Distance measurement and positioning | **RAD51D** | **Analog + 3 switching outputs**

Simple. Robust. Precise.
The compact RAD51D radar sensor is suitable for the tightest installation situations and the harshest environmental conditions. With a narrow opening angle of ±3° (6°), the sensor offers maximum focusing for positioning tasks.
Thanks to a measuring rate of 100 Hz and measuring ranges between 0.15 m ... 20 m or 0.3 ... 40 m, countless applications can be realized with the latest radar technology. The simplest tools not only help with implementation, but also create transparency in operation.

Analog Output

PNP NPN

Features and benefits

- **Wide measuring range**
  - Measuring range 0.15 m to 20 m or 0.30 m to 40 m
  - Small blind area of only 0.15 or 0.3 m
- **Fast and precise**
  - Measurement rate up to 100 Hz
  - Repeatability up to ±1 mm
- **Wide range of applications**
  - Small opening angle ±3° (6°) for precise distance and position detection
  - Different data output options: In addition to the analog output of 4 ... 20 mA, 3 switching outputs are available for a wide range of applications.
- **Compact and easy to install**
  - 96 mm total length incl. M12 connector
  - Standardized mounting due to M30 mounting thread
  - Matching mounting accessories for easy mounting and alignment on the application
- **Maximum robustness**
  Latest radar technology for reliable measurement even under the most adverse environmental conditions such as dust, fog, rain, smoke, wind or unfavorable light conditions.
- **Simple commissioning and setting of parameters**
  - Connection of the radar sensor to the PC using a configuration box (ConfigBox). Communication via the RS485 interface
  - “See what the sensor sees” through real-time visualization of the echo curve using appropriate software tools. This also enables simple and intuitive commissioning, as the measurement can be tracked live during installation.
  - Numerous setting options, such as setting the measuring range, setting switching points, filters or other features, to customize the sensor system to the respective application requirements.

Order code

RAD51D	.	XXX ⓐ	.	11111	.	1118
Type						

Opening angle: ±3° (6°)
Linearity: ±5 mm
Interface: 4 ... 20 mA + 3 x switching output PNP/NPN
RS485 as communication interface

ⓐ *Measuring range*
020 = 0.15 m ... 20 m
040 = 0.30 m ... 40 m

Stock types
RAD51D.020.11111.1118
RAD51D.040.11111.1118

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Accessories

		Order no.
M30 - Mounting bracket	For easy mounting and correct alignment of the RAD5x sensors on the measurement object.	
	Material: galvanized steel 1.4301 Weight: 81 g Dimensions: 60 x 55 x 42 mm **for vertical adjustment ±30°**	**8.0000.7000.0083** [1]
	Material: galvanized steel 1.4301 Weight: 223 g Dimensions: 70 x 65 x 65 mm **for vertical adjustment ±30° and horizontal adjustment ±15°**	**8.0000.7000.0084** [1]
Corner Cube	• Increasing the signal strength received from a target. • Increasing the possible angle between sensor and target. • Increasing the measurement accuracy by increasing the signal strength.	
	Material: 1.401 Weight: 120 g Dimensions: 104 x 82 x 91 mm **side length 100 mm**	**8.0000.7000.0081** [1]
	Material: 1.401 Weight: 690 g Dimensions: 254 x 170 x 221 mm **side length 250 mm**	**8.0000.7000.0082** [1]
Configuration box	For transferring the sensor data to a PC/laptop	**8.0010.9000.0023** [1]
	Scope of delivery: - Configuration box „ConfigBox“ - Connection cable M12, 8-pin with plug and socket - Connection element - LAN cable for connection to the PC - Power connection	

Cables and connectors

		Order no.
Preassembled cables	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56‘] PVC cable	**05.00.6041.8211.002M**
	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56‘] PUR cable	**05.00.6051.8211.002M**
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	**05.CMB 8181-0**

Further Kübler accessories can be found at: kuebler.com/accessories
Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

1) Stock types.

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Technical data

General data

Radar frequency (FMCW)	122.25 - 123 GHz
Radiation power	EIRP < 100 mW
MTTF	> 125 years
Measuring range	0.15 m ... 20 m 0.30 m ... 40 m
Opening angle	±3° (6°)
Measurement rate	100 Hz 300 Hz on request
Linearity	up to ±5 mm
Repeatability	±1 mm

Electrical characteristics

Power supply		24 V DC
Current consumption		75 mA (at 24 V DC)
Power consumption		1.8 W
Reverse polarity protection		yes
Communication		RS485 (half-duplex mode)
Analog output		4 ... 20 mA
	power supply	12 ... 30 V
Switching outputs		3 x PNP/NPN
	power supply	12 ... 30 V

Mechanical characteristics

Material	housing	stainless steel 1.4404
	lens	PTFE
Weight		205 g (170 g sensor / 35 g M30 nuts)
Protection acc. to ISO 20653		IP67 / IP69k
Working temperature range		-40 °C ... +70 °C [-40 °F ... +158 °F]
Storage temperature range		-40 °C ... +85 °C [-40 °F ... +185 °F]
Electrical connection		M12 connector, 8-pin, A-coded
Dimensions		l = 95,75 mm [3.77“] ø = 30 mm [1.18“]

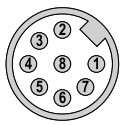
Approvals

CE compliant in accordance with

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Terminal assignment

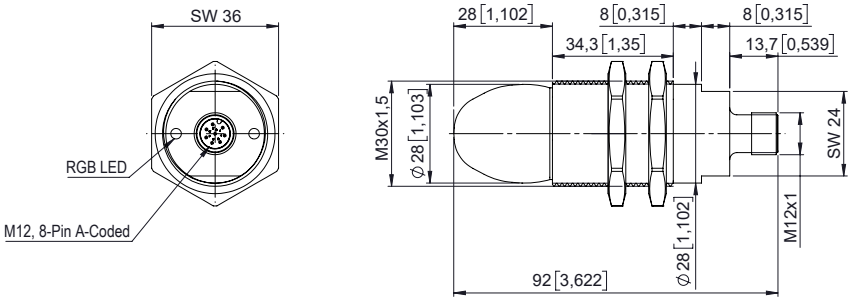
Function	M12 connector, 8-pin, A-coded									
Power supply Analog output Switching outputs	Signal:	A	+V	CL	OUT 2	OUT 1	B	0 V	OUT 3	⏚
	Pin:	1	2	3	4	5	6	7	8	PH



+V: supply voltage sensor +V DC
0 V: Ground sensor GND (0V)
A, B: RS485 Communication
CL: analog output (4 ... 20 mA)
OUT 1, 2, 3: switching outputs
PH ⏚: connector housing (Shield)

Dimensions

Dimensions in mm [inch]



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Technology in detail

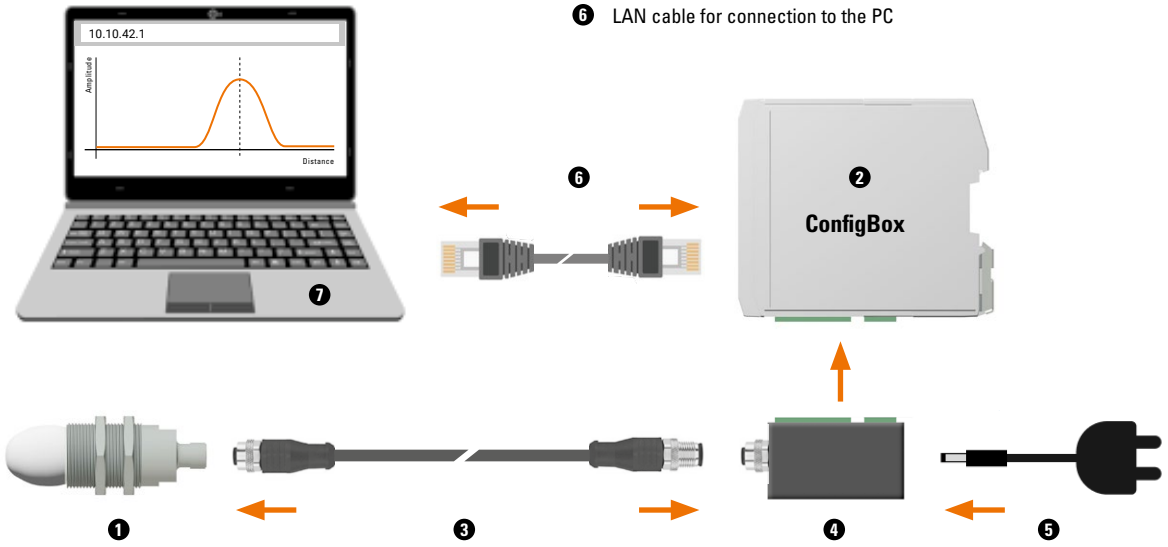
Individual setting options via the configuration box and configuration software

Connection

The radar sensor ❶ is first connected to the PC ❼ via the configuration box ❷.

All necessary connecting elements are included in the scope of delivery of the configuration box ❷:

❸ M12 connecting cable, 8-pin with male and female contacts
❹ Connection module
❺ Power connection
❻ LAN cable for connection to the PC



Commissioning / diagnosis

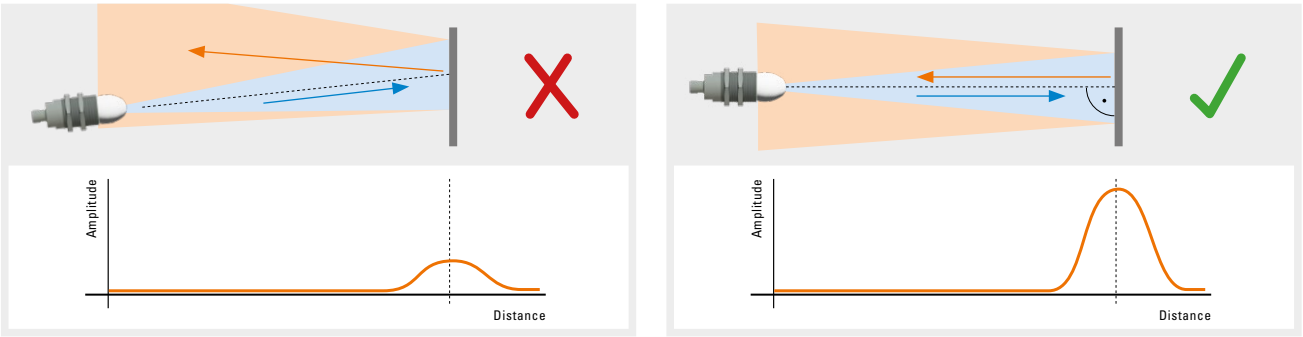
After connection, as shown above, the configuration software is opened via the browser - **10.10.42.1** (no “www”).
The software can be used to configure the sensor to the respective application requirements or to check its status during operation.

In addition to the visualization of the echo curve (radar signal), the following settings can be configured, for example:

- Configuration of the analog interface
- Setting the switching points for the switching outputs
- Setting the measuring range
- Setting the signal threshold value
- Selecting the desired signal for multiple peaks
- and much more

Simple start-up and analysis

Optimal alignment of the sensor to the measurement object by visualizing the measurement result during installation



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Technology in detail

Radar detection area

The detection pattern shows the extent to which a 25 mm diameter round metal rod illuminated by the radar sensor is detected.