KRTM 20M/N-20-0084-S12 — Cut-marking system

20 mm

12 - 30 V DC

80 kHz

- 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)

IEC 60947...

IEC 60947...

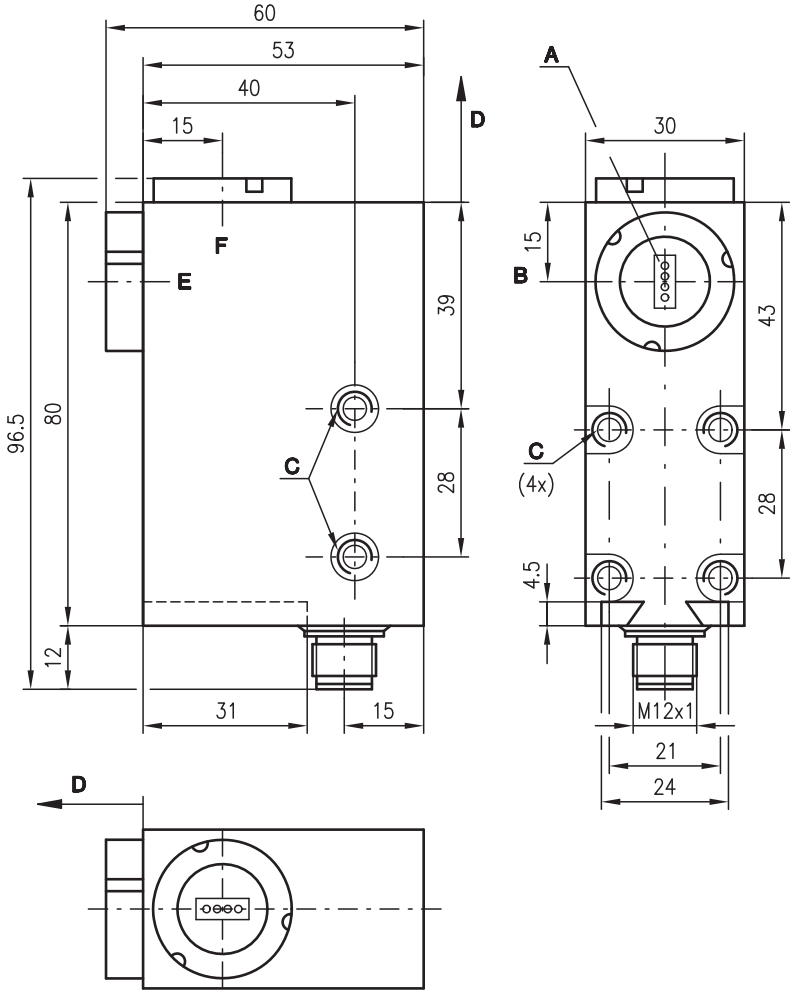
IP 67

Accessories:

(available separately)

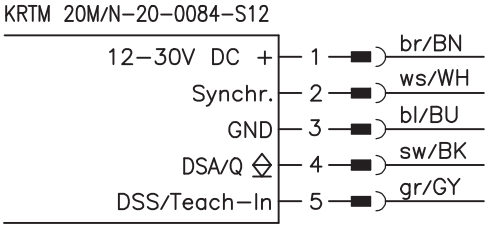
- M12 connectors, 5-pin (KD …)
- Ready-made cables (K-D …)
- Interchangeable objectives
- Tool for changing objectives

Dimensioned drawing



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

Electrical connection



DSA Data set acknowledgment (**D**ata **S**et **A**cknowledge)
DSS Data set selection (**D**ata **S**et **S**elect)

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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 V DC (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-2 V)/≤ 2 V
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

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	0 V/U_B or not connected
Teach-in input	
NPN: active/not active	0 V/U_B or not connected (for function see item 4)
Synchr. input	
NPN: active/not active	0 V/U_B or not connected (for function see item 4)
Pulse stretching	10 ms, can be activated via button
Remote control	2 Hz on switching output pin 4 (after teaching error) acknowledgement of the teaching error, see pt.4. Teach event
Compensation	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 1210xxxxxxx (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.

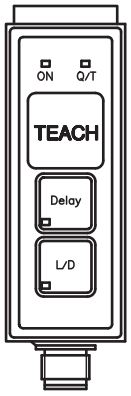
Contrast detection is achieved with the aid of multiple transmitter colors (red, green, blue). This allows the detection of minimal differences in contrast (gray tones). Each transmitter color consists of 1 LED. A round light spot is formed in the focal point. This very small, extremely bright light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

LED ON (green) for "Ready"

LED delay (green) for pulse stretching 10ms (LED=ON)



LED Q/T (yellow) for "Object detected" and "Error display" (flashing)

LED L/D (green) for dark switching (LED=ON)

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*5ms) from the start bit. The start bit must be a multiple of 5ms. Maximum period duration T_{max} = 100ms.
- 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):

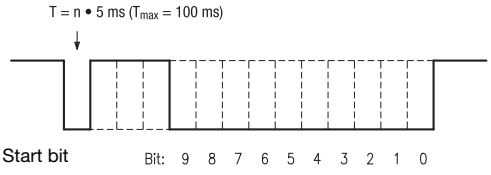
Bit 9 - button lock
(0V = all buttons disabled, U_B = all buttons enabled[1])

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.

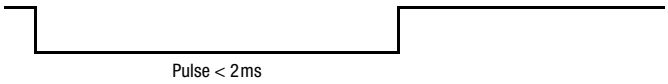
Operation	Transmitter	Indicator LED
Position the light spot on the background	Red, green or blue light spot visible	
Press the teach button approx. 0.5s	All colors are on White light spot visible	All LEDs flash
Move the light spot onto or over the mark	All colors are on White light spot visible	All LEDs 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 Equipment ↓	Order code →	KRTM 20M/N-20-0084-S12 Part no. 50119540									
Scanning range (in focus mode)	11mm										
	18mm	●									
	44mm										
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