

en 02-2012/10 50118529

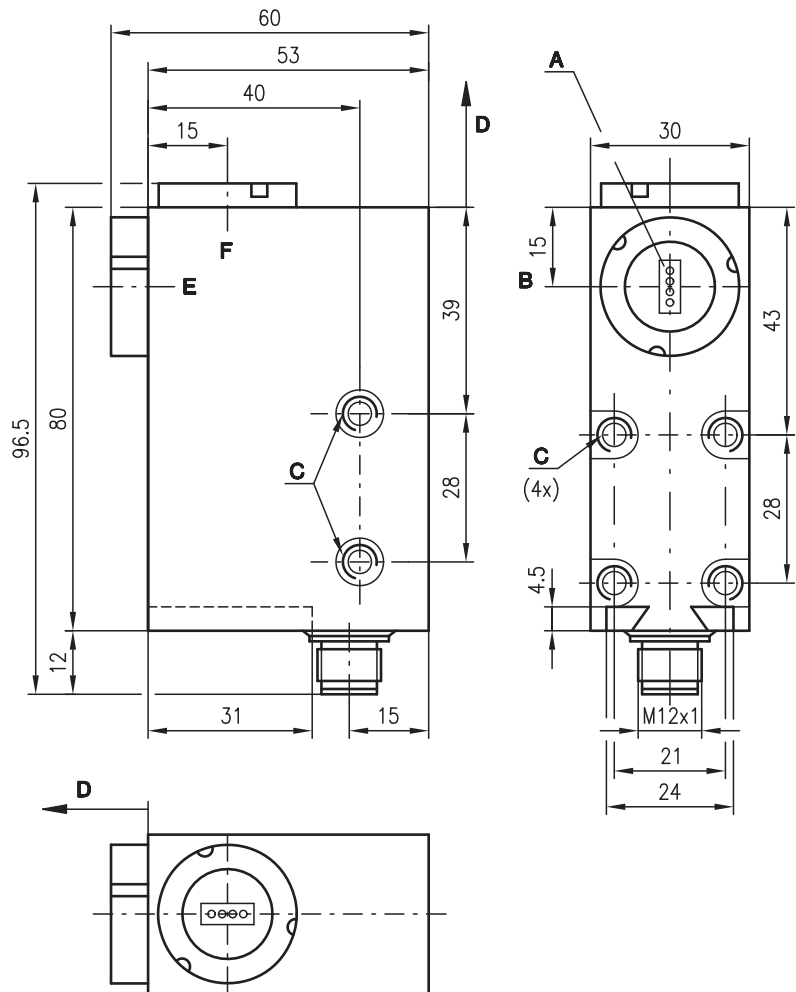


**20mm**



- Dynamic teach-in process
- Can store 128 data records
- Programming via teach-in via button or teach input (pin 5)
- Remote control after teach-in
- Small, round light spot (1 of 4 LEDs)

**Dimensioned drawing**



- A** Light spot orientation vertical
- B** Optical axis
- C** M5/5.5mm deep
- D** Scanning range
- E** Front
- F** Head

**Electrical connection**

KRTM 20M/N-20-0084-S12	
12-30V DC +	1 —■) br/BN
Synchr.	2 —■) ws/WH
GND	3 —■) bl/BU
DSA/Q	4 —■) sw/BK
DSS/Teach-In	5 —■) gr/GY

- DSA** Data set acknowledgment (**Data Set Acknowledge**)
- DSS** Data set selection (**Data Set Select**)

We reserve the right to make changes • DS\_KRTM20MN200084S12\_en\_50118529.fm



**Accessories:**

(available separately)

- M12 connectors, 5-pin (K-D ...)
- Ready-made cables (K-D ...)
- Interchangeable objectives
- Tool for changing objectives

## Specifications

### Optical data

Scanning range with objective 1 (accessory)	11 mm (in focus mode)
Scanning range with objective 2	18 mm (in focus mode)
Scanning range with objective 3 (accessory)	44 mm (in focus mode)
Light spot dimensions with objective 1	Ø 0.5 mm
Light spot dimensions with objective 2	Ø 0.6 mm
Light spot dimensions with objective 3	Ø 1.0 mm
Light source	LEDs (red, green, blue)

### Timing

Clock frequency	160 kHz
Switching frequency	80 kHz
Analysis depth	1
Response time	6.75 µs
Jitter	6.75 µs
Delay before start-up	≤ 250 ms

### Electrical data

Operating voltage $U_B$	12 ... 30 VDC (incl. residual ripple)
Residual ripple	≤ 15 % of $U_B$
Switching output	NPN
Function	1. Operational function light or dark switching, reversible via button 2. Remote control 2 Hz pulse sequence (after faulty teach-in via pin 5 or button)
Analog output	1 ... 10 mA
Signal voltage high/low	≥ ( $U_B - 2V$ ) / ≤ 2V
Output current	max. 100 mA
Open-circuit current	≤ 100 mA

### Indicators

LED green 1	ON "ready"
LED green 2	"ON/OFF" delay
LED green 3	L/D "light/dark switching"
Yellow LED	Q/T "object detected"
Yellow LED, flashing	Q/T "device error, teach error"

### Keyboard

Release	via bit 9 of the data protocol
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### Mechanical data

Housing	diecast zinc
Optics cover	glass
Weight	300 g
Connection type	M12 connector, stainless steel, 5-pin

### Environmental data

Ambient temp. (operation/storage)	-25 °C ... +60 °C / -40 °C ... +70 °C
Protection class	IP 67
Light source	exempt group (in acc. with EN 62471)
VDE safety class	II
Protective circuit 1)	2, 3
Standards applied	IEC 60947-5-2

### Options

#### Input for data-record selection

NPN: active/not active	0V/ $U_B$ or not connected
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#### Teach-in input

NPN: active/not active	0V/ $U_B$ or not connected (for function see item 4)
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#### Synchr. input

NPN: active/not active	0V/ $U_B$ or not connected (for function see item 4)
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#### Pulse stretching

10 ms, can be activated via button	
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#### Remote control

2 Hz on switching output pin 4 (after teaching error)	
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acknowledgement of the teaching error, see pt.4. Teach event  
active temperature and LED compensation through reference receiver

1) 2=polarity reversal protection, 3=short-circuit protection for all outputs

## Order guide

See section 5. Preferred types

## Tables

## Diagrams

## Remarks

- **Approved purpose:**  
This product may only be used by qualified personnel and must only be used for the approved purpose. This sensor is not a safety sensor and is not to be used for the protection of persons.
- With shiny objects, the sensor is to be mounted at an angle to the object surface.
- The objectives and objective covers must not be removed.
- This data sheet applies for device firmware with production date after 1210xxxxxx (year=2012, month=October).

**KRTM 20M/N-20-0084-S12**

**1. Method of function of the cut-marking system**

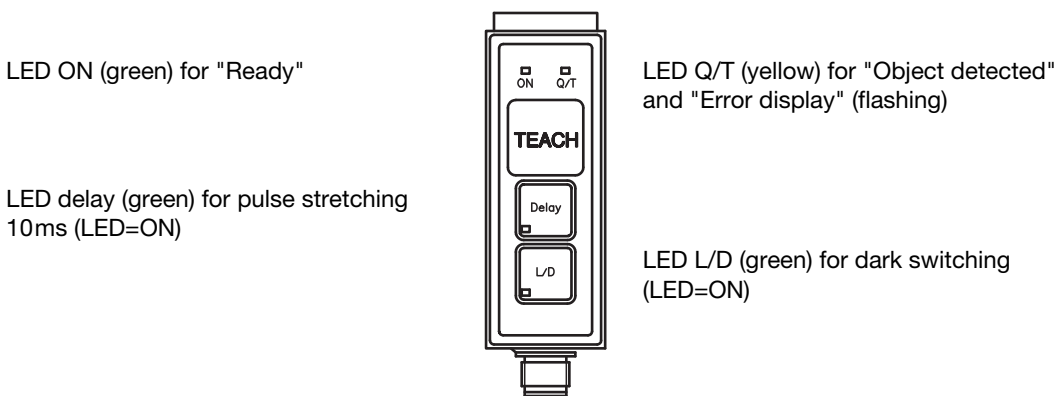
With this contrast scanning system, 128 data records can be stored in the sensor in zero-voltage-safe memory. A simple and asynchronous protocol is used for data-record selection and assignment. The transmission rate is specified by the controller by means of the start-bit pulse width. As a result, the contrast scanning system can work together with any controller system. A standardized serial interface, e.g. RS 232, is not required as communication is realized via standard NPN signals.

Setting is performed with dynamic teach-in via the keyboard or teach input (pin 5). When teach-in starts, a measurement window opens and closes when teach-in ends. The minimum and maximum values are determined and the switching threshold is set in the center.

Contrast detection is achieved with the aid of multiple transmitter colors (red, green, blue). This allows the detection of minimal differences in contrast (gray tones). Each transmitter color consists of 1 LED. A round light spot is formed in the focal point. This very small, extremely bright light spot guarantees a high repeatability and positioning accuracy.

The system features a reference receiver which ensures temperature and LED compensation. This leads to a very stable long-term behavior. The contrast scanners are not calibrated against reference contrasts.

**2. Controls and indicators**



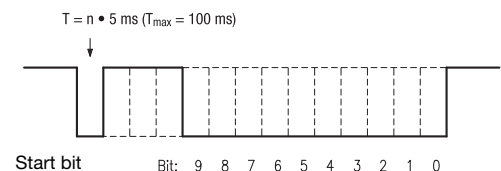
In the factory settings, the keyboard is enabled.

**3. Protocol procedure for selecting a data record**

- 1. The sensor system determines the period length **T** ( $T = n \cdot 5 \text{ ms}$ ) from the start bit. The start bit must be a multiple of 5ms. Maximum period duration  $T_{\text{max}} = 100 \text{ ms}$ .
- 2. A pause lasting **3T** follows the start bit.
- 3. Transmission of bit 9 ... bit 0 (evaluation of the level in the middle of the period).
- 4. Acknowledgment of the data record following reception of bit 0. The sensor system repeats the entire protocol (start bit + 3T + bit 9 ... bit 0) at the switching output.
- 5. During data-record selection, mark detection is not active.

**Data-record selection by the controller via pin 5 and acknowledgment of the data record by the sensor system via pin 4 (switching output Q):**

- Bit 9 - button lock  
(0V = all buttons disabled,  $U_B$  = all buttons enabled<sup>1)</sup>)
- Bit 8 - no function
- Bit 7 - no function
- Bit 6 - most significant bit of the data-record number  
(0V = active,  $U_B$  = inactive)
- Bit 0 - least significant bit of the data-record number  
(0V = active,  $U_B$  = inactive)



1) Factory setting

## 4. Teach process

The teach event is performed with the aid of the teach button or the teach input (pin 5).

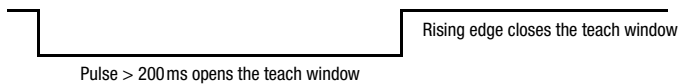
### Teach-in via teach button

The keyboard is enabled via bit 9.

Operation	Transmitter	Indicator LED
Position the light spot on the background	Red, green or blue light spot visible	
Press the teach button approx. 0.5s	All colors are on White light spot visible	All LEDs flash
Move the light spot onto or over the mark	All colors are on White light spot visible	All LEDs flash
Press the teach button approx. 0.5s	Changeover to red, green or blue Red, green or blue light spot visible	ON (green) illuminated Q/T (yellow) off Q/T (yellow) flashing (error)
Teaching error start new teaching process	All colors off	ON (green) illuminated Q/T (yellow) flashing (error)

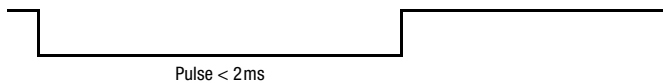
### Teach-in via teach input (pin 5)

Pulse > 200ms starts the dynamic teach-in.



### Acknowledgment of a teaching error after teach-in (pin 5)

One pulse < 2ms acknowledges the teaching error and activates the last valid teach values.



## 5. Preferred types

Selection table		Order code →	KRTM 20M/N-20-0084-S12 Part no. 50119540																	
Equipment ↓																				
Scanning range (in focus mode)	11 mm																			
	18 mm	●																		
	44 mm																			
Transmitter color	RGB	●																		
	green																			
Light spot orientation	vertical																			
	horizontal																			
	round	●																		
Optical outlet	Front																			
	Head	●																		
Output wiring	PNP																			
	NPN	●																		
	analogue current																			
Other features	cut-marking system	●																		
	can store 128 data records	●																		
	dynamic teach-in	●																		
	teach-in, background																			
	synchronous input	●																		

Additional types on request