

## KRTM 20

## Cut-Marking System



12mm  
20mm



- Static teach-in procedure
- Can store 128 data records
- Response time digital/analogue: 20  $\mu$ s/  
6.25  $\mu$ s
- 3 transmitters in the colours red, green,  
blue
- Programming via teach-in button

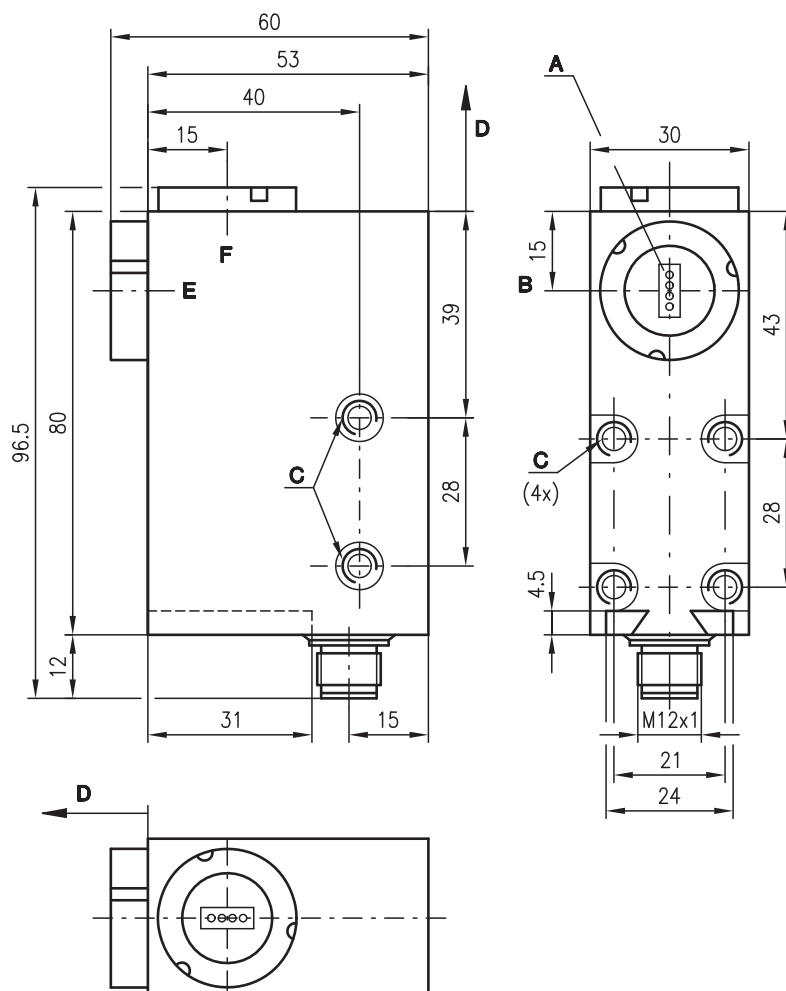


### Accessories:

(available separately)







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

## Dimensioned drawing



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

## Electrical connection

12-30V DC +	1		br/BN
1-10mA	2		ws/WH
GND	3		bl/BU
DSA/Q 	4		sw/BK
DSS	5		gr/GR

**DSA** Data set acknowledgement (**Data Set Acknowledge**)  
**DSS** Data set selection (**Data Set Select**)

## Specifications

### Optical data

Scanning range with objective 1	12 mm ± 1 mm
Scanning range with objective 2	20 mm ± 2 mm
Scanning range with objective 3 (accessory)	50 mm ± 5 mm
Light spot dimensions with objective 1	3.0 mm x 1.0 mm
Light spot dimensions with objective 2	4.0 mm x 1.2 mm
Light spot dimensions with objective 3	10.0 mm x 2.0 mm
Light spot orientation	vertical
Light source	LEDs (red, green, blue)

### Timing

Digital switching frequency	max. 25 kHz
Response time digital/analogue	min. 20 µs/6.25 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	PNP
Function characteristics	light or dark switching, reversible via button
Analogue output	1 ... 10 mA
Signal voltage high/low	≥ ( $U_B - 2V$ ) / ≤ 2V
Output current	max. 100 mA
Bias current	≤ 60 mA

### Indicators

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

### Keyboard

Release	via bit 9 of the data protocol
---------	--------------------------------

### 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 <sup>1)</sup>	2, 3
Standards applied	IEC 60947-5-2

### Options

#### Input for data-record selection

PNP: active / not active	$U_B$ /0V or not connected
<b>Pulse stretching</b>	20 ms, can be activated via button

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

## Tables

## Diagrams

## Order guide

See section 5. Preferred types (page 4)

## Remarks

### 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 shiny objects, the sensor is to be mounted at an angle to the object surface.
- The objectives and objective covers must not be removed.

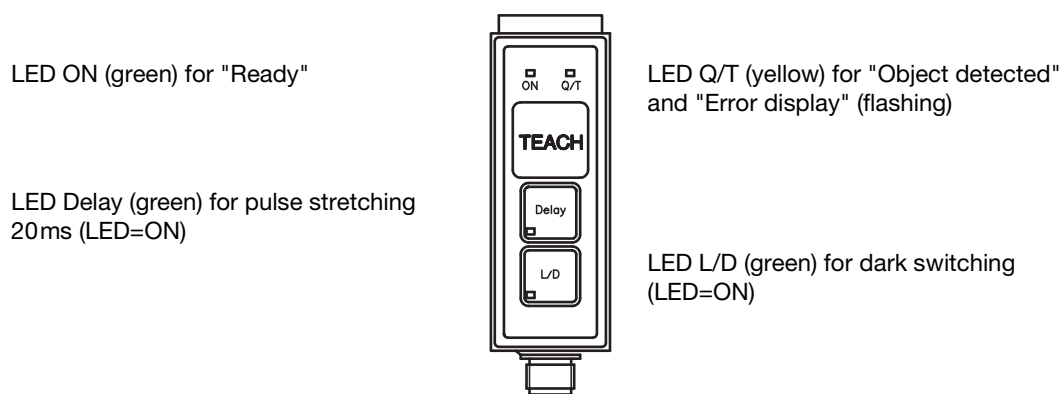
## KRTM 20

### 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 standardised serial interface, e.g. RS 232, is not required as communication is realised via standard PNP signals. Adjustment is performed by means of static teach-in via the keyboard, i.e. background and mark must be statically positioned below the light spot.

Contrast detection is achieved with the aid of multiple transmitter colours (red, green, blue). This allows the detection of minimal differences in contrast (grey tones). Each transmitter colour consists of 4 LEDs. A longish light spot with four points is formed in the focal point. This very small, extremely bright light spot guarantees a high repeatability and positioning accuracy. For the case that the marker or background is not optimally printed, the light spot can be focused by slightly changing the scanning distance in such a way that a homogeneous, rectangular light spot is formed.

### 2. Controls and indicators

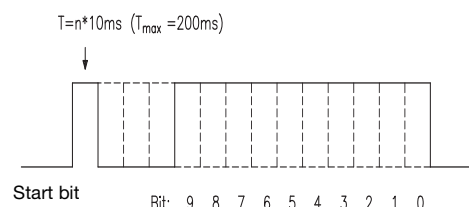


### 3. Protocol procedure for selecting a data record

- 1. The sensor system determines the period length  $T$  ( $T = n \cdot 10\text{ms}$ ) from the start bit. The start bit must be a multiple of 10ms. Maximum period duration  $T_{\text{max}} = 200\text{ms}$ .
- 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. Acknowledgement 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  
acknowledgement of the data record by the sensor system via pin 4 (switching output Q):**

- Bit 9 - button lock  
(1=all buttons disabled, 0=all buttons enabled)
- Bit 8 - no function
- Bit 7 - no function
- Bit 6 - most significant bit of the data-record number  
(1=high level, 0=low level)
- Bit 0 - least significant bit of the data-record number  
(1=high level, 0=low level)

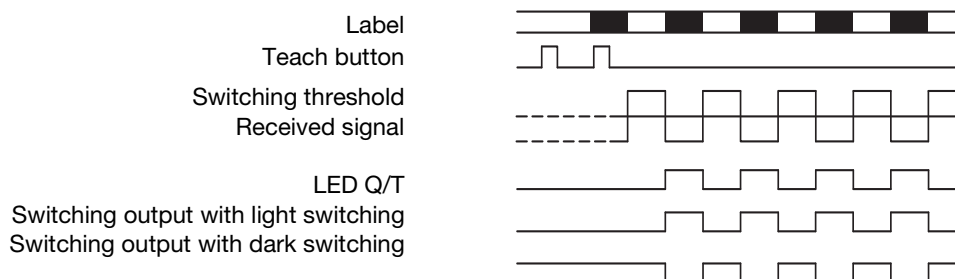


## 4. Teach process

The teach process is performed with the aid of the 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. 1 s	All colours are on White light spot visible	All LEDs flash
Position the light spot on the marker	All colours are on White light spot visible	All LEDs flash
Press the Teach button approx. 1 s	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 colours off	ON (green) illuminated Q/T (yellow) flashing (error)

## Signal response during teach-in



## 5. Preferred types

Selection table		Order code →									
Equipment ↓		KRTM 20M/V-20-0004-S12 Part No. 50041007	KRTM 20M/V-12-0004-S12 Part No. 50133896								
Scanning range	12 mm		●								
	20 mm	●									
	50 mm										
Transmitter colour	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	●	●								
	static teach-in	●	●								
	teach-in, background										
	synchronous input										

Additional types on request