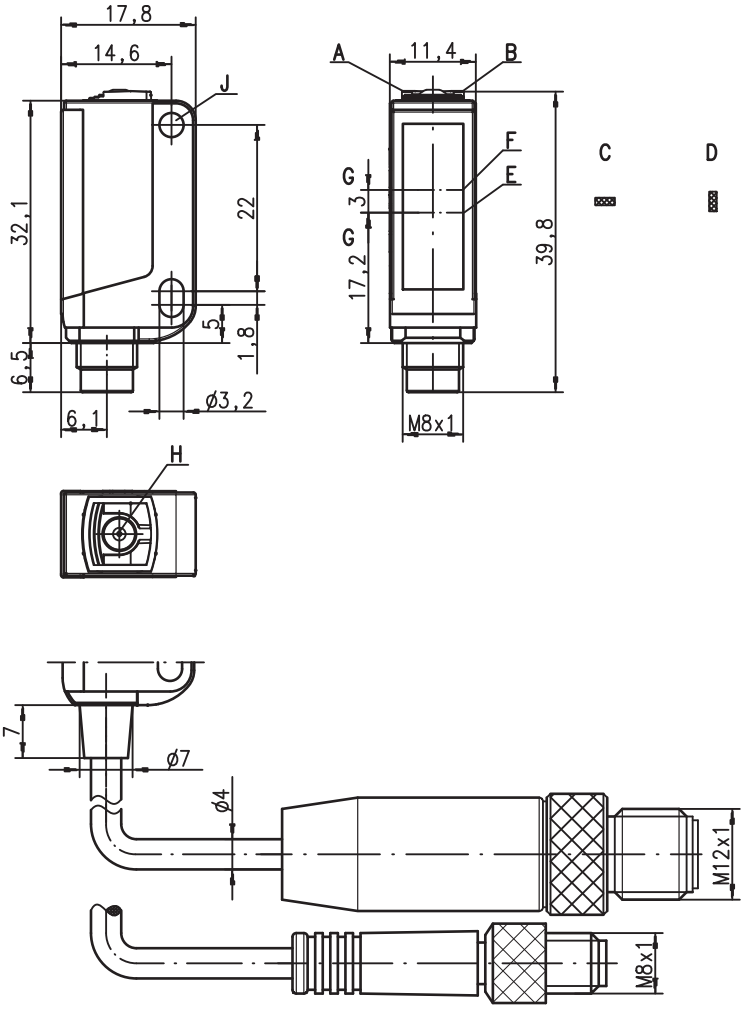
KRTM 3B — Multicolor contrast scanner

14.5mm

- RGB transmitter
- Various teach variants
- Short response time
- Switching threshold adjustment via EasyTune
- Level adaptation for glossy objects
- Keyboard lockout
- Remote teach via cable
- 20ms pulse stretching

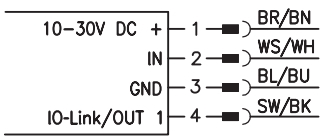
Dimensioned drawing



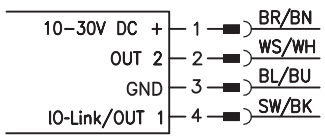
A Green indicator diode
B Yellow indicator diode
C Light spot orientation horizontal
D Light spot orientation vertical
E Transmitter
F Receiver
G Optical axis
H Teach button
J Mounting sleeve

Electrical connection

Connector, 4-pin



KRTM 3B/L6.1121-S8



Accessories:

(available separately)

- Mounting systems (BT 3…)
- Cable with M8 or M12 connector (K-D …)

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Specifications

Optical data

Scanning range [1]		14.5mm ± 2mm
Light spot dimensions	in RUN-Mode	1.5mm x 4mm (at a distance of 14.5mm)
	in Teach-Mode	1.5mm x 6.5mm (at a distance of 14.5mm)
Light spot orientation		vertical or horizontal (see dimensioned drawing)
Light source [2]		LEDs (red, green, blue)
Wavelength		640nm, 525nm, 470nm

Sensor operating modes

IO-Link	COM2 (38.4kBaud)
SIO	standard push-pull

Timing of the sensor

Internal switching frequency	10kHz
Internal response time	50µs
Response jitter, internal	20µs
Repeatability [3]	0.02mm
Delay before start-up	≤ 300ms
Conveyor speed during teach	≤ 0.1m/s for a mark width of 1mm
Teach process	static 1-point, static 2-point or dynamic 2-point
Teach delay	≤ 10ms

Timing of the outputs

Response time		SIO operation (without IO-Link): 50µs
		COM2 (with IO-Link): typ. 2.5ms

Electrical data

Operating voltage U_B [4]	with SIO	10 … 30VDC (incl. residual ripple)
	with COM2	18 … 30VDC (incl. residual ripple)
Residual ripple		≤ 15% of U_B
Output/function	…/2…	pin 4: NPN transistor, GND if mark detected
	…/4…	pin 4: PNP transistor, U_B if mark detected
	…/6.0001…	pin 4: push-pull switching output, PNP: U_B if mark detected, NPN: GND if mark detected
	…/6.1121…	pin 4: IO-Link 1.0
	…/L6.1121…	pin 4: IO-Link 1.1
Signal voltage high/low		≥ (U_B-2V)/≤ 2V
Output current		max. 100mA
Open-circuit current		≤ 25mA

Indicators

Green LED in continuous light	ready
Green and yellow LED flashing at 3Hz	teach event active
Green and yellow LED flashing at 8Hz	teaching error
Green LED off and yellow LED flashing at 8Hz	sensor error
Yellow LED in continuous light	mark detected (dependent on the teach sequence)
Transmitter LEDs flashing at 8Hz	teaching error

Mechanical data

Housing	plastic (PC-ABS), with nickel-plated mounting sleeve
Optics cover	plastic (PMMA)
Weight	10g
Connection type	M8 connector, metal

Environmental data

Ambient temp. (operation/storage)	-30°C … +55°C/-30°C … +70°C
Protective circuit [5]	2, 3
VDE safety class	III
Protection class	IP 67
Light source	free group (in acc. with EN 62471)
Standards applied	IEC 60947-5-2
Certifications	UL 508, C22.2 No.14-13 [4] [6]

Options

Input pin 2 (not for KRTM 3B/L6…)

Function characteristics		keyboard lockout / line teach / pulse stretching
Input active/not active		≥ 8V/≤ 2V or not connected

Output pin 4

Line teach active	for SIO	2Hz at the switching output
	for COM2	see configuration file IODD
Error after line teach	for SIO	2Hz at the switching output
	for COM2	see configuration file IODD

1) Scanning range: recommended range with performance reserve
2) Average life expectancy 100,000h at an ambient temperature of 25°C
3) At conveyor speed 1m/s
4) For UL applications: for use in class 2 circuits according to NEC only
5) 2=polarity reversal protection, 3=short-circuit protection for all transistor outputs
6) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.5A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7)

Remarks

UL REQUIREMENTS

Enclosure Type Rating: Type 1
For Use in NFPA 79 Applications only.
Adapters providing field wiring means are available from the manufacturer. Refer to manufacturers information.

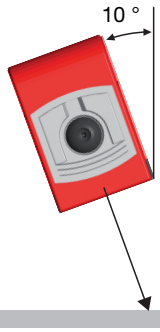
CAUTION – the use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

ATTENTION ! Si d'autres dispositifs d'alignement que ceux préconisés ici sont utilisés ou s'il est procédé autrement qu'indiqué, cela peut entraîner une exposition à des rayonnements et un danger pour les personnes.

Operate in accordance with intended use!

- This product is not a safety sensor and is not intended as personnel protection.
- The product may only be put into operation by competent persons.
- Only use the product in accordance with the intended use.

- With glossy objects, the sensor is to be fastened at an inclination of approx. 10° relative to the object surface.



Order guide

Selection table Equipment ↓			Order code →	KRTM 3B/6.1121-S8 Part No. 50111312	KRTM 3B/4.1121-S8 Part No. 50110584	KRTM 3B/4.1221-S8 Part No. 50110588	KRTM 3B/2.1121-S8 Part No. 50110585	KRTM 3B/4.1121.200-S12 Part No. 50110586	KRTM 3B/2.1121,200-S12 Part No. 50110587	KRTM 3B/2.1221-S8 Part No. 50110589	KRTM 3B/4.1221.200-S12 Part No. 50110590	KRTM 3B/2.1221,200-S12 Part No. 50110591	KRTM 3B/6.0001-S8 Part No. 50116788	KRTM 3B/L6.1121-S8 Part No. 50135163
Transmitter color	white light													
	RGB (red, green, blue)			●	●	●	●	●	●	●	●	●	●	●
	laser red light													
Light spot orientation	vertical			●	●	●	●	●	●	●	●	●	●	●
	horizontal													
	round													
Output (OUT 1)	PNP transistor output				●	●		●			●			
	NPN transistor output						●		●	●		●		
	push-pull switching output			●									●	●
	IO-Link 1.0			●										
	IO-Link 1.1													●
Input (IN)	teach input			●	●	●	●	●	●	●	●	●	●	
Housing	standard			●	●	●	●	●	●	●	●	●	●	●
	economy													
Connection	M8 connector, metal	4-pin		●	●	●	●			●			●	●
	M8 connector, plastic	4-pin												
	200 mm cable with M12 connector	4-pin						●	●		●	●		
Teach process	static 1-point													
	static 2-point			●	●		●	●	●				●	●
	dynamic 2-point					●				●	●	●		
Response time / Switching frequency	50 µs / 10 kHz			●	●	●	●	●	●	●	●	●	●	●
	83 µs / 6 kHz													
	125 µs / 4 kHz													
Configuration	switching threshold adjustment with EasyTune via teach button			●	●	●	●	●	●	●	●	●	●	●
	remote teach, keyboard lockout and pulse stretching via pin 2			●	●	●	●	●	●	●	●	●	●	
	teach level 1, teach-level 2 and pulse stretching via teach button			●	●	●	●	●	●	●	●	●	●	●
	dual channel architecture													●

IO-Link process data

The sensor transmits 2 bytes to the master.

Data bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Assignment	Default settings
																Switching output	0 = no mark, 1 = mark detected
																Not assigned	Free
																Sensor operation	0 = off, 1 = on
																Switching threshold LSB	Value range 0 … 31 (0 … 100% in approx. 3% steps) 0% = min. switching threshold 100% = max. switching threshold
																Switching threshold	
																Switching threshold	
																Switching threshold	
																Switching threshold MSB	
																Active transmitter LSB	00 = red, 01 = green or white, 10 = blue, 11 = all colors on (teach-in active)
																Active transmitter MSB	
																Not assigned	Free
																Measurement value LSB	Value range 0 … 31 (0 … 100% in approx. 3% steps) 0% = min. signal level 100% = max. signal level
																Measurement value	
																Measurement value	
																Measurement value	
																Measurement value MSB	

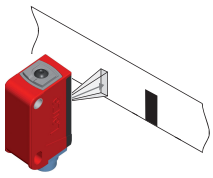
Further information and details on the IO-Link interface can be found in the separate IO-Link data sheet.

Static 2-point teach

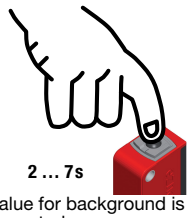
Suitable for manual positioning of the marks (availability dependent on sensor type).

Switching threshold in center:

Position the background.

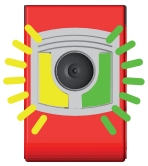


Press teach button for 2 … 7s and release.



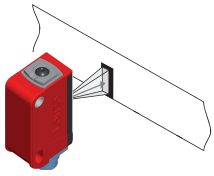
Value for background is accepted.

LEDs flash simultaneously.



Simultaneous flashing

Position the mark.



Briefly press teach button.

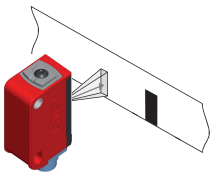
Value for mark is accepted.

Sensor in RUN mode. Yellow LED illuminates.

Switching threshold set in the center.

Switching threshold near the mark:

Position the background.



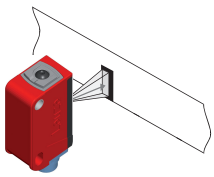
Press teach button for 7 … 12s and release.

Value for background is accepted.

LEDs flash alternatingly.

Alternating flashing

Position the mark.



Briefly press teach button.

Value for mark is accepted.

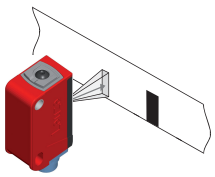
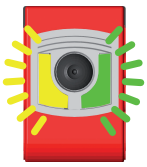
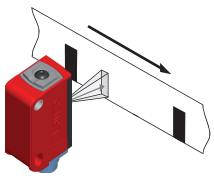
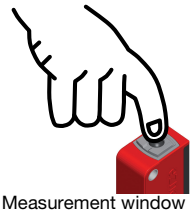
Sensor in RUN mode. Yellow LED illuminates.

Switching threshold is set near the mark.

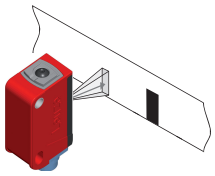
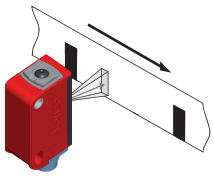
Dynamic 2-point teach

Suitable for marks moved during automated machine processes (availability dependent on sensor type).

Switching threshold in center

Position the background.	Press teach button for 2 … 7s and release.	LEDs flash simultaneously.	Allow marks to pass through dynamically.	Briefly press teach button.	Sensor in RUN mode. Yellow LED is off.
	 Measurement window opens.	 **Simultaneous flashing**		 Measurement window closes.	 Switching threshold set in the center.

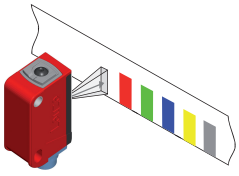
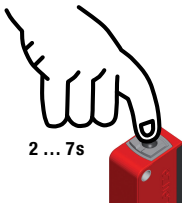
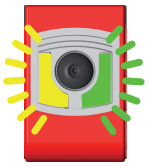
Switching threshold near the mark

Position the background.	Press teach button for 7 … 12s and release.	LEDs flash alternatingly.	Allow marks to pass through dynamically.	Briefly press teach button.	Sensor in RUN mode. Yellow LED is off.
	 Measurement window opens.	 **Alternating flashing**		 Measurement window closes.	 Switching threshold is set near the mark.

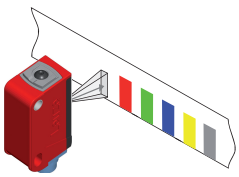
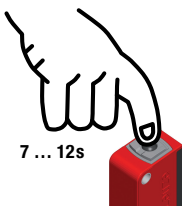
Static 1-point teach

Suitable for detecting all marks outside of the reference value (dependent on available sensor type).

Standard sensitivity

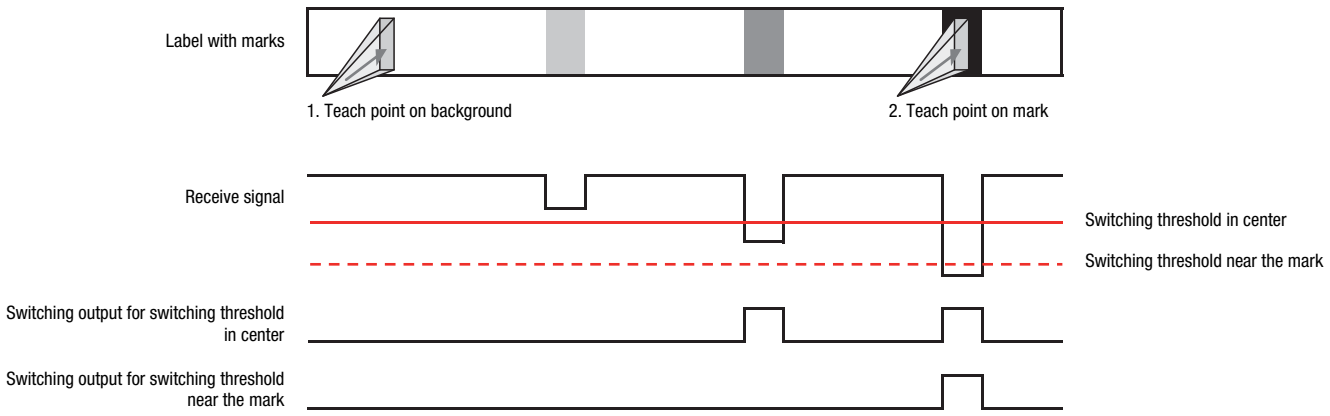
Position reference value.	Press the teach button for 2 ...7s.	LEDs flash simultaneously.	Release teach button.	Sensor in RUN mode. Yellow LED is off.
		 **Simultaneous flashing**	 Value is accepted.	 Standard sensitivity is set.

High sensitivity

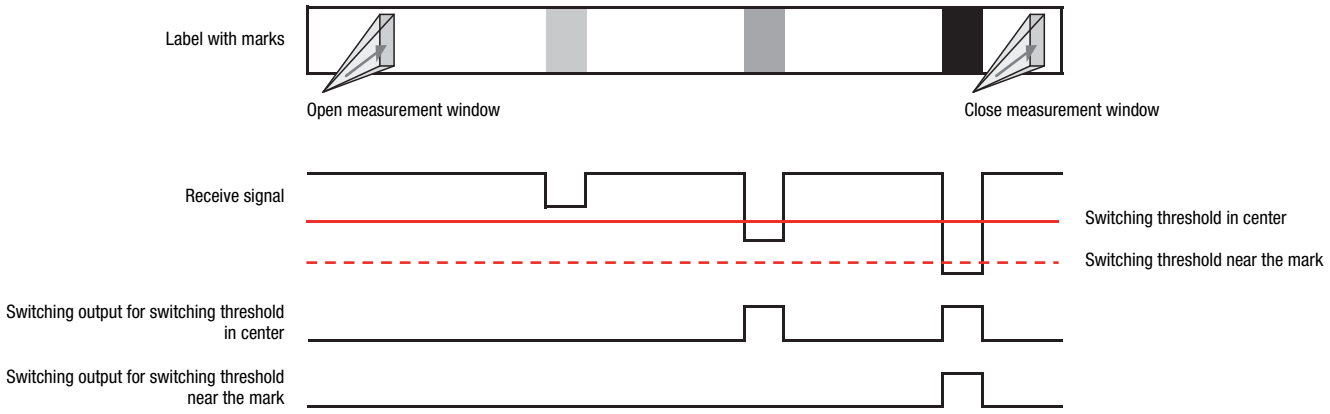
Position reference value.	Press the teach button for 7 ...12s.	LEDs flash alternatingly.	Release teach button.	Sensor in RUN mode. Yellow LED is off.
		 **Alternating flashing**	 Value is accepted.	 High sensitivity is set.

Switching threshold diagrams

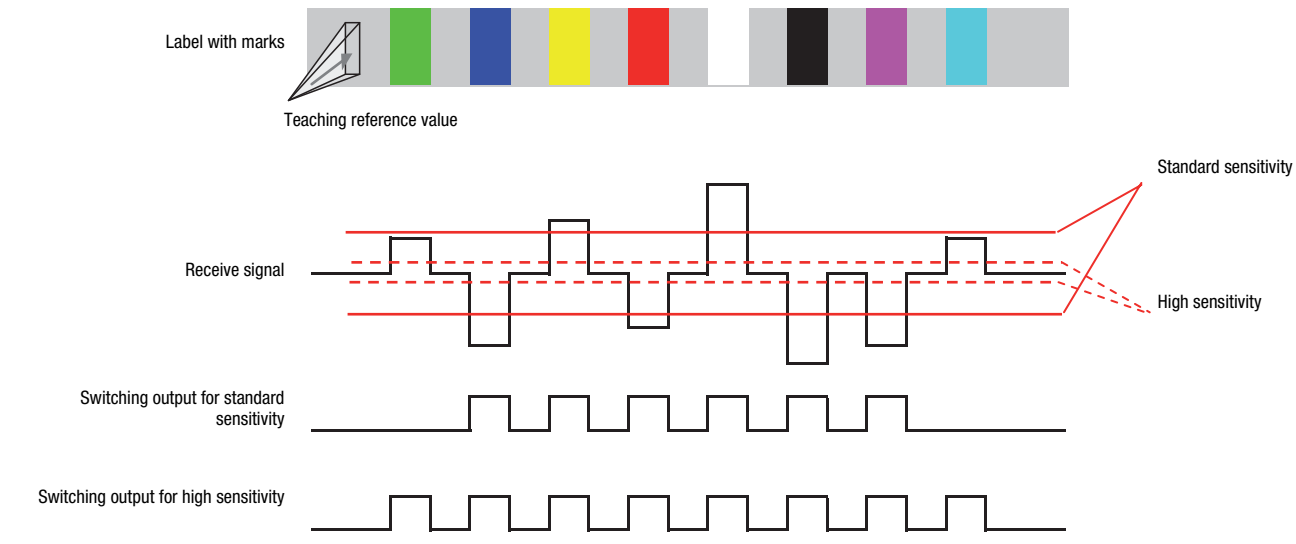
Static 2-point teach



Dynamic 2-point teach



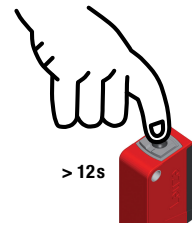
Static 1-point teach



Pulse stretching option

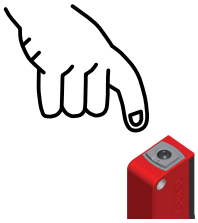
Switching pulse stretching on or off:

Press the teach button longer than 12s.

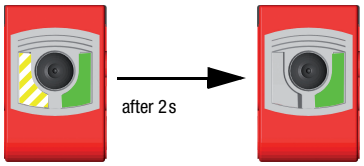


Only the green LED flashes.

Release teach button.



Change is displayed and accepted automatically after 2s.
Sensor in RUN mode.



After 2s the yellow LED is back to normal operation, displaying the state of the switching output.

After releasing the teach button, the yellow LED displays the new pulse stretching status for 2s:

yellow LED on:	pulse stretching ON
yellow LED off:	pulse stretching OFF

"EasyTune" option - fine tuning of the switching threshold

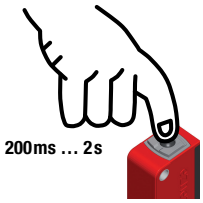
Following power-on and completed teach event:

Green LED illuminates continuously (ready)
Yellow LED on/off continuously (mark detected/not detected)

Increasing the switching threshold:

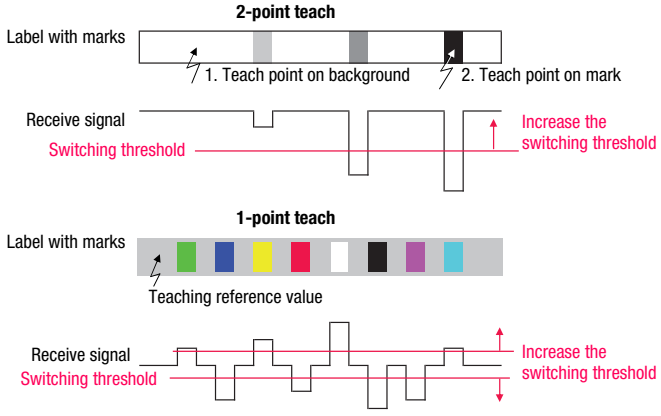
Long press of the button = large force expenditure = increase switching threshold

Each press of the button with a duration between 200ms and 2s increments the switching threshold.



Green LED flashes **briefly once**

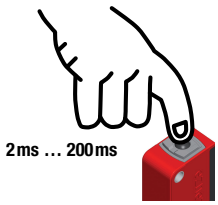
A press of the button is acknowledged by a single, brief **flash of the green LED** – the new switching threshold is now valid.



Reducing the switching threshold:

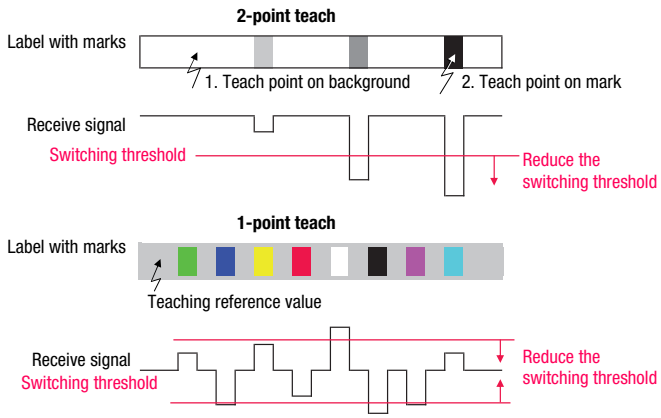
Short press of the button = small force expenditure = reduce switching threshold

Each press of the button with a duration between 2ms and 200ms decrements the switching threshold.



Green LED flashes **briefly once**

A press of the button is acknowledged by a single, brief **flash of the green LED** – the new switching threshold is now valid.



If the upper or lower end of the adjustment range is reached, the green and yellow LEDs flash at a considerably higher frequency of 8Hz for the duration of one second.

Sensor adjustments via the input IN (Pin 2, not for KRTM 3B/L6…)

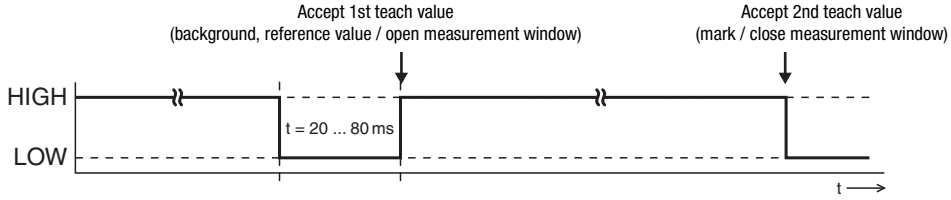
The following description applies to PNP switching logic!

Signal level LOW ≤ 2V

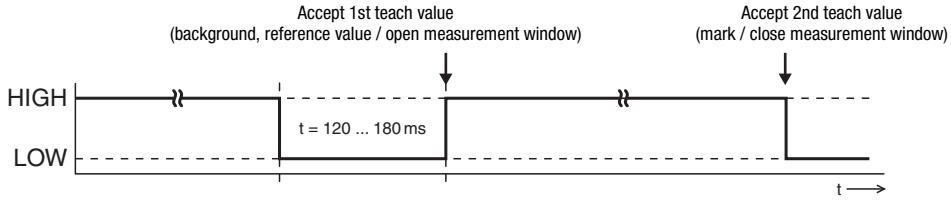
Signal level HIGH ≥ (U_B-2V)

With the NPN models, the signal levels are inverted!

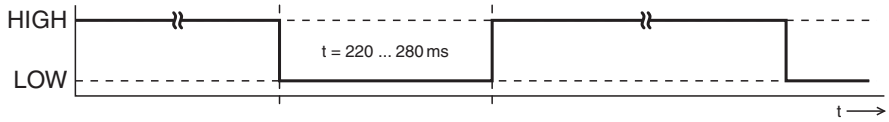
Switching threshold in center / standard sensitivity



Switching threshold near the mark / high sensitivity



Pulse stretching ON



Pulse stretching OFF

Locking the teach button via the input IN (Pin 2, not for KRTM 3B/L6…)

A **static HIGH signal** (≥ 20 ms) at the teach input locks the teach button on the sensor if required, such that no manual operation is possible (e.g., protection from erroneous operation or manipulation).

If the teach input is not connected or if there is a static low signal, the button is unlocked and can be operated freely.