

TURCK

**Industrial
Automation**

**ULTRASONIC
SENSORS**



Sense it! Connect it! Bus it! Solve it!

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: Even the simple compact devices RU40 and RU100 allow you to select between diffuse and retroreflective operating mode as well as to set the output to NC and NO switching via teach adapter. The standard versions additionally 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 additionally 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.

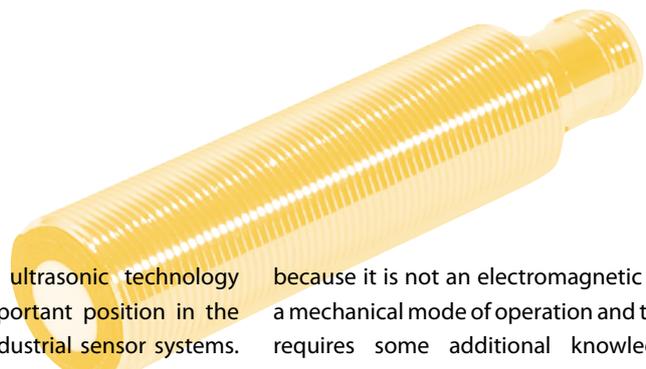


The functional principle

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 consulting. You find useful information here: www.turck.de/ru

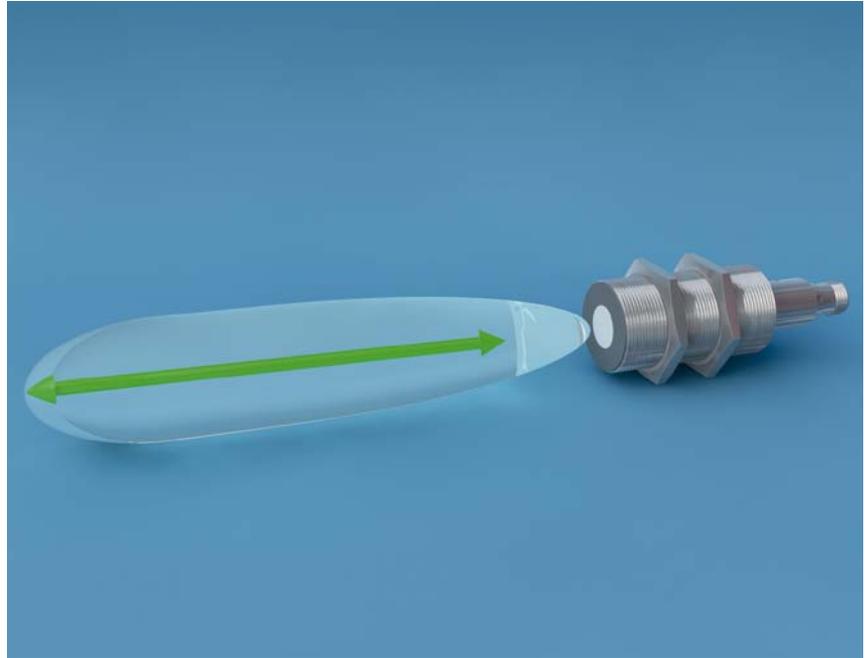


— Ultrasonic sensors	
Functional principle	2
— Features	
Large coverage	4
Short blind zone	4
Rugged construction	5
Front-flush diaphragm	5
Easy-Teach	6
IO-Link interface	7
— Benefits	
Benefits	8
— Application examples	
Conveyor belt	10
Level control	10
Clear object detection	11
Sag control	11
— Variants	
Compact	12
Standard	12
High-end	13
Overview of types	13
— Ultrasonic sensors M18, M30	
Type code	14
Technical features – Compact series	15
Technical features – Standard series	16
Technical features – High-end series	17
— Overview of types and accessories	
Types	18
Accessories	19

Features

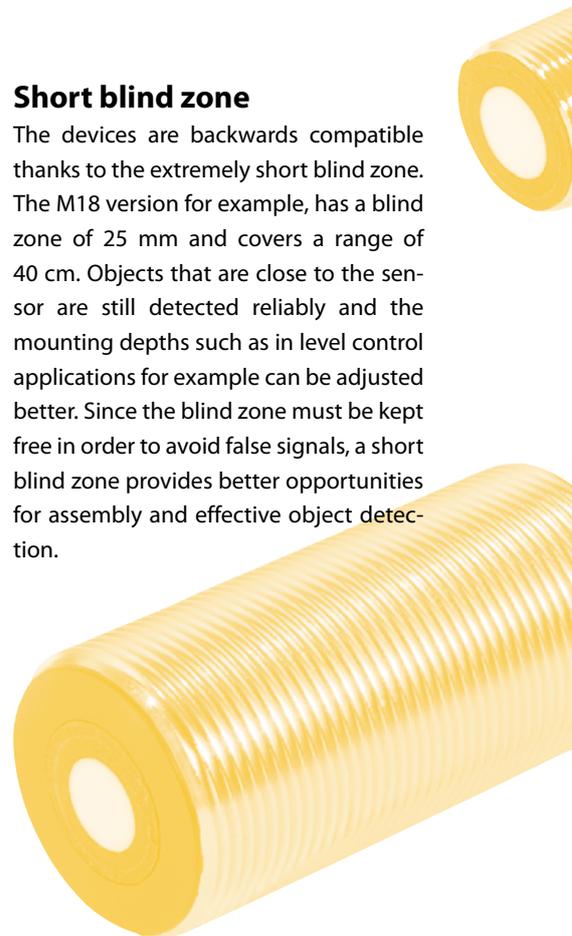
Large coverage

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.



Rugged construction

The rugged full-metal barrel, is extremely short and forms a unit 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 again and is so to speak 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.



Features



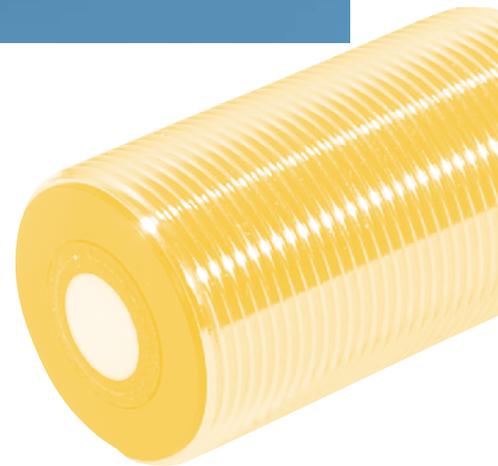
Easy-Teach

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. Only a mains reset of the sensor unlocks the buttons.

In addition, the M18 devices feature a teach input on pin 2, making this series fully backwards compatible to the old M18K devices.



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 for example, 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 38,400 Baud via the supported COM2 communication type.



Benefits

The advantages of the RU-R series are clear:

Plant availability

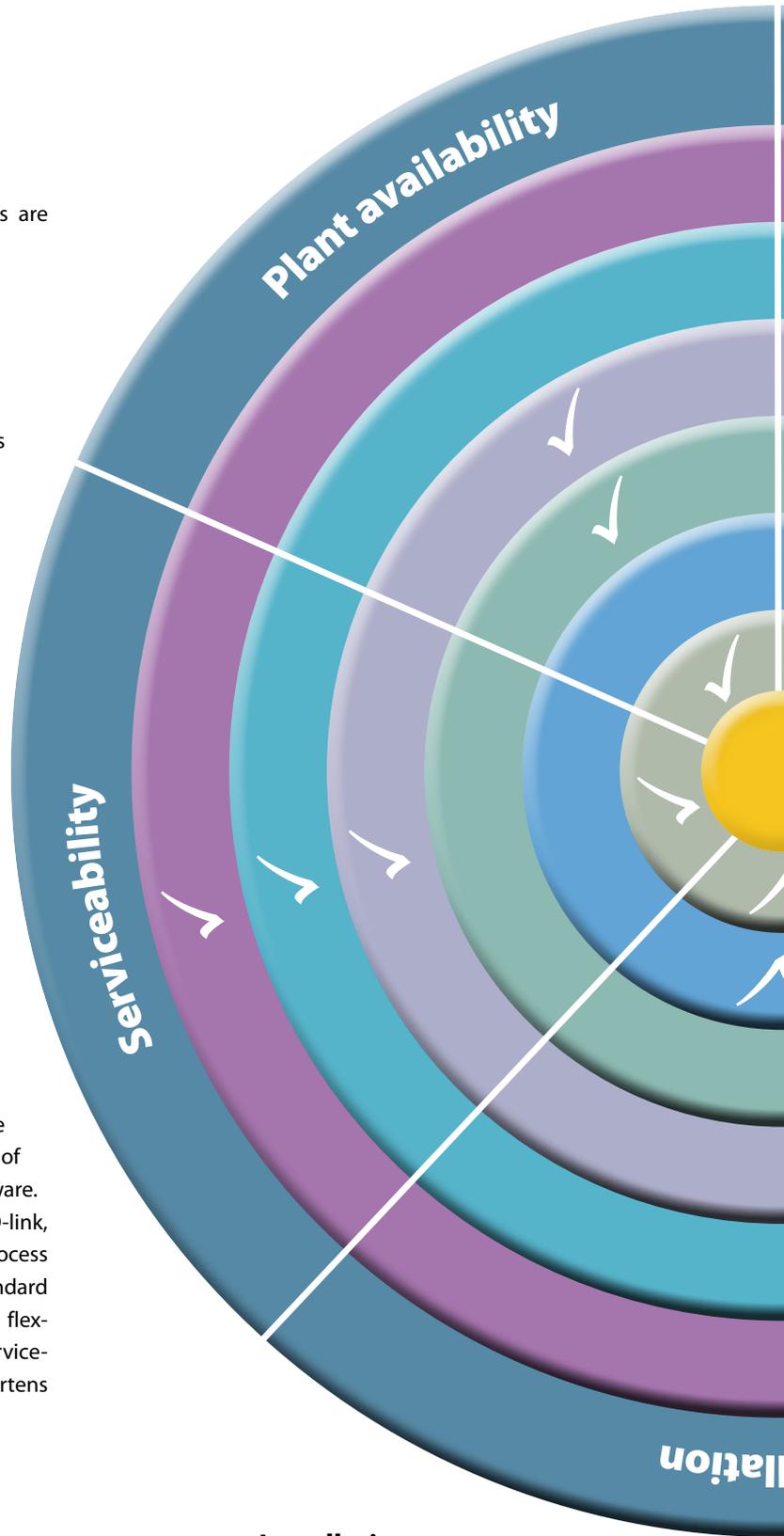
The greater process reliability results on the one hand from the rugged, one-piece construction of housing and connector and, on the other hand, from the smooth transducer front on which no dirt can collect. Last but not least, the high interference immunity makes this product line highly available.

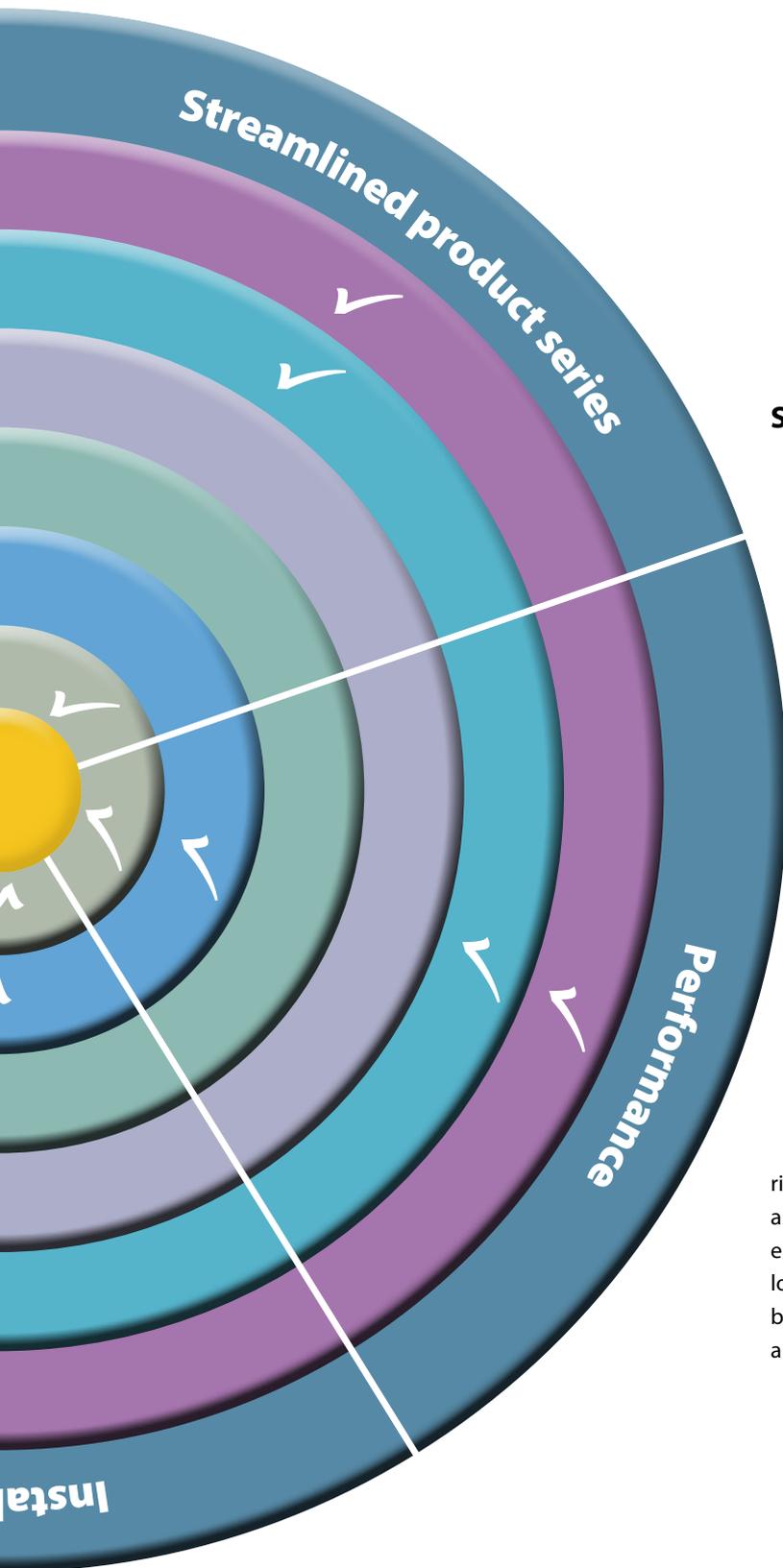
Serviceability

As an alternative to the flexibly adjustable PNP or NPN switching outputs and the current or voltage outputs, IO-link offers the ability to conveniently configure the sensor exactly to the requirements of the respective application via software. In addition to parametrizing via IO-link, you can of course read out the process value at any time, if you use the standard as a communication channel. This flexibility increases immensely the serviceability of the devices and thus shortens the lead time.

Installation

TURCK Easy-Teach facilitates the installation and commissioning of the new ultrasonic sensors. The concept allows the user, for instance the exact setting of the switching or measuring range limits, without that a certain degree of insecurity remains as to how the transducer head is best be aligned.





Streamlined product series

Thanks to the extremely short blind zones, even very close objects are detected and this in turn enables you to install the sensor in many different ways. Combined with the larger measuring ranges, the ability to set the devices to diffuse or retro-reflective sensing mode and to teach the output to NC and NO mode, you cover numerous applications with only a few sensor types from the new TURCK ultrasonic sensor series.

Performance

Thanks to the newly developed transducers, this sensor series has a better coverage than the previous series. The M18 devices cover up to 1.30 m and the M30 up to 3 m. Bigger transducer heads to extend the coverage are no longer required. Together with the short blind zones, you get more mounting and application possibilities.

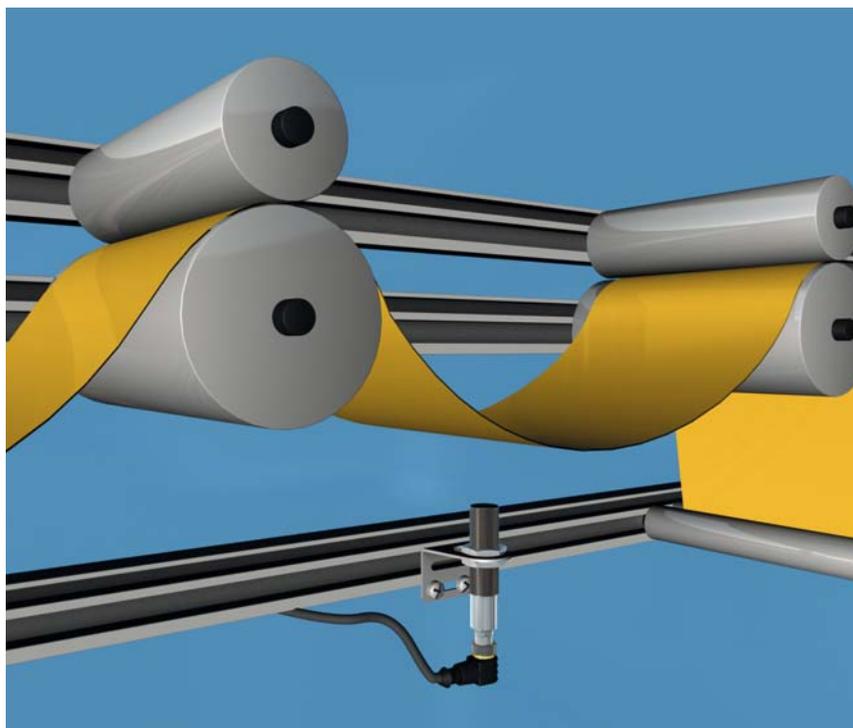
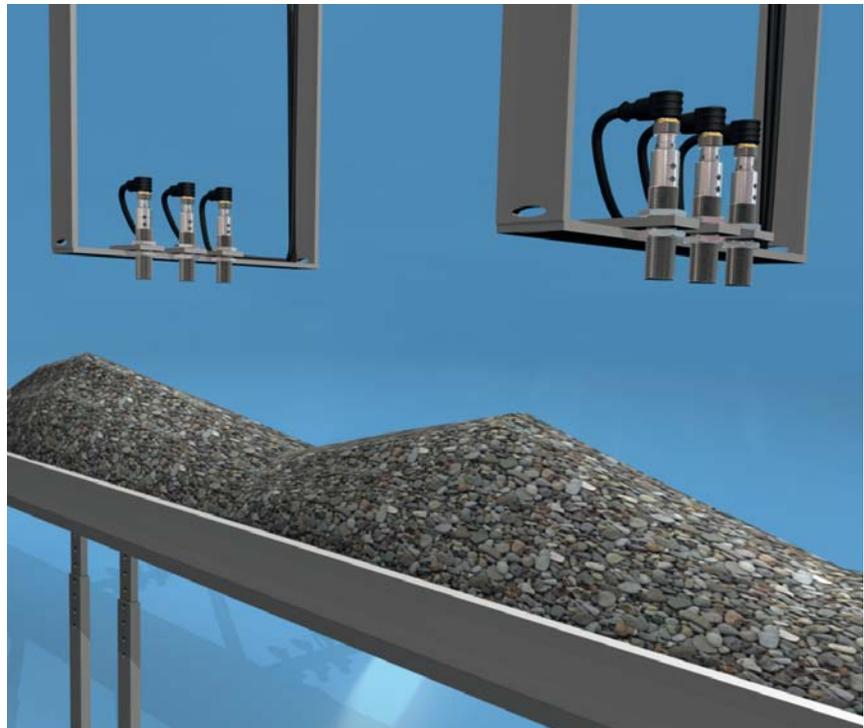
On the other hand, there is the possibility of programming via IO-link with PACTware™ which is the standard frame application preferred by many suppliers. No proprietary software modules make programming difficult anymore and thanks to this, running updates has become much more comfortable.

-  Large coverage
-  Short blind zone
-  Rugged housing
-  Front-flush diaphragm
-  Easy-Teach
-  IO-Link

Application examples

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.

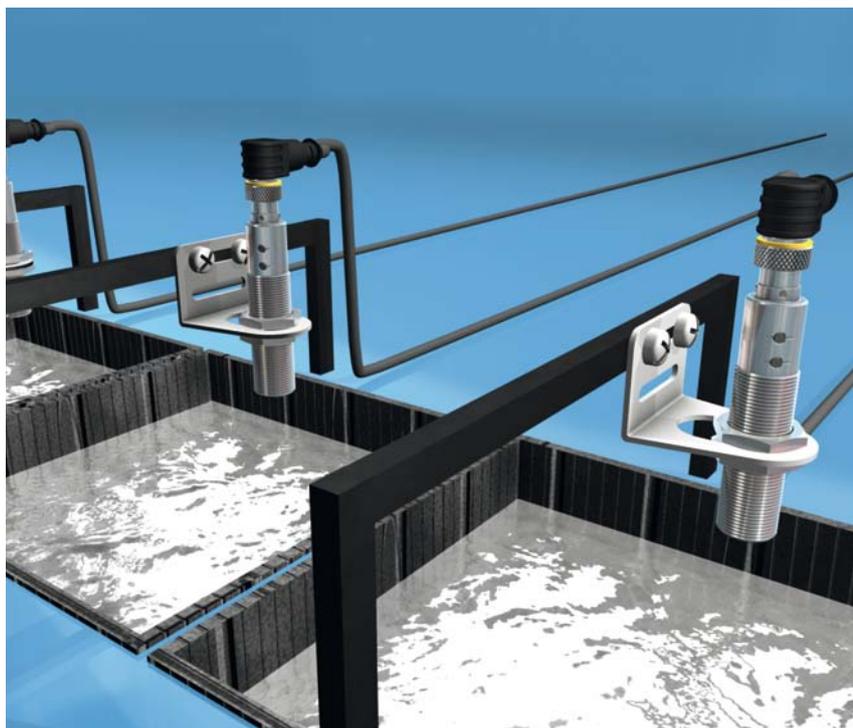


Sag control

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 for example. 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.

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 colour ignoring ability – they also capture seats, fittings, seals, or general interior. The ultrasound 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 mechanical 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.

Variants

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

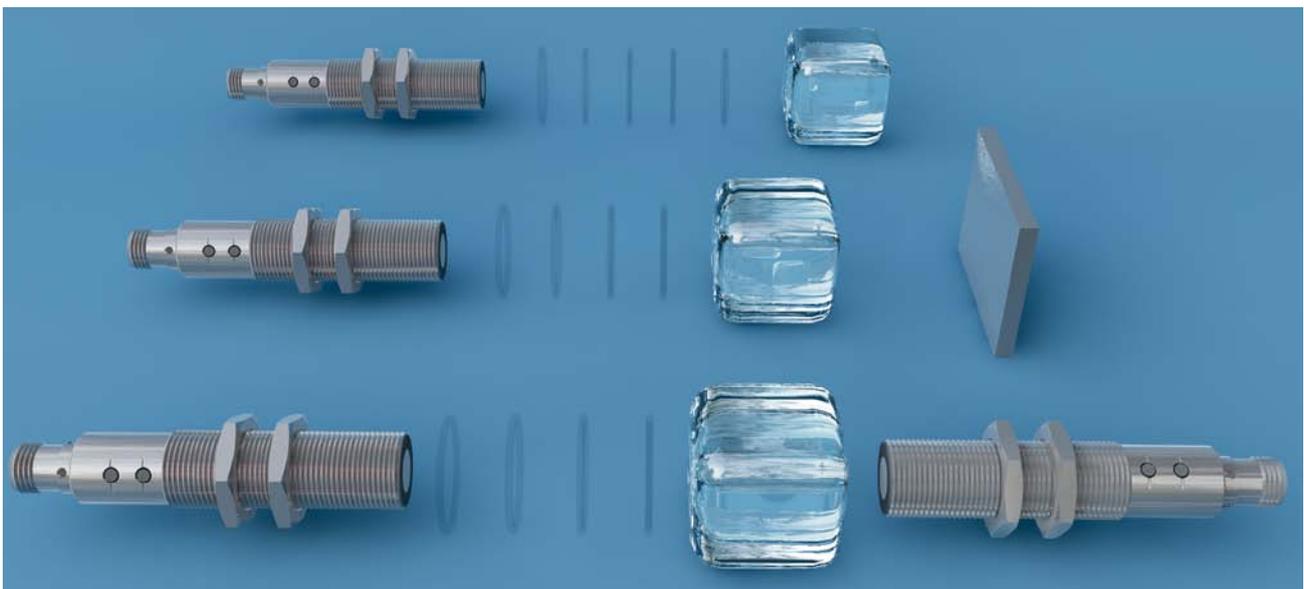
Compact series

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. The highest reach is achieved with the compact M18 variant.



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. To adjust the window, you only have to set output 1, because output 2 is linked to output 1 by default. In this way, up to three areas can be captured and evaluated at the same time.



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



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

Ultrasonic sensors M18/M30

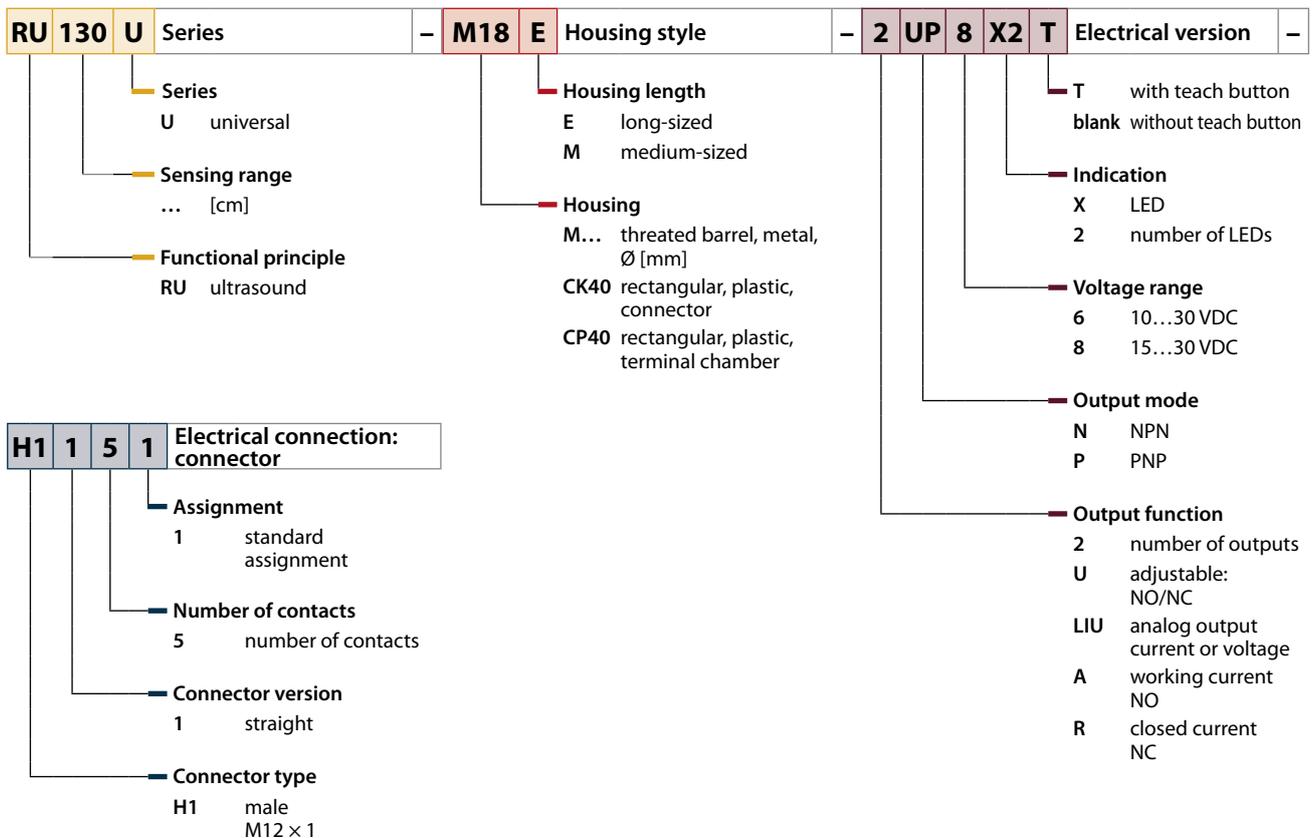
Product features

- 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

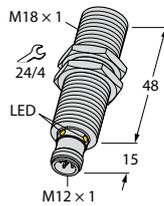
RU 130 U - M18 E - 2 U P 8 X2 T - H1 1 5 1



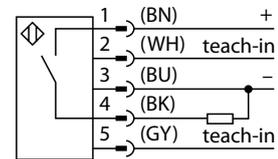
Technical features – Compact

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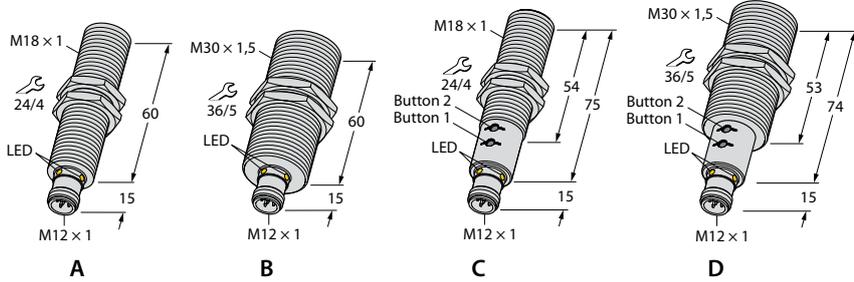


Wiring diagram

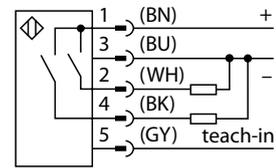


Technical features	RU40U-M18M-UP8X2-H1151	RU100U-M18M-UP8X2-H1151
Blind zone S_{min}	2.5 cm	15 cm
Operating distance	40 cm	100 cm
Cone angle	9°	16°
Ultrasonic frequency	300 kHz	200 kHz
Max. approach speed	4 m/s	8 m/s
Max. traverse speed	1.5 m/s	
Resolution	0.05 cm	0.1 cm
Repeatability	0.15 % of full 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 % of full scale	
Switching frequency	7 Hz	8 Hz
Response time	75 ms	65 ms
Readiness delay	≤ 300 ms	
Approvals	CE, UL	

Technical features – Standard



Wiring diagram

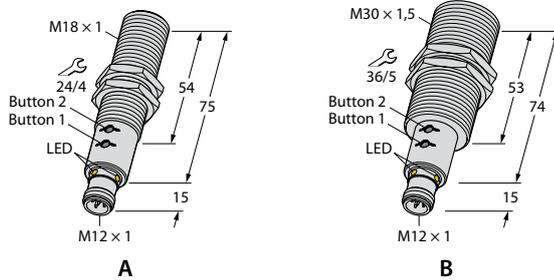


Technical features	RU40U-M18E-2UP8X2-H1151		RU40U-M18E-2UP8X2T-H1151		RU130U-M18E-2UP8X2-H1151		RU130U-M18E-2UP8X2T-H1151		RU40U-M30M-2UP8X2-H1151		RU130U-M30M-2UP8X2-H1151		RU130U-M30E-2UP8X2T-H1151		RU300U-M30M-2UP8X2-H1151		RU300U-M30E-2UP8X2T-H1151	
	A	C	A	C	B	B	D	B	D									
Dimension drawing	A	C	A	C	B	B	D	B	D									
Blind zone S_{min}	2.5 cm		15 cm		2.5 cm		15 cm		40 cm									
Operating distance	40 cm		130 cm		40 cm		130 cm		300 cm									
Cone angle	9°		16°		9°		16°		7°									
Ultrasonic frequency	300 kHz		200 kHz		300 kHz		200 kHz		200 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 % of full scale													
Switching frequency	7 Hz		8 Hz		7 Hz		8 Hz		2 Hz									
Response time	75 ms		65 ms		75 ms		65 ms		250 ms									
Readiness delay					≤ 300 ms													
Approvals					CE, UL													

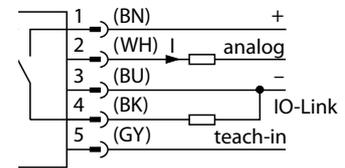
Technical features – High-end

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Wiring diagram



Technical features	RU40U-M18E- LIU2PN8X2T-H1151		RU130U-M18E- LIU2PN8X2T-H1151		RU130U-M30E- LIU2PN8X2T-H1151		RU300U-M30E- LIU2PN8X2T-H1151	
	A	B	A	B	A	B	A	B
Dimension drawing	A	B	A	B	A	B	A	B
Blind zone S_{min}	2.5 cm	15 cm	15 cm	15 cm	15 cm	40 cm		
Operating distance	40 cm	130 cm	130 cm	130 cm	130 cm	300 cm		
Cone angle	9°	16°	16°	16°	16°	7°		
Ultrasonic frequency	300 kHz	200 kHz	200 kHz	200 kHz	200 kHz	200 kHz		
Max. approach speed	4 m/s	8 m/s	8 m/s	8 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	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 % of full scale				
Switching frequency	7 Hz	8 Hz	8 Hz	8 Hz	8 Hz	2 Hz		
Response time	75 ms	65 ms	65 ms	65 ms	65 ms	250 ms		
Readiness delay				≥ 300 ms				
Approvals				CE, UL				

Overview of types



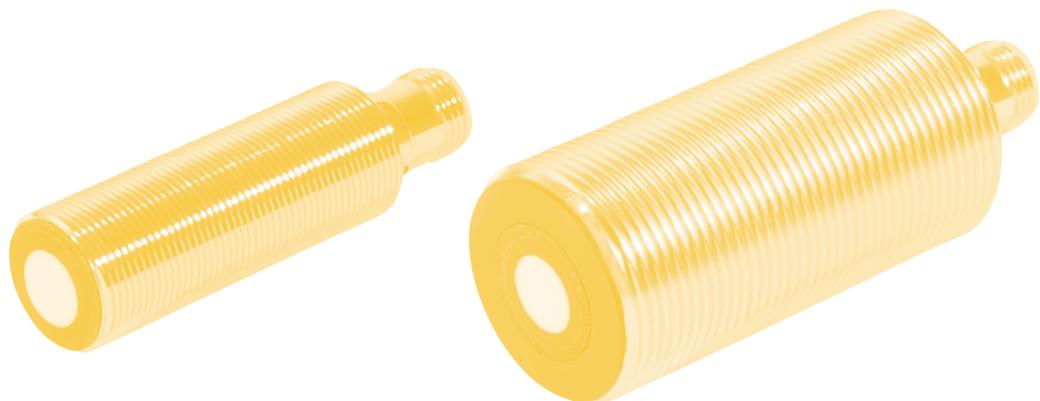
M18

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	teach cable + teach buttons	15...130 cm	
RU40U-M18E-2UP8X2-H1151			2.5...40 cm	
RU130U-M18E-2UP8X2T-H1151			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	



	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
	MW-18	Mounting bracket for M18 threaded barrels; stainless steel A2 1.4301 (AISI 304)
	MW-30	Mounting bracket for M30 threaded barrels; stainless steel A2 1.4301 (AISI 304)
	RKC4.5T-2/TEL	Connection cable, female M12, straight, 5-pin, cable length: 2 m*; sheath material: PVC, black, cULus approval
	WKC4.5T-2/TEL	Connection cable, female M12, angled, 5-pin, cable length: 2 m*; sheath material: PVC, black, cULus approval
	SDPX-IOL4-0001	PROFIBUS-DP slave, integrated IO-Link_Master for high-end version

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

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