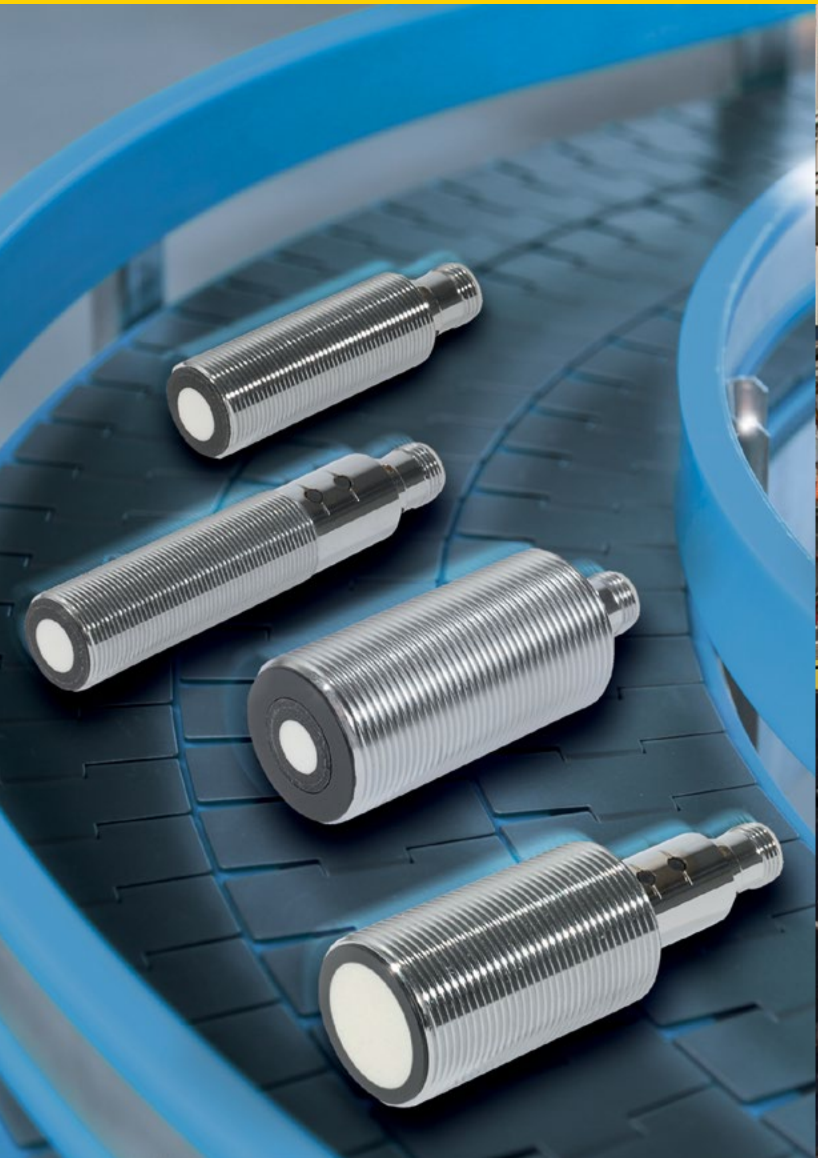
Your Global Automation Partner

Ultrasonic Sensors



At TURCK, we understand that not every application is the same. That's why we dedicate ourselves to finding the optimal engineered solution for every application; not just the standard ones.

Listening to customers and developing solutions are part of what makes TURCK fast, flexible and easy to do business with.

Whether you need a single product or a full suite of innovative automation solutions our experience allows us to tap into an extensive amount of engineering knowledge and solve customer problems others can't. Additionally, TURCK uses the most up to date manufacturing processes and quality materials so our products not only survive, but thrive in even the harshest applications.

That's the TURCK advantage.

85,000+
SOLUTIONS

50+
YEARS OF EXPERIENCE

2000+
EXPERIENCED SALES REPRESENTATIVES

Pioneer in non-contact sensing technology

Developed innovative connectivity solutions in response to our sensor customer needs

Recognized need and advanced knowledge of harsh duty environments lead to I/O solutions

SUPPORT & DEDICATED SERVICE

LIFETIME WARRANTY

3,500+
APPLICATION ENGINEERS

RESPOND & SOLVE over **1,200** inquiries per day

Strategically placed manufacturing facilities in the USA with 27 GLOBAL SUBSIDIARIES

with PARTNERS in 60 FURTHER **COUNTRIES**

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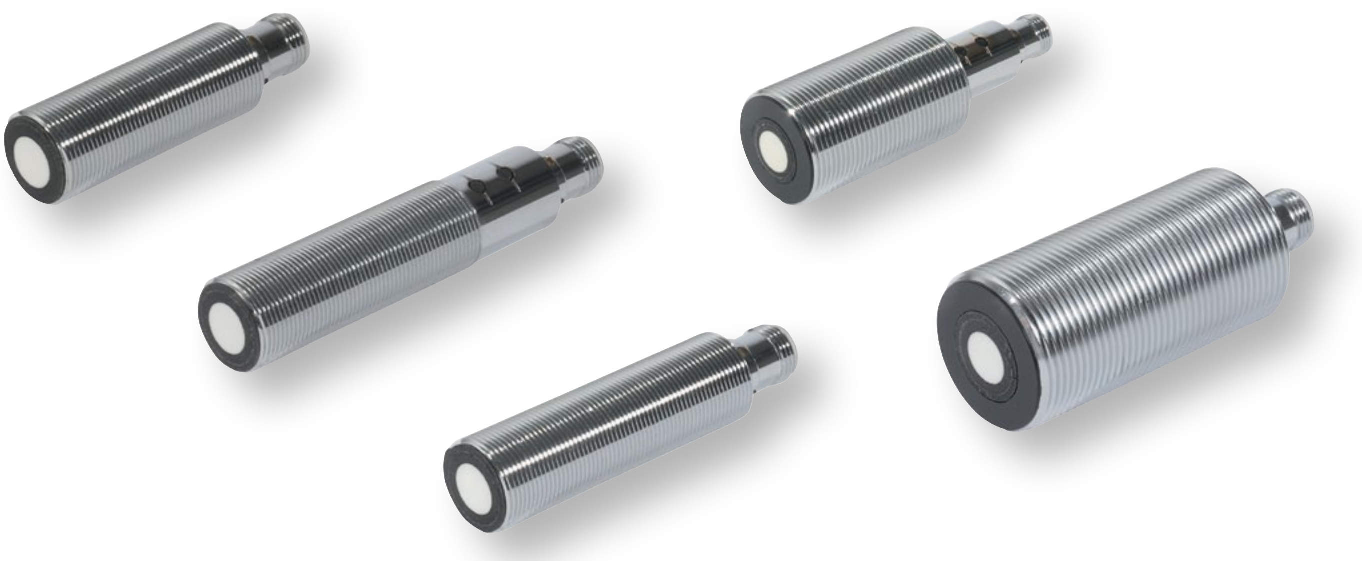
TURCK

Ultrasonic Sensors

The new RU-U sensor series from TURCK is a smart and streamlined selection of M18 and M30 devices with a great ultrasonic reach and the potential for effective inventory management. This is made possible thanks to the short blind zones that are effective even at long ranges.

TURCK has expanded the versatility of this sensor series to meet all application demands: The standard versions allow you to set a window and two separate switchpoints, either by teach adapter or via teach buttons directly on the sensor.

You can use the high-end variant as a switch and also as an analog sensor. Via IO-Link, you can adjust different operating modes, the temperature compensation and the output function. If you install several sensors side-by-side, you can run them in synchronized mode or multiplex them to prevent crosstalk.



The Functional Principle

The principle that applies here is the transit time method and works as follows: The sensor emits a sonic pulse and measures the time the reflected signal needs to return to the transducer. The distance to the object is calculated from the known speed of sound in the air and is either output as a measured value or as a switching signal. Since the speed of sound depends on the air temperature, the sensor measures the temperature separately to compensate the transit-time difference at different temperatures.

In general, the ultrasonic technology holds a very important position in the broad field of industrial sensor systems. With its large coverage, this technology is on equal terms with inductive, capacitive and optical sensing methods. However, this measuring principle is special, because it is not an electromagnetic but a mechanical mode of operation and thus requires some additional knowledge about the application.

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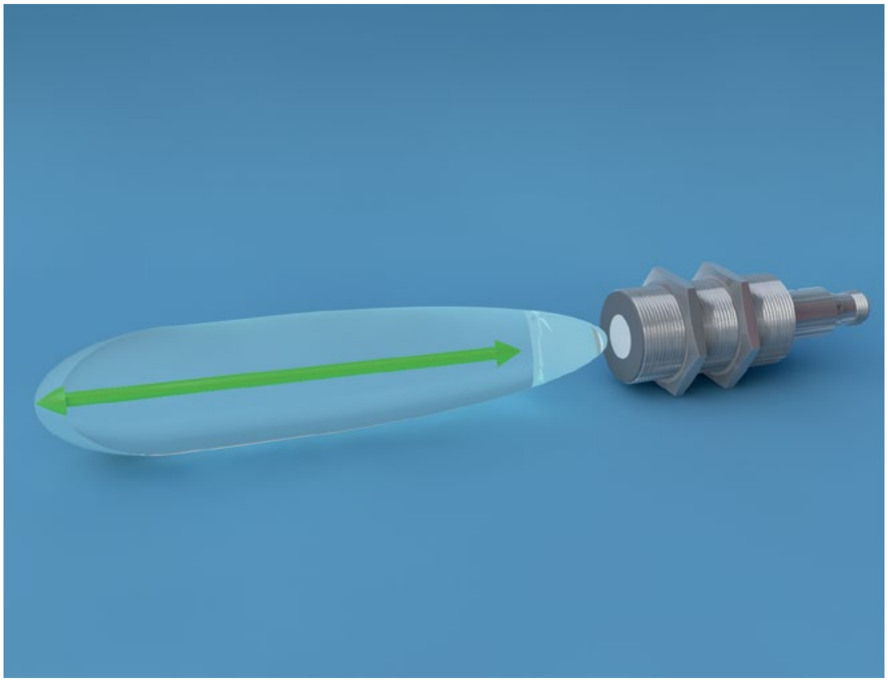
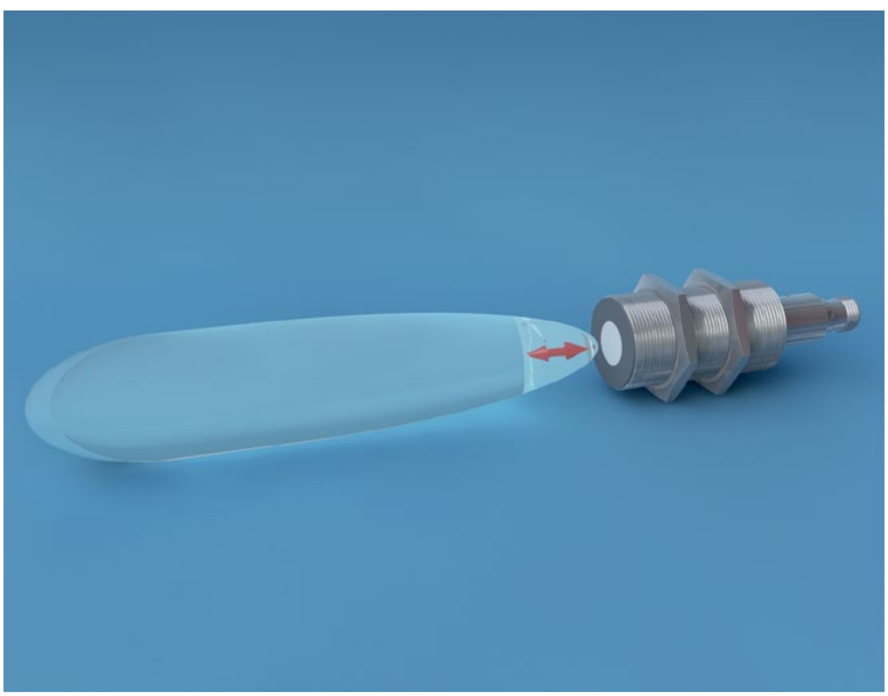
Features



Large Coverage

Thanks to the newly developed transducers, this sensor series covers large distances. The M18 up to 1.30 m and the M30 up to 3 m. The latter does not even need a bigger transducer head. This provides more flexibility for application.



Short Blind Zone

The devices are backwards compatible thanks to the extremely short blind zone. The M18 version for example, has a blind zone of 25 mm and covers a range of 40 cm. Objects that are close to the sensor are still detected reliably and the mounting depths such as in level control applications for example can be adjusted better. Since the blind zone must be kept free in order to avoid false signals, a short blind zone provides better opportunities for assembly and effective object detection.

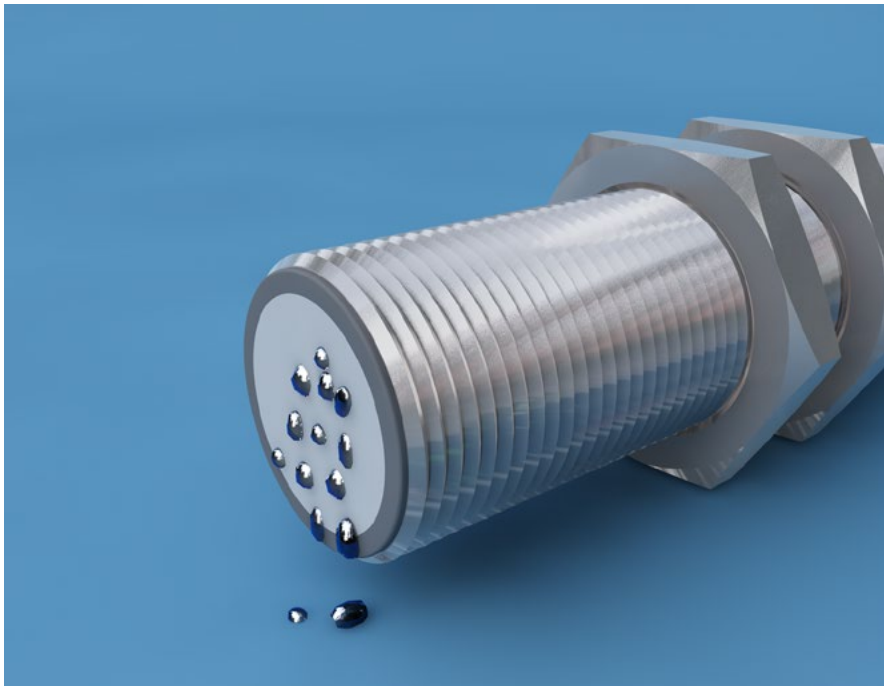
Features

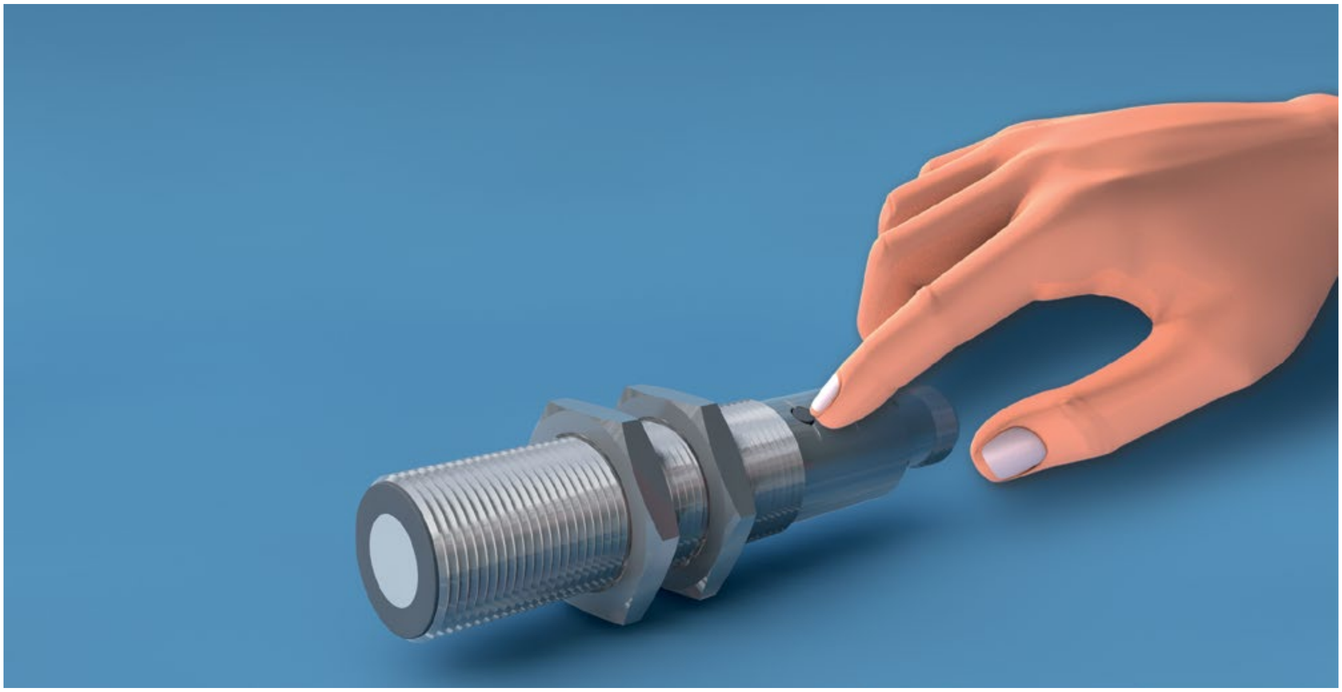
Rugged Construction

The rugged full-metal barrel is extremely short and forms with the metal M12 connector. Potential material weaknesses that may result in damage to the unit when installed in harsh environments and exposed to low temperatures are thus eliminated. The sensor is fully threaded and can be screwed in the desired position.

Front-Flush Transducer

The smooth transducer front prevents pollution and deposition of particles of any kind. In the ideal case, the mechanical motion of the transducer even shakes off deposits, making it self-cleaning. You can also simply wipe off particles that stick on the surface at higher humidity, thus keeping the area between transducer surface and ring clean. Damage caused by sharp or pointed cleaning tools belong to the past.





Easy-Teach

For simple and intuitive adjustment, all ultrasonic M18 and M30 sensors are equipped with a teach-in on pin 5, allowing you to focus the device easily and accurately on the target. You can set switch-points or measuring ranges comfortably this way without external software.

The settings are either made remotely via TURCK Easy-Teach or directly via buttons on the sensor that are embedded in the rugged metal housing. They must be made within a timeout period before the automatic locking sets in to protect against inadvertent operation. A reset of the sensor unlocks the buttons.

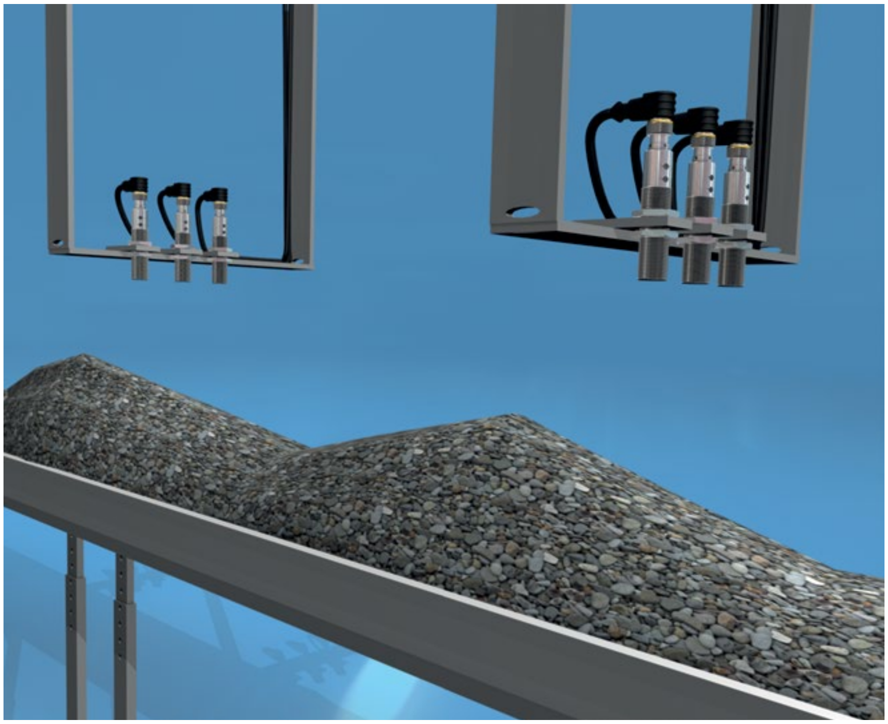
Features

IO-Link Interface

Besides the teach-in functionality, the high-end variants with switching and analog output can also be parametrized via the IO-Link interface version 1.1. You can set them to other operating modes, such as opposed mode sensing in order to use them as pure transmitters or receivers. Other adjustable features are timeout or temperature compensation. They are adjusted either via the internal temperature sensor or additionally via an external temperature sensor, thus allowing more accurate readings because the ambient temperature is also included in the measurement.

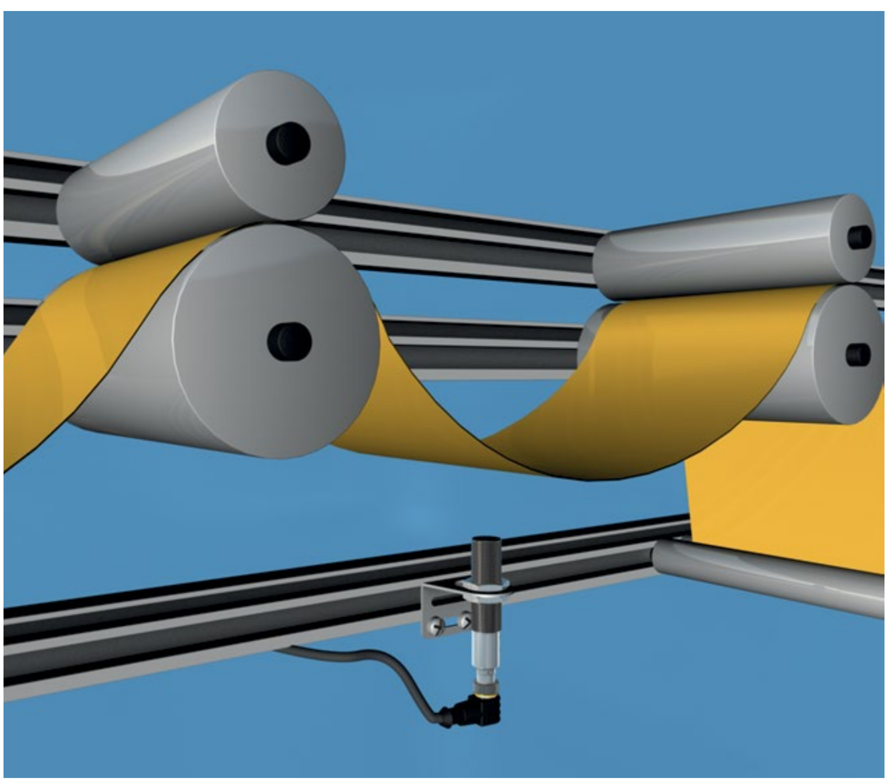
On devices with analog output you can adjust a rising or falling characteristic curve, whereas on those with switching output you can adjust the hysteresis. If instead of the switching and analog output, two independent switching outputs are required, these can be set to PNP or NPN and NC or NO function mode.

If multiple devices are installed in the same environment, it is possible to run them in synchronized mode or to multiplex them in order to prevent crosstalk. The 16-bit data width of the process value can be read out with



Conveyor Belt

The ultrasonic sensors are very suitable for harsh and dusty environments. They scan bulk material from above. For this, several sensors are mounted side-by-side to cover the entire width of the belt. Crosstalk is avoided by multiplexing, whereby each sensor has its own address. In this way the sensors work cyclically one at a time. A targeted control of each individual sensor is also possible. If the sensors are arranged with a larger clearance, they can also be run as a group in synchronized mode.



Web Control

Foil, paper and other roll material on motorized reels are usually controlled for sag. This is a typical task for ultrasonic sensors, because they ignore surface qualities such as color and also abrasion dust. Depending on the size of the sag, sensing ranges of up to several meters are possible with accuracies in the millimeter range. When used as a limit switch, they can start and stop drives, and via the analog output they can also be used for speed control.

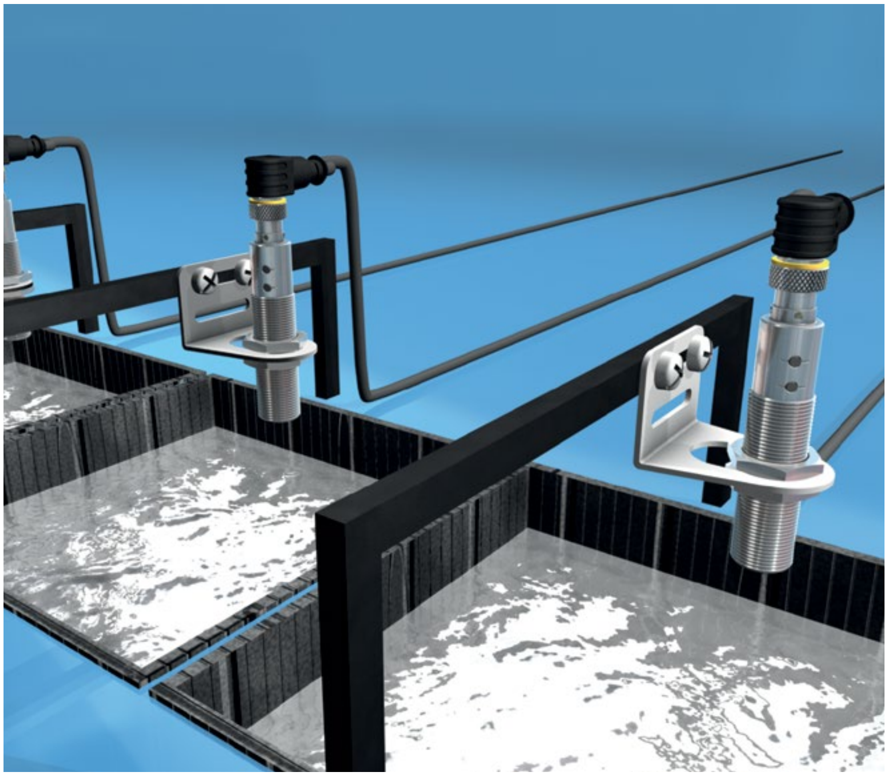
Application Examples

Clear Object Detection

Clear objects, which are difficult to detect by optical sensors, are no problem for ultrasonic devices. When properly aligned, they recognize a glass pane reliably even from a great distance. They are therefore ideal for final assembly processes such as the recognition of windscreens – and thanks to their color ignoring ability –they also capture seats, fittings, seals, or general interior. The ultrasonic technology also facilitates the function test of moving parts, such as the control of end positions of chairs or the drawing up of seats or car roofs.

Level Control

Liquids represent a very good reflector for ultrasonic waves, provided that they do not foam. Level control of fluid reservoirs is thus a perfect job for ultrasonic sensors. They are insensitive to spray and fluid drops. If suitably installed, the mechnical motion of the diaphragm even shakes off deposits and cleans itself. You can set multiple switching thresholds, use them for continuous measurement of filling levels or direct control of pumps. Thanks to the short blind zone, they can be installed near to the liquid's surface.



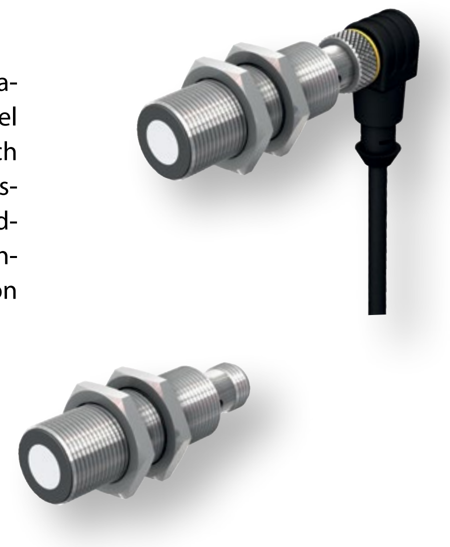
The new ultrasonic RU-U sensor series comprises compact, standard and high-end variants which replace the existing product portfolio of ultrasonic sensors.

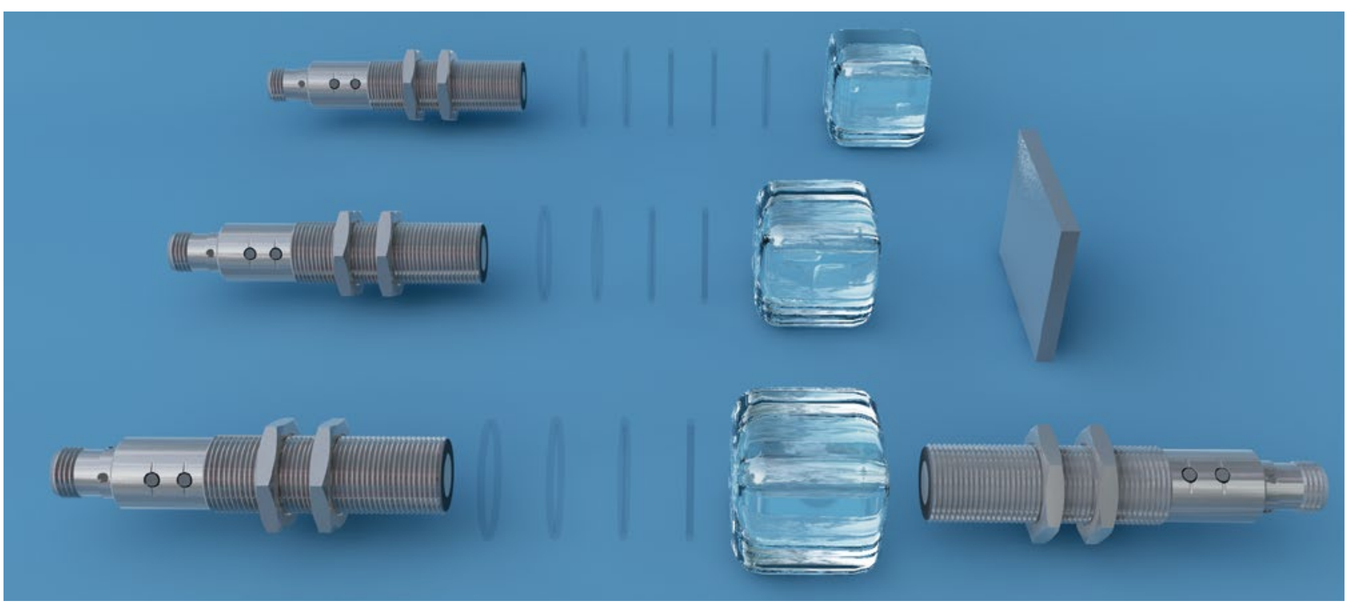
Compact Series

With the compact types RU40 and RU100 that cover ranges of up to 40 cm and 100 cm, we have significantly reduced the number of different types, since the output function can now be switched directly via teach adapter or cable on Pin 5.

Standard Series

The standard variants are also adjustable via pin 5, depending on the model either via teach adapter or with teach buttons. Equipped with a dual-discrete output, they round off the product portfolio. You can adjust a switching window and the output function on them.





The high-end series can be adjusted to different operating modes, such as diffuse, retroreflective and also opposed mode.

Variants

High-End Series

Besides devices with teach buttons, we also offer the "high-end" switching/analog versions on which you can do various settings via IO-link and, if you wish, you can even use them as a dual-discrete switch. The long-range standard and high-end M30 variants round off the product portfolio.

Overview Ranges

	M18			M30	
					
Compact 1 switching output	40 cm 100 cm				
Standard 2 switching outputs		40 cm 130 cm	40 cm 130 cm	40 cm 130 cm 300 cm	130 cm 300 cm
High-End 1 analog and 1 switching output			40 cm 130 cm		130 cm 300 cm

Product Features

- Compact, rugged housing
- Many mounting possibilities
- Immune to electromagnetic interference fields
- Easy-Teach functionality to set switching windows and measuring ranges
- Voltage supply 15…30 VDC
- Versions with switching output, 2 x switching outputs or 1 switching and 1 analog output
- Analog output, 4…20 mA and 0…10 V
- Male M12 x 1; 5-pin

LED Display

- **Green:** Object in the detection range
- **Yellow:** Object in the switching or measuring range
- **Off:** No object in the detection range

RU	130	U	–	M18	E	–	2	U	P	8	X2	T	–	H1	1	5	1

Series

RU = Ultrasonic

Sensing Range

. . . = [cm]

Functional principle

U = Universal

Housing length

E = long–sized
M = medium–sized

Housing

M... = threatened barrel metal Ø [mm]
CK40 = rectangular, plastic, connector
CP40 = rectangular, plastic terminal chamber

Output function

2 = number of outputs
U = adjustable: NO/NC
LIU = analog output current or voltage
A = working current NO
R = closed current NC

Output mode

N = NPN
P = PNP

Voltage range

6 = 10...30 VDC
8 = 15...30 VDC

Indication

X = LED
2 = number of LEDs

Electrical version

T = with teach button
blank without teach button

Connector type

H1 = male M12 x 1

Connector version

1 = straight

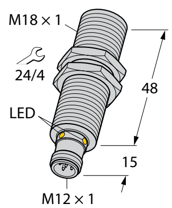
Number of contacts

5 = number of contacts

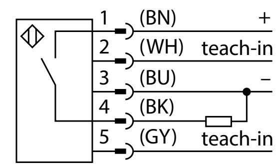
Connector assignments

1 = standard assignment

Technical Features – Compact



Wiring diagram



Technical features	RU40U-M18M -UP8X2-H1151	RU100U-M18M-UP8X2-H1151
Blind zone S_{min}	2.5 cm	15 cm
Operating distance	40 cm	100 cm
Cone angle	9 °	16 °
Ultrasonic frequency	300 kHz	200 kHz
Max. approach speed	4 m/s	8 m/s
Max. traverse speed	1.5 m/s	
Resolution	0.05 cm	0.1 cm
Repeatability	0.15 % of full scale	
Operating voltage	15…30 VDC	
Rated operational current	≤ 150 mA	
No-load current	≤ 50 mA	
Design	threaded barrel, CuZn, nickel-plated	
Protection class acc. to EN 60529	IP67	
Connection mode	male M12 x 1; 5-pin	
Resistance to vibration and mechanical shock	IEC 60068-2	
Operating temperature	-25…+70 °C	
Switching hysteresis	5 mm	10 mm
Switching frequency	7 Hz	8 Hz
Response time	75 ms	65 ms
Readiness delay	≤ 300 ms	
Approvals	CE, UL	

Technical Features – Standard

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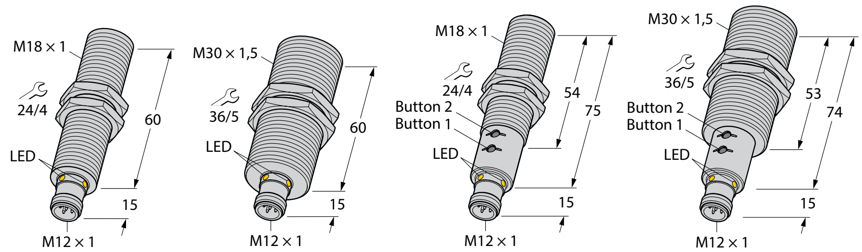
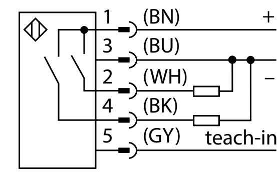


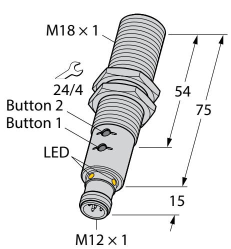
A B C D

Wiring diagram



Technical features	RU40U-M18E-2UP8X2-H1151	RU40U-M18E-2UP8X2T-H1151	RU130U-M18E-2UP8X2-H1151	RU130U-M18E-2UP8X2T-H1151	RU40U-M30M-2UP8X2-H1151	RU130U-M30M-2UP8X2-H1151	RU130U-M30E-2UP8X2T-H1151	RU300U-M30M-2UP8X2-H1151	RU300U-M30E-2UP8X2T-H1151
Dimension drawing	A	C	A	C	B	B	D	B	D
Blind zone S_{min}	2.5 cm		15 cm		2.5 cm	15 cm		30 cm	
Operating distance	40 cm		130 cm		40 cm	130 cm		300 cm	
Cone angle	9°		16°		9°	16°		15°	
Ultrasonic frequency	300 kHz		200 kHz		300 kHz	200 KHz		120 kHz	
Max. approach speed	4 m/s		8 m/s		4 m/s	8 m/s		8 m/s	
Max. traverse speed	1.5 m/s								
Resolution	0.05 cm		0.1 cm		0.1 cm	0.1 cm		0.1 cm	
Repeatability	0.15 % of full scale								
Operating voltage	15…30 VDC								
Rated operational current	≤ 150 mA								
No-load current	≤ 50 mA								
Design/ Housing	threaded barrel, CuZn, nickel-plated								
Protection class acc. to EN 60529	IP67								
Connection mode	male M12 x 1; 5-pin								
Resistance to vibration and mechanical shock	IEC 60068-2								
Operating temperature	-25…+70 °C								
Switching hysteresis	5 mm	5 mm	10 mm	10 mm	5 mm	10 mm	10 mm	25 mm	25 mm
Switching frequency	7 Hz		8 Hz		7 Hz	8 Hz		4 Hz	
Response time	75 ms		65 ms		75 ms	65 ms		125 ms	
Readiness delay	≤ 300 ms								
Approvals	CE, UL								

Technical Features – High-End



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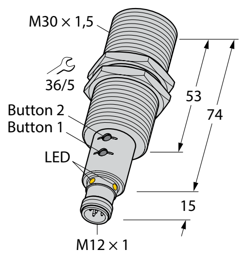
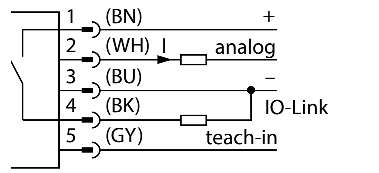


B

Wiring diagram



<table>
<tr><th>Technical features</th><th>RU40U-M18E-LIU2PN8X2T-H1151</th><th>RU130U-M18E-LIU2PN8X2T-H1151</th><th>RU130U-M30E-LIU2PN8X2T-H1151</th><th>RU300U-M30E-LIU2PN8X2T-H1151</th></tr>
<tr><td>Dimension drawing</td><td>A</td><td>B</td><td>A</td><td>B</td></tr>
<tr><td>Blind zone S_{min}</td><td>2.5 cm</td><td>15 cm</td><td>15 cm</td><td>30 cm</td></tr>
<tr><td>Operating distance</td><td>40 cm</td><td>130 cm</td><td>130 cm</td><td>300 cm</td></tr>
<tr><td>Cone angle</td><td>9 °</td><td>16 °</td><td>16°</td><td>15°</td></tr>
<tr><td>Ultrasonic frequency</td><td>300 kHz</td><td>200 kHz</td><td>200 kHz</td><td>120 kHz</td></tr>
<tr><td>Max. approach speed</td><td>4 m/s</td><td>8 m/s</td><td>8 m/s</td><td>8 m/s</td></tr>
<tr><td>Max. traverse speed</td><td colspan="4">1.5 m/s</td></tr>
<tr><td>Resolution</td><td>0.05 cm</td><td>0.1 cm</td><td>0.1 cm</td><td>0.1 cm</td></tr>
<tr><td>Repeatability</td><td colspan="4">0.15 % of full scale</td></tr>
<tr><td>Operating voltage</td><td colspan="4">15…30 VDC</td></tr>
<tr><td>Rated operational current</td><td colspan="4">≤ 150 mA</td></tr>
<tr><td>No-load current</td><td colspan="4">≤ 50 mA</td></tr>
<tr><td>Design/ Housing</td><td colspan="4">threaded barrel, CuZn, nickel-plated</td></tr>
<tr><td>Protection class acc. to EN 60529</td><td colspan="4">IP67</td></tr>
<tr><td>Connection mode</td><td colspan="4">male M12 x 1; 5-pin</td></tr>
<tr><td>Resistance to vibration and mechanical shock</td><td colspan="4">IEC 60068-2</td></tr>
<tr><td>Operating temperature</td><td colspan="4">-25…+70 °C</td></tr>
<tr><td>Switching hysteresis</td><td>5 mm</td><td>10 mm</td><td>10 mm</td><td>25 mm</td></tr>
<tr><td>Switching frequency</td><td>7 Hz</td><td>8 Hz</td><td>8 Hz</td><td>4 Hz</td></tr>
<tr><td>Response time</td><td>75 ms</td><td>65 ms</td><td>65 ms</td><td>125 ms</td></tr>
<tr><td>Readiness delay</td><td colspan="4">≥ 300 ms</td></tr>
<tr><td>Approvals</td><td colspan="4">CE, UL</td></tr>
</table>

Overview of Types

TURCK

M18

Type code	Output function	Setting	Range	Connectivity
RU100U-M18M-UP8X2-H1151	switching output	teach cable	15…100 cm	M12 x 1, 5-pin
RU40U-M18M-UP8X2-H1151			2.5…40 cm	
RU130U-M18E-2UP8X2-H1151	2 switching outputs		15…130 cm	
RU40U-M18E-2UP8X2-H1151			2.5…40 cm	
RU130U-M18E-2UP8X2T-H1151		teach cable + teach buttons	15…130 cm	
RU40U-M18E-2UP8X2T-H1151			2.5…40 cm	
RU130U-M18E-LIU2PN8X2T-H1151	switching and analog output IO-Link	teach cable + teach buttons + IO-Link	15…130 cm	
RU40U-M18E-LIU2PN8X2T-H1151			2.5…40 cm	

M30

Type code	Output function	Settings	Range	Connectivity
RU40U-M30M-2UP8X2-H1151	2 switching outputs	teach cable	2.5…40 cm	M12 x 1, 5-pin
RU130U-M30M-2UP8X2-H1151			15…130 cm	
RU300U-M30M-2UP8X2-H1151			30…300 cm	
RU130U-M30E-2UP8X2T-H1151		teach cable + Teach buttons	15…130 cm	
RU300U-M30E-2UP8X2T-H1151			30…300 cm	
RU130U-M30E-LIU2PN8X2T-H1151	switching and analog output IO-Link	teach cable + teach buttons + IO-Link	15…130 cm	
RU300U-M30E-LIU2PN8X2T-H1151			30…300 cm	

Accessories

	Type	Description
	TX1-Q20L60	Teach adapter for programming the measurement range
	USB-2-IOL-0002	IO-Link master with built-in USB port for high-end version

*for other cable lengths and qualities, see www.turck.com

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