CRT 442 — Colour sensors

Part No. 50109620

12,5 mm

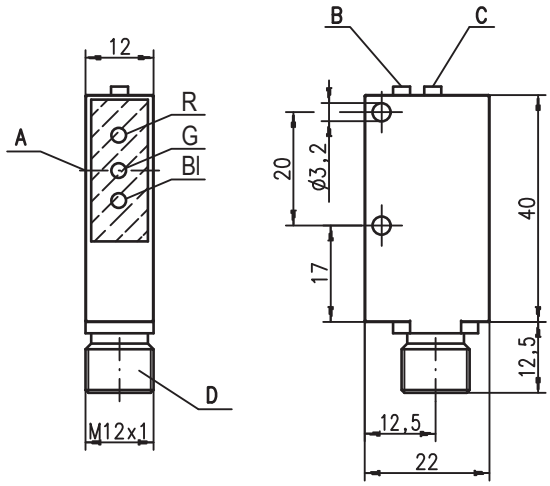
- Scanner for colour detection
- Colour tolerance adjustable in levels
- Static teach-in procedure
- Teach-in via button or control line
- High switching frequency for detection of fast or small objects and marks

Accessories:

(available separately)

- M12 connectors, 4-pin (KD …)
- Ready-made cables (K-D …)

Dimensioned drawing



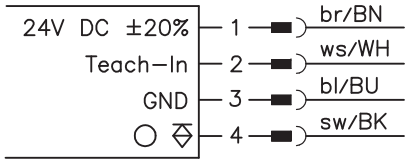
A Centre optical axis
B Indicator diode — illuminates yellow if object detected
C Teach-in button
D Connector, 4-pin M12x1
R Red transmitter LED — rough colour tolerance
G Green transmitter LED — medium colour tolerance
Bl Blue transmitter LED — precise colour tolerance

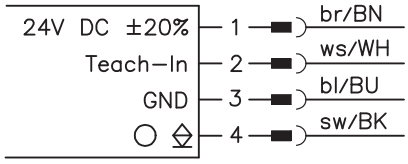
Teaching colour and colour tolerance

- Position the colour mark with the colour to be taught so that the light spot is fully incident on the mark.
- Press the teach-in button **C** for one second
- The transmitter LED now alternates colour in 1 s intervals
- The teach event is triggered by pressing the teach-in button again. The colour tolerance is determined by the colour of the transmitter LED on which the teach-in button is again pressed (red: rough, green: medium, blue: precise).
- Following successful teach-in, the yellow indicator diode **B** illuminates. If the yellow indicator diode **B** and the red transmitter LED **R** flash, the teach event must be repeated with a different colour tolerance.

When teaching-in with the control line, the most recently manually selected colour tolerance is set, this means that the colour tolerance can only be adjusted with the teach-in button.

Electrical connection





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Specifications

Optical data

Scanning range	12.5mm ±2mm
Light source[1)]	LEDs (red, green, blue)
Light spot dimensions	1.5x6.5mm
Light spot orientation	vertical

Timing

Switching frequency[2)]	1500Hz
Response time	500µs
Delay before start-up	≤ 250ms

Electrical data

Operating voltage U_B	24VDC ±20% (incl. residual ripple)
Residual ripple[3)]	≤ 15% of U_B
Open-circuit current	≤ 35mA
Switching output	PNP or NPN
Function characteristics	light switching
Signal voltage high/low	PNP: ≥ (U_B - 2V)/≤ 2V NPN: U_B/≤ 2V
Output current	max. 100mA

Indicators

Yellow indicator LED	object detected
Yellow indicator LED, flashing	error during teach event
Red transmitter LED, flashing	error during teach event
Red transmitter LED	rough colour tolerance
Green transmitter LED	medium colour tolerance
Blue transmitter LED	precise colour tolerance

Mechanical data

Housing	ABS
Optics cover	PMMA
Weight	11g
Connection type	M12 connector, 4-pin

Environmental data

Ambient temp. (operation/storage)	-10°C … +55°C / -20°C … +70°C
Protection class	IP 67
LED class	1 (acc. to EN 60825-1)
VDE safety class [4)]	II, all-insulated
Protective circuit [5)]	2, 3
Standards applied	IEC 60947-5-2
Certifications	UL 508 [6)]

Options

Teach-in input	PNP: ≥ 10V … ≤ U_B NPN: 0V … ≤ 2V

1) Average life expectancy 100,000h at an ambient temperature of 25°C
2) With light-dark ratio 1:1
3) Must lie within U_B ± tolerance
4) Rating voltage 50VDC
5) 2=polarity reversal protection, 3=short-circuit protection for all transistor outputs
6) For UL applications: for use in class 2 circuits according to NEC only

Preferred types

Selection table Equipment ↓	Order code →	CRT 442 K/P-12-001-S12 Part No. 501 09603	CRT 442 K/N-12-001-S12 Part No. 501 09602
Scanning range	12,5mm	●	●
Transmitter colour	RGB	●	●
Light spot orientation	vertical	●	●
	horizontal		
Optical outlet	front	●	●
	head		
Switching output	PNP	●	
	NPN		●
Adjustment	Teach-in via control buttons	●	●
	Teach-in via line, pin 2	●	●

Function principle of the colour sensor

Many sensors are capable of differentiating between light and dark or matt and shiny. As soon as colour is to serve as a distinguishing criterion, however, normal sensors are quickly pushed to their limits. As a result, colour sensors are of increasing importance in industrial automation.
The applications range from sorting coloured objects to the detection or inspection of coloured surfaces. Materials such as powders, granulates, fluids as well as metals, glasses, papers, plastics and textiles can be reliably detected in this way.

Simple operation makes it possible to teach-in the reference colour and to adjust the tolerance range.

During operation, the colour sensor compares the taught-in colour with the measured colour. If the values lie within the set tolerance range, the sensor passes on the match to the controller via a switching output.

Remarks

- **Approved purpose**:
  The CRT 442 colour sensors are optoelectronic sensors and are used for optical, contactless detection of coloured object.
- With shiny objects, the sensor is to be mounted at an angle of approx. 10° to the object surface.