

Ultrasonic proximity sensors UM30, UM18 and UC12 – powerful devices for almost any application.

Even when it's extremely dusty: The ultrasonic proximity sensors are not impaired by foreign bodies in the air, mist, vapour and dirt. Even the background suppression is near perfect. We call this concentrating on the essentials.

UM 30



Far and near – different scanning ranges

Short, medium or long-distance? The UM30 has three different scanning ranges. The minimum operating distance begins at a minute 30 mm, and for really long-distance applications, to the limit of the scanning range is astonishing 6000 mm.

Detection or measurement as required

The UM30 can be fitted with a binary output or analogue interface. Depending on the task on hand, objects can simply be detected or their distance measured.

UM 18



Smaller diameter with the same functionality

The UM18 has 1 or 2 switching outputs and extended features (for instance, ObSB mode): The sensor is taught a fixed background and reliably switches when an object is detected between sensor and background: Perfect for detecting round or tilted surfaces!

Typical applications

- Level control of solids and liquids
- Checking presence of outer packaging
- Assignment control during packaging
- Checking presence of PET bottles
- Diameter control
- Loop control

Typical applications

- Positioning of small objects in tight environments
- Checking for the presence of small, transparent or opaque outer packaging

Mode of operation: detecting, measuring and switching with ultrasonic proximity sensors.

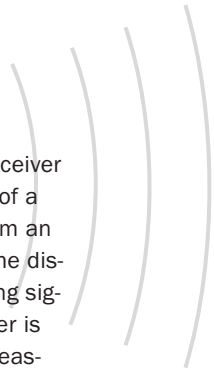
The detection of objects with ultrasonic sensors opens up a new dimension. Objects are positioned, detected and controlled virtually irrespective of material and environment.

Sensors with a profile – defining the detection area

SICK Ultrasonic Sensors generate an ultrasonic wave by means of a piezo element in the front part of the housing. The wave spreads in the atmosphere in accordance with the laws of physics. The same piezo element can detect and measure the sound reflected by an object. Therefore it functions alternately as sender and receiver (transceiver).

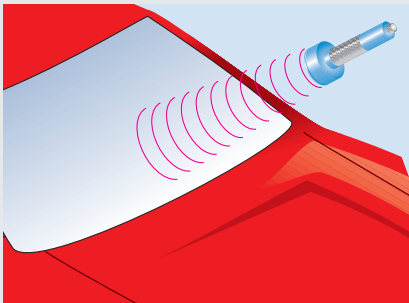
The measurement principle of ultrasonic sensors is based on the time taken for ultrasonic to travel through the medium air. The signals are transmitted in defined “packages”.

With the help of its processing electronics, the transceiver evaluates the time taken between the transmission of a sound “package” and the arrival of the reflection from an object. As a result, either a signal proportionate to the distance is sent via an analogue interface, or a switching signal depending on a previously set distance parameter is sent through a binary output. The accuracy of the measurement and the maximum scanning range lie within a tolerance range which depends mainly on the state of the carrier medium air and the roughness of the object in question.



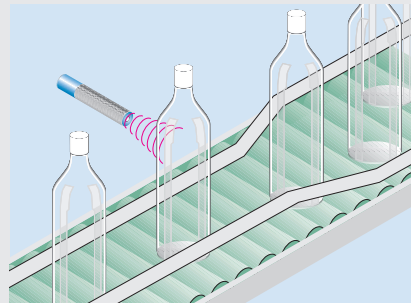
Positioning

Object detection and distance measurement independent of material



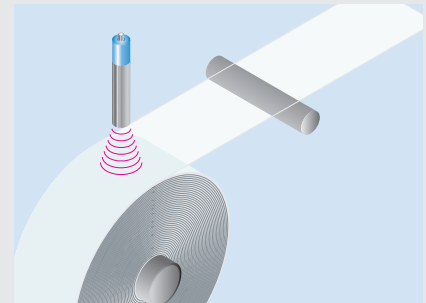
Detection

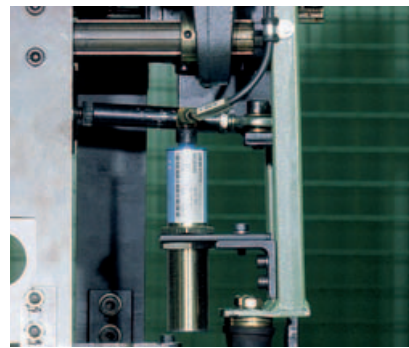
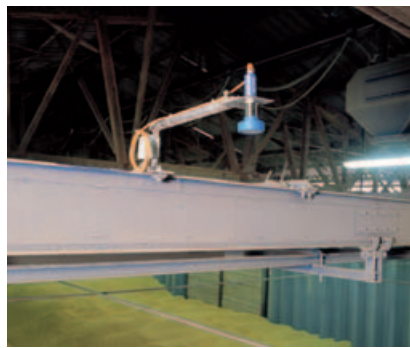
Recognise transparent objects



Unwind

Distance measurement for diameter check





Sensors in action – scanning and measuring reflections

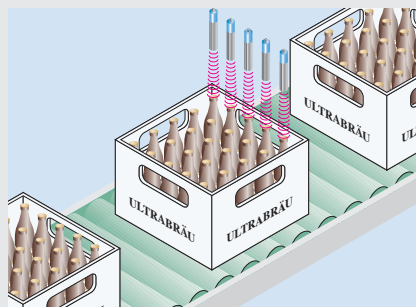
Ultrasonic sensors UM30 are used as non-contact proximity switches which process reflected signals, e.g. from objects on a conveyor belt. An essential benefit of the working principle of ultrasonic sensors is the almost complete blanking of the background, a prerequisite for accurate detection.

Scanning round corners – thanks to the right accessories

Ultrasonic sensors UM30 are small and easily installed even in confined spaces. And if things get really tight, the right accessories can help out. Suitable reflectors allow sound to be deflected almost without loss.

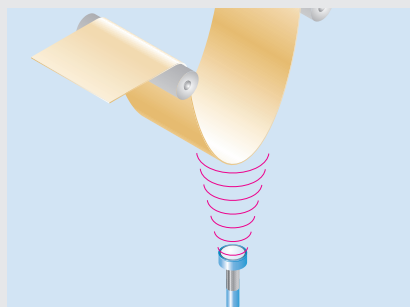
Package

“Engaged” check on package content



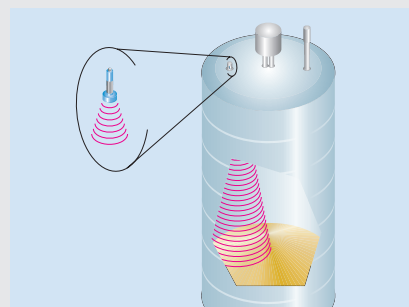
Adjust

Control material looping



Monitoring

Level control in silos and containers



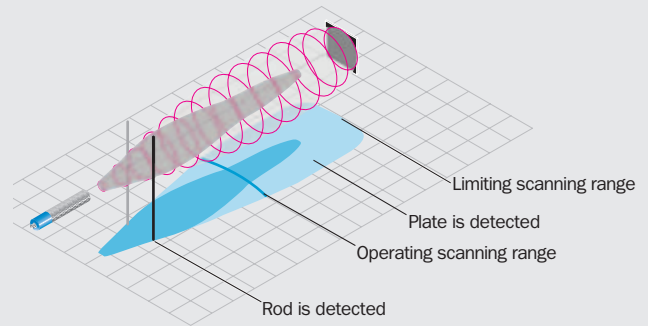
Detection range and assembly of ultrasonic sensors.

Detection range

To determine the area of detection of the sensors, a series of measurements are carried out with two standardised objects, a thin round rod and a plate. The three-dimensional area within which the sensor responds to the rod has the form of a thin club. It marks the typical operating scanning range of the sensor.

The sensor responds to the plate within the area of a larger beam. This area defines the maximum or limit detection range of the sensor.

When projected onto a two-dimensional grid, typical profiles are created. These are the operating diagrams of the ultrasonic sensors, from which the operating scanning range, the limiting scanning range, the specific shape and the blind zone of the detection range can be read off. Objects which are smaller than the round rod may only be detected within an area smaller than the operating scanning range.

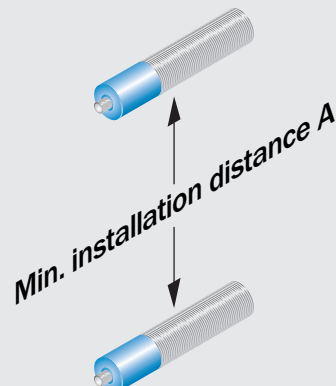
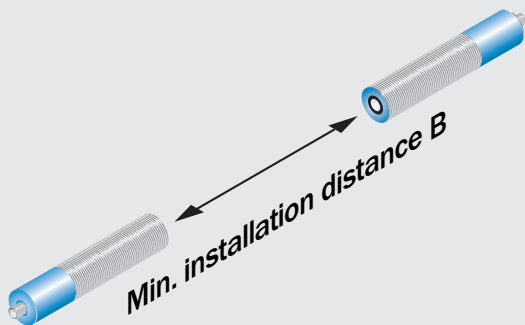


Every ultrasonic sensor has its characteristic club-shaped detection range. It is narrow for smaller objects and wide for larger ones. The typical detection areas are depicted by sound-beam diagrams.


Installation

Ultrasonic sensors installed close together or opposite one another may affect each other mutually. For this reason, different axial and lateral distances have to be maintained depending on the detection range. The sensor with the largest detection range determines the minimum distance.

Operating scanning range	Min. installation distance A	Min. installation distance B
0.25 m	10 cm	> 100 cm
0.35 m	> 30 cm	> 170 cm
1.3 m	> 60 cm	> 540 cm
3.4 m	> 160 cm	> 1600 cm
6 m	> 260 cm	> 3000 cm



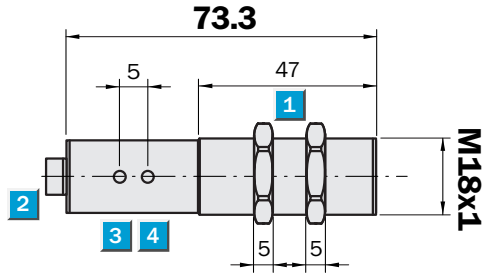
UM18 Ultrasonic sensor

 **Operating distance**
30 ... 250 mm

Ultrasonic sensor

- Independent of material shape (also foils, glass, bottles)
- Insensitive to dirt, dust and fog
- 1 switching output or 2 switching outputs (PNP or NPN) or analogue output
- Teach-in via control input MF

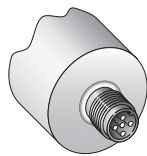
Dimensional drawing



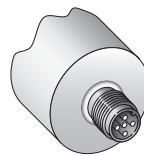
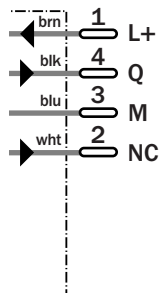
- 1 Locking nuts, 24 mm A/F
- 2 Connection plug M12
- 3 LED 1 (UM18-51112, UM18-51114, UM18-11116 and UM18-11117)
- 4 LED 2 (UM18-51112, UM18-51114, UM18-11116 and UM18-11117)



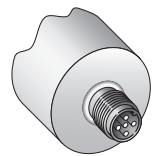
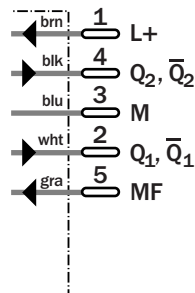
Connection types		
UM18-51111	UM18-51112	UM18-11116
UM18-51115	UM18-51114	UM18-11117



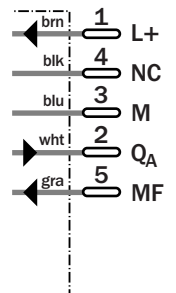
5-pin, M12



5-pin, M12



5-pin, M12



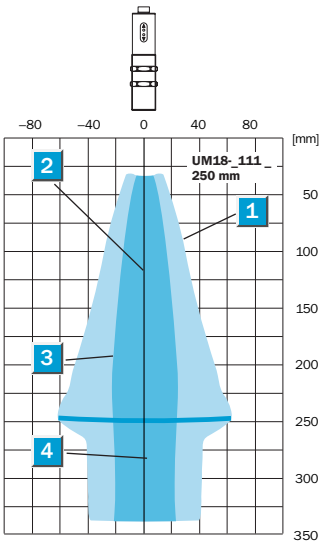
Technical data		UM18-	51111	51112	51114	51115	51116	51117				
Operating distance	30 mm ... 250 mm (< 350 mm)											
(maximum scanning distance)												
Ultrasonic frequency	320 kHz											
Resolution	0.36 mm											
Reproducibility	typ. ±0.15 % of final value											
Accuracy	≤ 2 % of final value											
Supply voltage V_s	V _s = 10 ... 30 V DC ¹⁾											
Residual ripple	± 10 %											
Current consumption ²⁾	≤ 40 mA											
Display elements	2 yellow LEDs											
Control input MF	Teach-in; Reset											
Switching outputs	Q: PNP											
	Q: NPN											
	invertable ³⁾ Q ₁ , Q ₂ : 2 x PNP											
	invertable ³⁾ Q ₁ , Q ₂ : 2 x NPN											
Analogue output, invertable ³⁾	Q _A : 4 ... 20 mA											
	Q _A : 0 ... 10 V											
Response time	32 ms											
Switching frequency	15/s											
Switching hysteresis	2.0 mm ± 10 %											
Temperature compensation												
Synchronisation option												
Functional display												
ObSB-mode ⁴⁾												
Standby delay	< 300 ms											
Connection type	Plug M12, 5-pin											
Enclosure rating	IP 67											
Ambient temperature	Operating -25 °C ... +70 °C											
	Storage -40 °C ... +85 °C											
Weight	65 g approx.											
Housing material⁵⁾	Nickel-plated brass											

¹⁾ Limit values
²⁾ Without load

³⁾ Outputs short-circuit protected
 $I_{max} = 200 \text{ mA}$
 PNP: High = $V_s - (< 2 \text{ V}) / \text{LOW} = 0 \text{ V}$
 NPN: High = $V_s / \text{LOW} \leq 2 \text{ V}$

⁴⁾ Object between sensor and background
⁵⁾ Plastic parts: PBT
 Ultrasonic transducer: Polyurethane-foam, glass epoxy resin

Detection ranges



- 1 Aligned plate 500 x 500 mm²
- 2 Tube diameter 10 mm
- 3 Operating distance
- 4 Maximum scanning distance

Order information

Type	Order no..
UM18-51111	6028965
UM18-51112	6028964
UM18-51114	6028973
UM18-51115	6028974
UM18-11116	6029507
UM18-11117	6029508

Dimensional drawings and order informations

SENSICK screw-in system M12, 5-pin, enclosure rating IP 67

- Contact assignment according to EN 50 044
- DC coding

Pin assignment

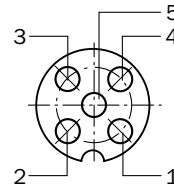
Pin 1 = brown

Pin 2 = white

Pin 3 = blue

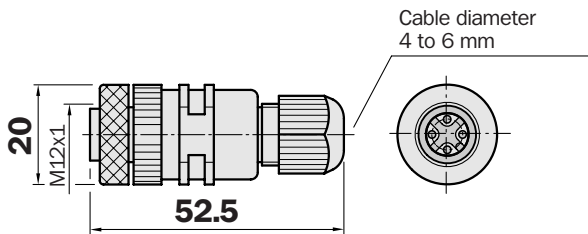
Pin 4 = black

Pin 5 = grey



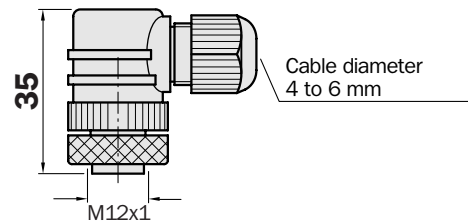
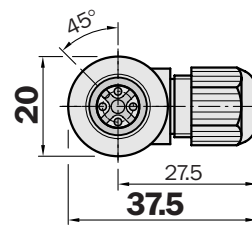
Female connector M12, 5-pin, straight

Type	Order no.	Contacts
DOS-1205-G	6009719	5



Female connector M12, 5-pin, right angle

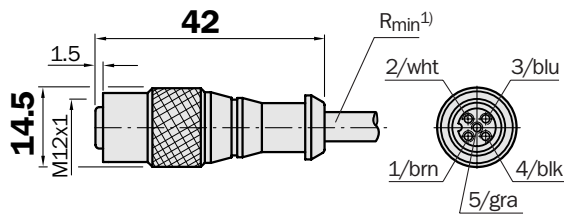
Type	Order no.	Contacts
DOS-1205-W	6009720	5



Female connector M12, 5-pin, straight

Cable diameter 6 mm, 5 x 0.25 mm², sheath PVC

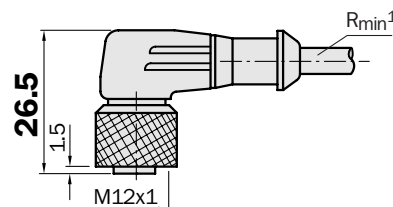
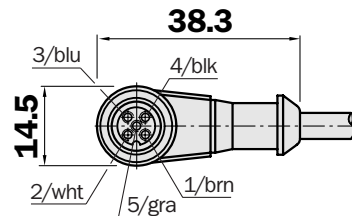
Type	Order no.	Contacts	Cable length
DOL-1205-G02M	6008899	5	2 m
DOL-1205-G05M	6009868	5	5 m
DOL-1205-G10M	6010544	5	10 m



Female connector M12, 5-pin, right angle

Cable diameter 6 mm, 5 x 0.25 mm², sheath PVC

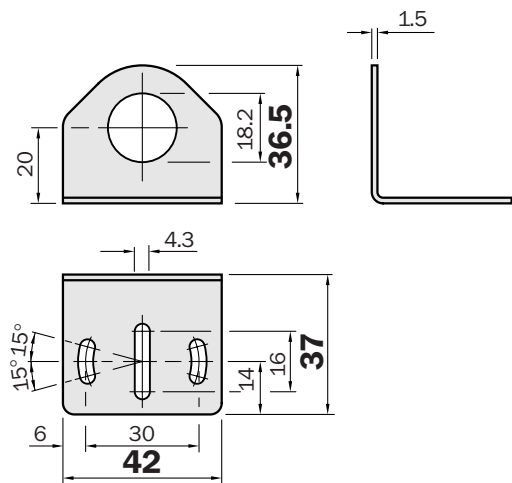
Type	Order no.	Contacts	Cable length
DOL-1205-W02M	6008900	5	2 m
DOL-1205-W05M	6009869	5	5 m
DOL-1205-W10M	6010542	5	10 m



Dimensional drawings and order informations

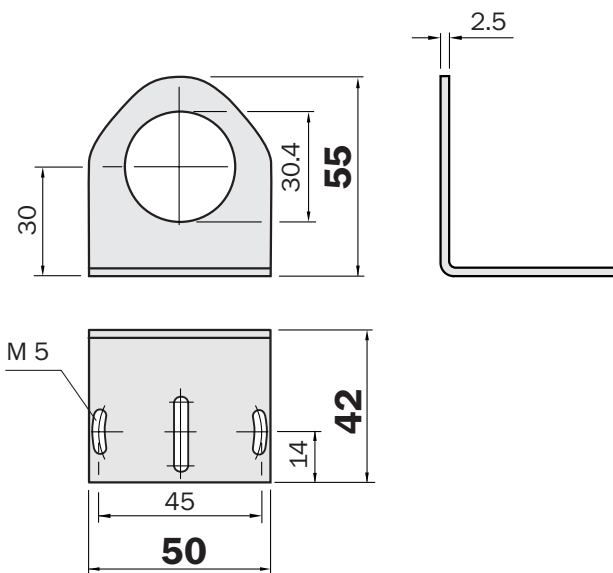
Mounting bracket for UM18

Type	Order no.
BEF-WN-M18	5308446



Mounting bracket for UM30

Type	Order no.
BEF-WN-M30	5308445



Diverter plate for UM30 to 1300 mm operating scanning range

Type	Order no.
USP-UM30	5312916

