

CONTRAST SENSOR IN STANDARD METAL HOUSING

B




CE 

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Product description

KT5-2 contrast sensors are ideal for high-precision contrast detection, such as detecting marks on high-gloss materials. Thanks to the 3-color LED, the sensors are able to activate the best-possible emitted light source for each contrast. The device also offers various possibilities for adapting the switching point to the application via teach-in process or potentiometer. The sensor defines all necessary parameters automatically. The sensor then determines

the ideal switching threshold from the two gray values detected. High-precision contrast detection, automatic gloss adaptation for highly reflective objects, a sensing distance of 10 mm, 20 mm and 40 mm, switching frequency of 10 kHz and individual alignment and mounting options make the device suitable for a wide range of tasks. Simple mounting is also ensured – the M12 plug connection can be rotated 90°.

At a glance

- Best contrast resolution thanks to RGB LED technology
- Intuitive 10-segment bar display indicates the detection reliability
- Dynamic or static teach-in method or manual potentiometer
- Switching frequency of 10 kHz
- Automatic gloss adjustment for highly reflective materials
- Various sensing distances and light spot directions
- M12 plug can be rotated 90°

Your benefits

- Able to process all packaging materials (yellow mark/white background), resulting in high machine throughput
- Reliable operation, even with jittering and high gloss materials
- High positioning accuracy improves packaging quality
- Simple teach-in and highly visible light spot ensure easy setup
- A range of sensing distances, light spot directions and 90° rotatable plug enables optimal integration
- Interchangeable lenses for maximum mounting flexibility

→ www.sick.com/de/en/KT5

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



Detailed technical data

Features

	KT5-2 Potentiometer	KT5-2 Teach-in	KT5-2 Display
Dimensions (W x H x D)	30,4 mm x 53 mm x 80 mm		
Sensing distance ¹⁾	10 mm / 20 mm / 40 mm / 50 mm (depending on type)	10 mm / 20 mm / 40 mm (depending on type)	
Housing design (light emission)	Rectangular		
Sensing distance tolerance	± 3 mm		
Light source ²⁾	LED		
Type of light	White Green (depending on type)	Green Red RGB	RGB
Light emission	Long and short side of housing, exchangeable		
Function	–	Off delay 20 ms (depending on type)	–
Output function	Light/dark switching adjustable	Light/dark switching (determined Teach-in sequence)	

¹⁾ From front edge of lens.

²⁾ Average service life: 100,000 h at $T_U = +25\text{ °C}$.

Mechanics/electronics

	KT5-2 Potentiometer	KT5-2 Teach-in	KT5-2 Display
Supply voltage ¹⁾	10 V DC ... 30 V DC		
Ripple ²⁾	≤ 5 V _{pp}		
Power consumption ³⁾	< 80 mA		< 130 mA
Switching frequency ⁴⁾	10 kHz		
Response time ⁵⁾	50 μs		
Switching output	PNP: HIGH = $V_S - \leq 2\text{ V}$ / LOW approx. 0 V NPN: HIGH = approx. V_S / LOW ≤ 2 V,		
Output type	PNP / NPN		
Analog output Q_A	0,3 mA ... 10 mA	–	
Output current I_{max}	100 mA ⁶⁾		
Input, teach-in (ET)	–	PNP Teach: $U = 10\text{ V} \dots < U_V$ Run: $U < 2\text{ V}$ NPN Teach: $U < 2\text{ V}$ Run: $U = 10\text{ V} \dots < U_V$	
Input, light/dark (L/D)	–	PNP Light: $U = 0\text{ V}$ Dark: $U > 10\text{ V} \dots < U_V$ NPN: light: $U = U_V$ Dark: $U = 0\text{ V}$ (depending on type)	
Retention time (ET)	–	25 ms, non-volatile memory	
Time delay	20 ms		
Connection type	Connector M12, 4-pin	Connector M12, 5-pin	Connector M12, 5-pin
Protection class	II ⁷⁾	II ⁷⁾ / III (KT5RG)	II ⁷⁾
Circuit protection	V_S connections reverse-polarity protected, Output Q short-circuit protected, Interference suppression		

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	KT5-2 Potentiometer	KT5-2 Teach-in	KT5-2 Display
Enclosure rating	IP 67		
Weight	400 g	-	
Housing material	Metal, zinc diecast		

¹⁾ Limit values; operation in short-circuit protected network max. 8 A.

²⁾ May not exceed or fall below U_v tolerances.

³⁾ Without load.

⁴⁾ With light/dark ratio 1:1.

⁵⁾ Signal transit time with resistive load.

⁶⁾ Short-circuit protected.

⁷⁾ Reference voltage DC 50 V.

Ambient data

	KT5-2 Potentiometer	KT5-2 Teach-in	KT5-2 Display
Ambient operating temperature	-10 °C ... +55 °C		
Ambient storage temperature	-25 °C ... +75 °C		
Shock load	According to IEC 60068		
UL File No.	NRKH.E181493 & NRKH7.E181493		

Ordering information

Other models → www.sick.com/de/en/KT5

KT5-2 Potentiometer, white

- **Wave length:** 450 ... 650 nm
- **Adjustment:** Manual adjustment, potentiometer
- **Connection:** Male connector M12, 4-pin

Sensing distance ¹⁾	Light spot size	Light spot direction ²⁾	Output type	Analog output	Connection diagram	Type	Part no.
10 mm	1.2 mm x 4.2 mm	Vertical	PNP	0.3 mA ... 10 mA	Cd-327	KT5M-2P1151	1044400
			NPN	-	Cd-327	KT5M-2N1111	1048489

¹⁾ From front edge of lens.

²⁾ In relation to long side of housing.

KT5-2 Potentiometer, green

- **Wave length:** 520 nm
- **Adjustment:** Manual adjustment, potentiometer
- **Connection:** Male connector M12, 4-pin

Sensing distance ¹⁾	Light spot size	Light spot direction ²⁾	Output type	Time delay	Connection diagram	Type	Part no.	
10 mm	1.2 mm x 4.2 mm	Vertical	PNP	-	Cd-327	KT5G-2P1111	1015993	
				20 ms	Cd-327	KT5G-2P1121	1015997	
			NPN	-	Cd-327	KT5G-2N1111	1015981	
		20 ms		Cd-327	KT5G-2N1121	1015983		
		Horizontal		PNP	-	Cd-327	KT5G-2P2111	1016008
			20 ms		Cd-327	KT5G-2P2121	1016009	
NPN	-		Cd-327	KT5G-2N2111	1015990			
	20 mm	1.5 mm x 5.5 mm	Vertical	PNP	-	Cd-327	KT5G-2P1211	1015999
20 ms					Cd-327	KT5G-2P1221	1016001	
NPN				-	Cd-327	KT5G-2N1211	1015985	
			Horizontal	PNP	-	Cd-327	KT5G-2P2211	1016010
					20 ms	Cd-327	KT5G-2P2221	1016011
NPN			-	Cd-327	KT5G-2N2211	1015991		
	40 mm	1.1 mm x 4.2 mm	Vertical	PNP	-	Cd-327	KT5G-2P1311	1016003
20 ms					Cd-327	KT5G-2P1321	1016005	
NPN				-	Cd-327	KT5G-2N1311	1015988	
			Horizontal	PNP	-	Cd-327	KT5G-2P2311	1016012
					20 ms	Cd-327	KT5G-2P2321	1016013
NPN			-	Cd-327	KT5G-2N2311	1015992		

¹⁾ From front edge of lens.

²⁾ In relation to long side of housing.

KT5-2 Potentiometer, green, analog output

- **Wave length:** 520 nm
- **Adjustment:** Manual adjustment, potentiometer
- **Analog output:** 0.3 mA ... 10 mA
- **Connection:** Male connector M12, 4-pin

Sensing distance ¹⁾	Light spot size	Light spot direction ²⁾	Output type	Connection diagram	Type	Part no.
10 mm	1.2 mm x 4.2 mm	Vertical	PNP	Cd-327	KT5G-2P1151	1016195
			NPN	Cd-327	KT5G-2N1151	1016385
		Horizontal	PNP	Cd-327	KT5G-2P2151	1017809
20 mm	1.5 mm x 5.5 mm	Vertical	PNP	Cd-327	KT5G-2P1251	1016196
			NPN	Cd-327	KT5G-2N1251	1022582
40 mm	1.1 mm x 4.2 mm	Vertical	PNP	Cd-327	KT5G-2P1351	1016197
			NPN	Cd-327	KT5G-2N1351	1016728
		Horizontal	PNP	Cd-327	KT5G-2P2351	1018067
			NPN	Cd-327	KT5G-2N2351	1018068

¹⁾ From front edge of lens.

²⁾ In relation to long side of housing.

KT5-2 Teach-in, red / green

- **Wave length:** 640 nm, 525 nm
- **Connection:** Male connector M12, 5-pin

Adjustment	Sensing distance ¹⁾	Light spot size	Light spot direction ²⁾	Output type	Time delay	Connection diagram	Type	Part no.
Static 2-point teach-in	10 mm	1.2 mm x 4.2 mm	Vertical	PNP	–	Cd-066	KT5RG-2P1116	1027393
					20 ms	Cd-066	KT5RG-2P1126	1027396
				NPN	–	Cd-066	KT5RG-2N1116	1027394

¹⁾ From front edge of lens.

²⁾ In relation to long side of housing.

KT5-2 Teach-in, RGB

- **Wave length:** 640 nm, 525 nm, 470 nm
- **Connection:** Male connector M12, 5-pin

Adjustment	Sensing distance ¹⁾	Light spot size	Light spot direction ²⁾	Output type	Time delay	Connection diagram	Type	Part no.
Dynamic teach-in	10 mm	1.2 mm x 4.2 mm	Vertical	PNP	–	Cd-324	KT5W-2P1113	1016629
					20 ms	Cd-324	KT5W-2P1123	1017810
			Horizontal	PNP	–	Cd-324	KT5W-2N1113	1016630
					–	Cd-324	KT5W-2P2113	1018043
	20 mm	1.5 mm x 5.5 mm	Vertical	NPN	–	Cd-324	KT5W-2N2113	1018042
					–	Cd-324	KT5W-2P1213	1016715
40 mm	1.1 mm x 4.2 mm	Horizontal	PNP	20 ms	Cd-324	KT5W-2N1213	1016716	
Static 2-point teach-in	10 mm	1.2 mm x 4.2 mm	Vertical	PNP	–	Cd-323	KT5W-2P1116	1018044
					20 ms	Cd-323	KT5W-2P1126	1018587
			NPN	–	Cd-323	KT5W-2N1116	1018045	
	20 mm	1.5 mm x 5.5 mm	Horizontal	PNP	–	Cd-323	KT5W-2P2116	1022312
					–	Cd-323	KT5W-2P1216	1018586
			Vertical	NPN	–	Cd-323	KT5W-2N1216	1019022
	–	Cd-323			KT5W-2P2216	1019020		
	40 mm	1.1 mm x 4.2 mm	Vertical	PNP	–	Cd-323	KT5W-2P1316	1018961
					–	Cd-323	KT5W-2N1316	1022678

¹⁾ From front edge of lens.

²⁾ In relation to long side of housing.

KT5-2 Display

- **Wave length:** 470 nm, 525 nm, 640 nm
- **Connection:** Male connector M12, 5-pin

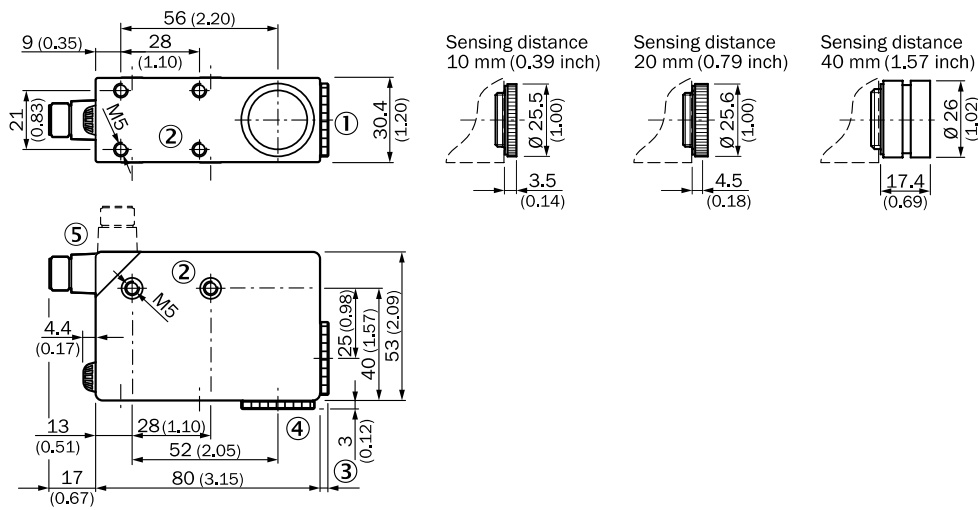
Adjustment	Sensing distance ¹⁾	Light spot size	Light spot direction ²⁾	Output type	Time delay	Connection diagram	Type	Part no.
Static 2-point teach-in with manual fine adjustment	10 mm	1.2 mm x 4.2 mm	Vertical	PNP	-	Cd-323	KT5W-2P1116D	1026538
					20 ms	Cd-323	KT5W-2P1126D	1026579
				NPN	-	Cd-323	KT5W-2N1116D	1026540
					20 ms	Cd-323	KT5W-2N1126D	1026582
			Horizontal	PNP	-	Cd-323	KT5W-2P2116D	1026584
					NPN	-	Cd-323	KT5W-2N2116D
	20 mm	1.5 mm x 5.5 mm	Vertical	PNP	-	Cd-323	KT5W-2P1216D	1026577
					NPN	-	Cd-323	KT5W-2N1216D
				PNP	-	Cd-323	KT5W-2P1316D	1026578
					NPN	-	Cd-323	KT5W-2N1316D

¹⁾ From front edge of lens.

²⁾ In relation to long side of housing.

Dimensional drawings (Dimensions in mm (inch))

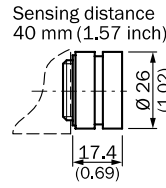
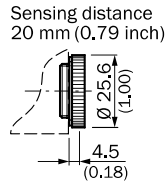
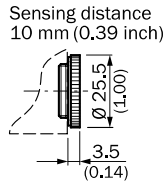
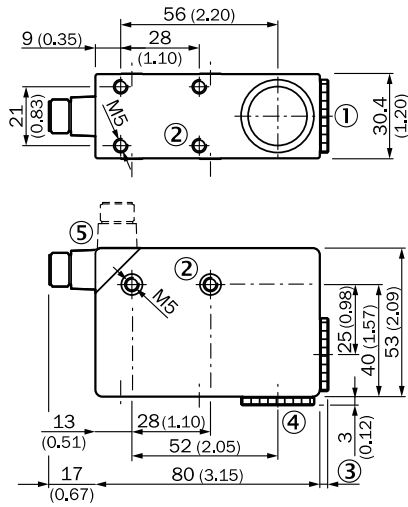
KT5-2 Potentiometer



- ① Lens (light transmission), can be exchanged for pos. 4
- ② M5 threaded mounting hole, 5.5 mm deep
- ③ See dimensional drawing for lens
- ④ Blind screw can be replaced by pos. 1
- ⑤ Connector M12 (rotatable up to 90°)

B

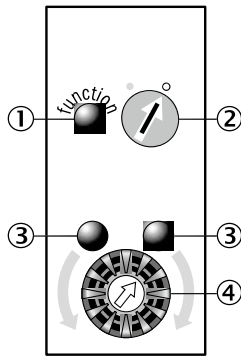
KT5-2 Teach-in, KT5-2 Display



- ① Lens (light transmission), can be exchanged for pos. 4
- ② M5 threaded mounting hole, 5.5 mm deep
- ③ See dimensional drawing for lens
- ④ Blind screw can be replaced by pos. 1
- ⑤ Connector M12 (rotatable up to 90°)

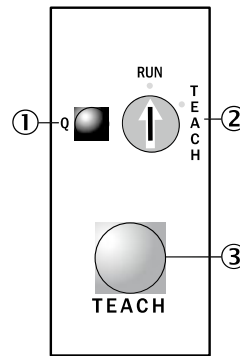
Adjustments

KT5-2 Potentiometer



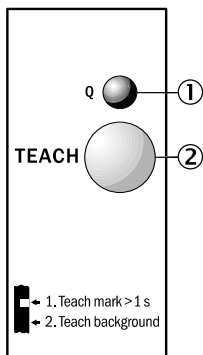
- ① Function signal indicator (yellow)
- ② Pre-selection switch (light/dark switching)
- ③ Switching threshold adjustment
- ④ Adjustment indicators (green)

KT5-2 Teach-in, KT5G-xxx6, KT5W-xxx6



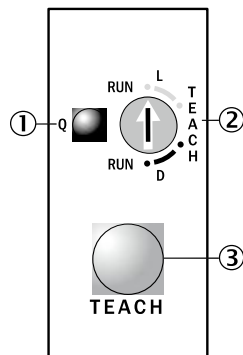
- ① Function signal indicator (yellow)
- ② Pre-selection switch
- ③ Teach-in button

KT5-2 Teach-in, KT5RG-xxx6



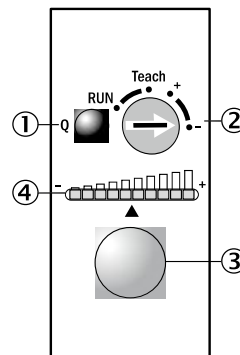
- ① Function signal indicator (yellow)
- ② Teach-in button

KT5-2 Teach-in, KT5W-xxx3



- ① Function signal indicator (yellow)
- ② Pre-selection switch
- ③ Teach-in button

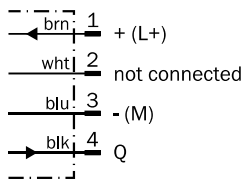
KT5-2 Display



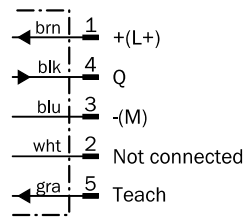
- ① Function signal indicator (yellow)
- ② Pre-selection switch
- ③ Teach-in button
- ④ Bar graph (green)

Connection diagram

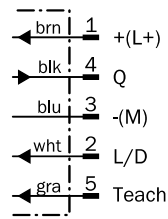
Cd-066



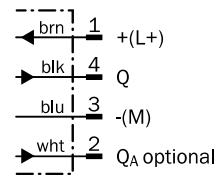
Cd-323



Cd-324



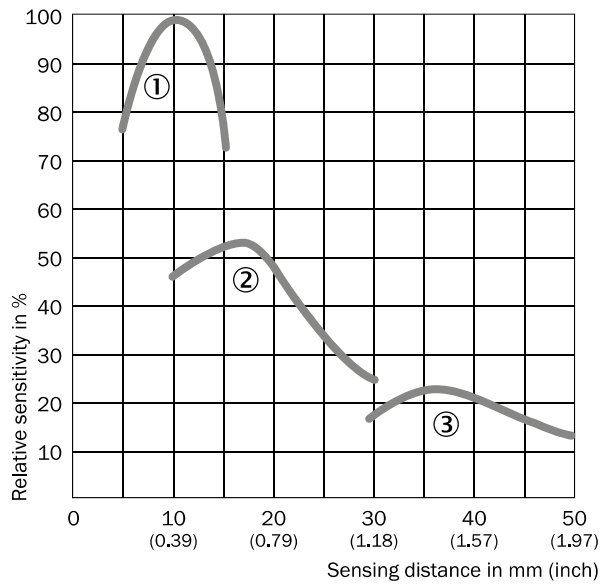
Cd-327



B

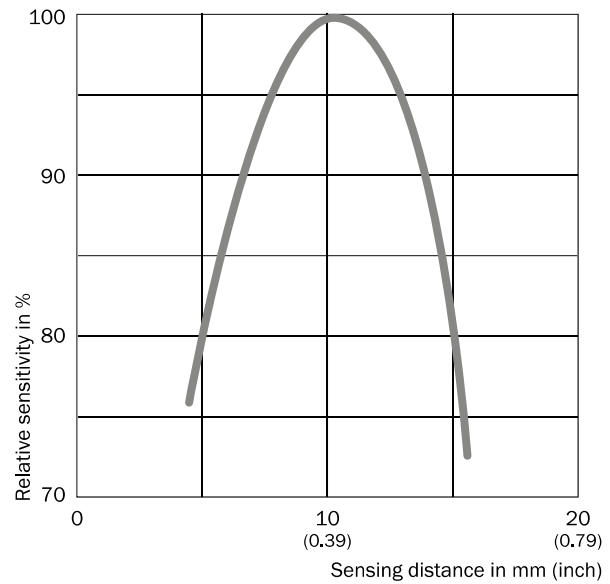
Sensing distance

KT5-2 Teach-in, KT5G, KT5W, KT5-2 Display



- ① Sensing distance 10 mm
- ② Sensing distance 20 mm
- ③ Sensing distance 40 mm

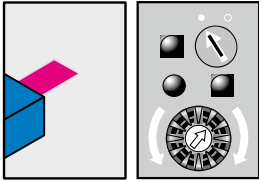
KT5-2 Teach-in, KT5RG-xxx6



Setting the switching threshold

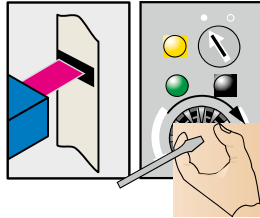
KT5-2 Potentiometer

1. Select switching function (light/dark)



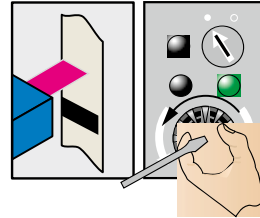
Turn the rotary switch to the desired position.
 ○ = light switching
 ● = dark switching

2. Position mark

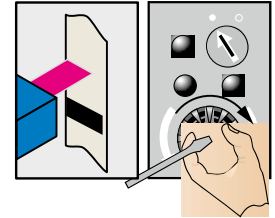


Turn potentiometer in the direction shown (green LED illuminates) until the yellow LED status changes and the green LED opposite illuminates.

3. Position background

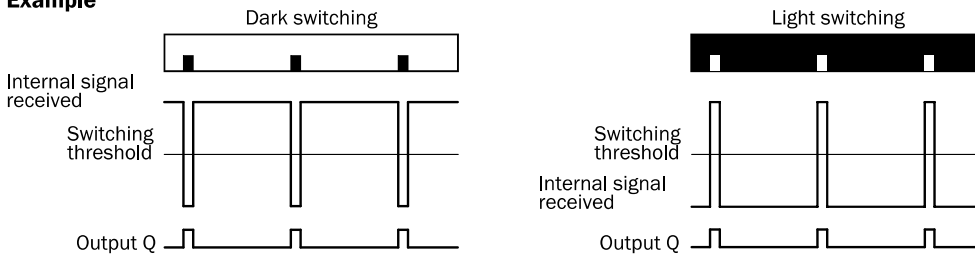


Gradually turn back the potentiometer (count the number of turns) until the yellow LED changes status again and illuminates.



Turn the potentiometer forward again by half the number of turns to ensure that the switching threshold is optimally set.

Example



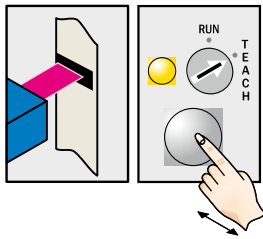
Switching characteristics

The switching threshold is set in the center between the background and the mark.

B

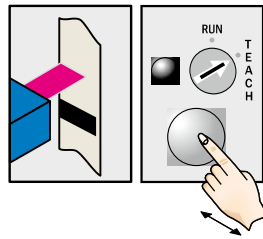
KT5-2 Teach-in, teach-in static

1. Position mark



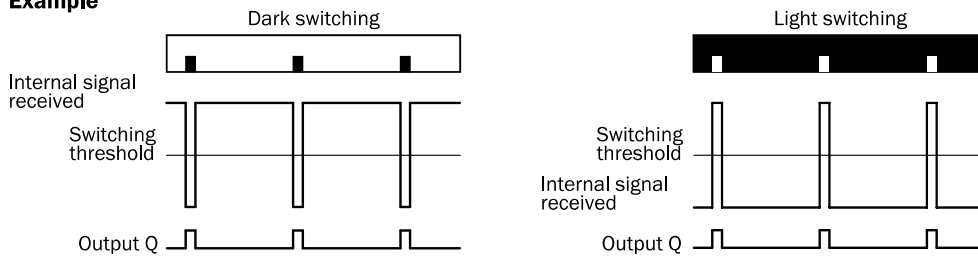
Turn rotary switch to "Teach" position. Press and hold teach-in button > 1 s. Red emitted light and yellow LED flash.

2. Position background



Press and hold teach-in button > 1 s. Yellow LED goes out.

Example



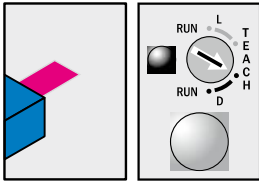
Switching characteristics

The optimum emitted light is selected automatically.
 Light/dark setting is defined using teach-in sequence.
 The switching threshold is set in the center between the background and the mark.
 Teach-in can also be performed using an external control signal.

KT5-2 Teach-in, teach-in dynamic

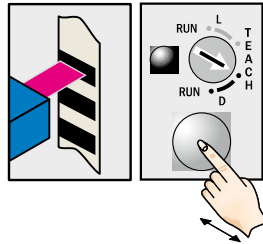
B

1. Select switching function (light/dark)



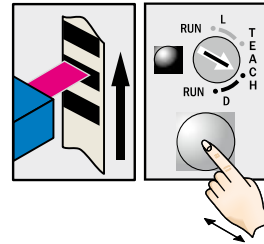
Turn rotary switch to desired teach position:
D = dark switching
L = light switching

2. Position mark or background

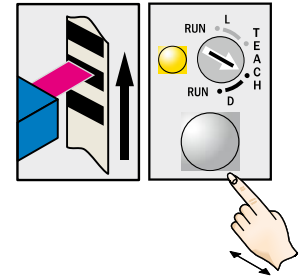


Press the teach-in button and keep it pressed.

3. Move at least one repeat length using the light spot

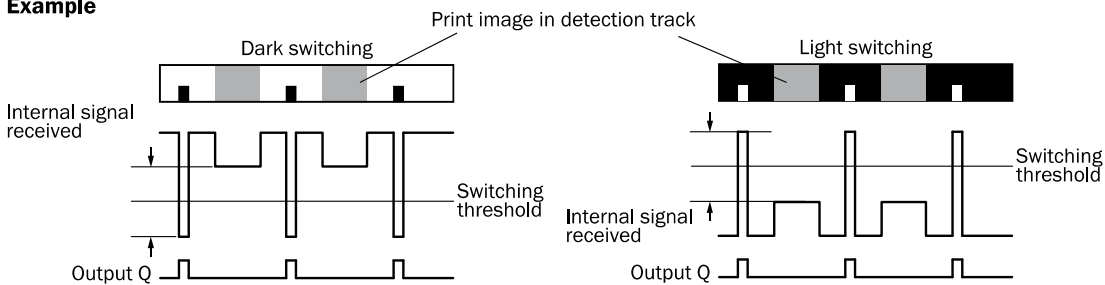


Keep the teach-in button pressed.



Release the teach-in button. Yellow LED will illuminate, when emitted light is on the mark.

Example



Switching characteristics

The optimum emitted light is selected automatically.

The switching threshold is set in the center between the lowest and the second-lowest reflectivity.

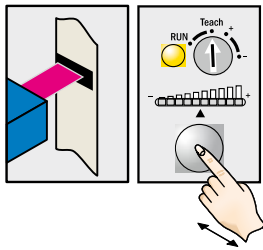
Teach-in can also be performed using an external control signal.

Light/dark setting can also be configured using an external control signal.

Observe the minimum speed (25 mm/s ... 300 mm/s).

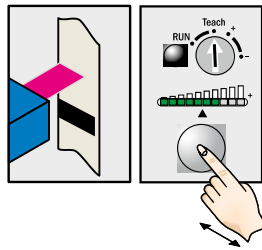
KT5-2 Display, Teach-in static

1. Position mark

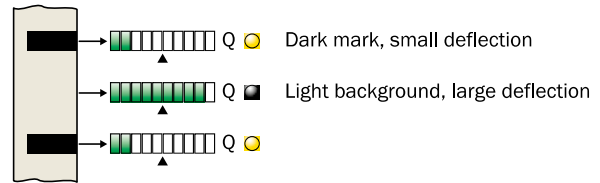


Turn rotary switch to "Teach" position. Press and hold teach-in button > 1 s. Red emitted light and yellow LED flash.

2. Position background



Press and hold teach-in button > 1 s. Yellow LED goes out. Optimum emitted light is selected.



Fine adjustment possible using the "+" / "-" buttons.

Note

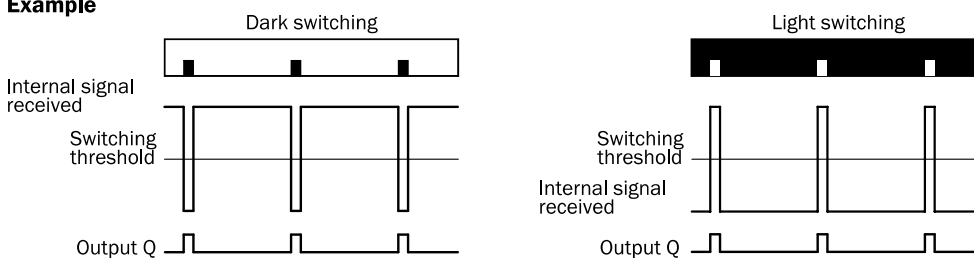
The bar display visualizes the detection reliability during teach-in. The more LEDs that illuminate, the better the teach-in:

1 LED illuminates = operation not reliable – contrast difference too low

≤ 4 LEDs illuminate = operation OK – sufficient contrast difference

> 4 LEDs illuminate = reliable operation – high contrast difference

Example



Switching characteristics

The optimum emitted light is selected automatically.

Light/dark setting is defined using teach-in sequence.

The switching threshold is set in the center between the background and the mark.

Teach-in can also be performed using an external control signal.








Recommended accessories

Lens and accessories

B

Description	Diameter	Type	Part no.
Lens, 40 mm sensing distance	26 mm	OBJ-210	2010945
Lens, 10 mm sensing distance	25.6 mm	OBJ-211	1004936
Lens, 20 mm sensing distance	25.6 mm	OBJ-212	1011506



Universal bar clamp systems

Figure	Material	Description	Type	Part no.
	Steel, zinc coated	Plate G for universal clamp bracket	BEF-KHS-G01	2022464
		Plate K for universal clamp bracket	BEF-KHS-K01	2022718
		Universal clamp bracket for rod mounting	BEF-KHS-KH1	2022726
		Mounting bar, straight, 200 mm, steel	BEF-MS12G-A	4056054
		Mounting bar, straight, 300 mm, steel	BEF-MS12G-B	4056055
		Mounting bar, L-shaped, 150 mm x 150 mm, steel	BEF-MS12L-A	4056052
		Mounting bar, L-shaped, 250 x 250 mm, steel	BEF-MS12L-B	4056053



Plug connectors and cables

Connecting cables with female connector

M12, 4-pin, PVC, chemical resistant

Figure	Connection type head A	Connection type head B	Connecting cable	Type	Part no.
	Female connector, M12, 4-pin, straight, unshielded	Cable, open conductor heads	2 m, 4-wire	DOL-1204-G02M	6009382
			5 m, 4-wire	DOL-1204-G05M	6009866
	Female connector, M12, 4-pin, angled, unshielded	Cable, open conductor heads	2 m, 4-wire	DOL-1204-W02M	6009383
			5 m, 4-wire	DOL-1204-W05M	6009867

M12, 5-pin, PVC, chemical resistant

Figure	Connection type head A	Connection type head B	Connecting cable	Type	Part no.
	Female connector, M12, 5-pin, straight, unshielded	Cable, open conductor heads	2 m, 5-wire	DOL-1205-G02M	6008899
			5 m, 5-wire	DOL-1205-G05M	6009868
	Female connector, M12, 5-pin, angled, unshielded	Cable, open conductor heads	2 m, 5-wire	DOL-1205-W02M	6008900
			5 m, 5-wire	DOL-1205-W05M	6009869

→ For additional accessories, please see page K-240

