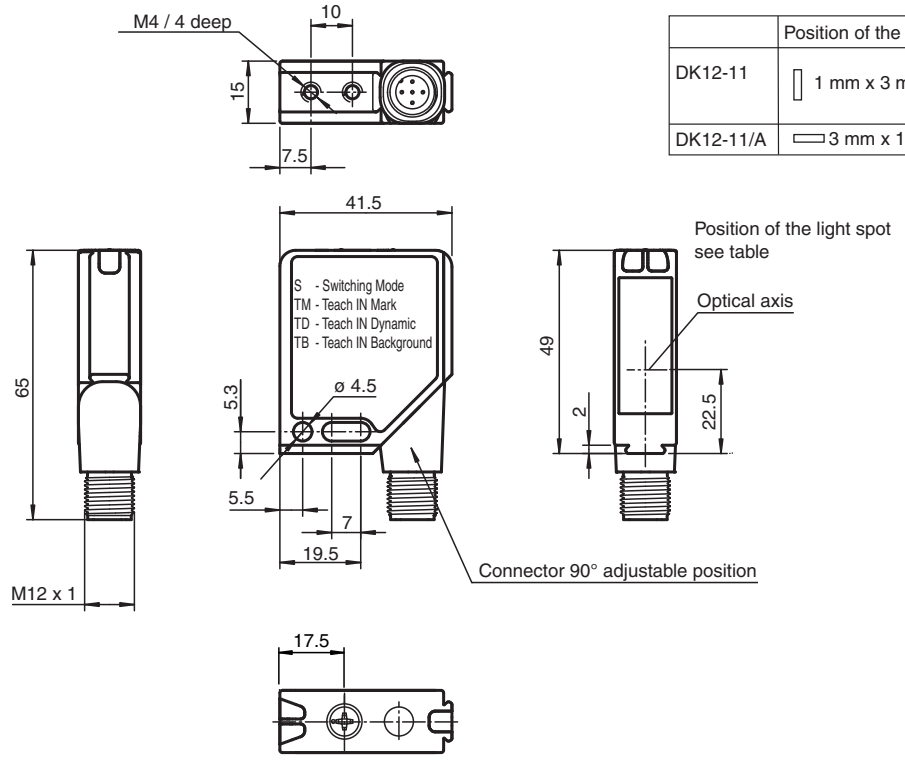
Print mark contrast sensor

DK12-11/A/124/136

- Diffuse mode sensor for recording any print mark
- TEACH-IN, static and dynamic
- 50 µs 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 perpendicular to the longitudinal direction of the housing, light/dark ON, external Teach-In, 2 push-pull outputs, M12 plug

Dimensions



	Position of the light spot
DK12-11	1 mm x 3 mm
DK12-11/A	3 mm x 1 mm

Technical Data

General specifications	
Sensor range	11 mm ± 2 mm

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Technical Data

Light source		3 LEDs (R,G,B)
Light type		Visible green/red/blue, modulated light
Light spot representation		3 mm x 1 mm , light spot perpendicular to housing
Angle deviation		max. ± 3°
Teach-In		static and dynamic Teach-In
Functional safety related parameters		
$MTTF_d$		750 a
Mission Time (T_M)		20 a
Diagnostic Coverage (DC)		60 %
Indicators/operating means		
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
Electrical specifications		
Operating voltage	U_B	10 ... 30 V DC
Ripple		10 %
No-load supply current	I_0	≤ 80 mA
Input		
Function input		Ext. Teach-In input (ET)
Output		
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 µs
Conformity		
Product standard		EN 60947-5-2
Approvals and certificates		
Protection class		II, rated voltage ≤ 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 ≤36 V
Ambient conditions		
Ambient temperature		-20 ... 60 °C (-4 ... 140 °F)
Storage temperature		-40 ... 75 °C (-40 ... 167 °F)
Mechanical specifications		
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

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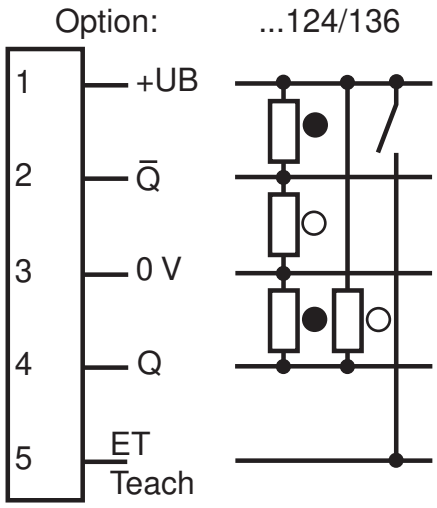
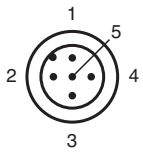
Connection Assignment



○ = Backround
● = Mark

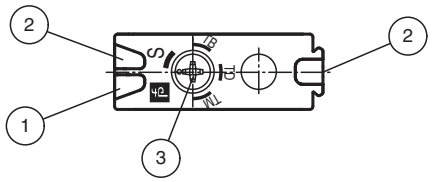
Connection Assignment



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



1	Operating display green
2	Switch state yellow
3	Teach-In switch

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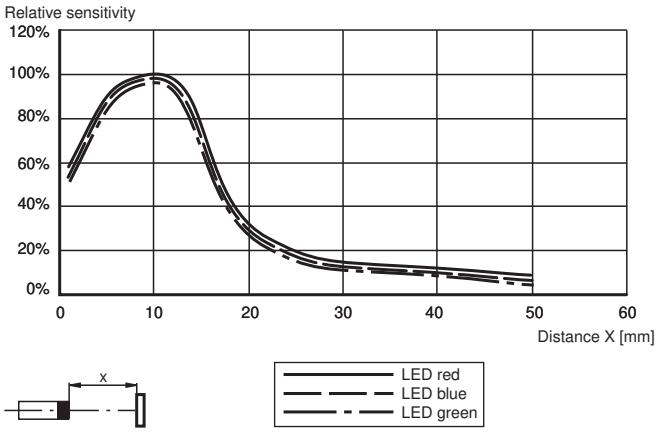
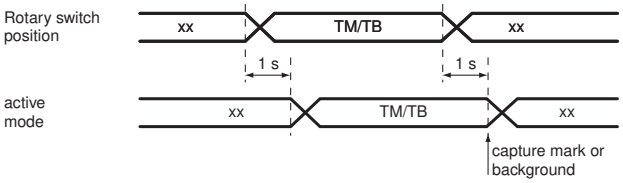
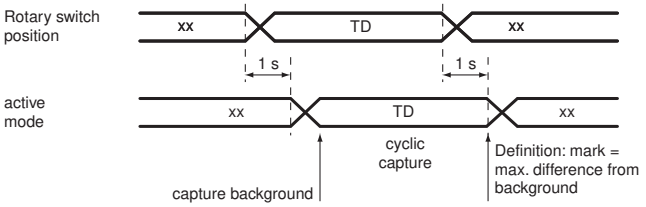
Relative received light strength



Static TEACH-IN



Dynamic TEACH-IN



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).

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