microsonic

EVERY THING ULTRA SONIC

Online catalogue

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"WE ARE DRIVEN BY AN INVISIBLE IMPULSE: **THE LOVE OF ULTRASOUND.**"

Dipl.-Ing. Johannes Schulte
Managing Director

Ultrasonic sensors - from ideas to innovations

A natural phenomenon in the service of industry

Since the very beginning, humans and animals have used sound as an information medium and as a means of measurement. Bats can locate their position by means of ultrasound. Dolphins can detect shoals of fish and other objects underwater using ultrasonic frequencies of up to 120 kHz, and are even able to determine the heartbeat rate of other animals. Probably the oldest type of sonic measurement used by human beings is to count the seconds between seeing a bolt of lightning and hearing the thunder in order to determine just how near a storm really is.

The idea of exploiting such measuring techniques-albeit very much refined-for industrial purposes led to the development of ultrasonic sensors. These emit high-frequency sound pulses, inaudible to the human ear, and measure the time taken by the signals to return after being reflected from an object.

The robust sensors prove their capabilities in the most diverse applications, particularly through their ability to operate without any contact with the objects being measured or detected. This is even possible under extreme ambient conditions. Also impressive is their ability to detect accurately a vast range of different materials and colours.

It is exactly this huge potential variety of practical applications and the need to overcome traditional performance boundaries with product innovation that have driven microsonic for over 25 years. Since 1990, the internationally active company, headquartered in Dortmund, has concentrated on the development and production of innovative ultrasonic sensors for industrial automation technology.

Our ultrasonic expertise gives you a head start

Concentrating on core skills

Today, microsonic is a globally recognised specialist in ultrasonic sensors for applications in industrial automation technology and industrial vehicles. A large number of patent applications and a constantly growing assortment of products are witness to the power of innovation at microsonic.

Examples are ultrasonic dual sheet control systems that work with no calibration at all, label sensors that use special teach-in methods to be able to detect even critical labels and splices at high transport speeds, and ultrasonic proximity switches with switching frequencies of up to 250 Hz.

Certified quality

The objectives of microsonic's quality management have always been to deliver maximum product quality and to be fully in control of every single step in the process from development to full-scale production, and to provide verifiable documentation for those processes.

The company's quality management system has been certified by the ICG Zertifizierung GmbH and complies with the international standard DIN EN ISO 9001.

ICG ISO 9001 zertifiziert ICG ISO 14001 zertifiziert

Responding to customers' needs without ifs and buts

It is the aim of all employees at microsonic to respond quickly and flexibly to the wishes of our customers. Even when this results in a one-off for a particular company-a special length of cable, an individual software adaptation or a complete new development.

At microsonic we always try to implement your wishes, requirements and ideas as rapidly as possible. We regard them as the prime movers for further progress in terms of development, production, sales and service.

"I BRING OUR ULTRASONIC SENSORS ON COURSE. **AND THEN TO THEIR GOAL."**

Dipl.-Ing. Harry Pilz
Quality development

Ultrasound - is everything conceivable also technically feasible?

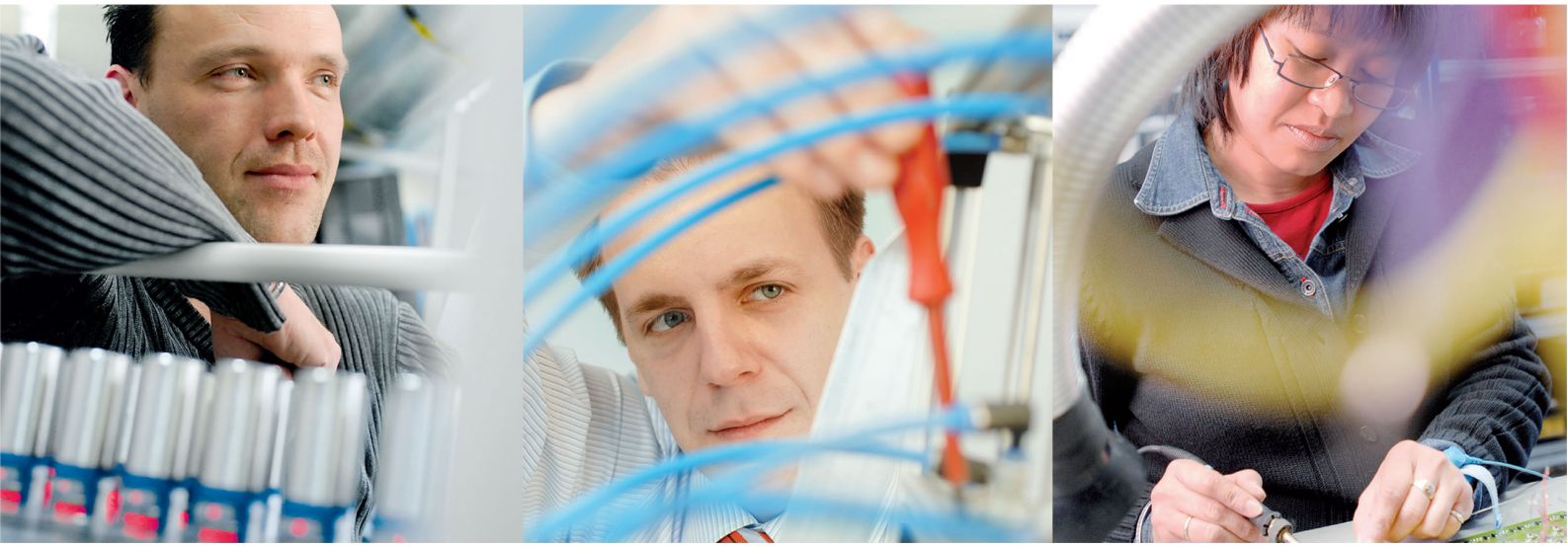
microsonic prefers to answer this question by way of practical examples. What that means is together with you, in a constant exchange and directly on site. The development of solutions to customers' specifications for special applications, requirements or installations is quite often a technical necessity-and at the same time the expression of what we at microsonic understand as "focusing on the customer".

The starting point for an individual development can be an inquiry about a different, tailor-made housing for a sensor, or a modified output signal, or evaluation logic that must be altered because in its present form it does not fit with your specific conditions or design.

And there is also the case where you wish to know whether it is even possible to solve your task with an ultrasonic sensor at all. We are happy to answer this question too. To realise your ideas and conceptions, we follow a systematic path. Firstly, we analyse your particular task or problem and the technical options, and then show you specific solutions.

In this way we can clear up right at the outset which sensor or which system is the most cost-effective-and hence

profitable-for your application. From the prototype to large-scale production, you are always involved and kept well informed.

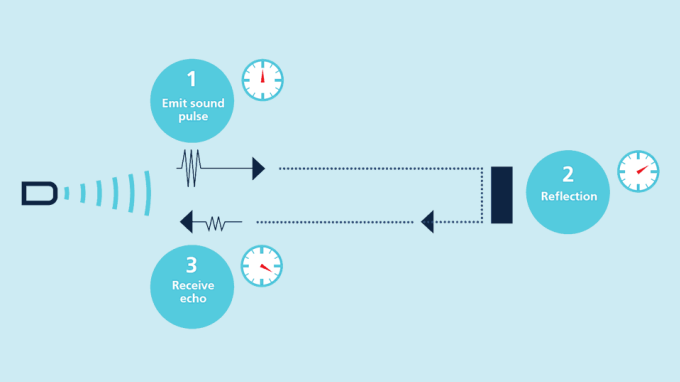


Ultrasonic principle

Ultrasonic sensors have set new standards in automation

Ultrasonic principle:

Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo.



Ultrasonic principle

As the distance to an object is determined by measuring the time of flight and not by the intensity of the sound, ultrasonic sensors are excellent at suppressing background interference.

Virtually all materials which reflect sound can be detected, regardless of their colour. Even transparent materials or thin foils represent no problem for an ultrasonic sensor.

microsonic ultrasonic sensors are suitable for target distances from 20 mm to 10 m and as they measure the time of flight

they can ascertain a measurement with pinpoint accuracy. Some of our sensors can even resolve the signal to an accuracy of 0.025 mm.

Ultrasonic sensors can see through dust-laden air and ink mists. Even thin deposits on the sensor membrane do not impair its function.

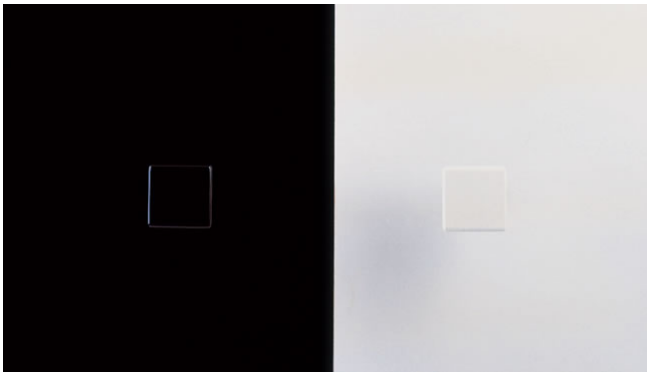
Sensors with a blind zone of only 20 mm and an extremely thin beam spread are making entirely new applications possible today: Fill level measurement in wells of microtiter plates and test tubes, as well as the detection of small bottles in the packaging industry, can be implemented with ease. Even thin wires are reliably detected.

Clear water or black coffee

The ultrasonic sensor registers virtually all liquids.

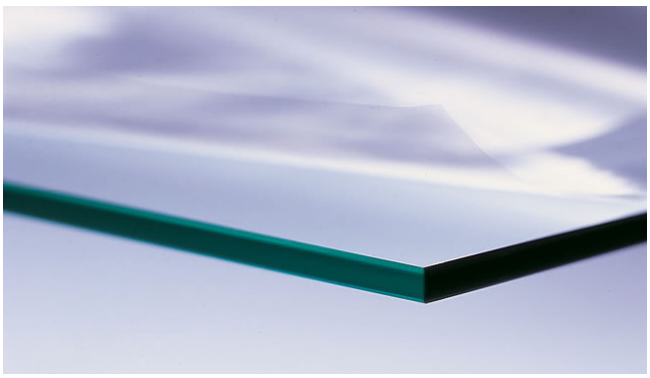
Ruby red, steel blue, lemon yellow, ...

What's your favourite colour? The ultrasonic sensor loves them all.



White on white, black on black?

No problem for the ultrasonic sensor.



Sheets of glass and skin-thin foils

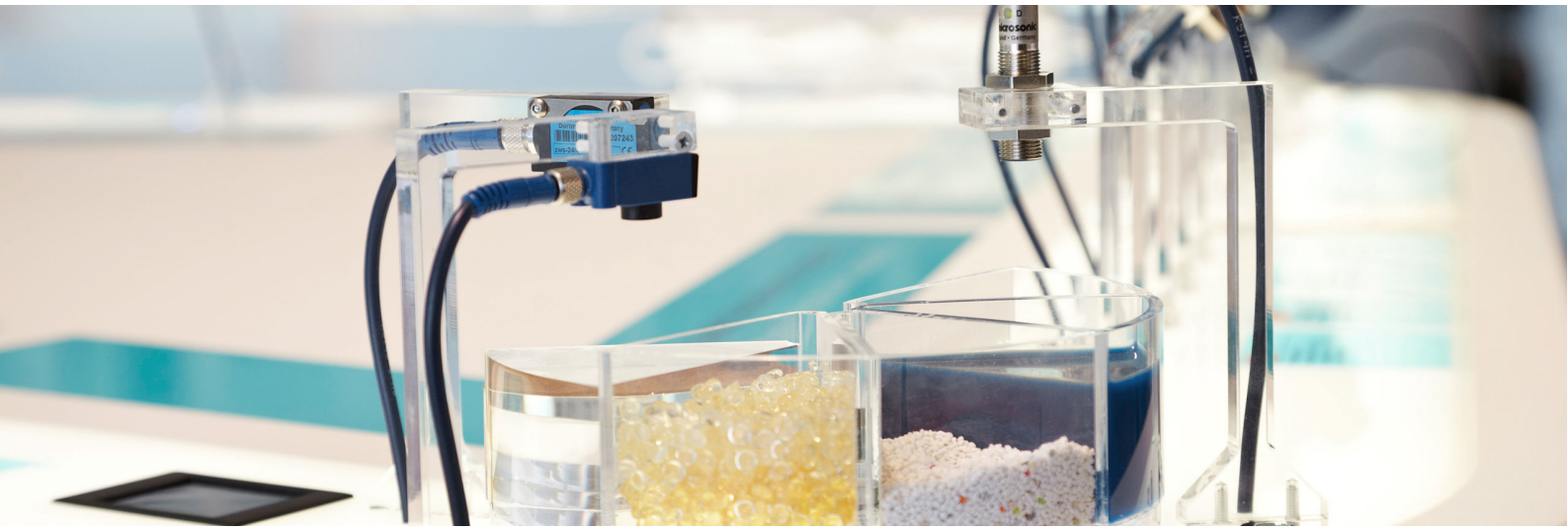
The ultrasonic sensor detects them all reliably.

Velvet and leather

Almost all fabrics can be detected.

Coarse grains, chips or fine sand

In level control the ultrasonic sensor is unbeatable.



Operating modes

Different operating modes and device configurations enable microsonic sensors to be used in all conceivable automation applications.

A sensor´s blind zone

determines its smallest permissible detection range. No objects or disturbing reflectors should be placed in the blind zone because this can lead to incorrect measurements.

The detection range

is measured by different standard reflectors.

The operating range

is a sensor´s typical area of operations.

The sensor can also be employed for distances up to its maximum range in the case of good reflectors.

All sensors comply with the requirements of German national (DIN) and European (EN) standards.

DIN EN 60947-5-2 Low-voltage switchgear and control gear: control circuit devices and switching elements; proximity switches

DIN EN 61000-4-2 Electromagnetic compatibility: testing and measurement techniques; electrostatic discharge immunity test

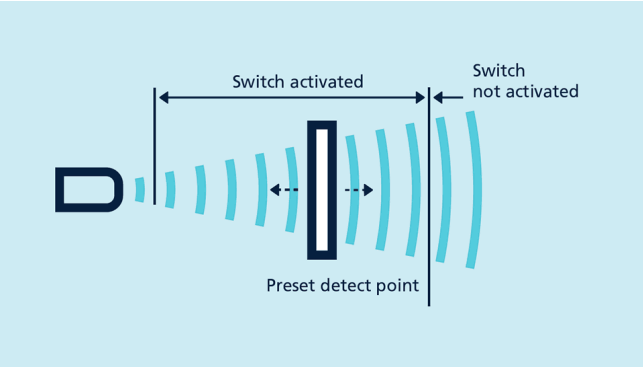
DIN EN 61000-4-3 Electromagnetic compatibility: testing and measurement techniques; radiated, radio-frequency electromagnetic field immunity test

DIN EN 61000-4-4 Electromagnetic compatibility: testing and measurement techniques; electrical transients/burst immunity test

EN 55011 Limits and methods of measurement of radio disturbance characteristics of ISM radio-frequency equipment

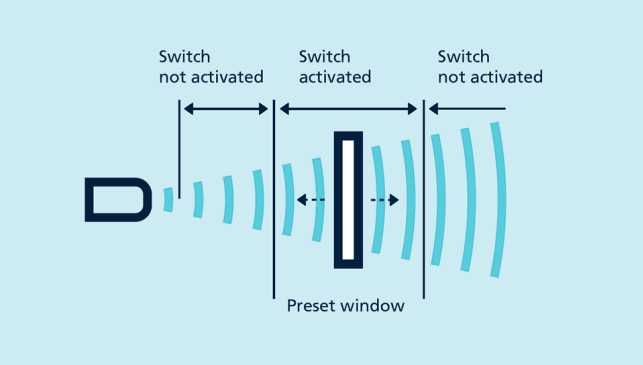
IEC 60068-2-6 Environmental testing – test Fc: vibration

IEC 60068-2-27 Environmental testing – test Ea and guidance: shock



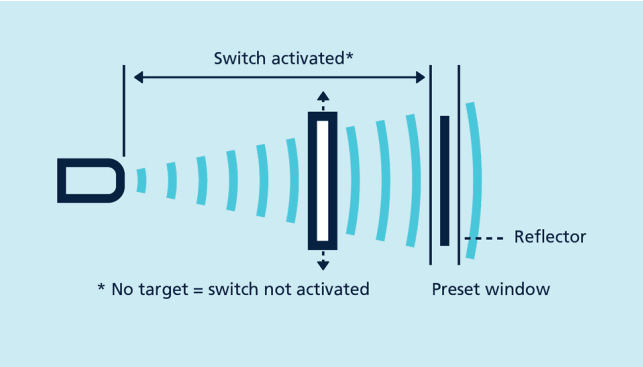
The ultrasonic sensor in reflective mode (proximity switch)

represents the classic method of operation. It exploits its background interference suppression which is superior to other sensing principles. Here, the switch is activated as soon as the target is located within the preset detect point. The detect point is coupled with a hysteresis. This operating mode is suitable for, e.g. counting items on a conveyor belt or for presence detection. The overview table for distance measurement sensors lists all the sensor types that can work in reflective mode.



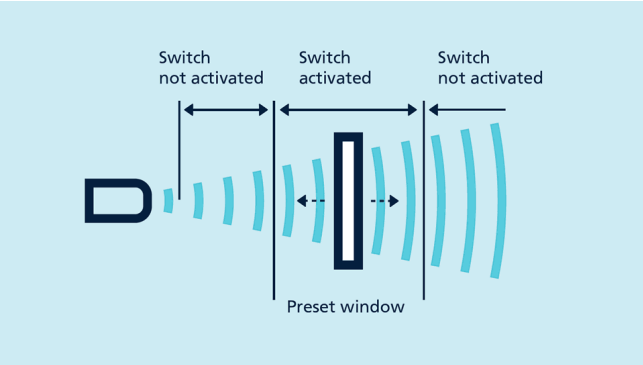
The window mode

is an extension of the reflective mode. In this case the switch is only activated when the target is located within a window defined by two window limits. This can be used to monitor, for example, correct bottle sizes in a crate - taller and shorter bottles are rejected. Window mode and also two-way or reflective ultrasonic barriers can be based on all ultrasonic sensors that support microsonic teach-in.



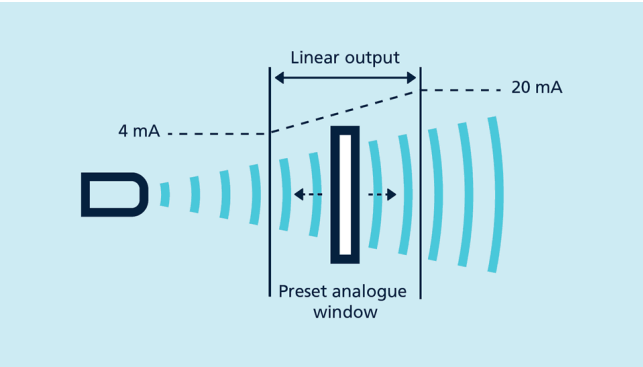
The two-way or reflective ultrasonic barrier

operates in a similar way to a photoelectric barrier. However, in contrast to the photoelectric barrier, no special triple reflector or similar device is needed. Any reflector, e.g. a metal flag, is adequate. In this case the ultrasonic sensor is set up in window mode in such a way that the fixed reflector lies within the window. The reflective ultrasonic barrier supplies a signal as soon as an object completely obscures the reflector. It does not matter whether the target absorbs all the sound or even 'deflects' it. Therefore, this operating mode is used for foams and other materials difficult to detect and for scanning objects with irregular surfaces.



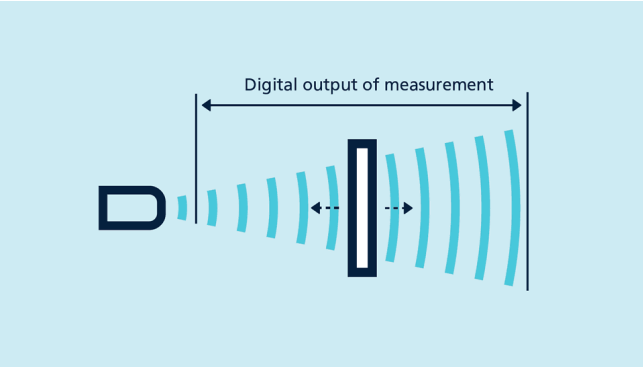
The foreground suppression

mode-unlike window mode-ignores all echo signals closer than the preset detect distance. This can disregard minor disturbing items which protrude into the foreground of the detection zone. For example, the neck of a bottle can be suppressed when checking the level in the bottle. The mic and lcs sensors support foreground suppression mode.



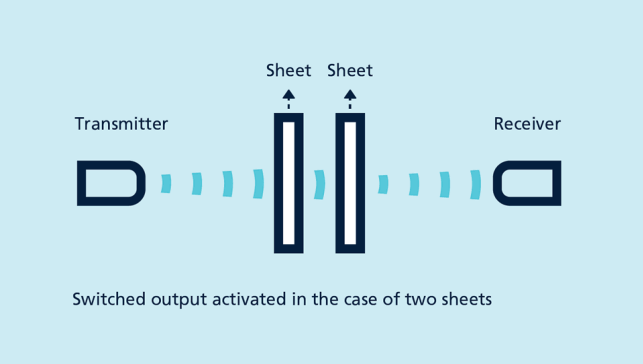
The ultrasonic sensors with analogue output

transmit the measurement as a proportional voltage (0-10 V) or current (4-20 mA). For ultrasonic sensors with analogue output, the near and far window boundary of the analogue characteristic and also whether the characteristic is rising or falling can be configured. Depending on the sensor type and window width, resolution lies between 0.025 and 0.36 mm.



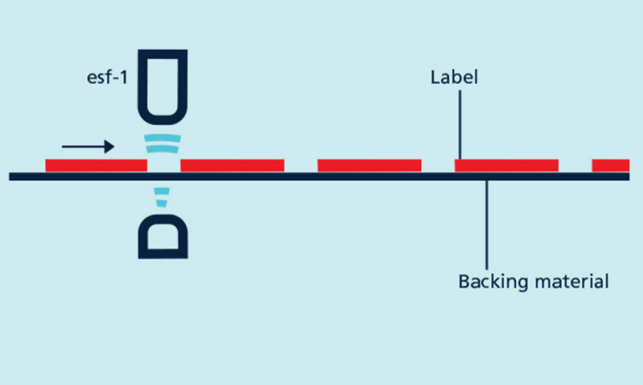
Ultrasonic sensors with IO-Link

permit continuous communication on all levels of the system architecture, from the sensor to the upper fieldbus level. The distance value measured is transmitted to the controller in bit serial form.



Ultrasonic double sheet controllers

operates as a one-way barrier and detects two or more sheets inadvertently stuck together. The transmitter-receiver arrangement can scan papers, films, cardboard and thin sheet metal. Signal outputs are available for indicating double and missing sheets.



Ultrasonic label and splice sensors

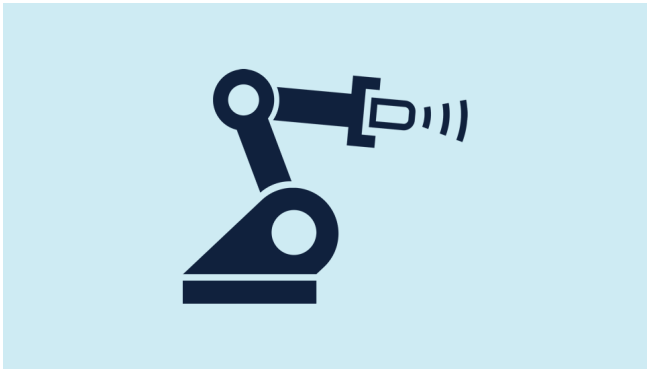
work on the same principle as ultrasonic double sheet controls. Since the interior adhesion of the labels to the backing material represents a joint without a separating air layer, label sensors must be calibrated to the backing material and the labels.

Ultrasonic edge sensors

are designed as fork sensors and also work as one-way barrier. They are used for path control and emit an analogue signal of 0–10 V or 4–20 mA which is proportional to the orientation of the path edge.

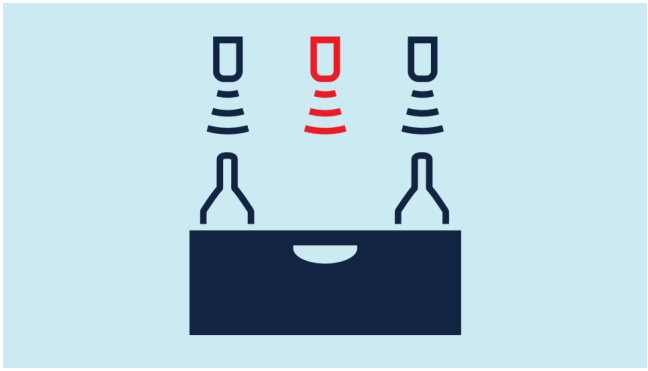
The right solution for every application

Different operating modes and device configurations enable microsonic sensors to be used in all conceivable automation applications.



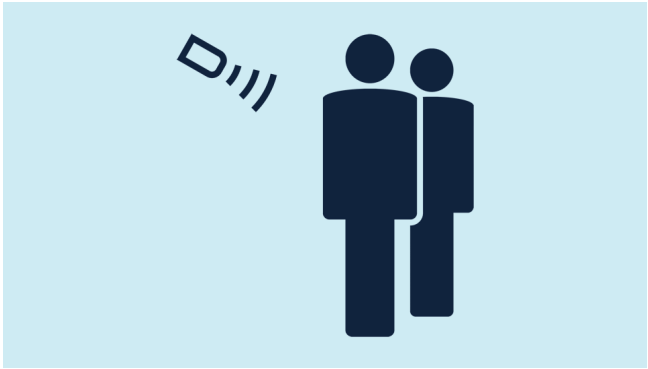
Robotic sensing

Owing to their compact dimensions pico+ ultrasonic sensors with an M18 threaded sleeve or the zws sensors in square housings are ideal for positioning robot arms.



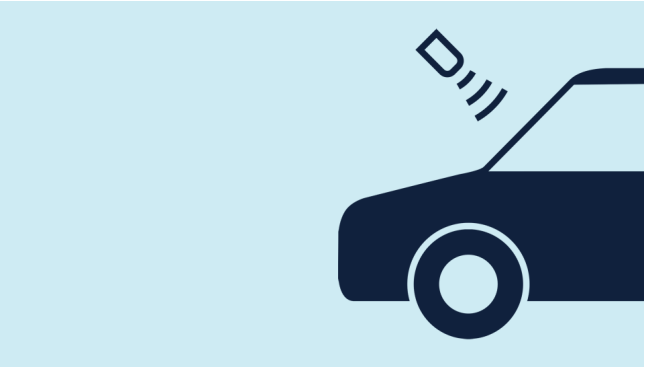
Crate inspection

The mic+ ultrasonic sensors and the pico+ ultrasonic sensors were specially developed for applications such as checking whether crates are filled or empty, or scanning empty plastic bottles on a conveyor belt. The synchronisation, which is integrated in both sensor families, simplifies the design of a sensor line.



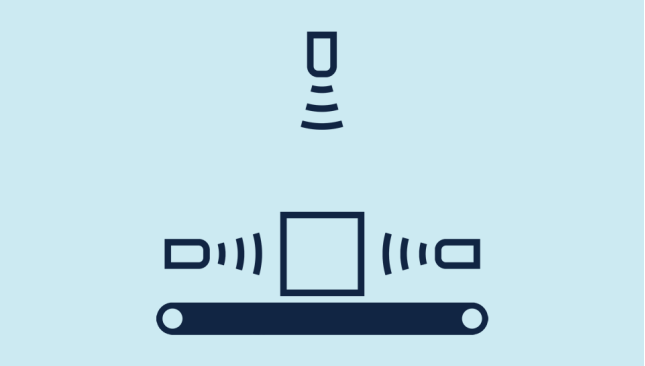
People detection

If the task is to detect the presence of persons, you are recommended to choose a ultrasonic sensor with an operating range well in excess of the required scanning distance. The greater the operating range of a sensor, the lower is its ultrasonic frequency. And the lower the ultrasonic frequency, the easier it is to detect absorbent clothing materials such as wool.



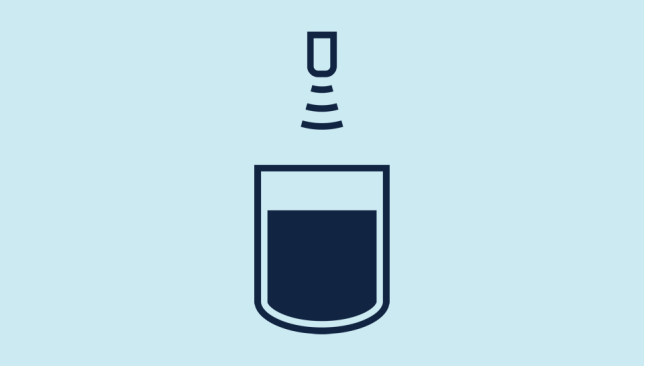
Positioning

When scanning panes of glass or other smooth, flat surfaces, care should be taken to ensure that the ultrasonic sensor scans perpendicular to the surface.



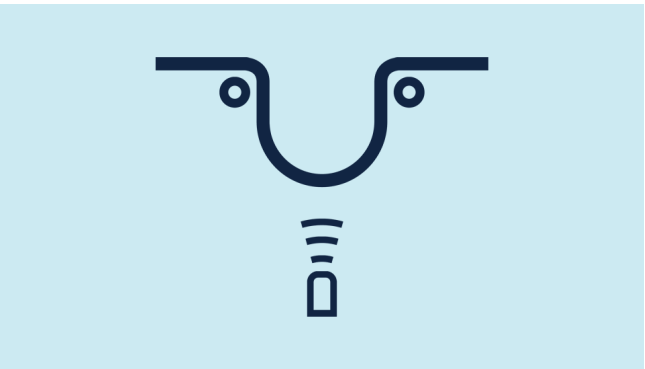
Height and width measurements

By using several mic+ ultrasonic sensors or pico+ ultrasonic sensors, three-dimensional scanning of any size box can be made. There are sensors with different detection ranges available.



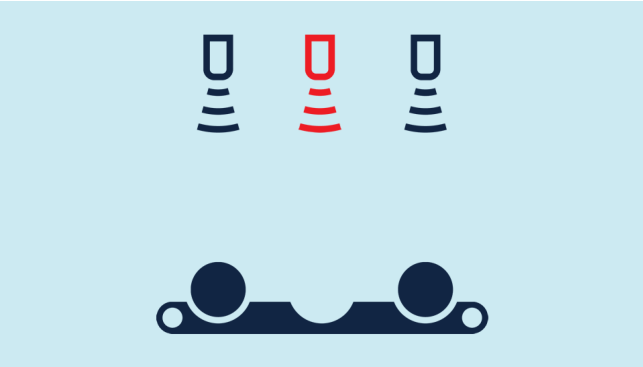
Level control

Detection of filling levels from just a few millimetres up to 8 m can be made. Ultrasonic sensors with one or two switched outputs for minimum/maximum control, or with 0-10 V and 4-20 mA analogue output are available. Chemical resistant versions are also available with crm+ or hps+ ultrasonic sensors.



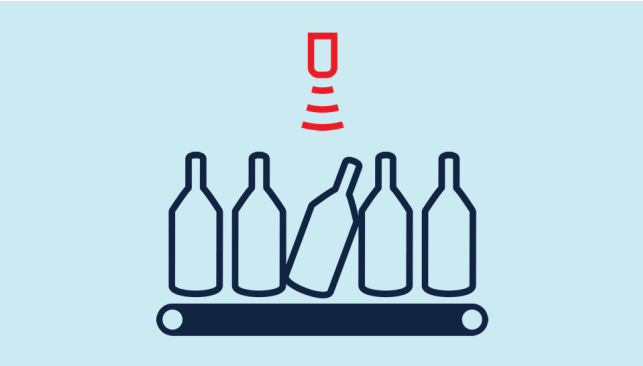
Loop control

In this case an ultrasonic sensor with analogue output scans from above into the loop and adjusts the material feed depending on the depth of the loop. If a loop of material tends to swing sideways, the sound waves are very easily deflected away when scanning from above. In such cases it is recommended to scan the loop from below, as shown in the diagram.



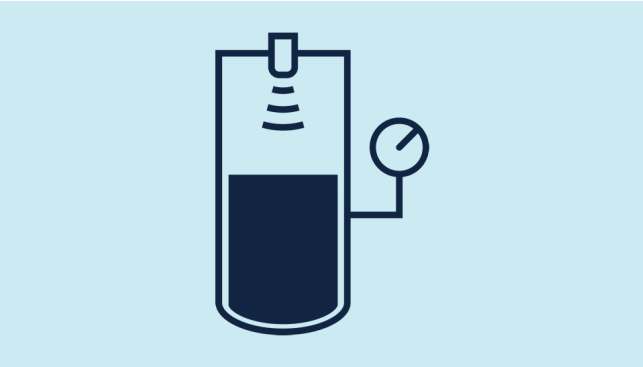
Monitoring of trays

A solution with the sensor operating as a two-way or reflective barrier should always be preferred when the object to be scanned absorbs the sound waves or, due to its shape or position in the tray, deflects the sound waves away. In this situation an additional reflector is positioned behind the actual object to be scanned. An ultrasonic sensor with switched output and operating in window mode emits a signal as soon as the object obscures the reflector.



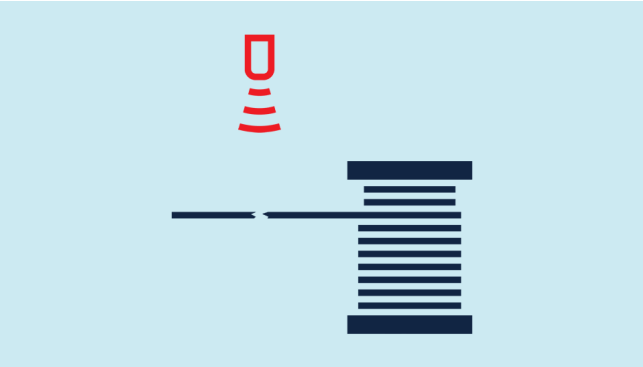
Quality control

on a packaging machine. A broad spectrum of ultrasonic sensors are available for the detection of objects during fast processes: the zws ultrasonic sensors in square-shaped housing, the sks sensors in miniature design, the pico+ultrasonic sensors in the M18 threaded sleeve with optional angled head and IO-Link interface.



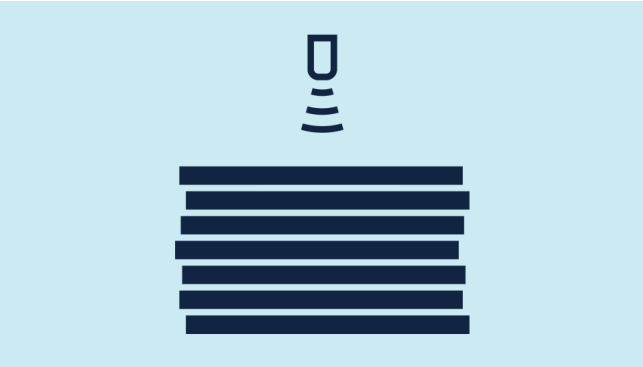
Level control in 6 bar overpressure

are possible with the hps+ sensors. In addition, the sensors are chemically resistant and available as a version with two pnp switching outputs or analogue and switching output.



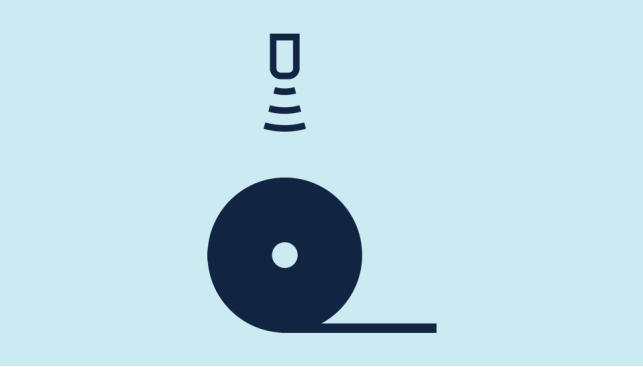
Wire break detection

during the winding/unwinding of wires. Depending on the size of the drum, a mic+130/D/TC with 1,300 mm operating range or a mic+35/D/TC with 350 mm operating range can be used. If the position of the wire on the drum should be recorded, there are ultrasonic sensors with analogue output available.



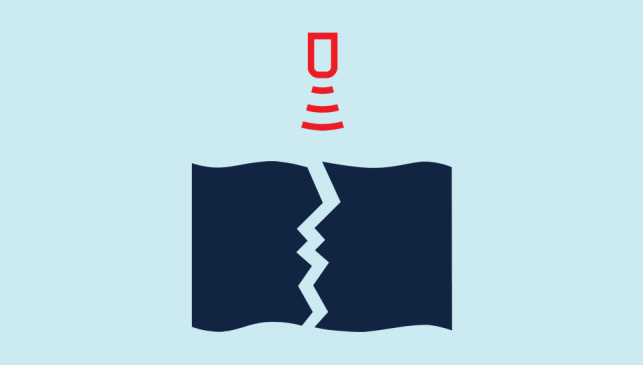
Stacking height control

Whether wooden boards, panes of glass, sheets of paper or coloured plastic panels, ultrasonic sensors are ideal for detecting the height accuracy to millimetre precision.



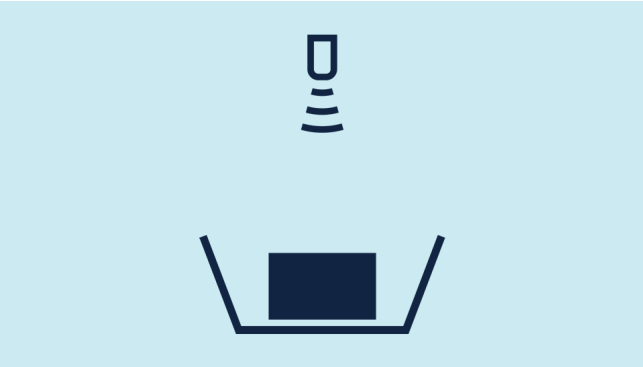
Checking diameter

The diameter of a roll or coil of material can be detected by an ultrasonic sensor with analogue output and the drive adjusted or brake applied accordingly. For small diameters this is a typical application for a mic+35/IU/TC and for diameters up to 2.5 m a mic+130/IU/TC.



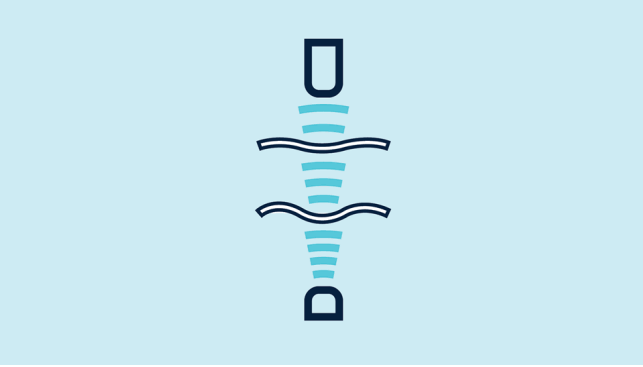
Foil tear monitoring

Can be implemented with all ultrasonic sensors with switching output. If the material does not lie flat, it is advisable to operate the sensor as a two-way or reflective barrier. This operating mode also works reliably when the sonic beam is deflected away by the waves in the material. All ultrasonic proximity switches with the microsonic Teach-in support the operating mode reflective barrier.



Presence detection

Sensors with a switched output, e.g., from the mic+ sensor family can be used, depending on the size of the box or container. The mic+25/D/TC , mic+35/D/TC or mic+130/D/TC can be selected for scanning small boxes. With larger containers you are recommended to use a mic+340/D/TC or mic+600/D/TC . If the box or container is to be scanned by several sensors, it is recommended to synchronise them with each other.

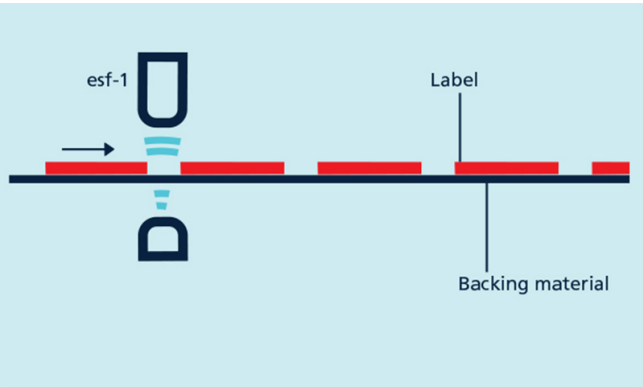


Double sheet control

identifies two or more sheets of material on top of each other. The dbk+4 product range is ideal for use where paper is in use, such as sheet fed printing presses, printers, copiers or collating machines. For thicker materials, plastic sheets and coarse corrugated cardboard, the dbk+5 ultrasonic double-sheet detection is used.

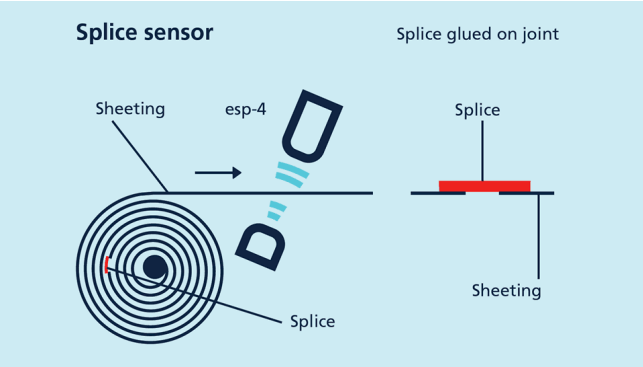
Path edge control

The ultrasonic edge sensors bks are designed as fork sensors and function as a one-way barrier. They are used for path control and emit an analogue signal of 0–10 V or 4–20 mA which is proportional to the orientation of the path edge.



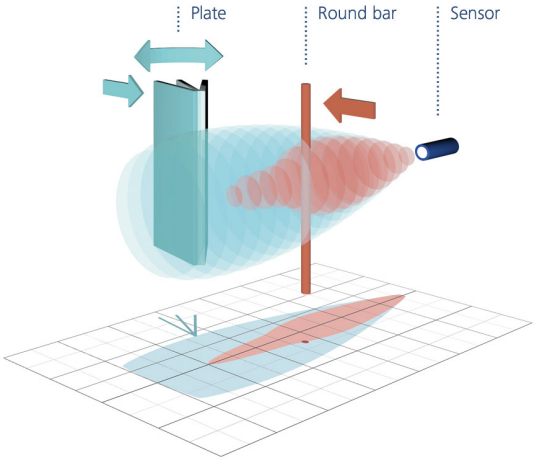
Label detection

The esf-1 label sensor reliably detects high-transparency, reflective materials as well as metallised labels and labels of any colour. The measurement cycle time automatically self-adjusts to the sound power required.



Splice detection

The esp-4 splice sensor reliably detects splices and also labels. It is available both in M18 housings, as well as in M12 with external receiving transducer.



Detection Zones

The detection zones of ultrasonic sensors

The most important criterion to bear in mind when selecting an ultrasonic sensor is its detection range and the associated three-dimensional detection zone.

In measuring the sensors various standard reflectors are introduced into the detection zones from the side and the points at which these reflectors are detected by the sensor are marked.

Objects may be introduced into the detection zone from any direction.

The red areas

are determined with a thin round bar (10 or 27 mm dia. depending on type of sensor) and indicate the typical operating range of a sensor.

In order to obtain the blue areas,

a plate (500 x 500 mm) is introduced into the beam spread from the side. In doing so, the optimum angle between plate and sensor is always employed. This therefore indicates the maximum detection zone of the sensor. It is not possible to evaluate ultrasonic reflections outside the blue beam spread.

A reflector with reflective properties inferior to those of the round bar can be detected in a zone that is smaller than that indicated by the red area. On the other hand, a reflector with better reflective properties will be detected in a zone with a size somewhere between that of the red and blue areas.

A sensor's blind zone determines its smallest permissible detection range. No objects or disturbing reflectors should be placed in the blind zone because this can lead to incorrect measurements.

The operating ranges

given in the diagrams specify the distance at which the ultrasonic sensor can measure common reflectors with sufficient operating reserve. The sensor can also be employed for distances up to its maximum range in the case of good reflectors. The maximum detection range is always greater than the operating range. The diagrams apply for 20 °C, a relative humidity of 50% and normal pressure.

	0.07 m		0.7 m
	0.15 m		1.0 m
	0.24 m		1.3 m
	0.25 m		3.4 m
	0.35 m		6.0 m

These symbols in the technical data show the operating ranges of microsonic ultrasonic sensors.

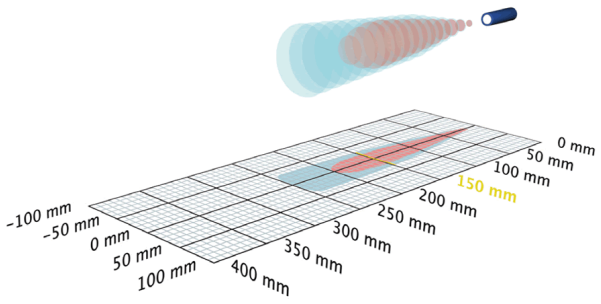
The attenuation of sound in the air

depends on the temperature and pressure of the air as well as its relative humidity. The physical relationships are complex and have different effects at different ultrasonic frequencies. For simplicity we can say that the attenuation in the air increases with rising temperature and rising humidity. This necessitates a reduction in the size of the detection zones.

With a lower relative humidity and falling temperatures, the attenuation in the air decreases and the detection zones enlarge accordingly.

The reduction in the size of the detection zone is essentially compensated for by the sensor's operating reserves. And at temperatures below 0 °C some sensors can operate over distances certainly twice as large as those given here.

As the pressure of the air rises, so the attenuation in the air drops considerably. This aspect should be taken into account for applications involving overpressure. Sound propagation is impossible in a vacuum.



0.15 m

20 mm blind zone

150 mm operating range

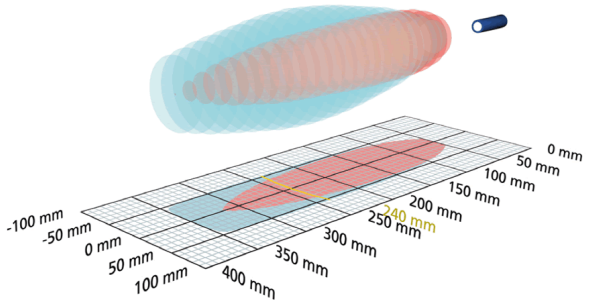
250 mm maximum range

f = 380 kHz, λ = 0,9 mm

Used in the following product groups:

pico+ nano zws sks ucs

- Round bar, 10 mm Ø or 27 mm Ø
- Operating range
- 500 x 500 mm plate



0.24 m

50 mm blind zone

240 mm operating range

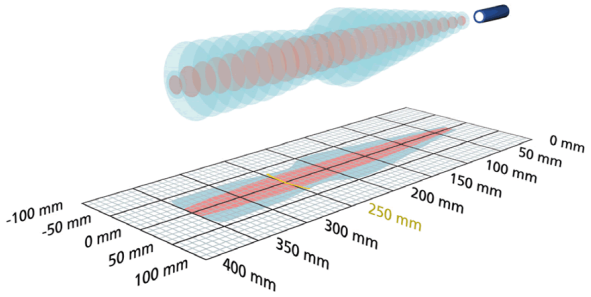
350 mm maximum range

f = 500 kHz, λ = 0.7 mm

Used in the following product groups:

nano zws ucs

- Round bar, 10 mm Ø or 27 mm Ø
- Operating range
- 500 x 500 mm plate



0.25 m

30 mm blind zone

250 mm operating range

350 mm maximum range

f = 320 kHz, λ = 1.1 mm

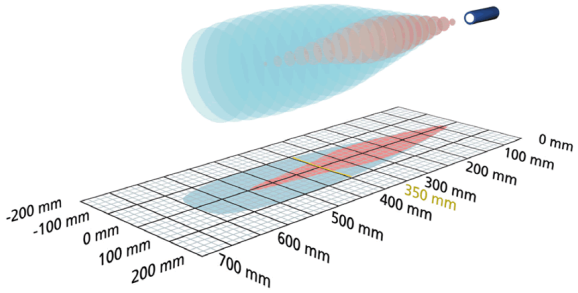
Used in the following product groups:

mic+ mic pico+ lpc lcs zws crm+ hps+ wms

Round bar, 10 mm Ø or 27 mm Ø

Operating range

500 x 500 mm plate



0.35 m

65 mm blind zone

350 mm operating range

600 mm maximum range

f = 400 kHz, λ = 0.9 mm

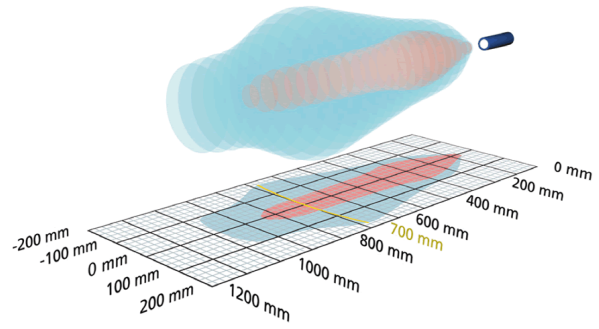
Used in the following product groups:

mic+ mic pico+ lcs crm+ hps+ wms

Round bar, 10 mm Ø or 27 mm Ø

Operating range

500 x 500 mm plate



0.7 m

120 mm blind zone

700 mm operating range

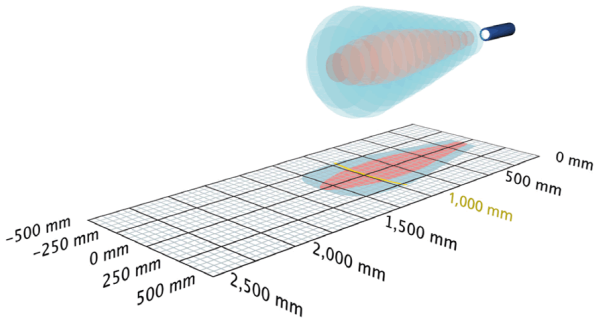
1,000 mm maximum range

f = 300 kHz, λ = 1.1 mm

Used in the following product groups:

zws

- Round bar, 10 mm Ø or 27 mm Ø
- Operating range
- 500 x 500 mm plate



1.0 m

120 mm blind zone

1,000 mm operating range

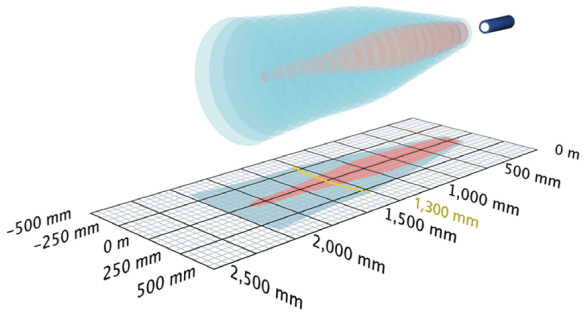
1,300 mm maximum range

f = 200 kHz, λ = 1.7 mm

Used in the following product groups:

pico+

- Round bar, 10 mm Ø or 27 mm Ø
- Operating range
- 500 x 500 mm plate



1.3 m

200 mm blind zone

1,300 mm operating range

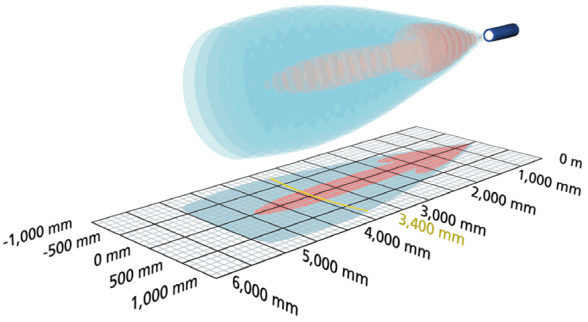
2,000 mm maximum range

f = 200 kHz, λ = 1.7 mm

Used in the following product groups:

mic+ mic lcs crm+ hps+ wms

- Round bar, 10 mm Ø or 27 mm Ø
- Operating range
- 500 x 500 mm plate



3.4 m

350 mm blind zone

3,400 mm operating range

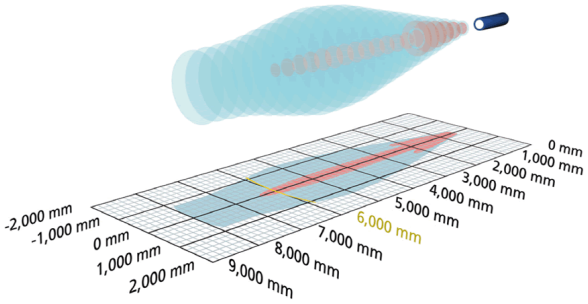
5,000 mm maximum range

f = 120 kHz, λ = 2.9 mm

Used in the following product groups:

mic+ mic lcs+ crm+ hps+ wms

- Round bar, 10 mm Ø or 27 mm Ø
- Operating range
- 500 x 500 mm plate



6.0 m

600 mm blind zone

6,000 mm operating range

8,000 mm maximum range

f = 80 kHz, λ = 4.3 mm

Used in the following product groups:

mic+ mic lcs+ crm+ wms

- Round bar, 10 mm Ø or 27 mm Ø
- Operating range
- 500 x 500 mm plate

Installation instructions for ultrasonic sensors

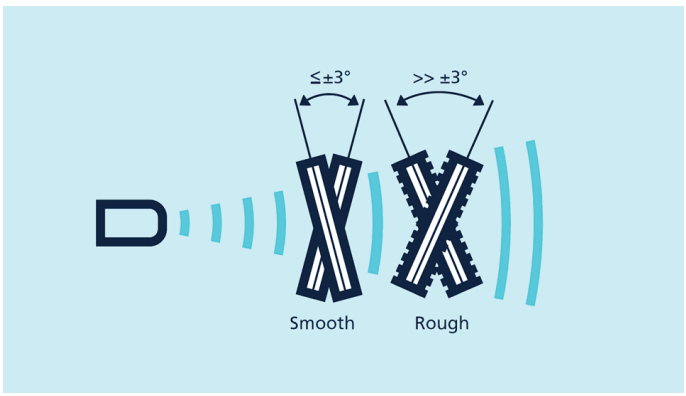
Notes for installation and operation

Ultrasonic sensors can be incorporated and operated in any position. However, positions which could lead to severe soiling of the sensor surfaces should be avoided. Drops of water and severe deposits on the surface of the transducer can impair the function. However, small dust deposits and splashes of paint do not affect the function.

For scanning objects with flat and smooth surfaces, the sensors should be mounted at an angle of 90 ± 3° to the surface. On the other hand, rough surfaces can cope with much larger angular deviations. In terms of ultrasonics, a surface is considered rough when its peak-to-valley height is in the order of magnitude of the wavelength of the ultrasonic frequency or is larger than this.

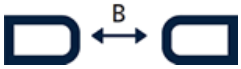
The sound is then reflected in a scattered fashion and this can lead to a shortening of the operating range. In the case of rough surfaces the maximum permissible angular deviation and the maximum possible detection range should be determined by way of trials.

Sound-absorbent materials, e.g. cotton wool or soft foams, can reduce the operating range. On the other hand, liquids and solid materials are very good reflectors of sound.

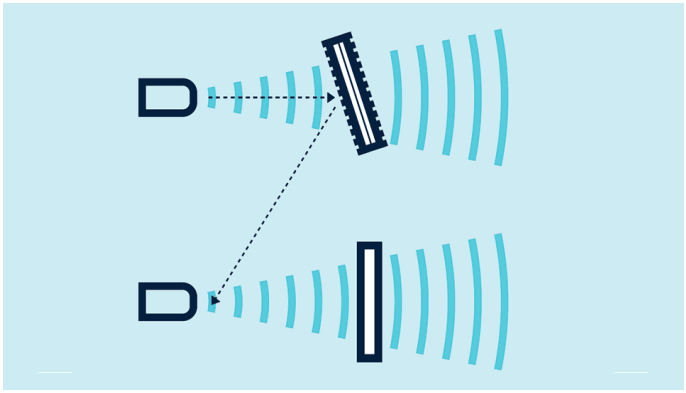


Mounting spacing and synchronisation

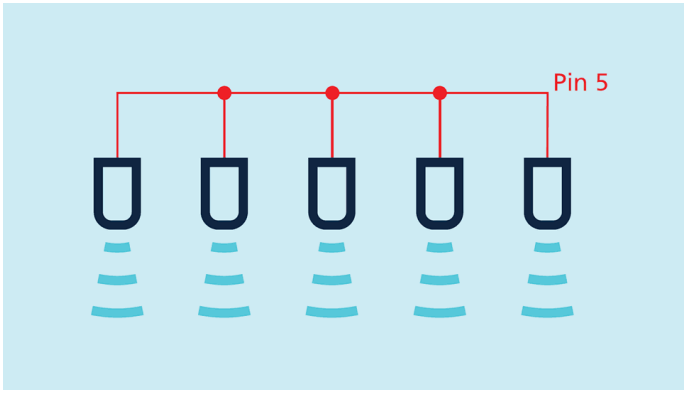
If two or more sensors are mounted too close to one another, they can influence one another. To avoid this, either the mounting spacing must be sufficiently large, or the sensors must be synchronised with one another. The following table lists the minimum mounting distances between unsynchronised sensors.

Operating range			
	0.07 m	≥ 0.25 m	≥ 1.10 m
	0.15 m	≥ 0.25 m	≥ 1.30 m
	0.24 m	≥ 0.25 m	≥ 1.40 m
	0.25 m	≥ 0.35 m	≥ 2.50 m
	0.35 m	≥ 0.40 m	≥ 2.50 m
	0.7 m	≥ 0.70 m	≥ 4.00 m
	1.0 m	≥ 0.70 m	≥ 4.00 m
	1.3 m	≥ 1.10 m	≥ 8.00 m
	3.4 m	≥ 2.00 m	≥ 18.00 m
	6.0 m	≥ 4.00 m	≥ 30.00 m

The mounting distances should be regarded as standard values. In the case of objects positioned at an angle, the sound can also be "reflected" to an adjacent sensor. Minimum mounting distances should then be determined by way of trials. Some sensors can be synchronised with each other and this enables much smaller mounting distances to be used than those given in the table. Please refer to the descriptions of the various sensors.



If sensors are mounted at distances from one other that are less than the values specified in the table, the ultrasonic sensors must be synchronised with one another. This means that the sensors always carry out their measurements at the same time.



Many microsonic sensors have integrated synchronisation, which can be activated for example simply by connecting to Pin 5 on the device connector. Other sensors require an external clock signal.

Redirecting the sound

The sonic beam can be redirected via a reverberant, smooth reflecting surface without significant losses. Accessories are available to deflect the sound through 90°.
These can be used to advantage in certain confined installations.

Accuracy

The (absolute) accuracy is the discrepancy between the real distance between sensor and object and the distance as measured by the sensor. The accuracy obtainable depends on the reflective properties of the object and the physical influences affecting the velocity of sound in air.
Objects with poor reflective properties or a surface roughness greater than the wavelength of the ultrasonic frequency have an adverse effect on the accuracy achievable. It is not possible to quantify this exactly but as a rule of thumb we can assume an inaccuracy of several wavelengths of the ultrasonic frequency employed.

Air temperature

The biggest influence on the velocity of sound and hence on the accuracy is the temperature of the air (0.17%/K). Therefore, the majority of ultrasonic sensors from microsonic contain temperature compensation circuitry. Even better is to carry out a comparative measurement over a known distance to determine the influence of temperature. The pico column sensor is, for example, designed for such comparative measurements. With temperature-compensated sensors, an accuracy of ≤ ±1 % can be achieved.

Air pressure

The velocity of sound over a wide range does not depend on the pressure of the air. microsonic has special sensors for measuring distances in up to 4 bar overpressure.

Relative humidity

In comparison to the influence of temperature, the effect of the humidity of the air on the accuracy can be ignored.

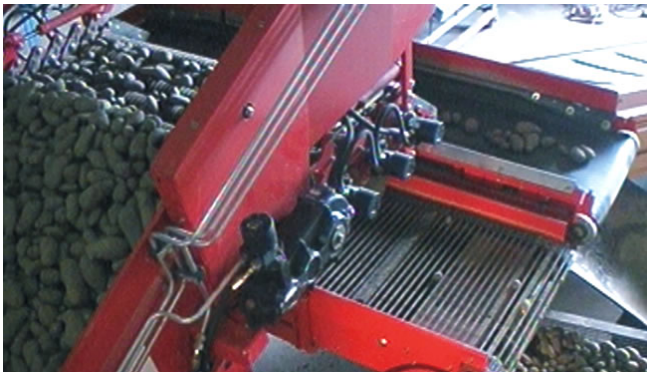
Repeat accuracy R

The repeat accuracy, or reproducibility, describes the deviation in the measured distances under the same conditions over a defined period.
The repeat accuracy of microsonic sensors is better than ±0.15%.

The right solution for every application

Different operating modes and device configurations enable microsonic sensors to be used in all conceivable automation applications.

All sensors comply with the requirements of German national (DIN) and European standards (EN).



mic-130/IU/M

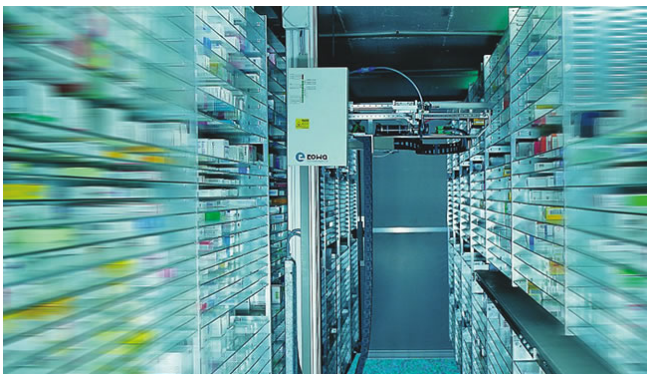
mic-130/IU/M tracks elevator on the potato hopper.

wms-130/RT

wms-130/RT controls the path of a harvester.

lcs-130/IU/QP

lcs-130/IU/QP keeps dte ground clearence constant for a patient table extended out of a vehicle.



zws-15/CD/QS

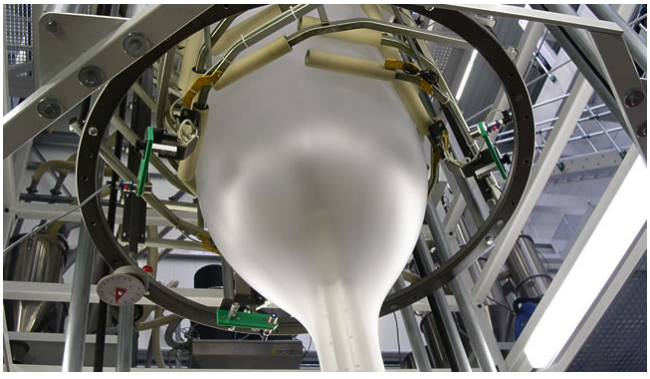
zws-15/CD/QS measures the height and width of medical products for storage in automated pharmacy warehouse.

zws-15/CD/QS

zws-15/CD/QS detects assembled printer circuit boards in an inspection unit for circuit board production.

dbk+4/3CDD/M18 E+S

Double sheet detector dbk+4/3CDD/M18 E+S in the originals infeed unit of a high-speed copier.



mic+130/IU/TC

Three mic+130/IU/TC control a film extruder.

wms-130/RT

Four wms-130/RT supply measurement signals to the autopilot that steers a tractor.

mic-130/IU/M

mic-130/IU/M supplies the control signals for steering a plough automatically.

mic+130/IU/TC

mic+130/IU/TC controls the volume flow on automatic scales for packing food.

dbk+4/3CDD/M18 E+S

dbk+4/3CDD/M18 E+S monitors the incoming sheets for a sheet-fed printing press.

dbk+4/3CDD/M18 E+S

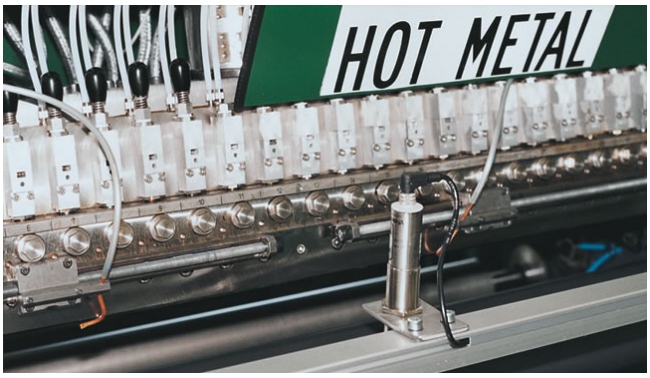
dbk+4/3CDD/M18 E+S monitors double and missing sheets on a window insertion machine for cardboard boxes.

wms-800/RT

wms-800/RT as a ramp approach for commercial vehicles.

mic+25/IU/TC

mic+25/IU/TC with internal synchronisation for checking empty crates in the drinks industry.



mic+35/IU/TC

mic+35/IU/TC senses the winding diameter on a laminating machine.

mic+130/D/TC

mic+130/D/TC detects the filling level of shredded PET bottles (optionally glass bottles) in the container of reverse vending machines.

mic+ sensors are available in four device designs with five different detection ranges

HIGHLIGHTS

› Digital display with direct measured value output in mm/cm or %

› Numeric configuration of the sensor using digital display › permits complete advance configuration of the sensor

› Automatic synchronisation and multiplex operation › for simultaneous operation of up to ten Sensors in close quarters

BASICS

› 1 or 2 switching outputs in pnp or npn variants

› Analogue output 4–20 mA and 0–10 V › with automatic switching between current and voltage outputs

› Analogue output plus 1 pnp switching output

› 5 detection ranges with a measurement range of 30 mm to 8 m

› microsonic Teach-in by using button T1 and T2

› 0.025 mm to 2.4 mm resolution

› Temperature compensation

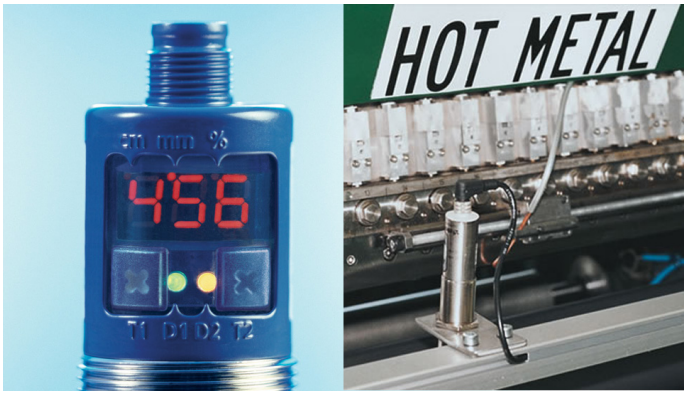
› 9–30 V operating voltage

› LinkControl › for configuration of sensors from a PC

Description

The mic+ sensor family

embedded in its M30 housing design covers a measuring range from 30 mm to 8 m with its five detection ranges. Depending on the detection range, the internal resolution for distance measurement is 0.025 or 2.4 mm. All sensors are equipped with integrated temperature compensation.



TouchControl with LED Display (l.), Winding diameter measurung at the laminating machine (r.)

Four different output levels

are available for all five detection ranges:

1 switching output, optionally in pnp or npn circuitry

2 switching outputs, optionally in pnp or npn circuitry

1 analogue output 4–20 mA and 0–10 V

1 analogue output with an additional pnp switching output

With TouchControl

all sensor settings are made. The easily readable LED display constantly shows the current distance value and automatically alternates between the millimetre and centimetre indication. By operating the two keys beneath the LED display, the parameterisation is called up and the self-explanatory menu structure is run through.

The detection points of the switching outputs and the window limits for the analogue output can be pre-set numerically via

the LED display without the object to be detected being positioned within the detection range. Therefore, it is possible to completely set the sensor without the help of auxiliary reflectors, even outside the actual application.

Two three-colour LEDs

always indicate the current status of the switching outputs and/or the analogue output.

Further additional function (add-ons)

are available as an option within the TouchControl menu structure. Measured distances can be smoothed with different measurement filters, e.g., be stressed by means of the ten level software filter, from F00 (direct measuring value output without filtration) to F09 (extremely strong filtration and measuring value attenuation). A high measuring-value attenuation is useful for filling-level measuring operations with wave motions or in situations where parts may sporadically fly between the sensor and the actual measuring surface. The default filter value is F01. Thus, the sensors are preset for rapid counting and control operations. As further add-ons, the default settings of the switching hysteresis of the switching outputs can be changed if required. The LED display can be permanently switched off or dimmed.

Analogue sensors

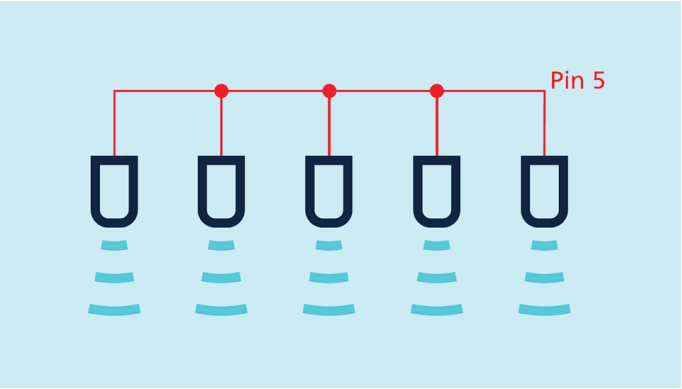
verify the load connected to the output and automatically switch to 4–20 mA current output and 0–10 V voltage output depending on the resistance value. The load verification by the sensor is always initiated upon connection of the operating voltage.

In the add-on menu of TouchControl, the user can, however, also preset the sensor to current or voltage output. In this menu, the measuring value output on the LED display with analogue sensors can additionally be changed to indicate percentage. The window limits of the analogue characteristic curve then correspond to the 0% or the 100% value respectively.

Synchronisation

of up to ten sensors automatically also operates in a mixed configuration of sensors with different detection ranges. The measurement repetition rate is then determined by the sensor with the largest detection range. If the sensors are electrically connected via pin 5 of the M12 circular connector, the synchronisation is active. In synchronised operation, all sensors initiate the measuring process at exactly the same time. With relatively narrow mounting distances between the sensors, a sensor may also receive echo signals from an adjacent sensor.

This can be used as an advantage, e.g. to broaden a sensor's detection range.



Synchronisation using pin 5

If more than ten sensors need to be synchronised, this can be carried out with the SyncBox1, which is available as an accessory.

Multiplex operation

ensures that each sensor can only receive echo signals from its own transmission pulse, which completely avoids any interference between the sensors (crosstalk).

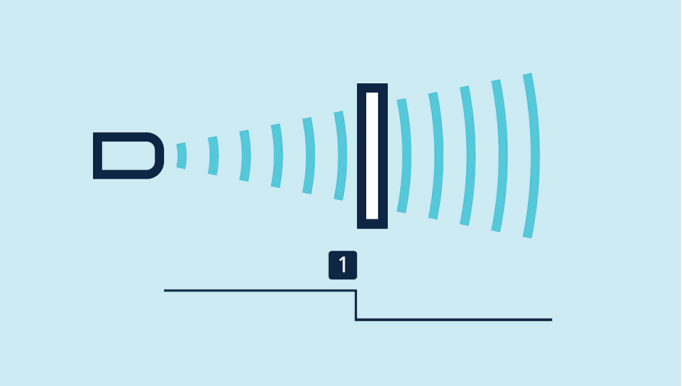
Each sensor is assigned an address from 1 to 10 for this purpose in the add-on menu. The sensors then work in multiplex mode and carry out their measurements one after the other in ascending address order.

The setting of a switching or an analogue output

is either carried out by means of numerically entering the desired distance values (refer to graphic left below) or by means of a Teach-in procedure (refer to this page).
Thanks to this, the user can select the preferred setting mode.

In the microsonic Teach-in process

the object to be detected must be placed in the desired distance (1) to the sensor. The button assigned to the output must then be pressed until tEACH d1 (or tEACH d2) appears on the LED display. Finally, the Teach-in procedure must be confirmed by a further short keystroke. Ready.

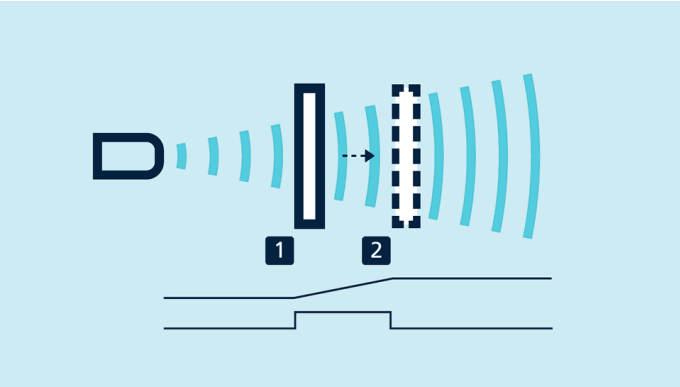


Teach-in of a switching point

To set an analogue output

the object to be detected must first be placed on the sensor-close window limit (1) and the key assigned to the output must be pressed until TEACH 1U appears on the display. Then, the object to be detected must be moved to the sensor-distant window limit (2) and the Teach-in procedure must be terminated by a further short keystroke. Ready.

To set window mode with two switching points, the same procedure applies to one switching output.



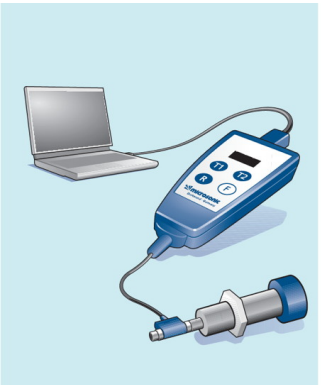
Teach-in of an analogue characteristic curve or a window with two switching points

NCC/NOC

for the switching outputs and rising/falling characteristic for the analogue sensors can also be set by means of the Teach-in-procedure. For this, press the key assigned to output until the symbol ¯⌊_ bzw. _-¯ appears on the display. With each further keystroke, the NCC/NOC (_⌋¯ / ¯⌊_) and rising/falling (_-¯ / ¯-_) settings are alternated. After approx. 10 seconds, the new setting is automatically stored.

LinkControl

consists of the LinkControl adapter and the LinkControl software and facilitates the configuration of the mic+ sensors via a PC or laptop with all conventional Windows® operating systems. All settings of the TouchControl menu can be read ou during operation, edited on the PC, buffered and re-entered into the sensor.
Especially the two measuring value plotters for the visualisation of distance values support the development of solutions for complex automation tasks (also refer to the chapter "Accessories").

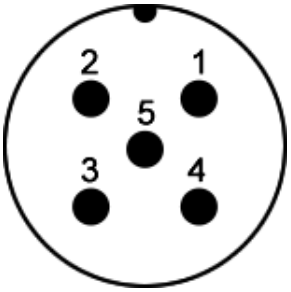


Sensor connected to the PC via LCA-2 for programming

Pin assignment

Pin	PNP	NPN	PNP	NPN	Analogue output	1 PNP output + Analogue	Colour code of sensor cable
1	$+U_B$	$+U_B$	$+U_B$	$+U_B$	$+U_B$	$+U_B$	brown
3	$-U_B$	$-U_B$	$-U_B$	$-U_B$	$-U_B$	$-U_B$	blue
4	D	E	D2	E2	-	D	black
2	-	-	D1	E1	I/U	I/U	white
5	COM	COM	COM	COM	COM	COM	grey

View on connector



Setting

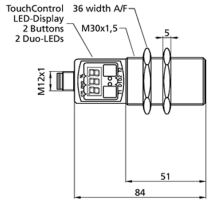
Numerical setting via LED display

Press both keys until "Pro" for programming is shown on the LED display.	*Select the output to be set (according to sensor type d1, d2 or IU).*	*Via the LED display, set the switching point (or, with analogue outputs, the sensor-close window limit) in mm/cm.*	*If window mode is required for the switching output, the rear window limit must be set (or, with analogue outputs, the sensor-distant window limit) in mm/cm.*	*Select between NCC and NOC (or, with analogue outputs, between rising and falling characteristics).*	*Ready.*

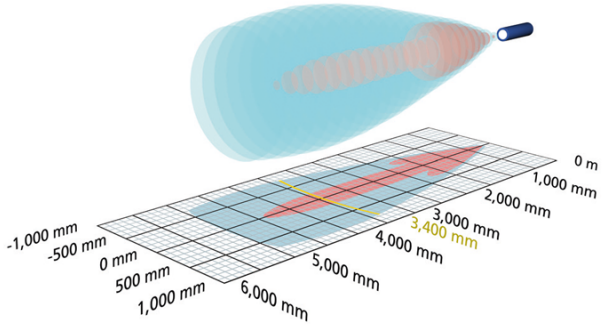
For numerical input, the object to be detected needs not to be placed within the sensor´s detection range.

mic+130/D/TC

scale drawing



detection zone



1 x pnp

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

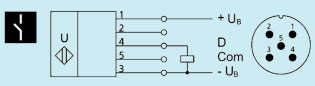
mic+130/D/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

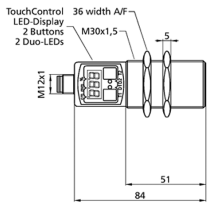
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+130/D/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

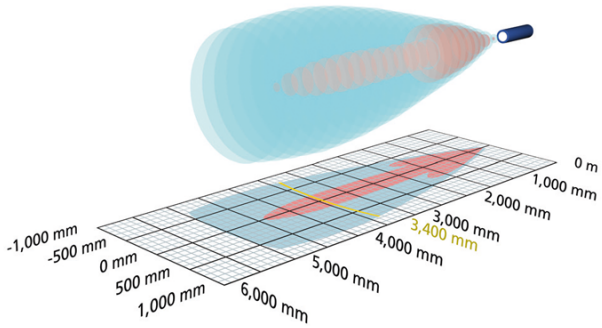
documentation (download)	
pin assignment	
order no.	**mic+130/D/TC**

mic+130/DD/TC

scale drawing



detection zone



2 x pnp

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+130/DD/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

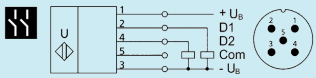
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel high chemical resistance cable connection (on request)
further versions	mic+130/DD/TC/E mic+130/SI/DD/TC

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

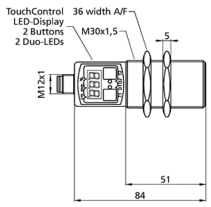
mic+130/DD/TC

documentation (download)

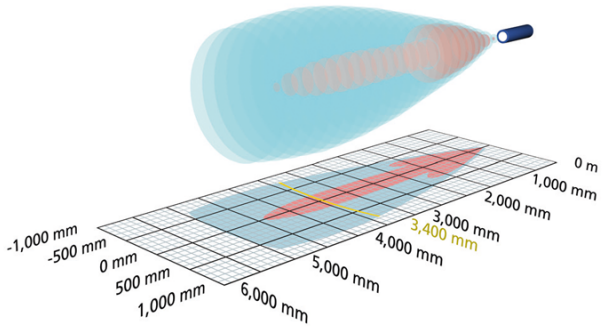
pin assignment	
order no.	mic+130/DD/TC

mic+130/DIU/TC

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm to 0.57 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+130/DIU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
output 2	switching output pnp: $I_{max} = 200$ mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

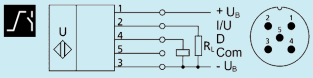
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+130/DIU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

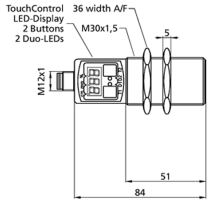
mic+130/DIU/TC

documentation (download)

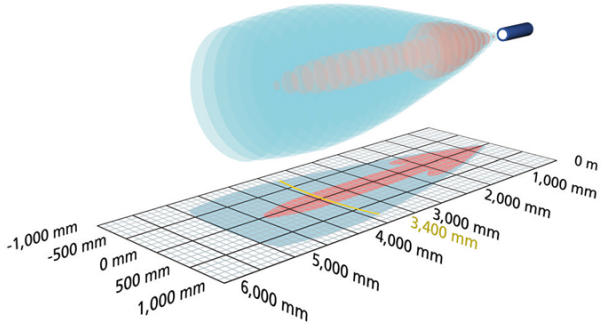
pin assignment	
order no.	mic+130/DIU/TC

mic+130/E/TC

scale drawing



detection zone



1 x npn

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

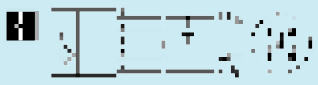
mic+130/E/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

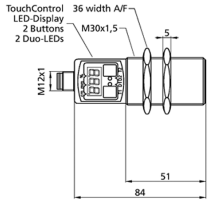
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

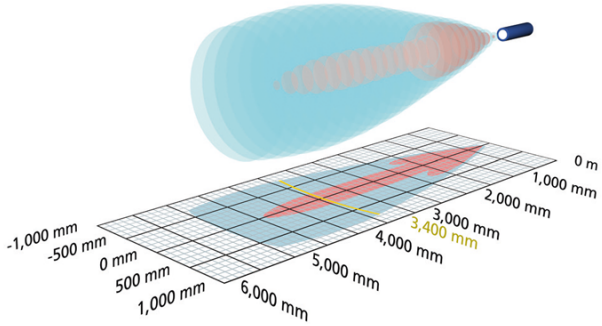
documentation (download)	
pin assignment	
order no.	**mic+130/E/TC**

mic+130/EE/TC

scale drawing



detection zone



2 x npn

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

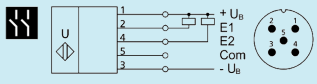
mic+130/EE/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

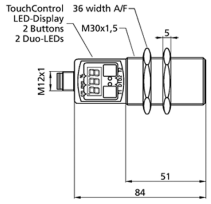
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

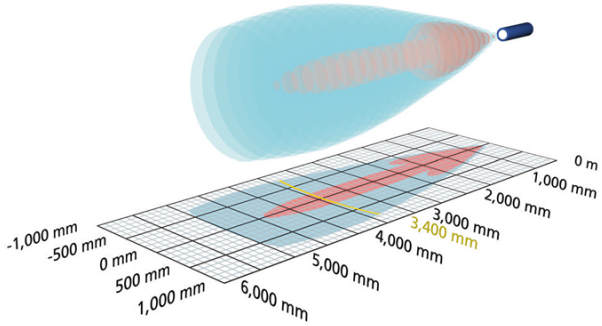
documentation (download)	
pin assignment	
order no.	**mic+130/EE/TC**

mic+130/IU/TC

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm to 0.57 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

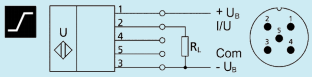
mic+130/IU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

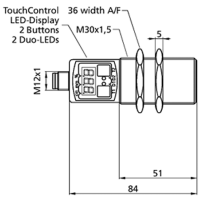
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+130/IU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

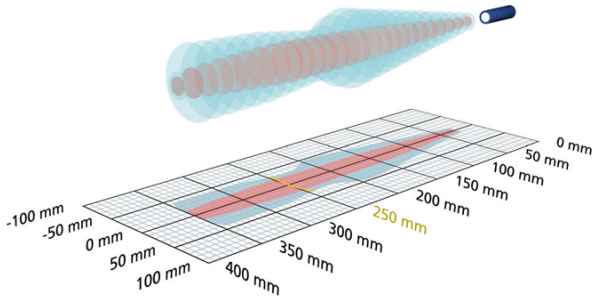
documentation (download)	
pin assignment	
order no.	**mic+130/IU/TC**

mic+25/D/TC

scale drawing



detection zone



1 x pnp

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

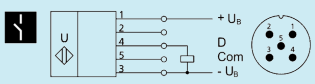
mic+25/D/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

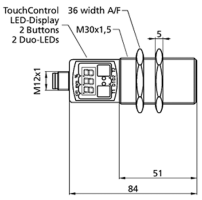
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+25/D/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

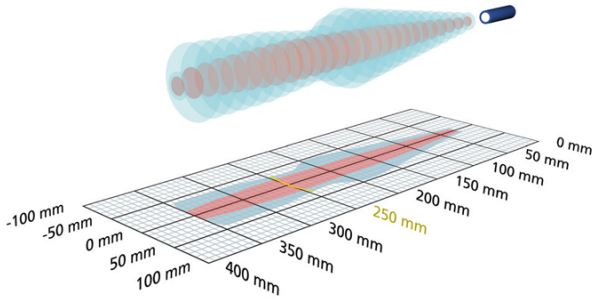
documentation (download)	
pin assignment	
order no.	**mic+25/D/TC**

mic+25/DD/TC

scale drawing



detection zone



2 x pnp

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+25/DD/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

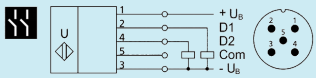
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+25/DD/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

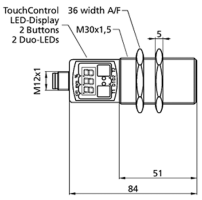
mic+25/DD/TC

documentation (download)

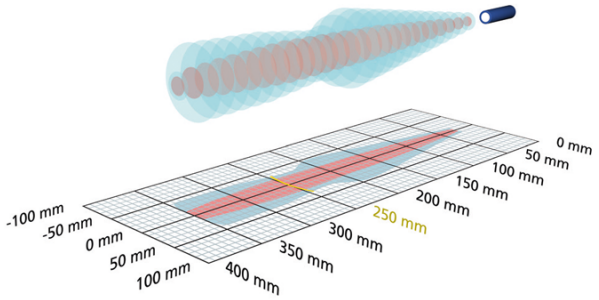
pin assignment	
order no.	mic+25/DD/TC

mic+25/DIU/TC

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+25/DIU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
output 2	switching output pnp: $I_{max} = 200$ mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

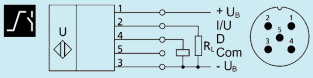
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+25/DIU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

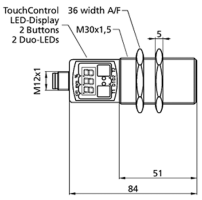
mic+25/DIU/TC

documentation (download)

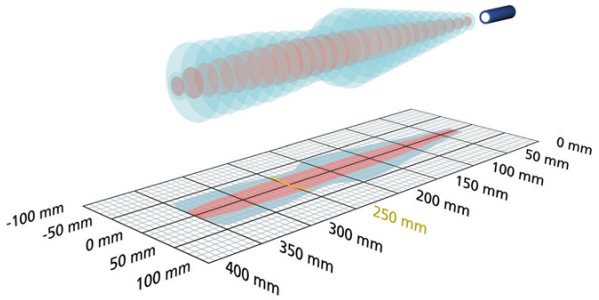
pin assignment	
order no.	mic+25/DIU/TC

mic+25/E/TC

scale drawing



detection zone



1 x npn

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

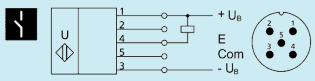
mic+25/E/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

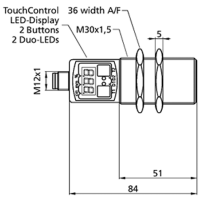
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

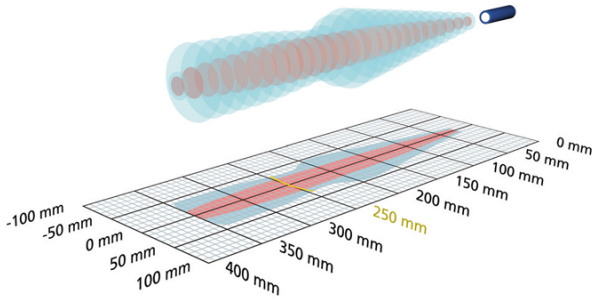
documentation (download)	
pin assignment	
order no.	**mic+25/E/TC**

mic+25/EE/TC

scale drawing



detection zone



2 x npn

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

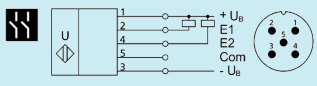
mic+25/EE/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

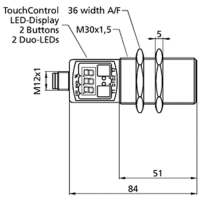
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

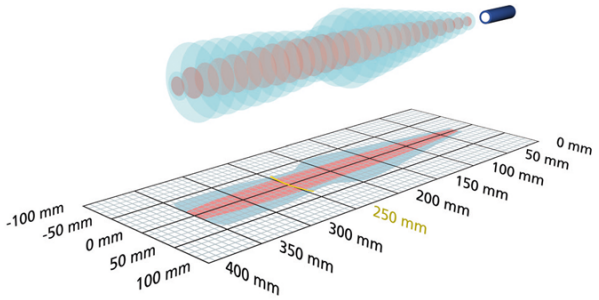
documentation (download)	
pin assignment	
order no.	**mic+25/EE/TC**

mic+25/IU/TC

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

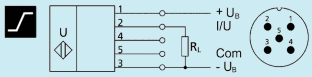
mic+25/IU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

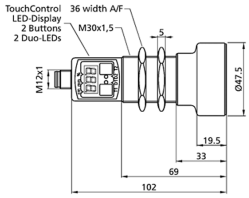
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+25/IU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

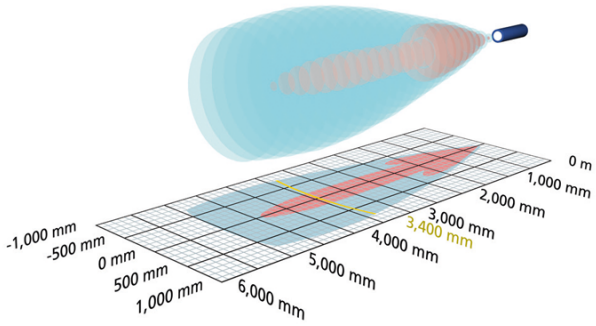
documentation (download)	
pin assignment	
order no.	**mic+25/IU/TC**

mic+340/D/TC

scale drawing



detection zone



1 x pnp

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

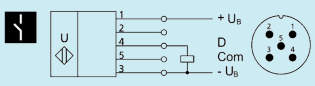
mic+340/D/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 380 ms

inputs	
input 1	com input synchronisation input

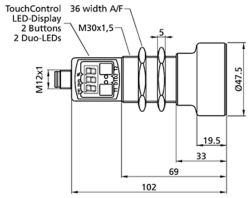
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	stainless steel cable connection (on request)
further versions	mic+340/D/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

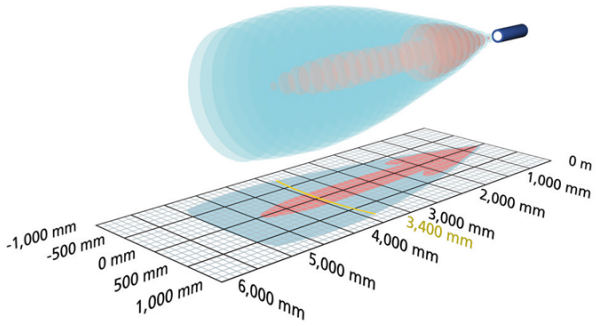
documentation (download)	
pin assignment	
order no.	**mic+340/D/TC**

mic+340/DD/TC

scale drawing



detection zone



2 x pnp

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+340/DD/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 380 ms

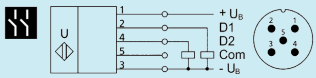
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	stainless steel cable connection (on request)
further versions	mic+340/DD/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

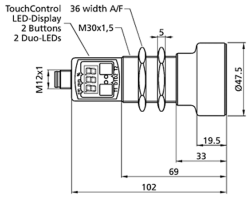
mic+340/DD/TC

documentation (download)

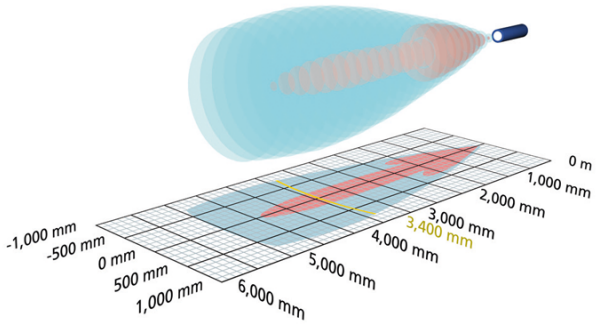
pin assignment	
order no.	mic+340/DD/TC

mic+340/DIU/TC

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm to 1.5 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+340/DIU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
output 2	switching output pnp: $I_{max} = 200$ mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 450 ms

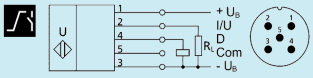
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	stainless steel cable connection (on request)
further versions	mic+340/DIU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

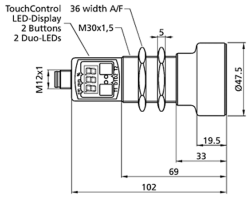
mic+340/DIU/TC

documentation (download)

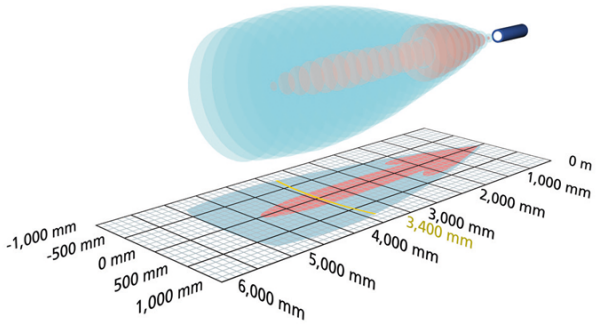
pin assignment	
order no.	mic+340/DIU/TC

mic+340/E/TC

scale drawing



detection zone



1 x npn

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

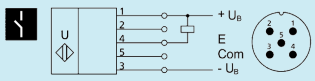
mic+340/E/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 380 ms

inputs	
input 1	com input synchronisation input

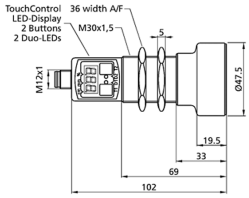
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

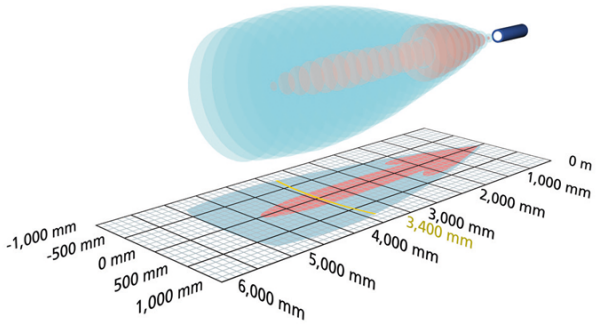
documentation (download)	
pin assignment	
order no.	**mic+340/E/TC**

mic+340/EE/TC

scale drawing



detection zone



2 x npn

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

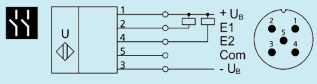
mic+340/EE/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 380 ms

inputs	
input 1	com input synchronisation input

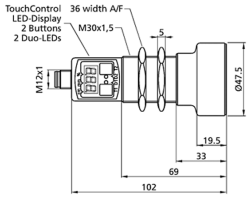
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

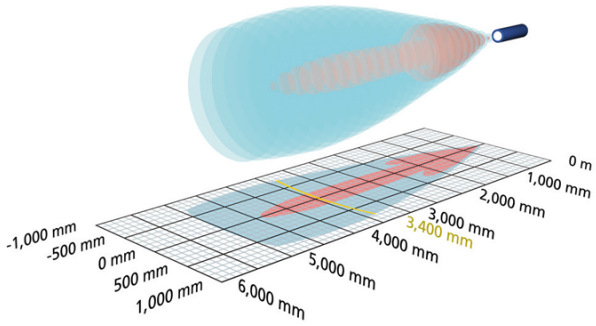
documentation (download)	
pin assignment	
order no.	**mic+340/EE/TC**

mic+340/IU/TC

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm to 1.5 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

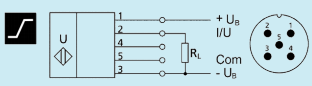
mic+340/IU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	180 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

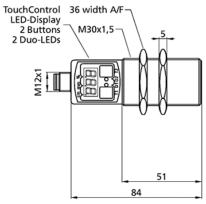
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	stainless steel high chemical resistance cable connection (on request)
further versions	mic+340/IU/TC/E mic+340/SI/IU/TC

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

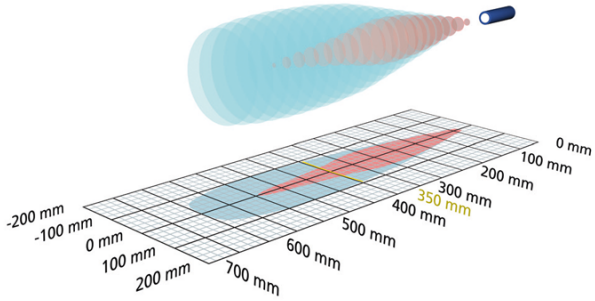
documentation (download)	
pin assignment	
order no.	**mic+340/IU/TC**

mic+35/D/TC

scale drawing



detection zone



1 x pnp

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

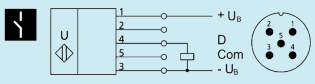
mic+35/D/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

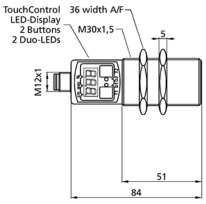
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+35/D/TC/E mic+35/D/TC/K6

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

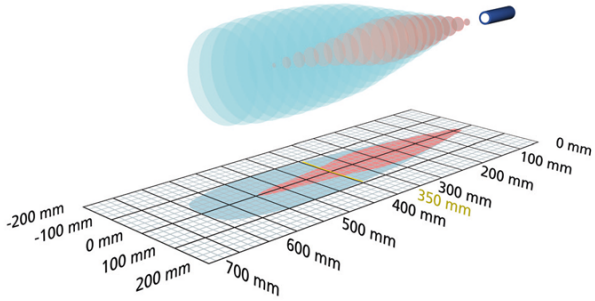
documentation (download)	
pin assignment	
order no.	**mic+35/D/TC**

mic+35/DD/TC

scale drawing



detection zone



2 x pnp

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+35/DD/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+35/DD/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

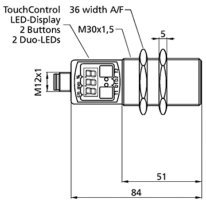
mic+35/DD/TC

documentation (download)

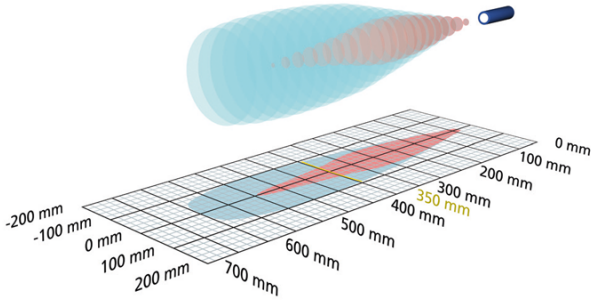
pin assignment	
order no.	mic+35/DD/TC

mic+35/DIU/TC

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+35/DIU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
output 2	switching output pnp: $I_{max} = 200$ mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

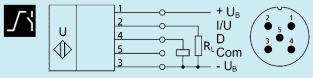
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+35/DIU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

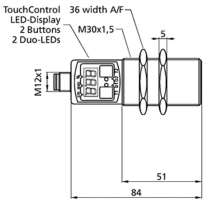
mic+35/DIU/TC

documentation (download)

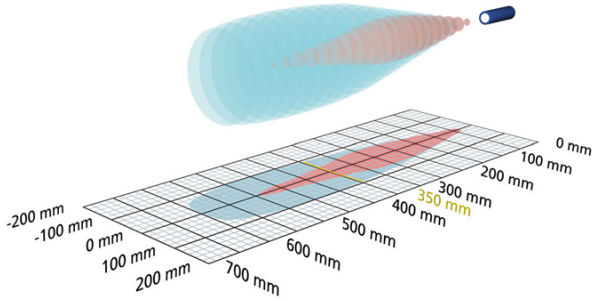
pin assignment	
order no.	mic+35/DIU/TC

mic+35/E/TC

scale drawing



detection zone



1 x npn

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

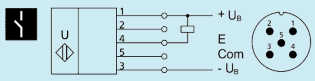
mic+35/E/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

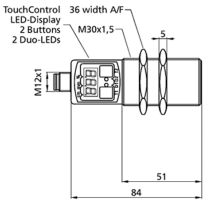
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

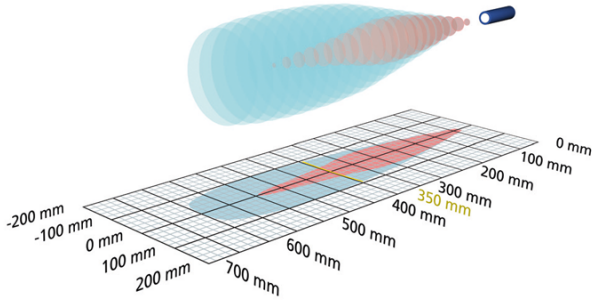
documentation (download)	
pin assignment	
order no.	**mic+35/E/TC**

mic+35/EE/TC

scale drawing



detection zone



2 x npn

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

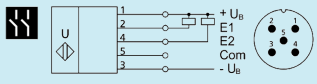
mic+35/EE/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

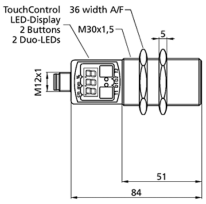
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

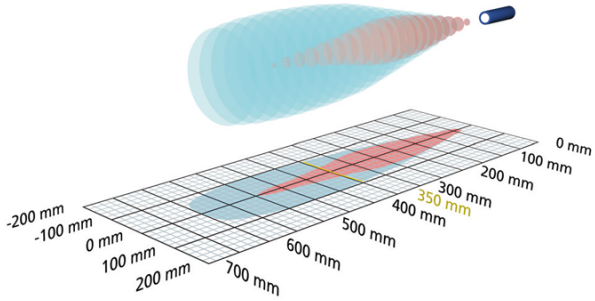
documentation (download)	
pin assignment	
order no.	**mic+35/EE/TC**

mic+35/IU/TC

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

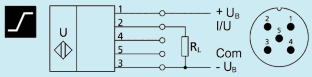
mic+35/IU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

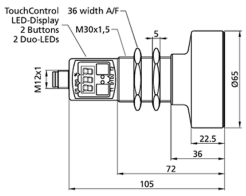
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	stainless steel cable connection (on request)
further versions	mic+35/IU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

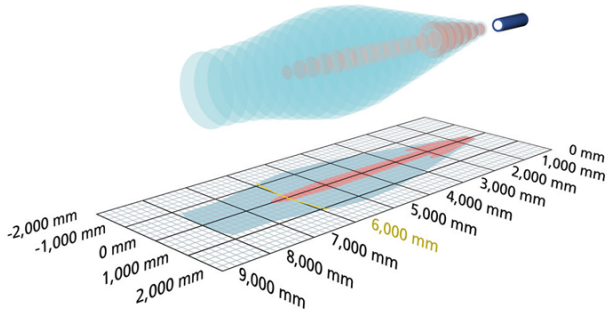
documentation (download)	
pin assignment	
order no.	**mic+35/IU/TC**

mic+600/D/TC

scale drawing



detection zone



1 x pnp

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

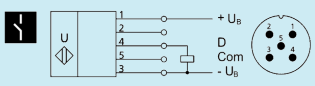
mic+600/D/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

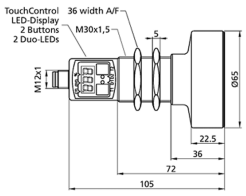
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	stainless steel cable connection (on request)
further versions	mic+600/D/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

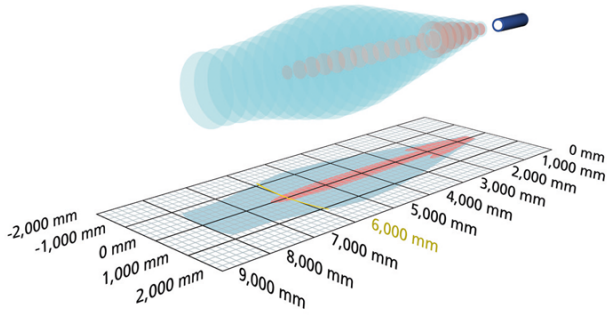
documentation (download)	
pin assignment	
order no.	**mic+600/D/TC**

mic+600/DD/TC

scale drawing



detection zone



2 x pnp

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+600/DD/TC

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	stainless steel cable connection (on request)
further versions	mic+600/DD/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

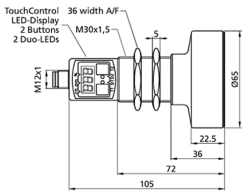
mic+600/DD/TC

documentation (download)

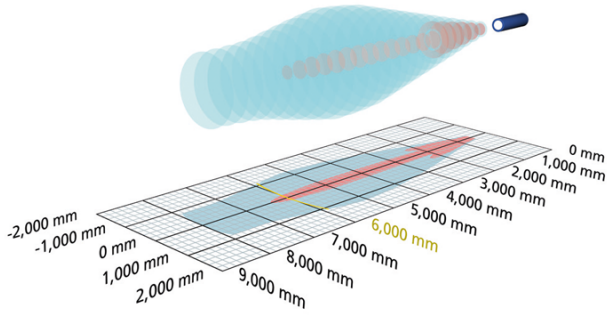
pin assignment	
order no.	mic+600/DD/TC

mic+600/DIU/TC

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm to 2.4 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

mic+600/DIU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
output 2	switching output pnp: $I_{max} = 200$ mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 450 ms

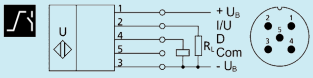
inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	stainless steel cable connection (on request)
further versions	mic+600/DIU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

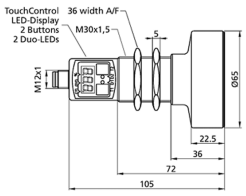
mic+600/DIU/TC

documentation (download)

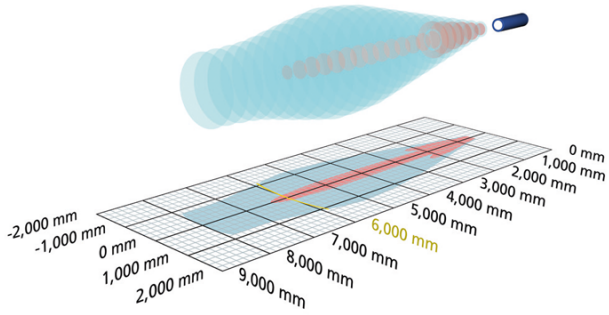
pin assignment	
order no.	mic+600/DIU/TC

mic+600/E/TC

scale drawing



detection zone



1 x npn

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

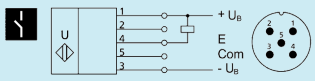
mic+600/E/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

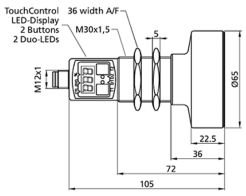
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

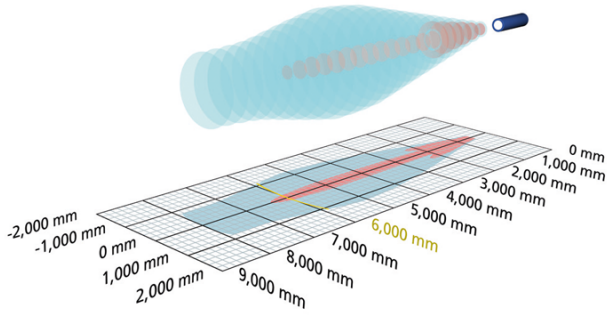
documentation (download)	
pin assignment	
order no.	**mic+600/E/TC**

mic+600/EE/TC

scale drawing



detection zone



2 x npn

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

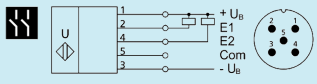
mic+600/EE/TC

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

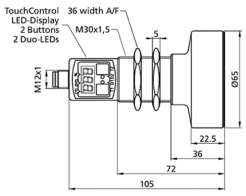
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

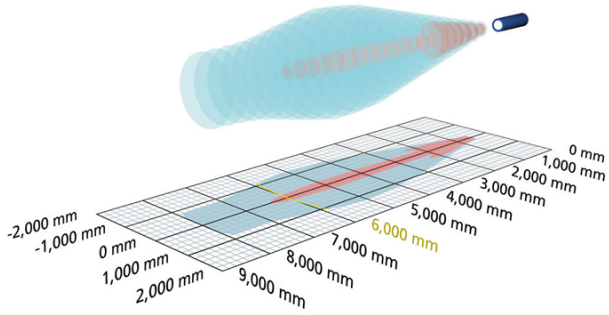
documentation (download)	
pin assignment	
order no.	**mic+600/EE/TC**

mic+600/IU/TC

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm to 2.4 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

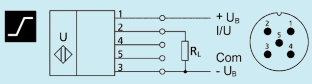
mic+600/IU/TC

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, TPU
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	stainless steel high chemical resistance cable connection (on request)
further versions	mic+600/IU/TC/E mic+600/SI/IU/TC/E

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	display

documentation (download)	
pin assignment	
order no.	**mic+600/IU/TC**

These completely metal mic sensors are available in two device designs with five different detection ranges.

HIGHLIGHTS

› M30 housing and M12 circular connector in metal design › for harsh usage conditions

› Automatic synchronisation › for simultaneous operation of up to ten sensors in close quarters

BASICS

› 1 switching output in pnp variant

› Analogue output 4–20 mA and 0–10 V › with automatic switching between current and voltage outputs

› 5 detection ranges with a measurement range of 30 mm to 8 m

› microsonic Teach-in on pin 5

› 0.18 mm to 2.4 mm resolution

› Temperature compensation

› 9–30 V operating voltage

› LinkControl › for configuration of sensors from a PC

Description

This very solid construction

is fully made of metal from the M30 housing to the M12 circular connector. Since the sensors do not contain any operating elements or signal lamps, they are especially suited for application under extreme ambient conditions with high mechanical loads for housing and plug connector. The sensors are available in five detection ranges and cover a measuring range of 30 mm up to 8 m.

Two output levels

are available for all five detection ranges:

1 pnp switching output

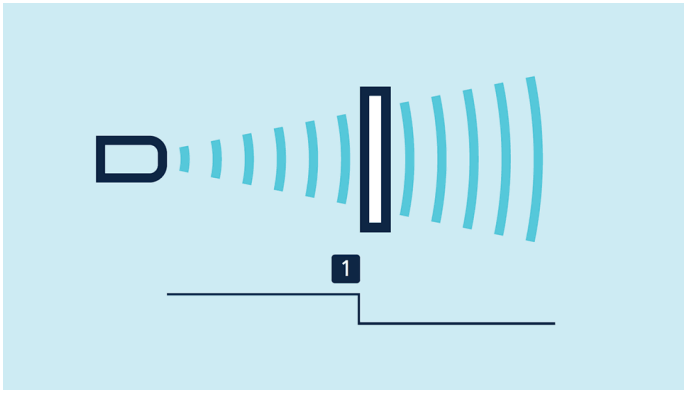
1 analogue output 4–20 mA and 0–10 V

Sensors with switching output have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

Teach-in of a single switching point

- Place object to be detected (1) at the desired distance
- Apply $+U_B$ to pin 5 for about 3 seconds
- Then apply $+U_B$ to pin 5 again for about 1 seconds

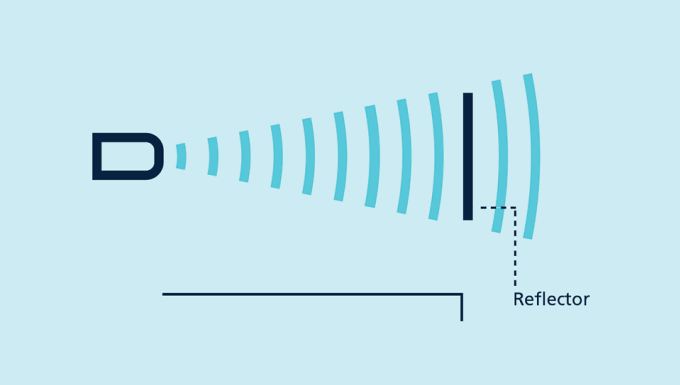


Teach-in of a switching point

Teach-in of a two-way reflective barrier with a fixed reflector

› Apply +U_B to pin 5 for about 3 seconds

› Then apply +U_B to pin 5 again for about 10 seconds



Teach-in of a two-way reflective barrier

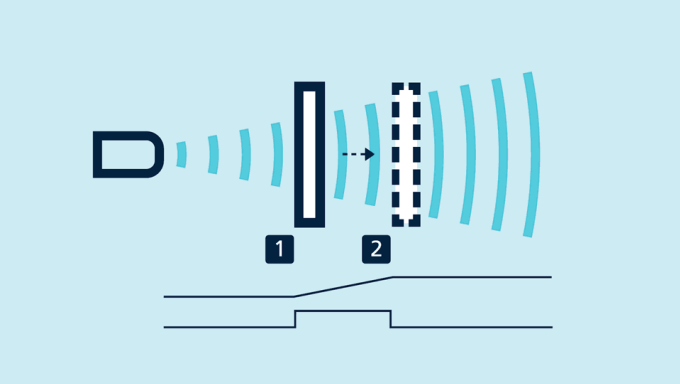
For configuration of a window

› Place object at the near edge of the window (1)

› Apply +U_B to pin 5 for about 3 seconds

› Then move the object to the far edge of the window (2)

› Then apply +U_B to pin 5 again for about 1 seconds



Teach-in of an analogue characteristic or a window with two switching points

NCC/NOC

and rising/falling analogue characteristic curve can also be set via pin 5.

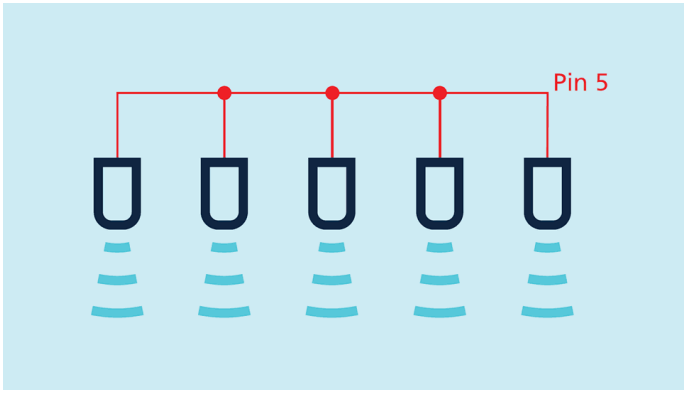
LinkControl

optionally permits the extensive parameterisation of mic sensors. The LCA-2 LinkControl adapter, which is available as an accessory, can be used to connect mic sensors to the PC.

Sensor connected to the PC via LCA-2 for programming

Synchronisation

permits the simultaneous use of multiple mic sensors in an application. To avoid mutual interference, the sensors can be synchronised with one another. To do this, all the sensors are electrically connected on pin 5.

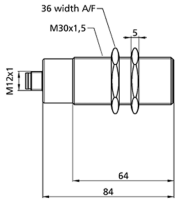


Synchronisation using pin 5

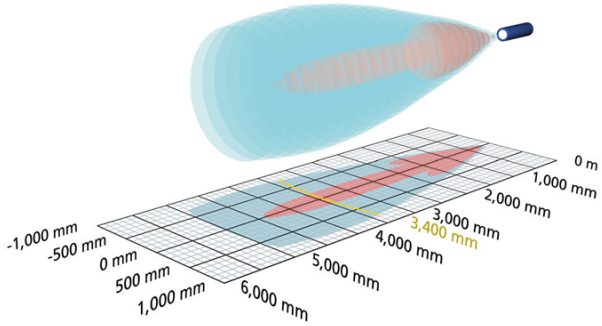
If more than 10 sensors need to be synchronised, this can be carried out with the SyncBox1, which is available as an accessory.

mic-130/D/M

scale drawing



detection zone



1 x pnp

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

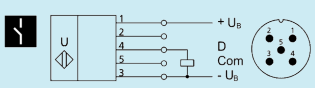
mic-130/D/M

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 440 ms

inputs	
input 1	com input teach-in input

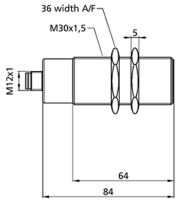
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

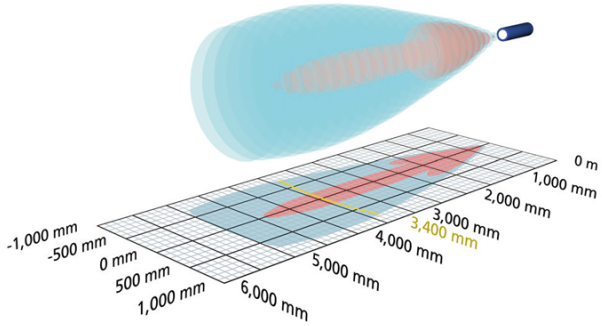
documentation (download)	
pin assignment	
order no.	**mic-130/D/M**

mic-130/IU/M

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm to 0.57 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

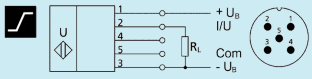
mic-130/IU/M

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	110 ms
delay prior to availability	< 440 ms

inputs	
input 1	com input teach-in input

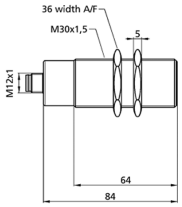
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

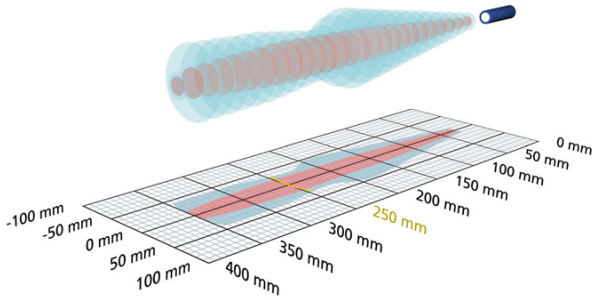
documentation (download)	
pin assignment	
order no.	**mic-130/IU/M**

mic-25/D/M

scale drawing



detection zone



1 x pnp

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

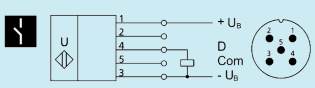
mic-25/D/M

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 390 ms

inputs	
input 1	com input teach-in input

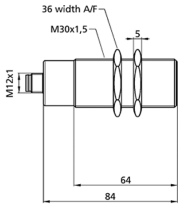
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

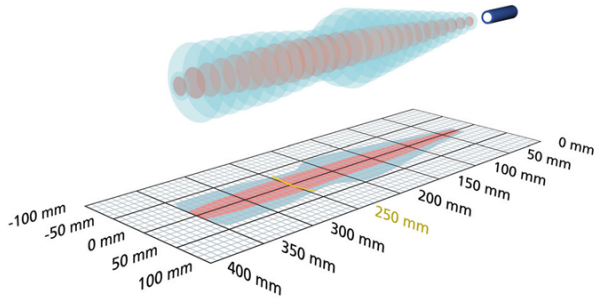
documentation (download)	
pin assignment	
order no.	**mic-25/D/M**

mic-25/IU/M

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

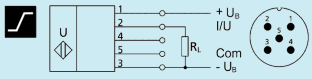
mic-25/IU/M

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 390 ms

inputs	
input 1	com input teach-in input

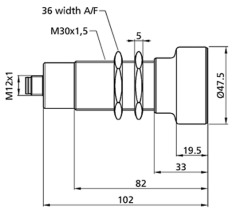
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

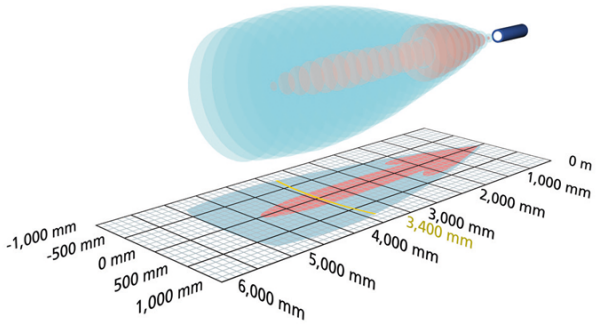
documentation (download)	
pin assignment	
order no.	**mic-25/IU/M**

mic-340/D/M

scale drawing



detection zone



1 x pnp

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

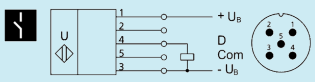
mic-340/D/M

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 530 ms

inputs	
input 1	com input teach-in input

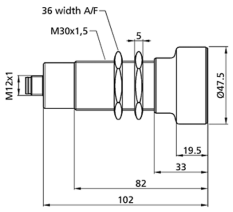
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

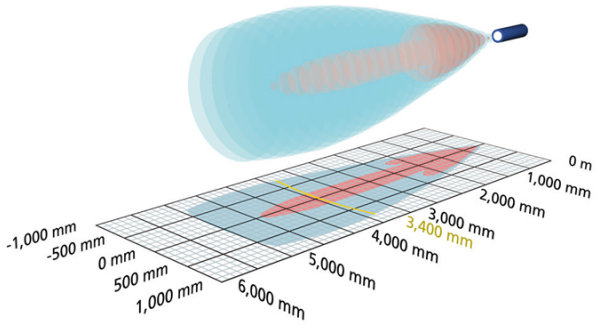
documentation (download)	
pin assignment	
order no.	**mic-340/D/M**

mic-340/IU/M

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm to 1.5 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

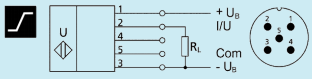
mic-340/IU/M

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	180 ms
delay prior to availability	< 530 ms

inputs	
input 1	com input teach-in input

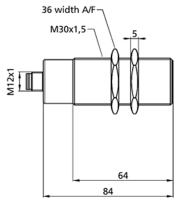
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	270 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

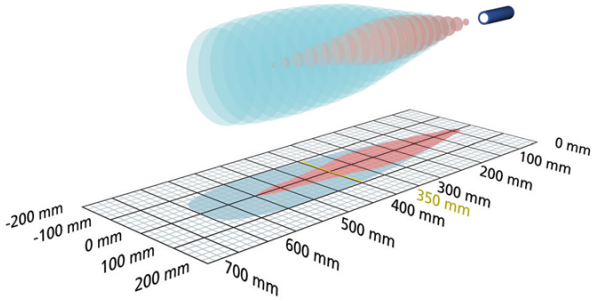
documentation (download)	
pin assignment	
order no.	**mic-340/IU/M**

mic-35/D/M

scale drawing



detection zone



1 x pnp

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

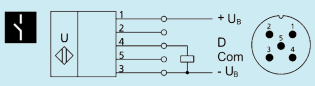
mic-35/D/M

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 420 ms

inputs	
input 1	com input teach-in input

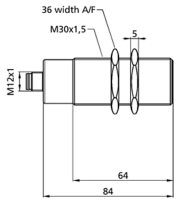
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	cable connection (on request)
further versions	mic-35/D/M/K6

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

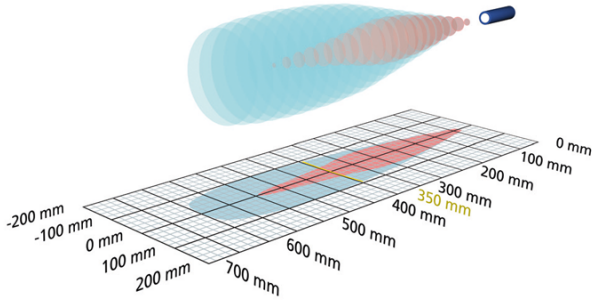
documentation (download)	
pin assignment	
order no.	**mic-35/D/M**

mic-35/IU/M

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

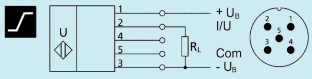
mic-35/IU/M

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	70 ms
delay prior to availability	< 420 ms

inputs	
input 1	com input teach-in input

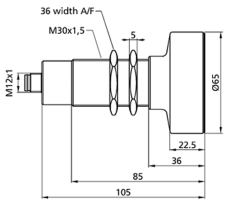
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

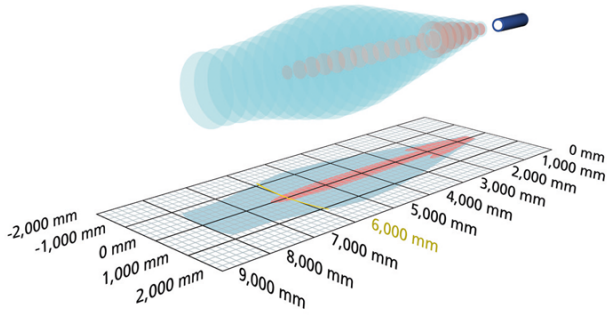
documentation (download)	
pin assignment	
order no.	**mic-35/IU/M**

mic-600/D/M

scale drawing



detection zone



1 x pnp

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

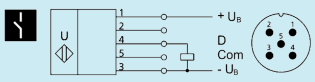
mic-600/D/M

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 600 ms

inputs	
input 1	com input teach-in input

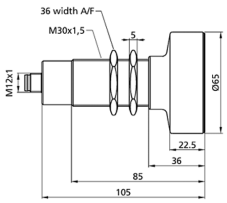
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	260 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

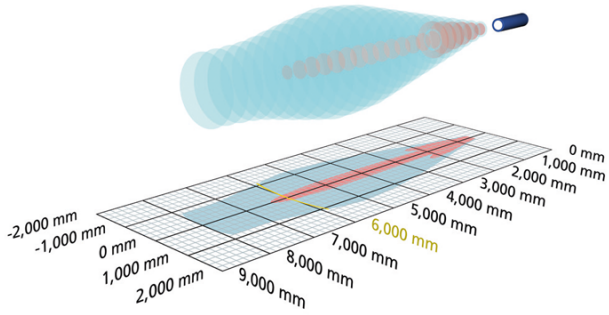
documentation (download)	
pin assignment	
order no.	**mic-600/D/M**

mic-600/IU/M

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	metal plug for harsh operational conditions

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm to 2.4 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 55 mA
type of connection	5-pin M12 initiator plug

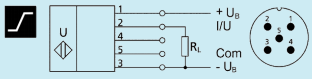
mic-600/IU/M

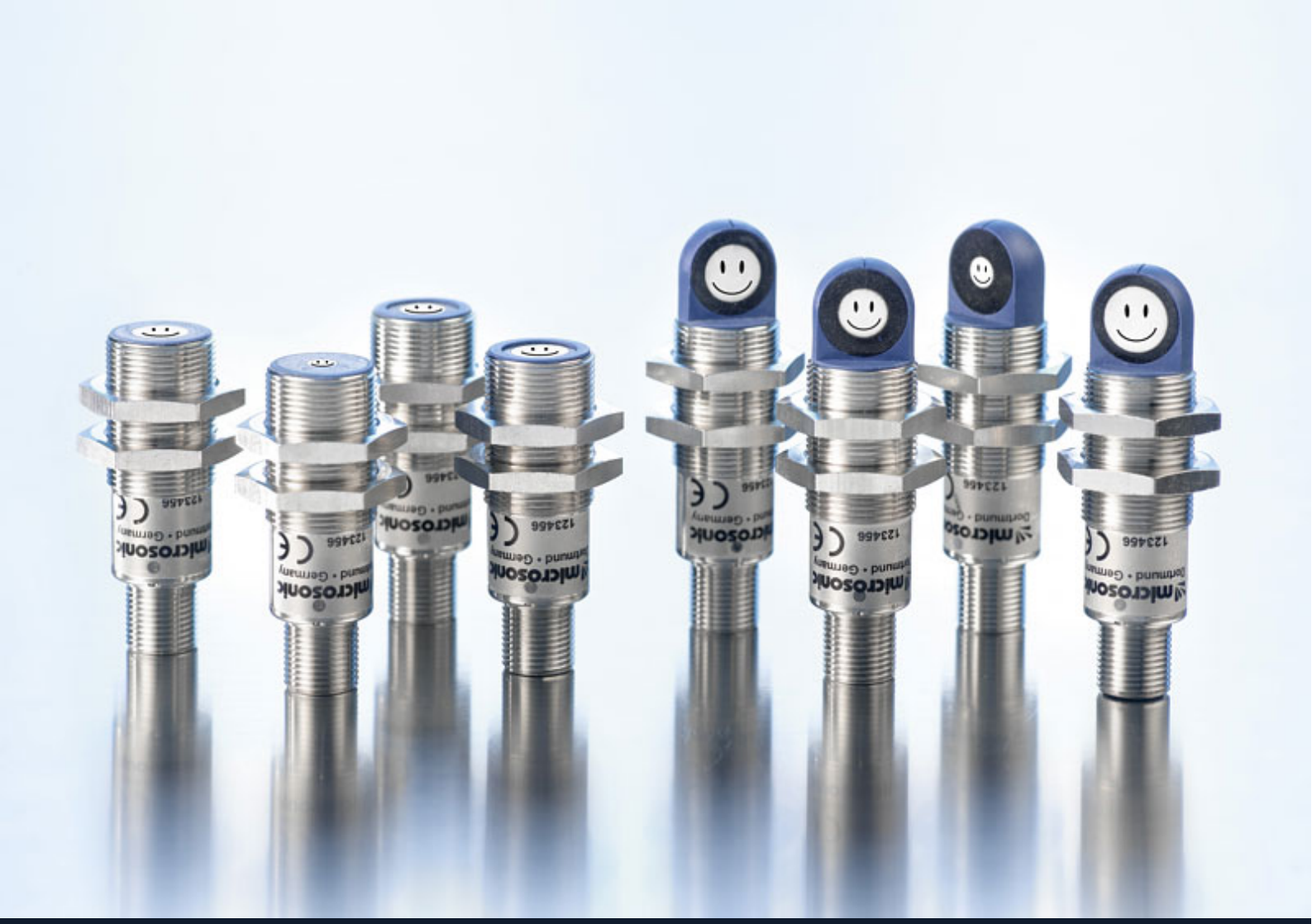
outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	240 ms
delay prior to availability	< 600 ms

inputs	
input 1	com input teach-in input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	320 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	no
particularities	metal plug for harsh operational conditions

documentation (download)	
pin assignment	
order no.	**mic-600/IU/M**



pico+ the "little guy" that can do it all: 4 ranges, 3 output signals, 2 housing variants and 1 IO-Link interface.

HIGHLIGHTS

- Variant with 90° angled head
- IO-Link interface › for support of the new industry standard
- Automatic synchronisation and multiplex operation › for simultaneous operation of up to ten sensors in close quarters

BASICS

- 1 Push-Pull switching output, pnp or npn basis
- Analogue output 4–20 mA or 0–10 V
- 4 detection ranges with a measurement range of 20 mm to 1.3 m
- microsonic Teach-in on pin 5
- 0.069 mm to 0.1 mm resolution
- Temperature compensation
- 10–30 V operating voltage
- LinkControl › for configuration of sensors from a PC

Description

The pico+ ultrasonic sensors

are a compact series with M18 threaded sleeves and a housing length of only 41 mm. In addition to the variants with an axial beam direction, there is also a housing variant with a 90° angled head and radial beam direction.

With four detection ranges from 20 mm to 1.3 m and three different output stages, this sensor family covers a wide range of applications.

Sensors with the Push-Pull output stage support SIO and IO link modes. Sensors with analogue output are optionally available with 4–20 mA current output or 0–10 V voltage output.

In SIO mode, sensors are configured using the microsonic Teach-in procedure on pin 5.

For the pico+ sensor family

there are 2 output stages and 4 detection ranges available:

1 Push-Pull switching output with pnp or npn switching technology

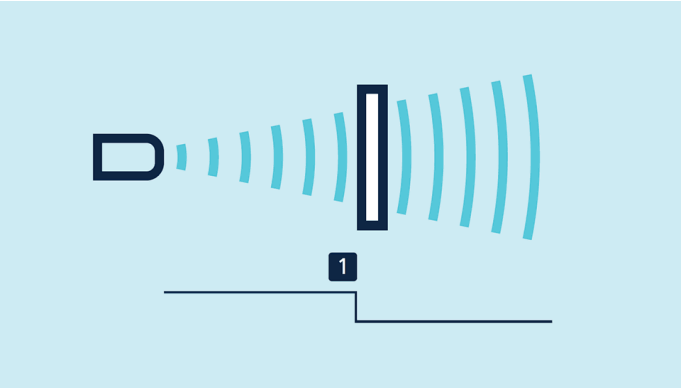
1 analogue output 4–20 mA or 0–10 V

Sensors with switching output have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

Teach-in of a single switching point

- Place object to be detected (1) at the desired distance
- Apply $+U_B$ to pin 5 for about 3 seconds
- Then apply $+U_B$ to pin 5 again for about 1 seconds

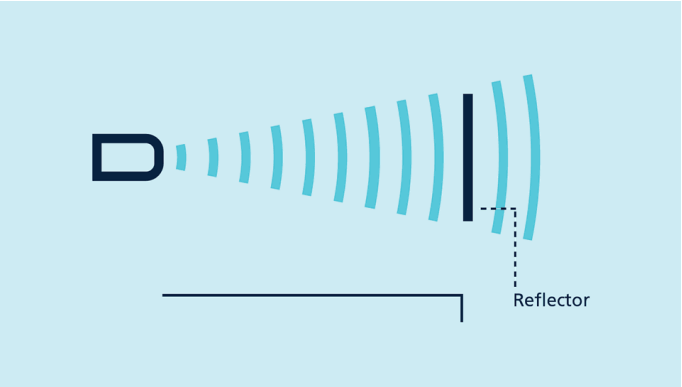


Teach-in of a switching point

Teach-in of a two-way reflective barrier

with a fixed reflector

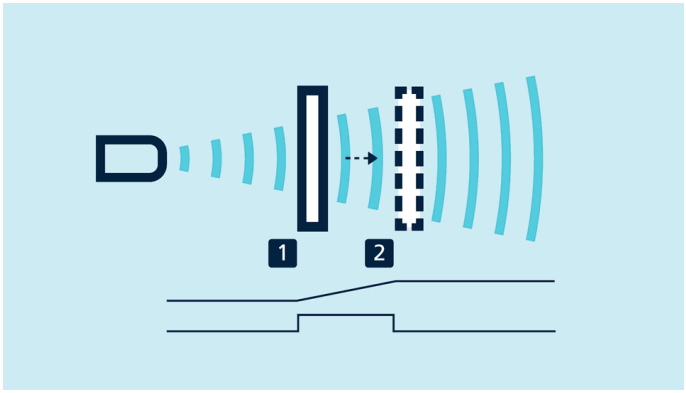
- Apply $+U_B$ to pin 5 for about 3 seconds
- Then apply $+U_B$ to pin 5 again for about 10 seconds



Teach-in of a two-way reflective barrier

For configuration of a window

- Place object at the near edge of the window (1)
- Apply $+U_B$ to pin 5 for about 3 seconds
- Then move the object to the far edge of the window (2)
- Then apply $+U_B$ to pin 5 again for about 1 seconds



Teach-in of an analogue characteristic or a window with two switching points

NCC/NOC

and rising/falling analogue characteristic curve can also be set via pin 5.

One green and one yellow LED

indicate the state of the output and support microsonic Teach-in.

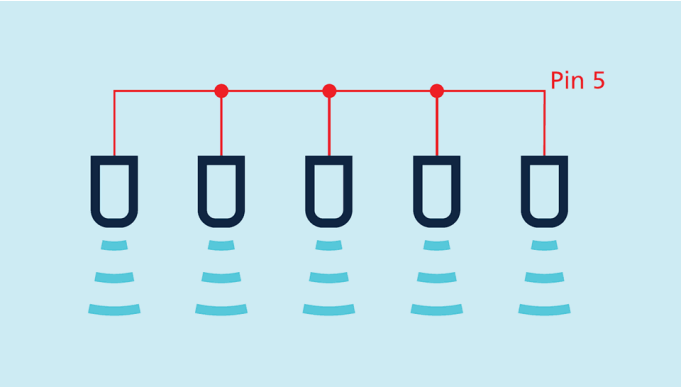
LinkControl

optionally permits the extensive parameterisation of pico+ sensors. The LCA-2 LinkControl adapter, which is available as an accessory, can be used to connect pico+ sensors to the PC.

Sensor connected to the PC via LCA-2 for programming

Easy to synchronise

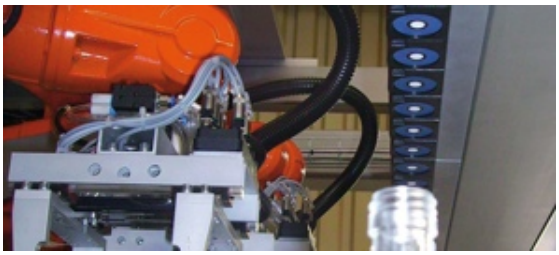
A number of pico+ sensors can be run closely packed in applications synchronised to stop them from influencing one another. To this end, the sync mode has to be activated and all the sensors are to be electrically connected one to another with pin 5.



Synchronisation using pin 5

If more than 10 sensors must be synchronised, this can be carried out with the SyncBox1, which is available as an accessory.

In instances of where a number of sensors are run at an IO-Link master, then the master's function is to assume synchronisation (Pin 5 must not be wired under IO-Link operations).



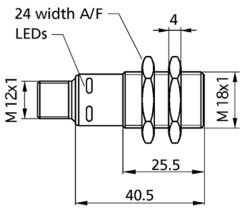
Synchronised sensor cell in glass bottle production

IO-Link integrated

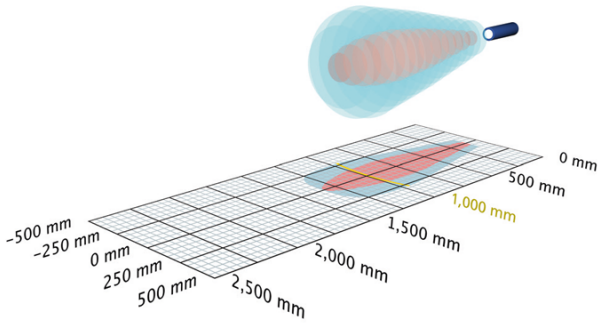
in version 1.0 for sensors with switching output.

pico+100/F

scale drawing



detection zone



1 x Push-Pull

1,300 mm

operating range	120 - 1,000 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	120 mm
operating range	1,000 mm
maximum range	1,300 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

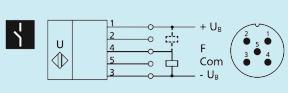
pico+100/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching hysteresis	20 mm
switching frequency	10 Hz
response time	80 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

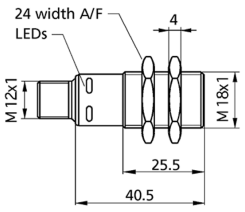
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+100/WK/F

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	IO-Link

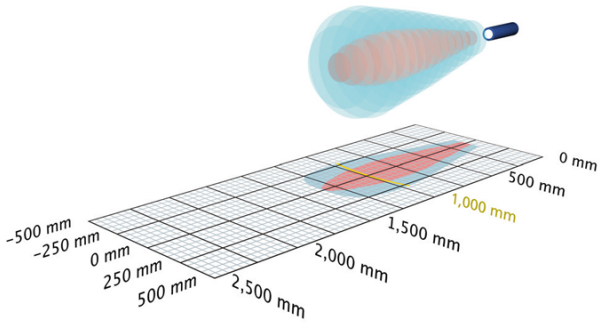
documentation (download)	
pin assignment	
order no.	**pico+100/F**

pico+100/I

scale drawing



detection zone



1 x analogue

1,300 mm

operating range	120 - 1,000 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	120 mm
operating range	1,000 mm
maximum range	1,300 mm
resolution/sampling rate	0.069 mm to 0.38 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

pico+100/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	100 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

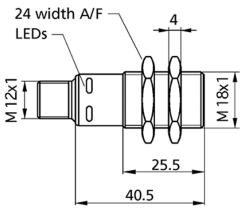
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+100/WK/I

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window

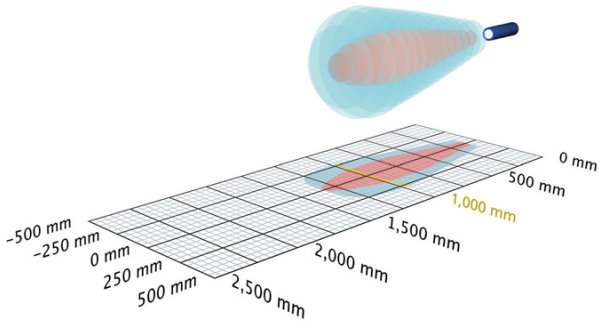
documentation (download)	
pin assignment	
order no.	**pico+100/I**

pico+100/U

scale drawing



detection zone



1 x analogue

1,300 mm

operating range	120 - 1,000 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	120 mm
operating range	1,000 mm
maximum range	1,300 mm
resolution/sampling rate	0.069 mm to 0.38 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

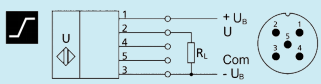
pico+100/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	100 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

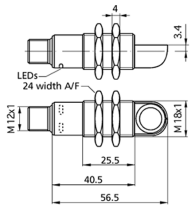
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+100/WK/U

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window

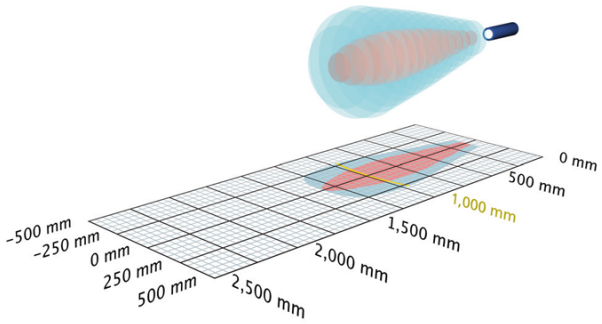
documentation (download)	
pin assignment	
order no.	**pico+100/U**

pico+100/WK/F

scale drawing



detection zone



1 x Push-Pull

1,300 mm

operating range	120 - 1,000 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	90°-Winkelkopf IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	120 mm
operating range	1,000 mm
maximum range	1,300 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

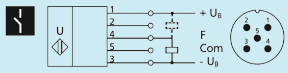
pico+100/WK/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching hysteresis	20 mm
switching frequency	10 Hz
response time	80 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

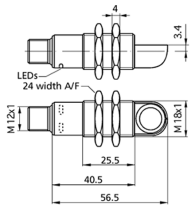
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	90°-Winkelkopf IO-Link

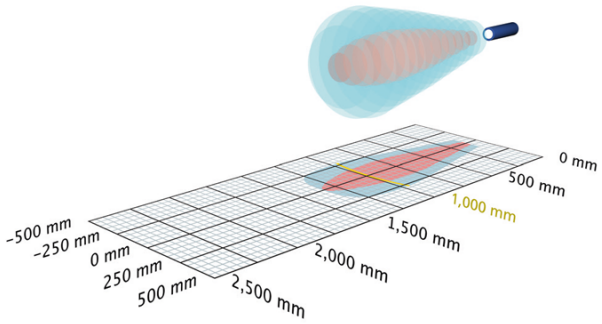
documentation (download)	
pin assignment	
order no.	**pico+100/WK/F**

pico+100/WK/I

scale drawing



detection zone



1 x analogue

1,300 mm

operating range	120 - 1,000 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	analogue distance measurements
particularities	90° angular head

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	120 mm
operating range	1,000 mm
maximum range	1,300 mm
resolution/sampling rate	0.069 mm to 0.38 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

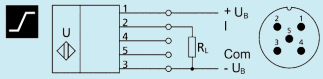
pico+100/WK/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	100 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

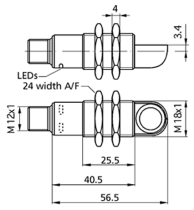
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	90° angular head

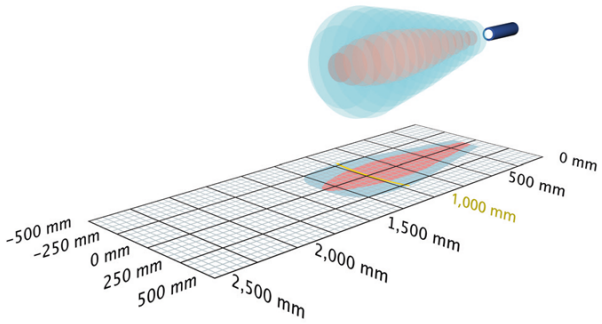
documentation (download)	
pin assignment	
order no.	**pico+100/WK/I**

pico+100/WK/U

scale drawing



detection zone



1 x analogue

1,300 mm

operating range	120 - 1,000 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	analogue distance measurements
particularities	90° angular head

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	120 mm
operating range	1,000 mm
maximum range	1,300 mm
resolution/sampling rate	0.069 mm to 0.38 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

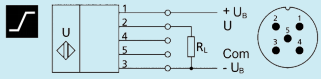
pico+100/WK/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	100 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

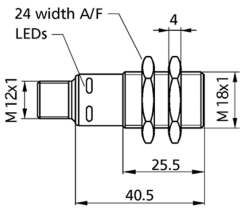
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	90° angular head

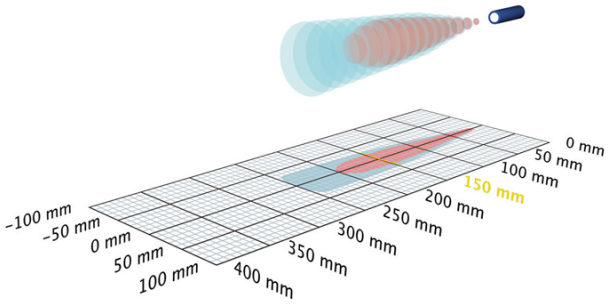
documentation (download)	
pin assignment	
order no.	**pico+100/WK/U**

pico+15/F

scale drawing



detection zone



1 x Push-Pull

250 mm

operating range	25 - 150 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	narrow sound field IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	25 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

pico+15/F

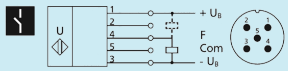
outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+15/WK/F

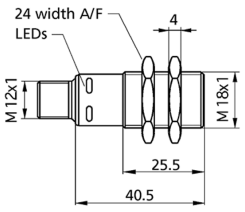
technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	narrow sound field IO-Link

pico+15/F

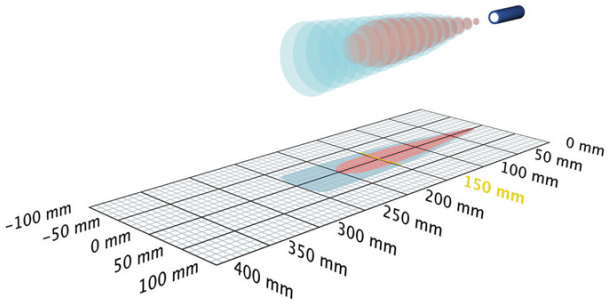
documentation (download)	
pin assignment	
order no.	pico+15/F

pico+15/I

scale drawing



detection zone



1 x analogue

250 mm

operating range	25 - 150 mm
design	cylindrical M18
operating mode	analogue distance measurements
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	25 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

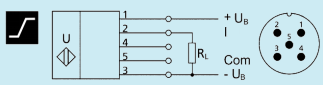
pico+15/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

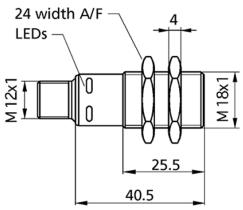
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+15/WK/U

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	narrow sound field

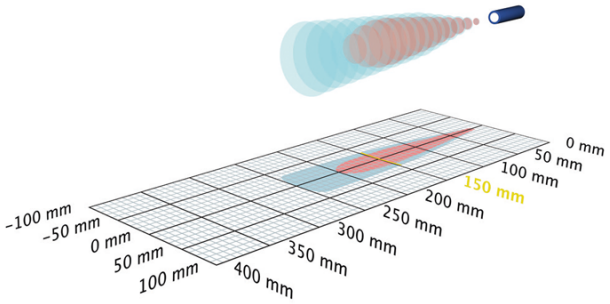
documentation (download)	
pin assignment	
order no.	**pico+15/I**

pico+15/U

scale drawing



detection zone



1 x analogue

250 mm

operating range	25 - 150 mm
design	cylindrical M18
operating mode	analogue distance measurements
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	25 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

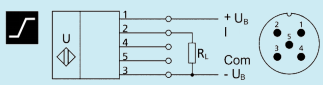
pico+15/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

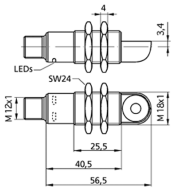
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+15/WK/U

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	narrow sound field

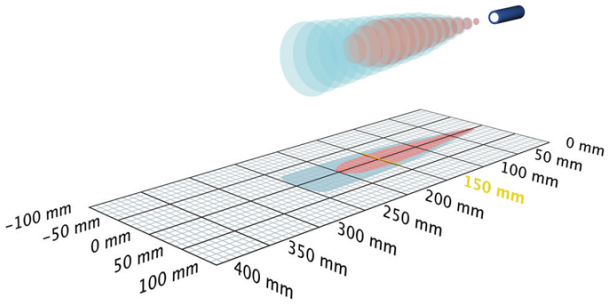
documentation (download)	
pin assignment	
order no.	**pico+15/U**

pico+15/WK/F

scale drawing



detection zone



1 x Push-Pull

250 mm

operating range	25 - 150 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	90° angular head narrow sound field IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	25 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

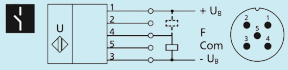
pico+15/WK/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

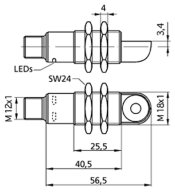
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	90° angular head narrow sound field IO-Link

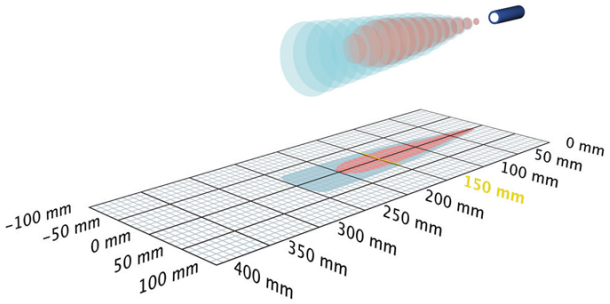
documentation (download)	
pin assignment	
order no.	**pico+15/WK/F**

pico+15/WK/I

scale drawing



detection zone



1 x analogue

250 mm

operating range	25 - 150 mm
design	cylindrical M18
operating mode	analogue distance measurements
particularities	90°-Winkelkopf schlankes Schallfeld

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	25 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

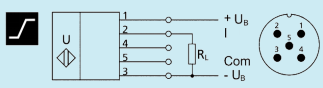
pico+15/WK/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

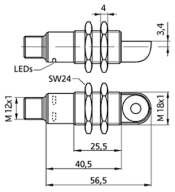
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g
further versions	90° angular head
further versions	pico+15/WK/F

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	90°-Winkelkopf schlankes Schallfeld

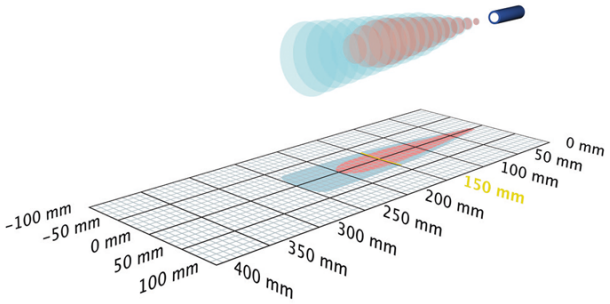
documentation (download)	
pin assignment	
order no.	**pico+15/WK/I**

pico+15/WK/U

scale drawing



detection zone



1 x analogue

250 mm

operating range	25 - 150 mm
design	cylindrical M18
operating mode	analogue distance measurements
particularities	90°-Winkelkopf schlankes Schallfeld

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	25 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

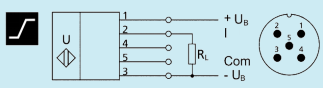
pico+15/WK/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

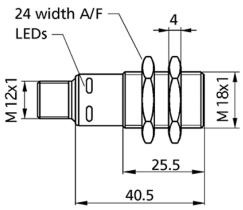
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g
further versions	90° angular head
further versions	pico+15/WK/F

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	90°-Winkelkopf schlankes Schallfeld

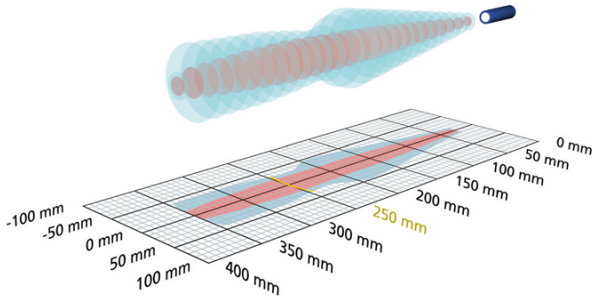
documentation (download)	
pin assignment	
order no.	**pico+15/WK/U**

pico+25/F

scale drawing



detection zone



1 x Push-Pull

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

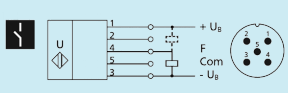
pico+25/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V, I_{max} = 100 mA
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

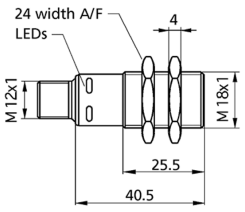
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+25/WK/F

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	IO-Link

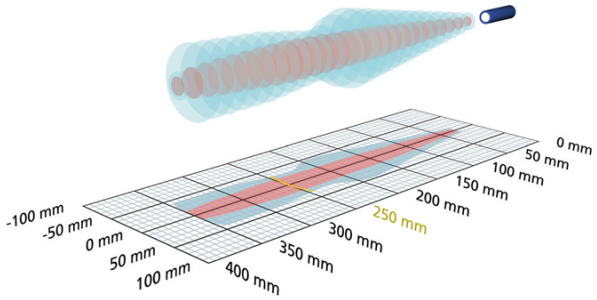
documentation (download)	
pin assignment	
order no.	**pico+25/F**

pico+25/I

scale drawing



detection zone



1 x analogue

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

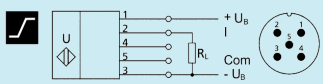
pico+25/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

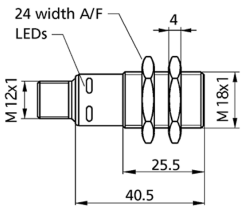
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+25/WK/I

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window

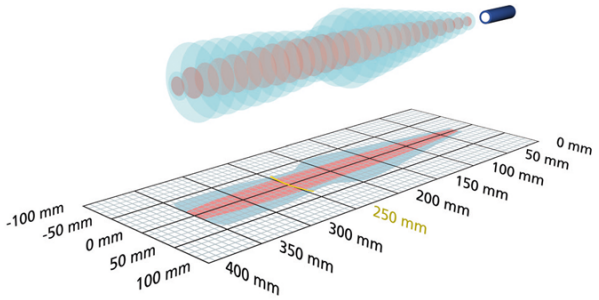
documentation (download)	
pin assignment	
order no.	**pico+25/I**

pico+25/U

scale drawing



detection zone



1 x analogue

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

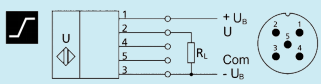
pico+25/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

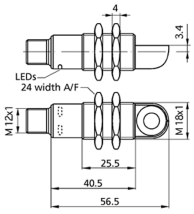
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+25/WK/U

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window

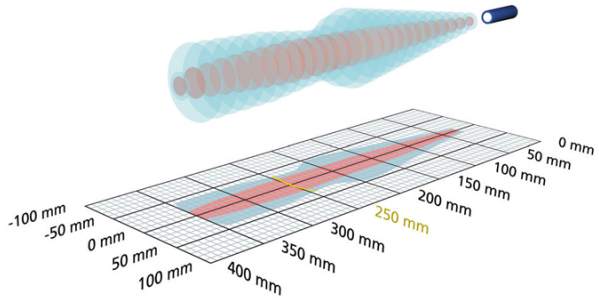
documentation (download)	
pin assignment	
order no.	**pico+25/U**

pico+25/WK/F

scale drawing



detection zone



1 x Push-Pull

350 mm

operating range	30 - 250 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	90°-Winkelkopf IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

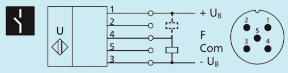
pico+25/WK/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

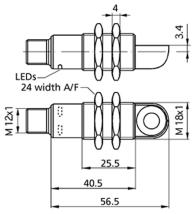
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	90°-Winkelkopf IO-Link

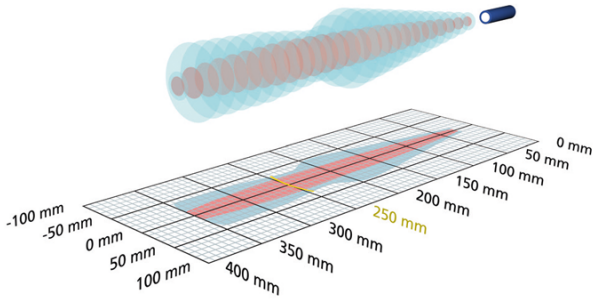
documentation (download)	
pin assignment	
order no.	**pico+25/WK/F**

pico+25/WK/I

scale drawing



detection zone



1 x analogue

350 mm

operating range	30 - 250 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	analogue distance measurements
particularities	90° angular head

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

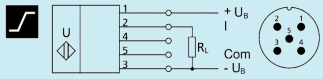
pico+25/WK/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

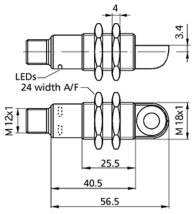
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	90° angular head

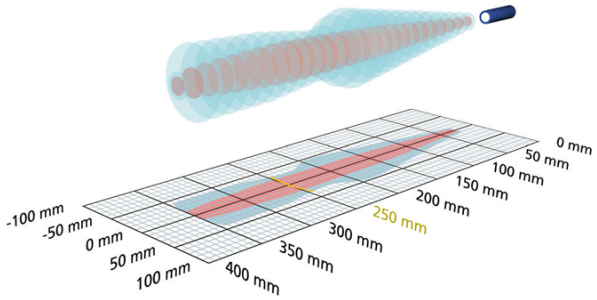
documentation (download)	
pin assignment	
order no.	**pico+25/WK/I**

pico+25/WK/U

scale drawing



detection zone



1 x analogue

350 mm

operating range	30 - 250 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	analogue distance measurements
particularities	90° angular head

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm to 0.10 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

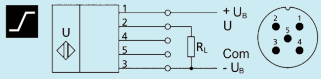
pico+25/WK/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

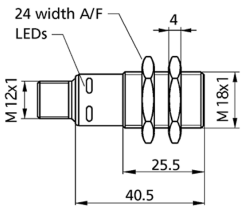
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	90° angular head

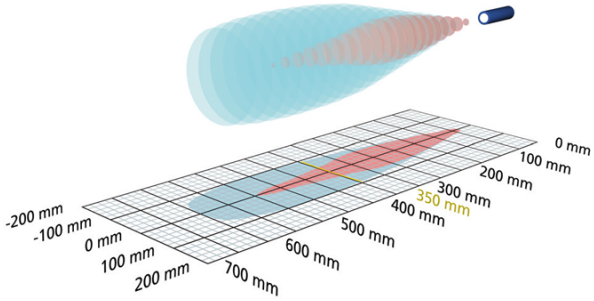
documentation (download)	
pin assignment	
order no.	**pico+25/WK/U**

pico+35/F

scale drawing



detection zone



1 x Push-Pull

600 mm

operating range	65 - 350 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

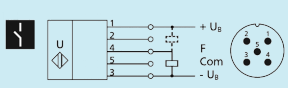
pico+35/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching hysteresis	5 mm
switching frequency	8 Hz
response time	64 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

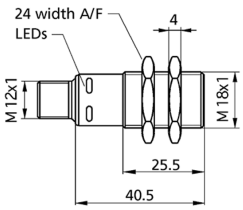
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+35/WK/F

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	IO-Link

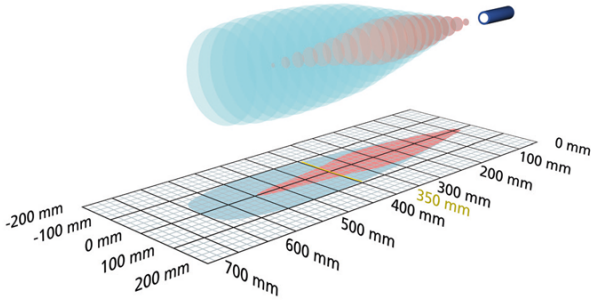
documentation (download)	
pin assignment	
order no.	**pico+35/F**

pico+35/I

scale drawing



detection zone



1 x analogue

600 mm

operating range	65 - 350 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.069 mm to 0.17 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

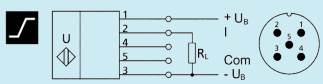
pico+35/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

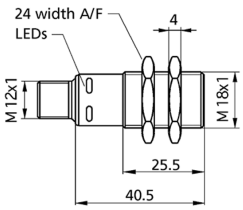
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+35/WK/I

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window

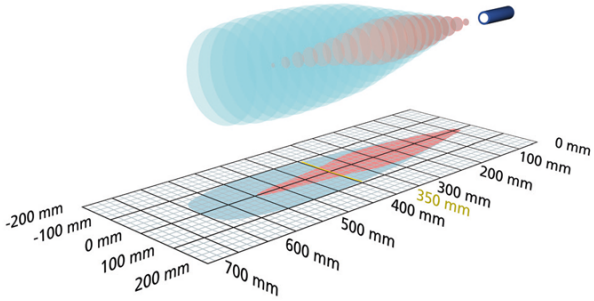
documentation (download)	
pin assignment	
order no.	**pico+35/I**

pico+35/U

scale drawing



detection zone



1 x analogue

600 mm

operating range	65 - 350 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.069 mm to 0.17 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

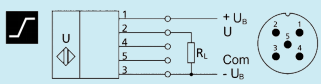
pico+35/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

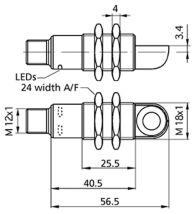
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	90° angular head
further versions	pico+35/WK/U

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window

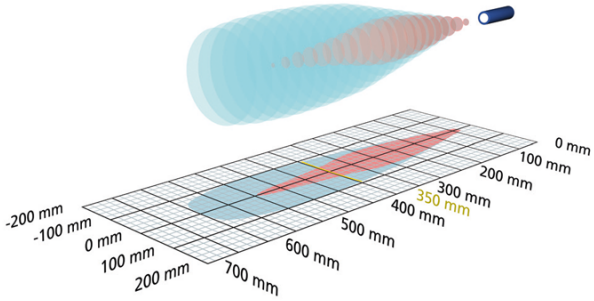
documentation (download)	
pin assignment	
order no.	**pico+35/U**

pico+35/WK/F

scale drawing



detection zone



1 x Push-Pull

600 mm

operating range	65 - 350 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	90°-Winkelkopf IO-Link

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

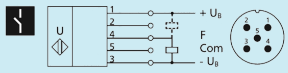
pico+35/WK/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching hysteresis	5 mm
switching frequency	8 Hz
response time	64 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

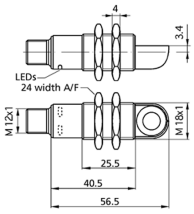
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	90°-Winkelkopf IO-Link

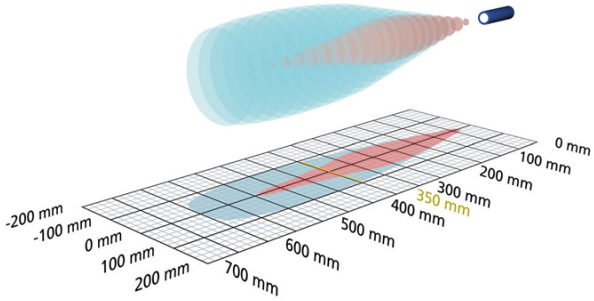
documentation (download)	
pin assignment	
order no.	**pico+35/WK/F**

pico+35/WK/I

scale drawing



detection zone



1 x analogue

600 mm

operating range	65 - 350 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	analogue distance measurements
particularities	90° angular head

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.069 mm to 0.17 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

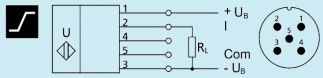
pico+35/WK/I

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

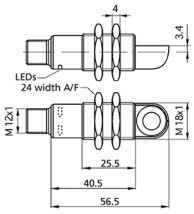
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	90° angular head

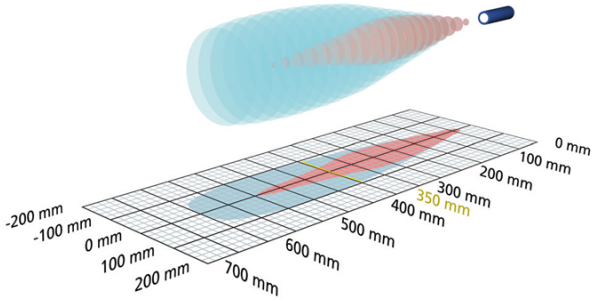
documentation (download)	
pin assignment	
order no.	**pico+35/WK/I**

pico+35/WK/U

scale drawing



detection zone



1 x analogue

600 mm

operating range	65 - 350 mm
design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	analogue distance measurements
particularities	90° angular head

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.069 mm to 0.17 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

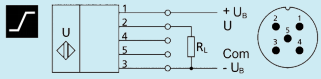
pico+35/WK/U

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	35 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	90° angular head

documentation (download)	
pin assignment	
order no.	**pico+35/WK/U**

The Ipc sensors are available as a two switched outputs, a one analogue output and a combined one analogue plus one switched output version.

HIGHLIGHTS

› Analogue output plus 1 pnp switching output in M18 design

› Automatic synchronisation › for simultaneous operation of up to ten sensors in close quarters

BASICS

› 2 switching outputs in pnp or npn variant

› Analogue output 4–20 mA or 0–10 V

› Analogue output plus 1 pnp switching output

› microsonic Teach-in on pin 5

› 0.08 mm resolution

› Temperature compensation

› 10–30 V operating voltage

› LinkControl › for configuration of sensors from a PC

Description

The sensors of the lpc sensor range

have an extremely narrow beam spread with an operating range of 250 mm and a maximum range of 350 mm. The blind zone amounts to a mere 30 mm.

3 output versions are available:

2 switching outputs, optionally in pnp or npn circuitry

1 analogue output 4–20 mA and 0–10 V

1 analogue output with an additional pnp switching output

Via pin 5 at the circular connector,

the lpc sensors are set (Teach-in): If pin 5 is connected to $+U_B$, the D1 switched output is set; if pin 5 is connected to $-U_B$, the D2 switched output is set. With the sensor version with analogue and switched output, the analogue output is set with pin 5 connected to +UB and the switched output is set with pin 5 connected to $-U_B$.

Two yellow LEDs,

which are laterally arranged at the M18 threaded sleeve, indicate the sensor output states and support the Teach-in procedures.

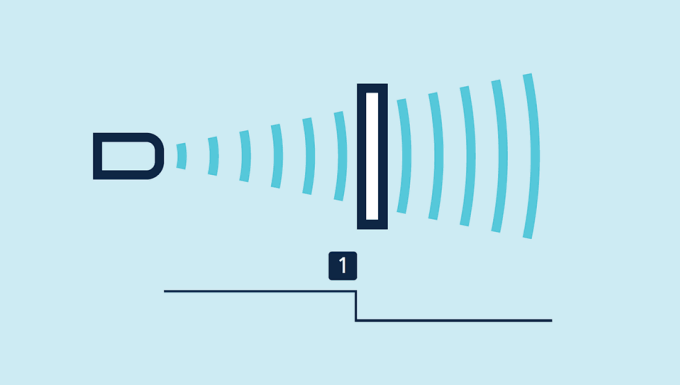
The lpc sensors with switched output

have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

A single switching point is set by:

› positioning the object to be detected within the desired distance (1) to the sensor,
› connecting pin 5 to $+U_B$ (for switched output D1) or $-U_B$ (for switched output D2) for avout 3 seconds until both LEDs flash,
› once more connecting pin 5 to $+U_B$ (for D1) or $-U_B$ (for D2) for about 1 second until the corresponding LED go out.



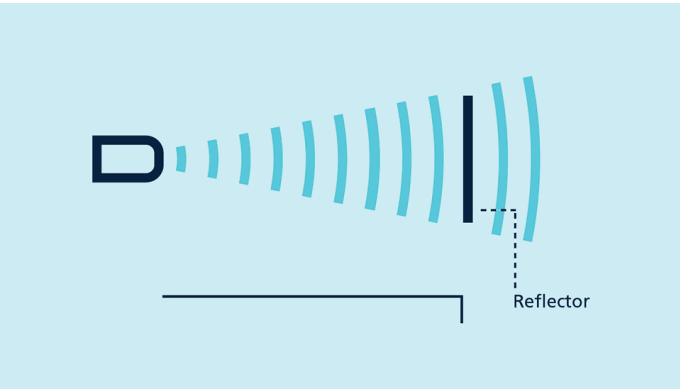
Teach-in of a switching point

A two-way reflective barrier

can be very easily set with the help of a permanently mounted reflector. The lpc sensor is set up in window mode in such a way that the fixed reflector lies within the window.

The two-way barrier is taught to the D1 switched output by:

› connecting pin 5 to $+U_B$ for about 3 seconds until both LEDs start to flash,
› once more connecting pin 5 to $+U_B$ for about 10 seconds until LED 1 remain lit.



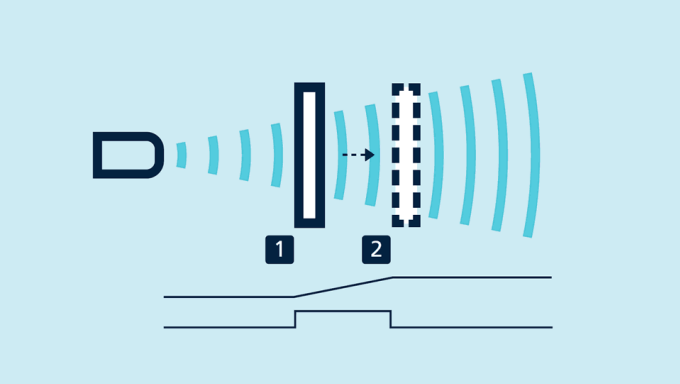
Teach-in of a two-way reflective barrier

Now, the two-way reflective barrier has been set. The D2 switched output can be set in the same way by connecting pin 5 to $-U_B$.

The analogue output is set by:

› initially positioning the object to be detected on the sensor-close window limit (1),

› connecting pin 5 to +U_B for about 3 seconds until both LEDs start to flash,
› shifting the object to the sensor-far window limit (2),
› once more connecting pin 5 to +U_B for about 1 second until LED 2 go out.



Teach-in of an analogue characteristic curve or a window with two switching points

To set a window

with two switching points on a single switched output, the procedure is the same as setting the analogue.

The NCC/NOC function and the rising/falling analogue characteristic

can also be set via pin 5.

A synchronisation

of up to ten Ipc sensors is possible thanks to the integrated self-synchronisation:

› First, set the sensors in accordance with the above-described Teach-in procedures.
› Then, switch pin 5 to the synchronisation mode by:
  - disconnecting the sensors' supply voltage,
  - connecting pin 5 to –U_B,
  - reconnecting the supply voltage,
  - disconnecting pin 5 from –U_B as soon
  as LED 2 starts to flash rapidly,
  - applying pin 5 to –U_B to activate the self-synchronisation and
  - waiting 10 seconds.
› Once the synchronisation mode has been activated for all sensors, the sensors must be electrically interconnected via pin 5.

All connected sensors are now automatically synchronised via pin 5. In synchronous mode, all Ipc sensors implement their measurements accurately simultaneously. This prevents mutual interference. With a respectively narrow mounting distance between the sensors, a synchronised sensor can also receive echo signals from an adjacent sensor. This can, for example, be exploited to broaden the sensors' detection zone. With this, the sensors form a sensor line.

If more then ten sensors must be synchronised, this can be carried out with the SyncBox1, which is available as an accessory.

The default settings

of the lpc sensors can also be restored via pin 5.

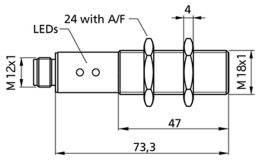
LinkControl

consists of the LinkControl adapter and the LinkControl software and facilitates the setting of the lpc sensors with the help of a PC or notebook running running any conventional Windows® operating systems. Switching points, analogue characteristic and a multitude of further settings can be read out, edited on the PC, buffered and written back to the sensor. Particularly the two measurement plotters for distance value visualisation support the development of solutions for complex automation tasks .

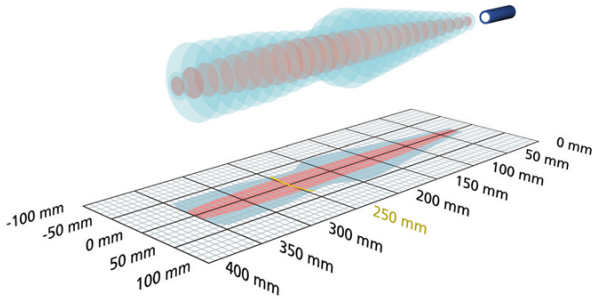
LinkControl adapter for lpc sensors, LinkControl adapter

lpc-25/CDD/M18

scale drawing



detection zone



2 x pnp

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

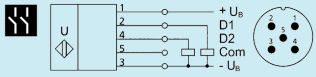
lpc-25/CDD/M18

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

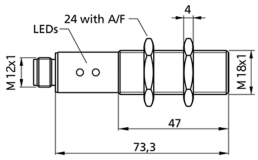
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	43 g
further versions	stainless steel high chemical resistance

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x LED yellow: switch status

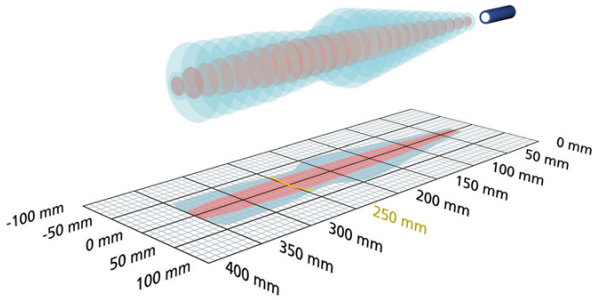
documentation (download)	
pin assignment	
order no.	**lpc-25/CDD/M18**

lpc-25/CDI/M18

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0,069 mm bis 0,098 mm, abhängig vom eingestellten Analogfenster
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

lpc-25/CDI/M18

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

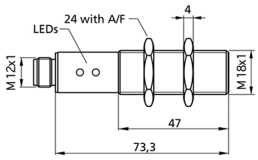
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	43 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x LED yellow: switch status, 1 x LED yellow: object in the window

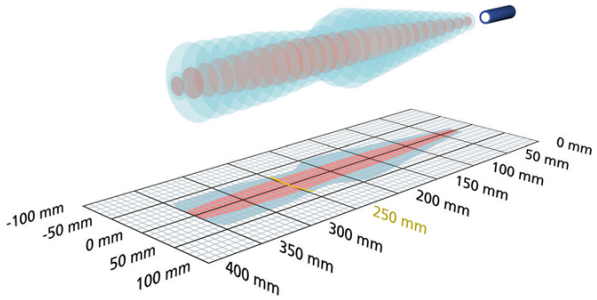
documentation (download)	
pin assignment	
order no.	**lpc-25/CDI/M18**

lpc-25/CDU/M18

scale drawing



detection zone



1 x pnp + 1 x analogue 0-10 V

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0,069 mm bis 0,078 mm, abhängig vom eingestellten Analogfenster
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

lpc-25/CDU/M18

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

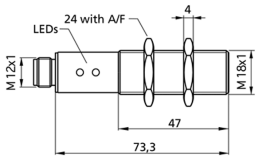
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	43 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x LED yellow: switch status, 1 x LED yellow: object in the window

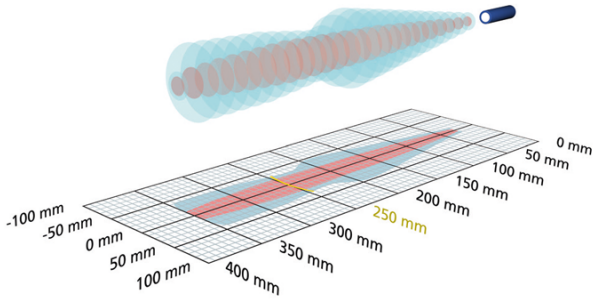
documentation (download)	
pin assignment	
order no.	**lpc-25/CDU/M18**

lpc-25/CEE/M18

scale drawing



detection zone



2 x npn

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	proximity switch/reflective mode reflective barrier window mode

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.069 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

lpc-25/CEE/M18

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

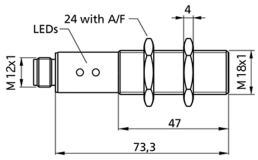
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	43 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x LED yellow: switch status

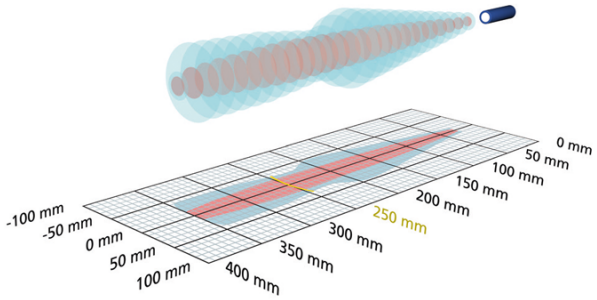
documentation (download)	
pin assignment	
order no.	**lpc-25/CEE/M18**

lpc-25/CI/M18

scale drawing



detection zone



1 x analogue 4-20 mA

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0,069 mm bis 0,098 mm, abhängig vom eingestellten Analogfenster
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

lpc-25/CI/M18

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

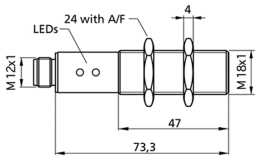
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	43 g
further versions	stainless steel high chemical resistance

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x LED yellow: object in the window

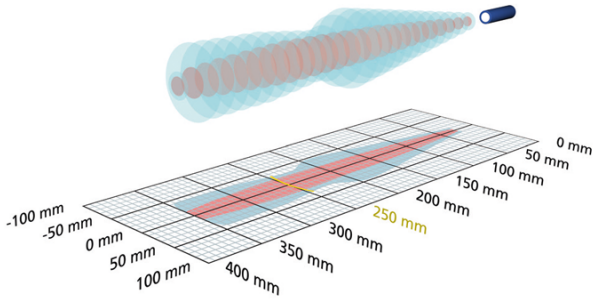
documentation (download)	
pin assignment	
order no.	**lpc-25/CI/M18**

lpc-25/CU/M18

scale drawing



detection zone



1 x analogue 0-10 V

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	analogue distance measurements

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0,069 mm bis 0,078 mm, abhängig vom eingestellten Analogfenster
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

lpc-25/CU/M18

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	43 g
further versions	stainless steel high chemical resistance

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x LED yellow: object in the window

documentation (download)	
pin assignment	
order no.	**lpc-25/CU/M18**

nano – what's in a name? At just 55 mm long, including plug, the nano is the shortest M12 ultrasonic sensor on the market.

HIGHLIGHTS

- Ultrasonic sensor in the M12 threaded sleeve
- The total length including plug is only 55 mm
- Improved temperature compensation › adjustment to working conditions within 45 seconds

BASICS

- 1 switching output in pnp or npn variant
- Analogue output 4–20 mA or 0–10 V
- 2 detection ranges with a measurement range of 20 mm to 350 mm
- microsonic Teach-in on pin 2
- 0.069 mm resolution
- Operating voltage 10–30 V › for use with various voltage networks

Description

With a housing length of only 55 mm

nano sensors with switching outputs are the smallest ultrasonic sensors inside the M12 threaded sleeve on the market. Analogue sensors are 60 mm long. The nano has a 4-pole M12 circular plug and are taught via pin 2.

For the nano sensor family

there are 4 output stages and 2 measuring ranges available:

1 switching output, optionally in pnp or npn circuitry

1 analogue output 4–20 mA or 0–10 V

The temperature compensation

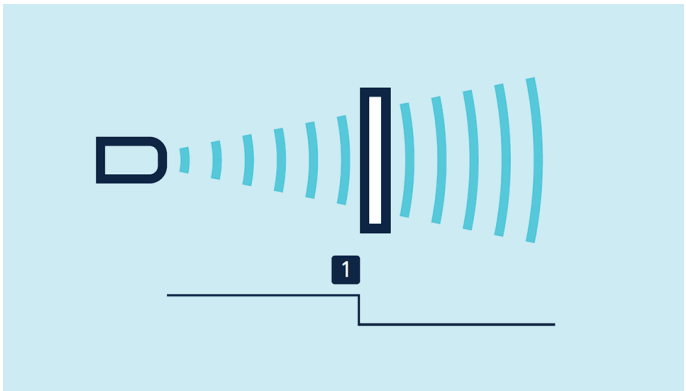
of the sensors profits from a significant improvement. The sensors reach their operating point only 45 seconds after activation of the operating voltage. We now compensate for the influence of self-heating and installation conditions. This brings improved precision shortly after activation of the supply voltage and in running operation.

The nano sensors with switched output have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

Teach-in of a single switching point

- Place object (1) to be detected at the desired distance
- Apply $+U_B$ to pin 2 for about 3 seconds
- Then apply $+U_B$ to pin 2 again for about 1 second

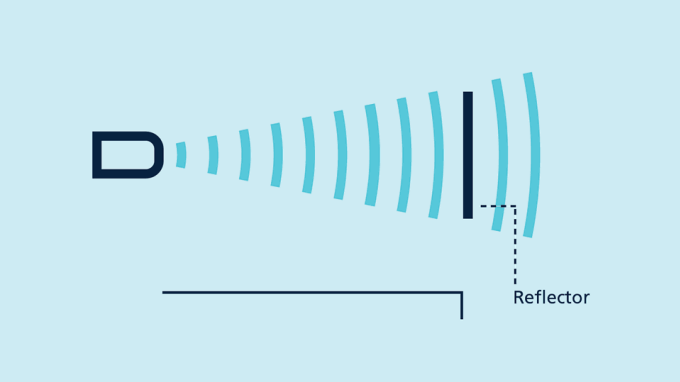


Teach-in of a switching point

Teach-in of a two-way reflective barrier

with a fixed mounted reflector.

› Apply +U_B to pin 2 for about 3 seconds
› Then apply +U_B to pin 2 again for about 10 second



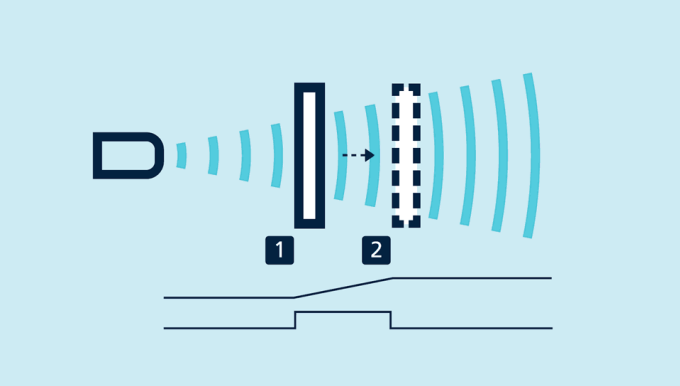
Teach-in of a two-way reflective barrier

To set a window with two switching points

› Place object to the sensor-close window limit (1)
› Apply +U_B to pin 2 for about 3 seconds until both LEDs flash
› Then move the object to the sensor-distant window limit (2)
› Then apply +U_B to pin 2 again for about 1 second until LED2 extinguishes

For setting an analogue output

› initially position the object to be detected on the sensor-close window limit (1)
› Apply +U_B to pin 2 for about 3 seconds until both LEDs flash
› Move the object to the sensor-distant window limit (2)
› Then apply +U_B to pin 2 again for about 1 second



Teach-in of an analogue characteristic or of a window with two switching points

NCC/NOC

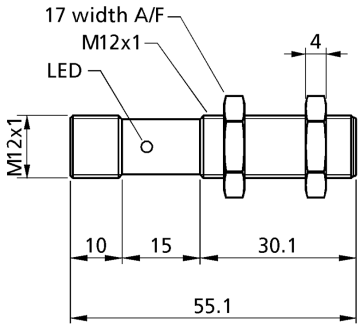
and rising/falling analoge characteristic can also be set via pin 2.

One green and one yellow LED

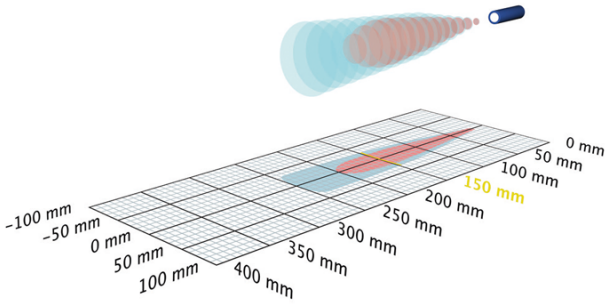
indicate the state of the output and support microsonic Teach-in.

nano-15/CD

scale drawing



detection zone



1 x pnp

250 mm

operating range	20 - 150 mm
design	cylindrical M12
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M12 initiator plug

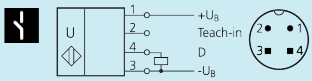
nano-15/CD

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	30 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

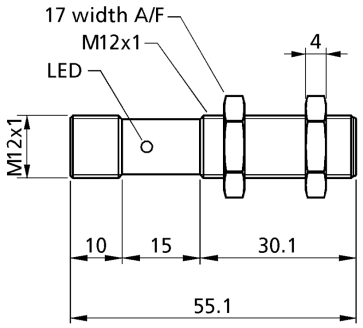
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	narrow sound field

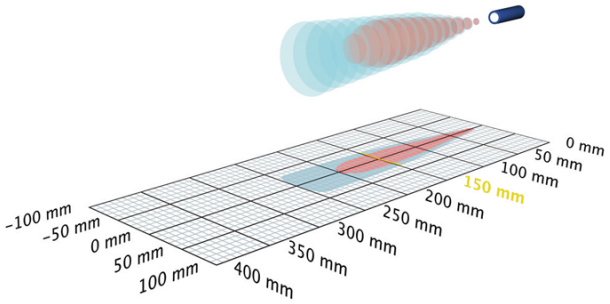
documentation (download)	
pin assignment	
order no.	**nano-15/CD**

nano-15/CE

scale drawing



detection zone



1 x npn

250 mm

operating range	20 - 150 mm
design	cylindrical M12
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M12 initiator plug

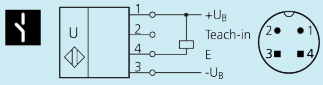
nano-15/CE

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	30 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

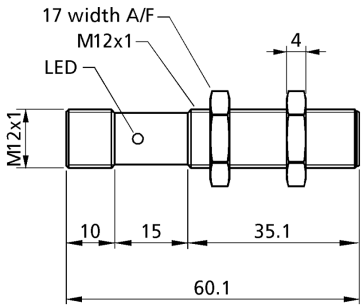
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	narrow sound field

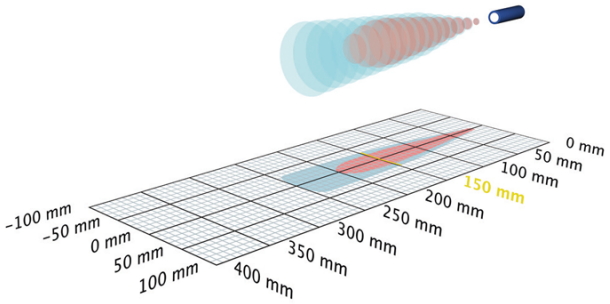
documentation (download)	
pin assignment	
order no.	**nano-15/CE**

nano-15/CI

scale drawing



detection zone



1 x analogue 4-20 mA

250 mm

operating range	20 - 150 mm
design	cylindrical M12
operating mode	analogue distance measurements
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M12 initiator plug

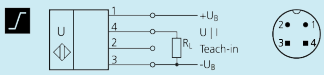
nano-15/CI

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

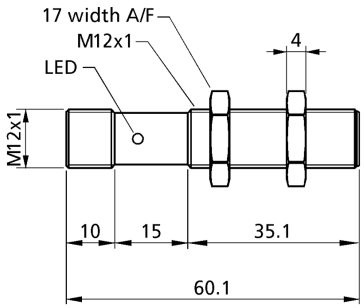
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	narrow sound field

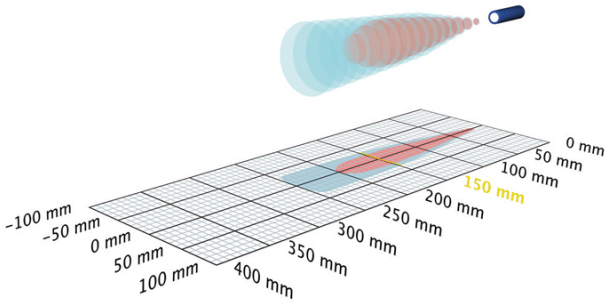
documentation (download)	
pin assignment	
order no.	**nano-15/CI**

nano-15/CU

scale drawing



detection zone



1 x analogue 0-10 V

250 mm

operating range	20 - 150 mm
design	cylindrical M12
operating mode	analogue distance measurements
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	15 V bis 30 V DC, verpolfest
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M12 initiator plug

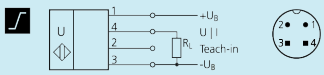
nano-15/CU

outputs	
output 1	analogue output voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

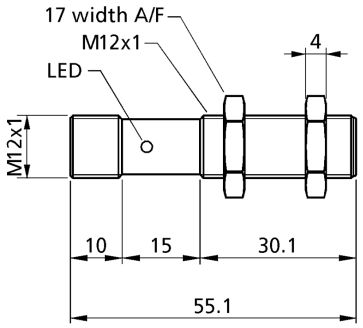
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	narrow sound field

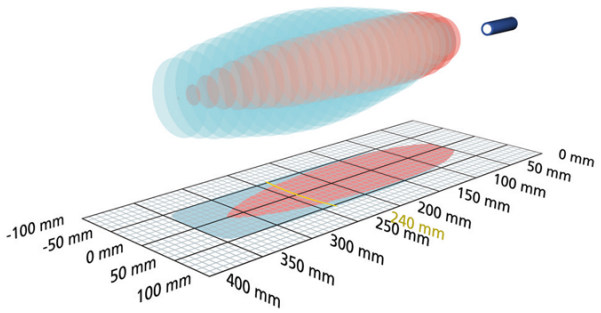
documentation (download)	
pin assignment	
order no.	**nano-15/CU**

nano-24/CD

scale drawing



detection zone



1 x pnp

350 mm

operating range	40 - 240 mm
design	cylindrical M12
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	40 mm
operating range	240 mm
maximum range	350 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 35 mA
type of connection	4-pin M12 initiator plug

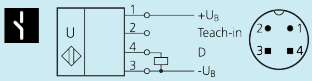
nano-24/CD

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	30 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

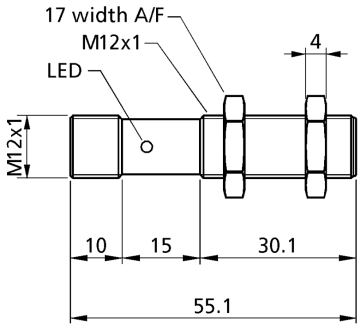
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	narrow sound field

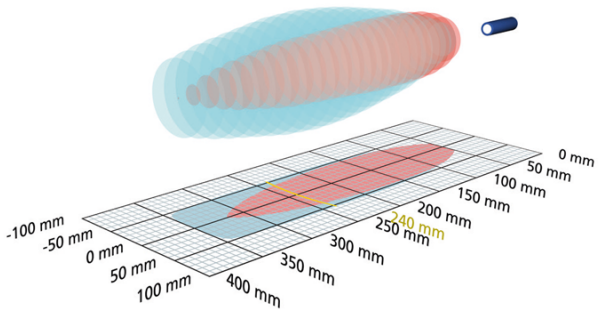
documentation (download)	
pin assignment	
order no.	**nano-24/CD**

nano-24/CE

scale drawing



detection zone



1 x npn

350 mm

operating range	40 - 240 mm
design	cylindrical M12
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	40 mm
operating range	240 mm
maximum range	350 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 35 mA
type of connection	4-pin M12 initiator plug

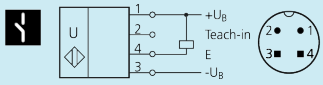
nano-24/CE

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	30 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

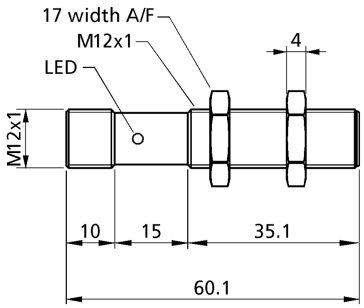
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	narrow sound field

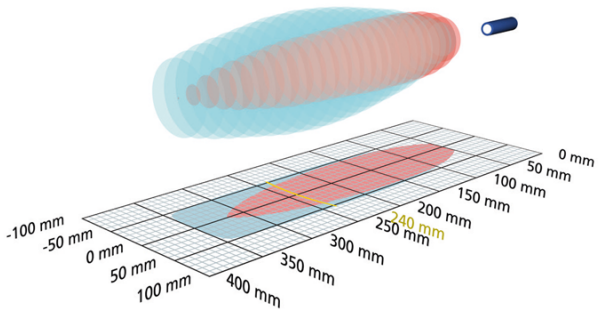
documentation (download)	
pin assignment	
order no.	**nano-24/CE**

nano-24/CI

scale drawing



detection zone



1 x analogue 4-20 mA

350 mm

operating range	40 - 240 mm
design	cylindrical M12
operating mode	analogue distance measurements
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	40 mm
operating range	240 mm
maximum range	350 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 35 mA
type of connection	4-pin M12 initiator plug

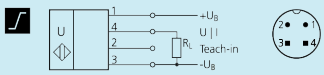
nano-24/CI

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	30 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

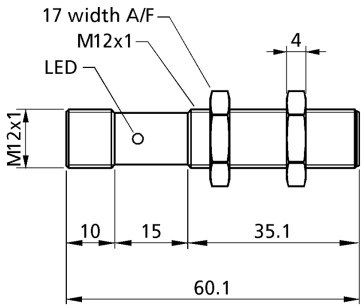
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	narrow sound field

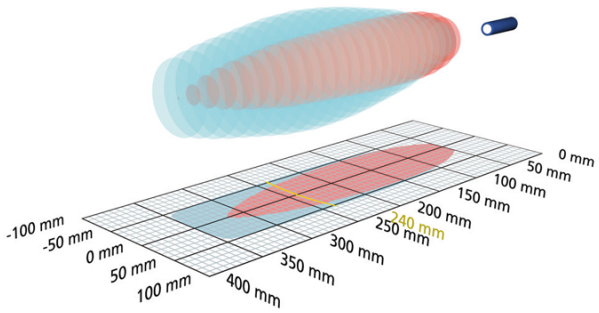
documentation (download)	
pin assignment	
order no.	**nano-24/CI**

nano-24/CU

scale drawing



detection zone



1 x analogue 0-10 V

350 mm

operating range	40 - 240 mm
design	cylindrical M12
operating mode	analogue distance measurements
particularities	narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	40 mm
operating range	240 mm
maximum range	350 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	15 V bis 30 V DC, verpolfest
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 35 mA
type of connection	4-pin M12 initiator plug

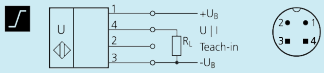
nano-24/CU

outputs	
output 1	analogue output voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	30 ms
delay prior to availability	< 300 ms

inputs	
input 1	Teach-in input

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	15 g

technical features/characteristics	
scope for settings	Teach-in Teach-in über Com-Eingang an Pin 2
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	narrow sound field

documentation (download)	
pin assignment	
order no.	**nano-24/CU**

The new Ics+ ultrasonic sensors come in a very compact square-shaped housing - with analogue or switching output + IO-Link.

HIGHLIGHTS

- Very compact housing dimensions › only 62.2 mm x 62.2 mm x 36.7 mm
- IO-Link interface › for support of the new industry standard
- Synchronisation and multiplex mode › for simultaneous operation of up to ten sensors in close quarters
- 8 m maximum detection range
- UL Listed to Canadian and US safety standards

BASICS

- 1 Push-Pull switching output, or 2 pnp switching outputs
- Analogue output 4–20 mA and 0–10 V › with automatic switching between current and voltage outputs
- microsonic Teach-in by using button T1 and T2
- 0.18 mm to 2.4 mm resolution
- Temperature compensation
- 9–30 V operating voltage
- LinkControl › for configuration of sensors from a PC

Description

The Ics+ ultrasonic sensors

have a block-like plastic housing with a base area of only 62.2 x 62.2 mm and four fastening bores.

The sensors are Listed to applicable UL Standards and requirements by UL for Canada and the US.

Two dual colour LEDs

show all operating statuses.

Three output stages are available for selection:

1 Push-Pull switching output with pnp or npn switching technology

2 pnp switching outputs

1 analogue output 4–20 mA or 0–10 V

Using the two Teach-in buttons T1 and T2

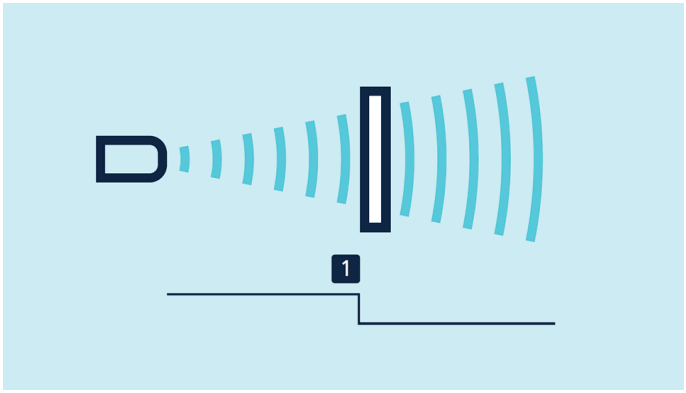
the Ics+ sensors can be easily set.

The Ics+ sensors with switching output have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

Teach-in of a single switching point

- Place object to be detected (1) at the desired distance
- Push button T1 for about 3 seconds
- Then push button T1 again for about 1 second

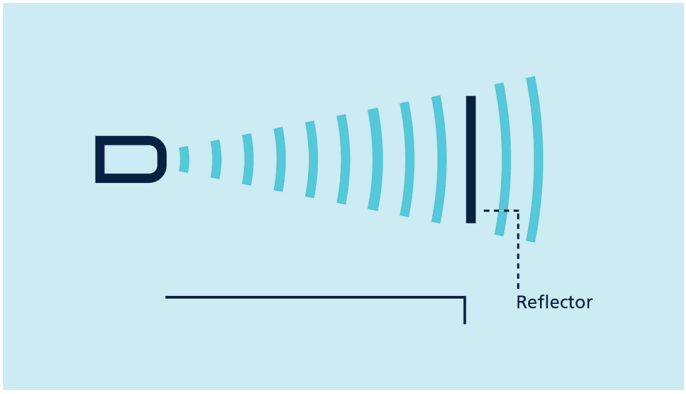


Teach-in of a switching point

Teach-in of a two-way reflective barrier

with a fixed mounted reflector

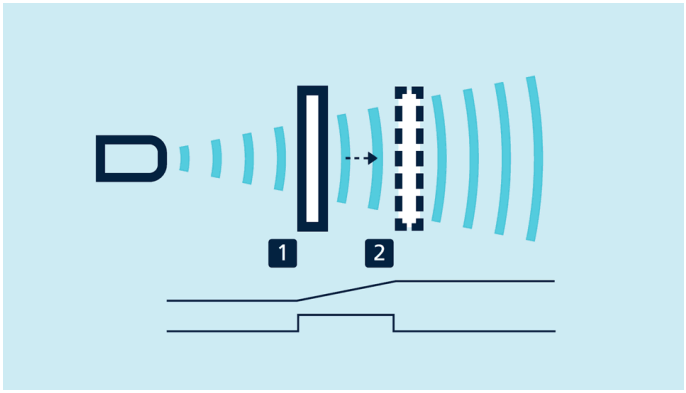
› Push button T1 for about 3 seconds
› Then push button T1 again for about 10 seconds



Teach-in of a two-way reflective barrier

For setting the analogue output

› Initially position the object to be detected to the sensor-close window limit (1)
› Push button T1 for about 3 seconds
› Then move the object to the sensor-distant window limit (2)
› Then push button T1 again for about 1 second



Teach-in of an analogue characteristic or a window with two switching points

For configuration of a window

with two switching points on a single switched output, the procedure is the same as setting the analogue.

Analogue sensors

check the connected working resistance at the output and automatically switch to 4–20 mA current output or 0–10 V voltage output.

NCC/NOC

and rising/falling analogue characteristics can also be set via the buttons.

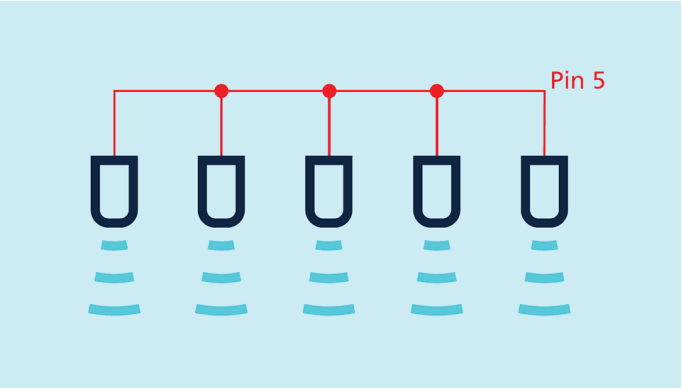
LinkControl

permits comprehensive parameterisation of Ics+ ultrasonic sensors via the LinkControl adapter LCA-2 which connects the sensors to the PC.

Sensor connected to the PC via LCA-2 for programming

Easy to synchronise

If several Ics+ ultrasonic sensors are operated in one application, the can be synchronised via pin 5 to prevent.



Synchronisation using pin 5

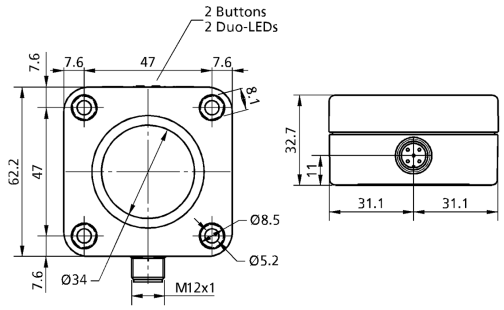
If more than 10 sensors must be synchronised, this can be carried out with the SyncBox1, which is available as an accessory. Synchronisation via pin 5 is also possible in IO-Link mode.

IO-Link

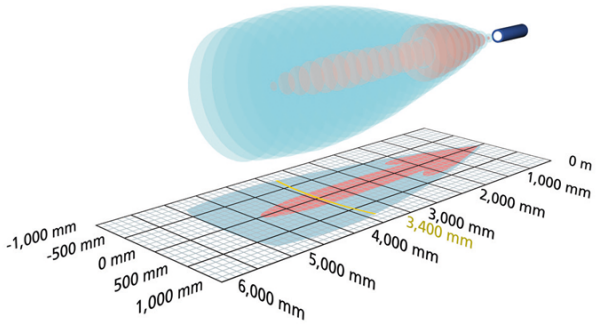
Ultrasonic sensors lcs+340/F and lcs+600/F have a Push-Pull switching output and support IO-Link in version 1.0.

lcs+340/DD

scale drawing



detection zone



2 x pnp

5,000 mm

operating range	350 - 3,400 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	UL Listed

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA

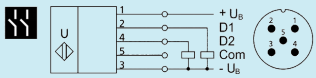
lcs+340/DD

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	4 Hz
response time	172 ms
delay prior to availability	< 380 ms

inputs	
input 1	com input synchronisation input

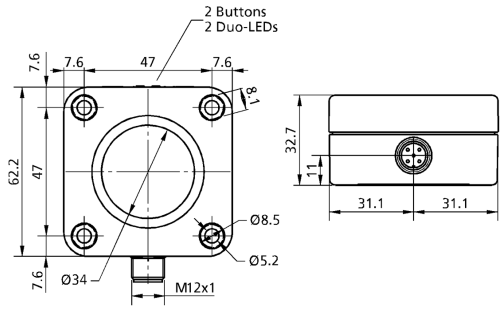
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	180 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	2 x three-colour LED
particularities	UL Listed

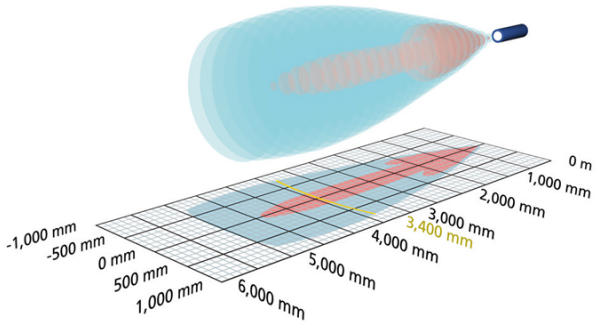
documentation (download)	
pin assignment	
order no.	**lcs+340/DD**

lcs+340/F

scale drawing



detection zone



1 x Push-Pull

5,000 mm

operating range	350 - 3,400 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	IO-Link UL Listed

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA
type of connection	5-pin M12 initiator plug

lcs+340/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching frequency	4 Hz
response time	172 ms
delay prior to availability	< 380 ms

inputs	
input 1	com input synchronisation input

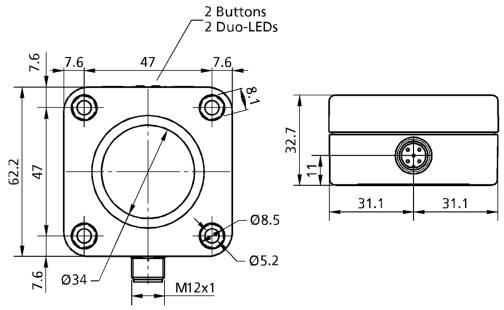
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	180 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons
scope for settings	Teach-in via push-button LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	2 x three-colour LED
particularities	IO-Link UL Listed

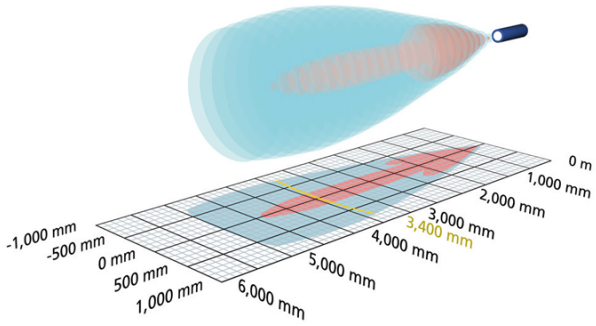
documentation (download)	
pin assignment	
order no.	**lcs+340/F**

lcs+340/IU

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

5,000 mm

operating range	350 - 3,400 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	UL Listed

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm to 1.5 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA
type of connection	5-pin M12 initiator plug

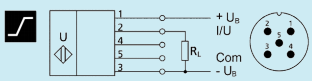
lcs+340/IU

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	172 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

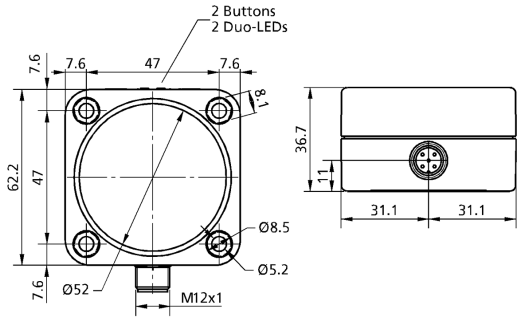
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	180 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
particularities	UL Listed

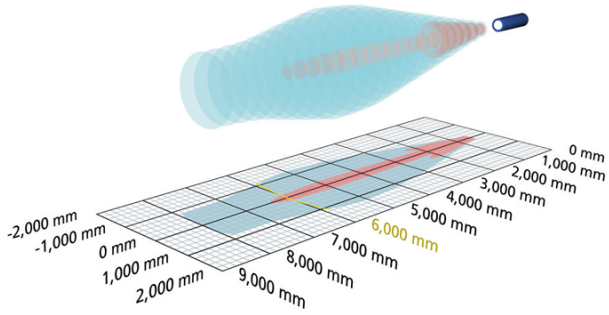
documentation (download)	
pin assignment	
order no.	**lcs+340/IU**

lcs+600/DD

scale drawing



detection zone



2 x pnp

8,000 mm

operating range	600 - 6,000 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	UL Listed

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA
type of connection	5-pin M12 initiator plug

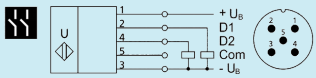
lcs+600/DD

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	3 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

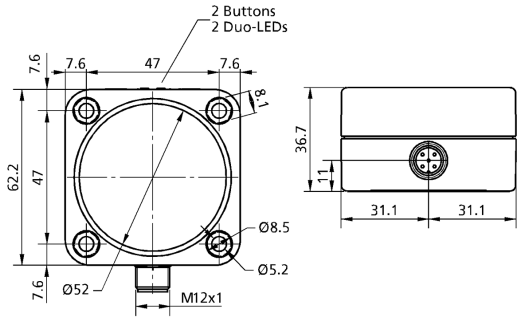
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	240 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	2 x three-colour LED
particularities	UL Listed

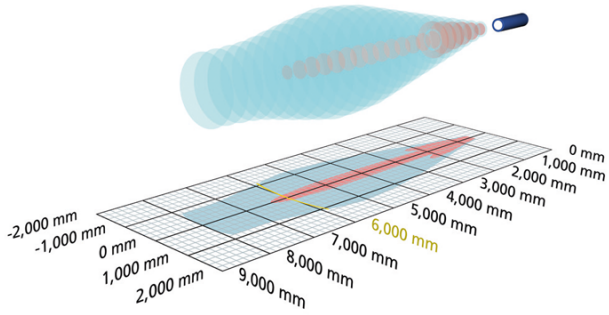
documentation (download)	
pin assignment	
order no.	**lcs+600/DD**

lcs+600/F

scale drawing



detection zone



1 x Push-Pull

8,000 mm

operating range	600 - 6,000 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	IO-Link UL Listed

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA
type of connection	5-pin M12 initiator plug

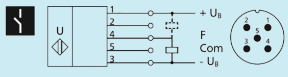
lcs+600/F

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
switching frequency	3 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

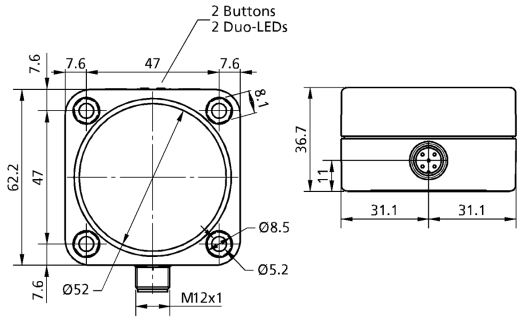
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	240 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons
scope for settings	Teach-in via push-button LCA-2 with LinkControl IO-Link
Synchronisation	yes
multiplex	yes
indicators	2 x three-colour LED
particularities	IO-Link UL Listed

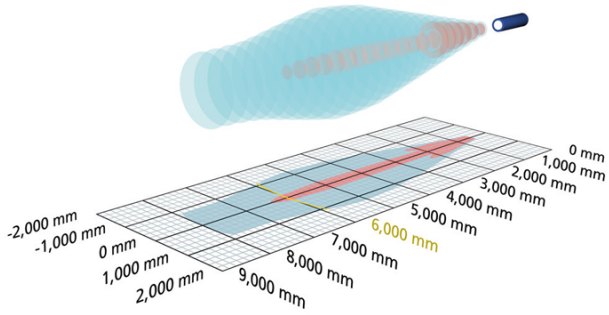
documentation (download)	
pin assignment	
order no.	**lcs+600/F**

lcs+600/IU

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

8,000 mm

operating range	600 - 6,000 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	UL Listed

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm to 2.4 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA
type of connection	5-pin M12 initiator plug

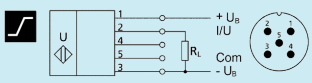
lcs+600/IU

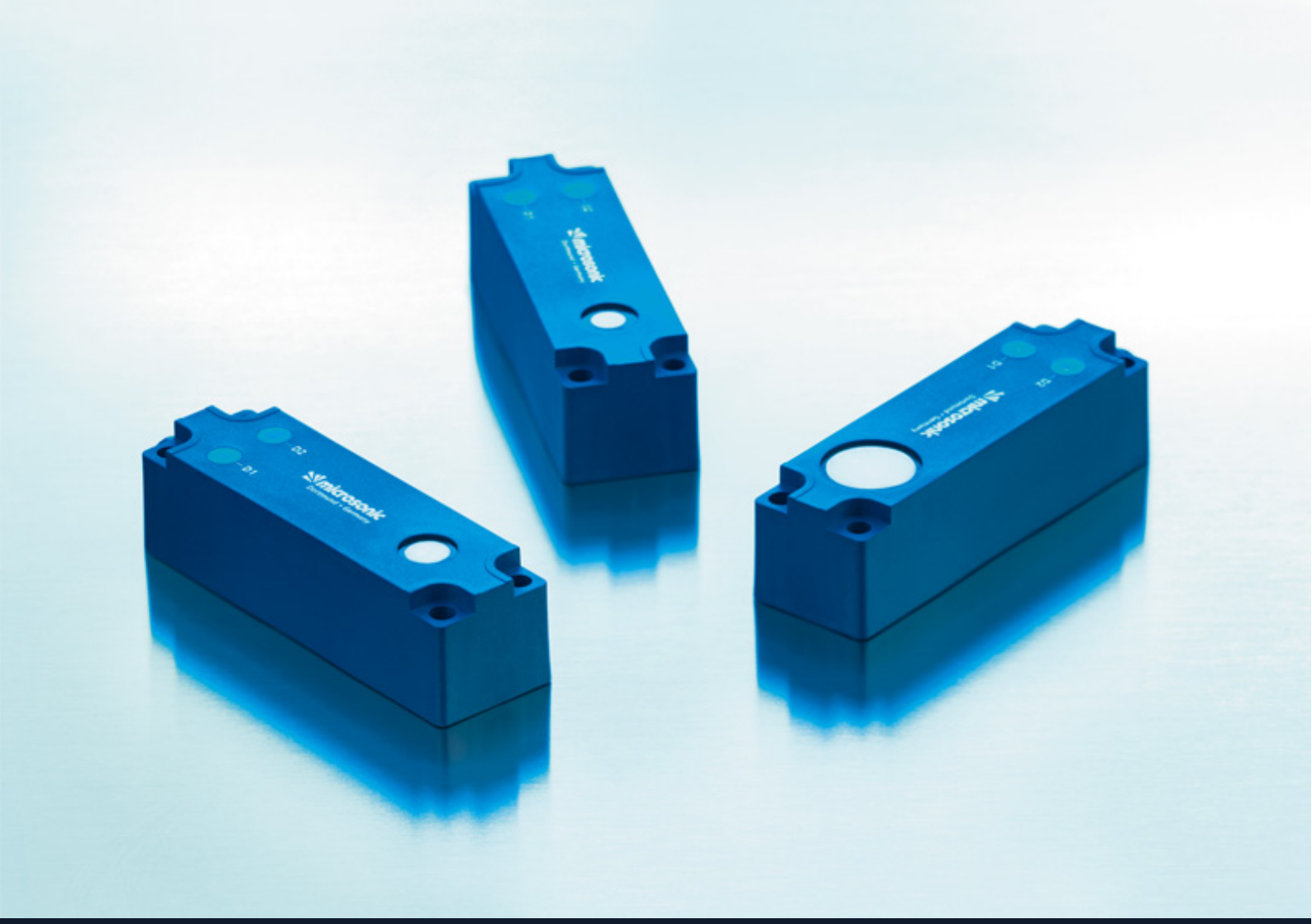
outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	240 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
particularities	UL Listed

documentation (download)	
pin assignment	
order no.	**lcs+600/IU**



Ultrasonic sensors in the Ics series in cuboidal housing with lateral sound exit are available in three device variants with three different detection ranges.

HIGHLIGHTS

› Up to 3 pnp switching outputs

› Automatic synchronisation › for simultaneous operation of up to ten sensors in close quarters

BASICS

› 2 or 3 switching outputs in pnp variant

› Analogue output 4–20 mA and 0–10 V › with automatic switching between current and voltage outputs

› 3 detection ranges with a measurement range of 30 mm to 2 m

› microsonic Teach-in on pin 5

› 0.18 mm resolution

› Temperature compensation

› 9–30 V operating voltage

› LinkControl › for configuration of sensors from a PC

Description

The Ics sensors

have a block-like plastic housing with four fixation bores, two of which are already equipped with M4 threaded bushings for eased mounting.

Two or three LEDs

indicate all operating statuses.

Three detection ranges and two output stages are available for selection:

2 pnp switched outputs

3 pnp switched outputs

1 analogue output 4–20 mA and 0–10 V

Via pin 5 at the M12 circular connector,

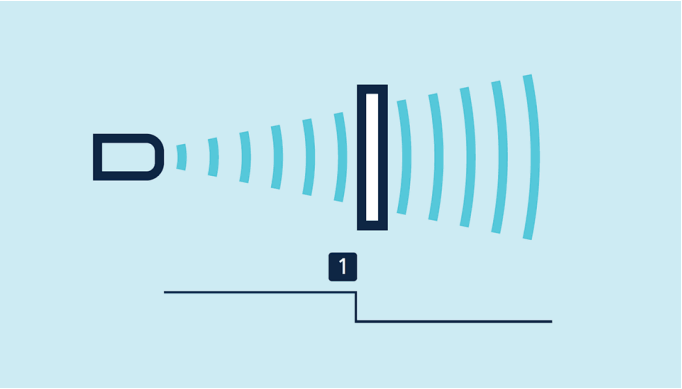
(Com input), the Ics sensors are set (Teach-in): Switched output D1 is set by connecting pin 5 to $+U_B$, while switched output D2 is set by connecting pin 5 to $-U_B$. Also the sensors with analogue output are set via pin 5.

The Ics sensors with switched output offer three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

Teach-in of a single switching point

- Place object to be detected (1) at the desired distance
- Apply $+U_B$ to pin 5 for about 3 seconds
- Then apply $+U_B$ to pin 5 again for about 1 seconds

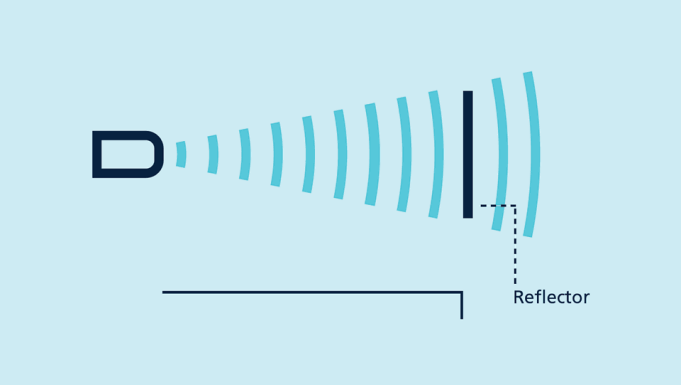


Teach-in of a switching point

Teach-in of a two-way reflective barrier

with a fixed reflector

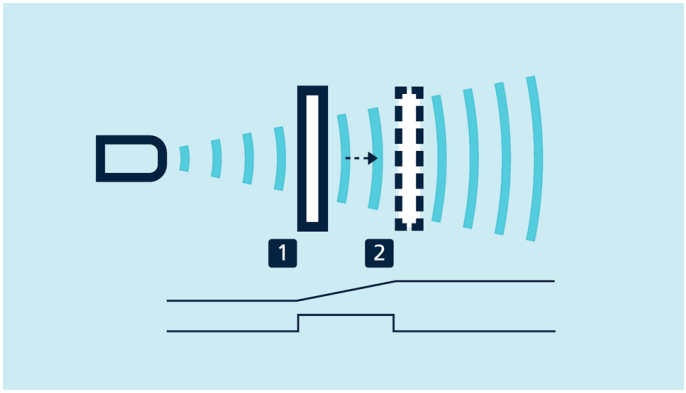
- Apply +U_B to pin 5 for about 3 seconds
- Then apply +U_B to pin 5 again for about 10 seconds



Teach-in of a two-way reflective barrier

For configuration of a window

- Place object at the near edge of the window (1)
- Apply +U_B to pin 5 for about 3 seconds
- Then move the object to the far edge of the window (2)
- Then apply +U_B to pin 5 again for about 1 seconds



Teach-in of an analogue characteristic or a window with two switching points

NCC/NOC

and rising/falling analogue characteristic curve can also be set via pin 5.

The analogue sensor

checks the load connected to the output and then automatically switch to 4–20 mA current output or 0–10 V voltage output to ensure maximum ease of handling.

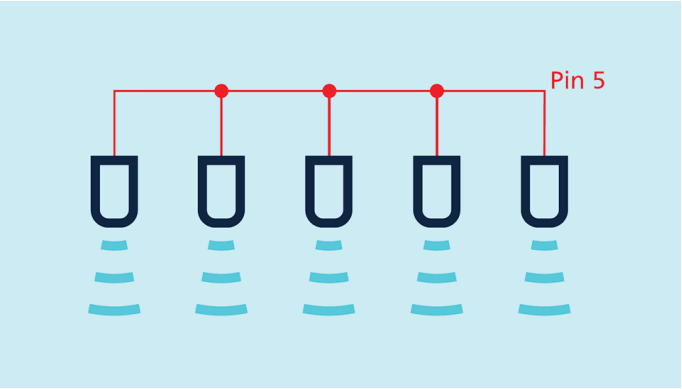
The Ics-25/DDD is equipped with three pnp switched outputs

which are set with the help of the Link-Control adapter LCA-2 (see LCA-2). In addition to this “offline” programming, all Ics sensors can also be parameterised on the PC with the LCA-2 and the Link-Control software.

Sensor connected to the PC via LCA-2 for programming

Synchronisation

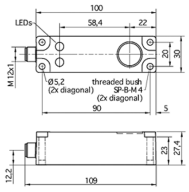
permits the simultaneous use of multiple mic sensors in an application. To avoid mutual interference, the sensors can be synchronised with one another. To do this, all the sensors are electrically connected on pin 5.



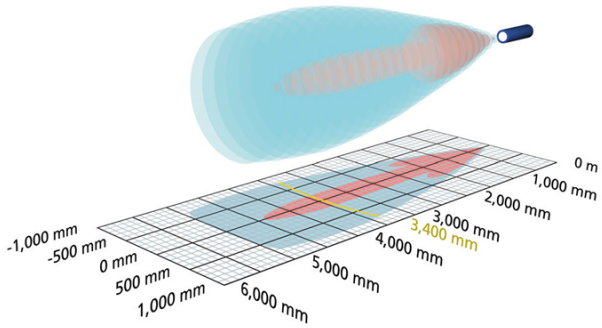
Synchronisation using pin 5

lcs-130/DD/QP

scale drawing



detection zone



2 x pnp

2,000 mm

operating range	200 - 2.000 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

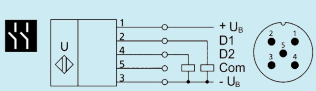
lcs-130/DD/QP

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

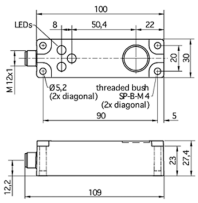
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x three-colour LED
particularities	flat housing lateral sound exit

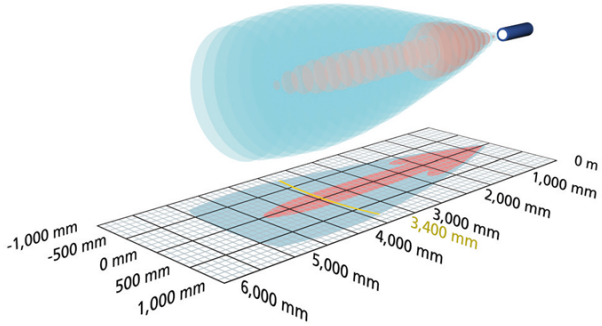
documentation (download)	
pin assignment	
order no.	**lcs-130/DD/QP**

lcs-130/DDD/QP

scale drawing



detection zone



3x

3 x pnp

2,000 mm

operating range	200 - 2.000 mm
design	cuboidal
operating mode	proximity switch/reflective mode window mode
particularities	3 switched outputs flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

lcs-130/DDD/QP

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 3	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

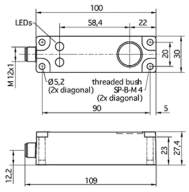
technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	3 x three-colour LED
particularities	3 switched outputs flat housing lateral sound exit

lcs-130/DDD/QP

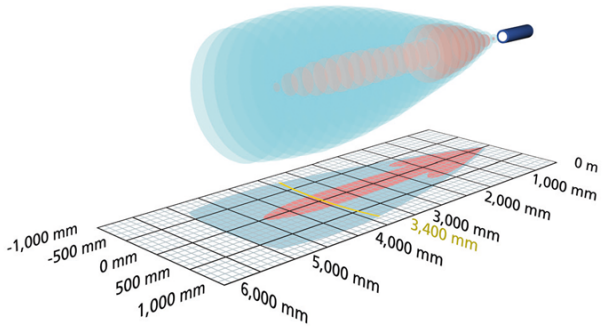
documentation (download)	
pin assignment	
order no.	lcs-130/DDD/QP

lcs-130/IU/QP

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

2,000 mm

operating range	200 - 2.000 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm to 0.57 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

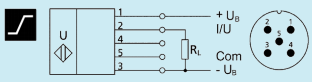
lcs-130/IU/QP

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

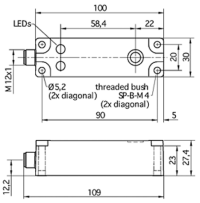
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-20°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x three-colour LED
particularities	flat housing lateral sound exit

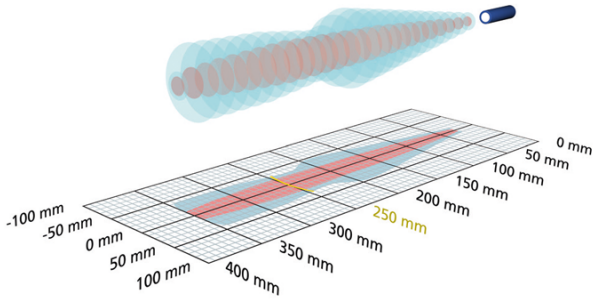
documentation (download)	
pin assignment	
order no.	**lcs-130/IU/QP**

lcs-25/DD/QP

scale drawing



detection zone



2 x pnp

350 mm

operating range	30 - 250 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

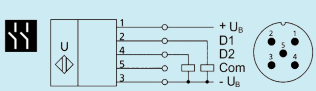
lcs-25/DD/QP

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

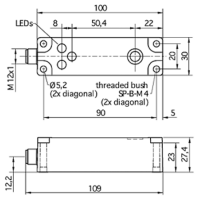
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x three-colour LED
particularities	flat housing lateral sound exit

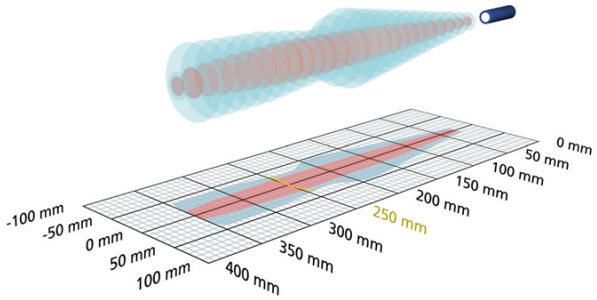
documentation (download)	
pin assignment	
order no.	**lcs-25/DD/QP**

lcs-25/DDD/QP

scale drawing



detection zone



3 x pnp

350 mm

operating range	30 - 250 mm
design	cuboidal
operating mode	proximity switch/reflective mode window mode
particularities	3 switched outputs flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

lcs-25/DDD/QP

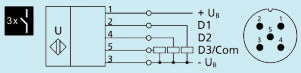
outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 3	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

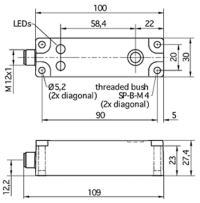
technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	3 x three-colour LED
particularities	3 switched outputs flat housing lateral sound exit

lcs-25/DDD/QP

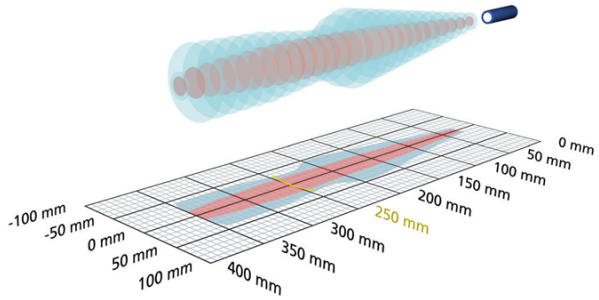
documentation (download)	
pin assignment	
order no.	lcs-25/DDD/QP

lcs-25/IU/QP

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

350 mm

operating range	30 - 250 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

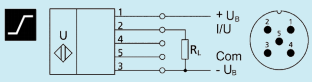
lcs-25/IU/QP

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

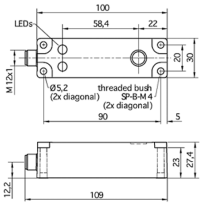
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-20°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x three-colour LED
particularities	flat housing lateral sound exit

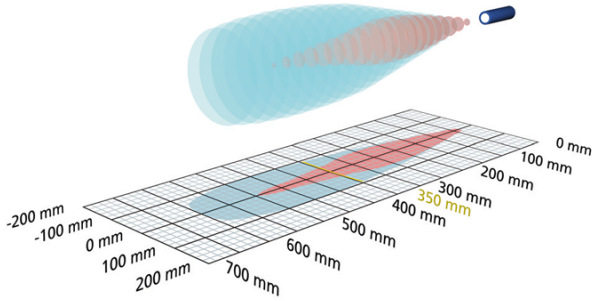
documentation (download)	
pin assignment	
order no.	**lcs-25/IU/QP**

lcs-35/DD/QP

scale drawing



detection zone



2 x pnp

600 mm

operating range	65 - 350 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

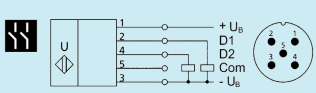
lcs-35/DD/QP

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

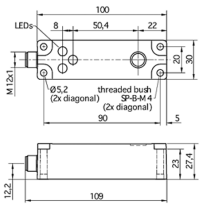
housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x three-colour LED
particularities	flat housing lateral sound exit

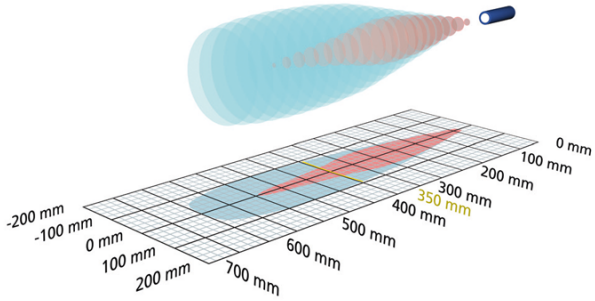
documentation (download)	
pin assignment	
order no.	**lcs-35/DD/QP**

lcs-35/DDD/QP

scale drawing



detection zone



3 x pnp

600 mm

operating range	65 - 350 mm
design	cuboidal
operating mode	proximity switch/reflective mode window mode
particularities	3 switched outputs flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

lcs-35/DDD/QP

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 3	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

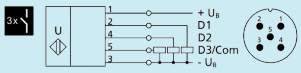
inputs	
input 1	com input

housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

technical features/characteristics	
temperature compensation	yes
controls	com input
scope for settings	LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	3 x three-colour LED
particularities	3 switched outputs flat housing lateral sound exit

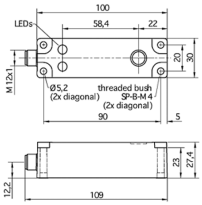
lcs-35/DDD/QP

documentation (download)

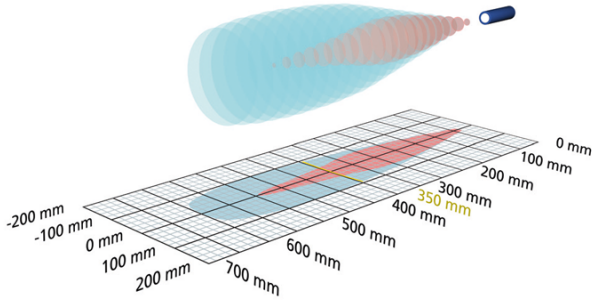
pin assignment	
order no.	lcs-35/DDD/QP

lcs-35/IU/QP

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

600 mm

operating range	65 - 350 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	flat housing lateral sound exit

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 70 mA
type of connection	5-pin M12 initiator plug

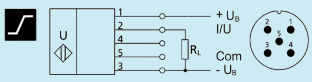
lcs-35/IU/QP

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input teach-in input

housing	
material	PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-20°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g

technical features/characteristics	
temperature compensation	yes
controls	com input control input
scope for settings	Teach-in via com input on pin 5 LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	2 x three-colour LED
particularities	flat housing lateral sound exit

documentation (download)	
pin assignment	
order no.	**lcs-35/IU/QP**

The zws sensors are among the smallest ultrasonic sensors available on the market in cuboidal housings with Teach-in buttons.

HIGHLIGHTS

- Ultrasonic sensor in miniature housing
- Installation-compatible with many optical sensors › a true alternative for critical applications
- Up to 250 Hz switching frequency › for fast sampling
- Optionally with SoundPipe waveguide attachment
- Synchronisation input
- Improved temperature compensation › adjustment to working conditions within 45 seconds

BASICS

- 1 switching output in pnp or npn variant
- Analogue output 4–20 mA or 0–10 V
- 5 detection ranges with a measurement range of 20 mm to 1 m
- microsonic Teach-in by using a button
- 0.08 mm resolution
- 20–30 V operating voltage

Description

The miniature sensor housing

of the zws-15 has a dimensions of 20 mm x 32 mm x 12 mm. The housing's design and mounting is compatible with many optical sensors. This facilitates the conversion to ultrasonic sensors for critical applications.

For the zws sensor range

2 output versions and 3 detection ranges are available:

1 switching output, optionally in pnp or npn circuitry

1 analogue output 4–20 mA or 0–10 V

The Teach-in button

on the top facilitates the convenient setting of the sensor.

Two LEDs

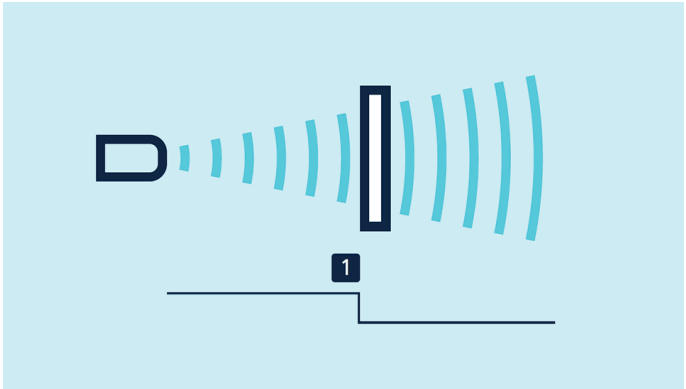
in the sensor housing's upper half indicate the switched output and respectively the analogue output states.

The zws sensors with switched output have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

Teach-in of a single switching point

by positioning the object to be detected within the desired distance (1) to the sensor, pressing the button for approx. 3 seconds and then pressing it once more for approx. 1 second. Ready.

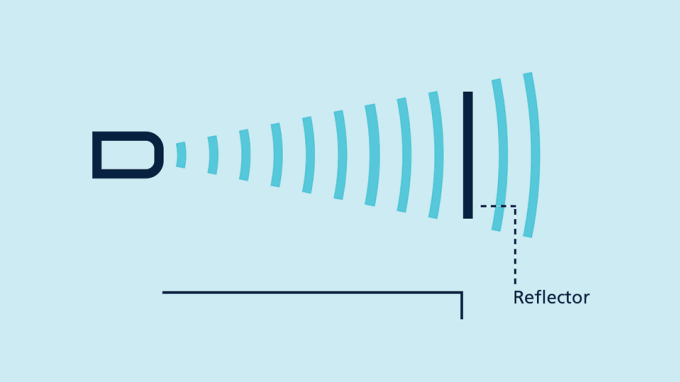


Teach-in of a switching point

Teach-in of a two-way reflective barrier

with a fixed reflector can be set up with the help of a permanently mounted reflector by mounting the zws sensor and the reflector, then pressing the button for approx.

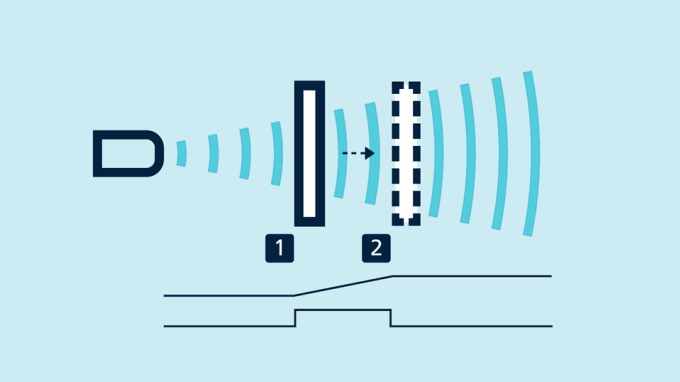
3 seconds and then pressing it once more for approx. 10 seconds. Now, the two-way reflective barrier has been set.



Teach-in of a two-way reflective barrier

Set the analogue output

by initially positioning the object to be detected on the sensor-close window limit (1), pressing the button for approx. 3 seconds, shifting the object to the sensor-distant window limit (2) and pressing the button once more for approx. 1 second. Ready.



Teach-in of an analogue characteristic or of a window with two switching points

To set a window

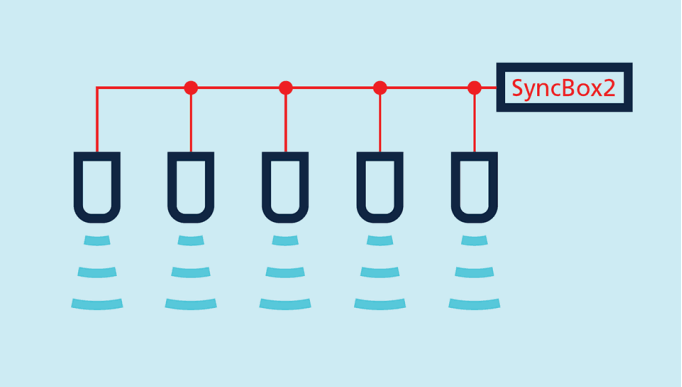
with two detection points on a single switched output, the procedure is the same as setting the analogue.

NCC/NOC

and rising/falling analogue characteristic curve can also be set using the push-button.

The control input on pin 2

can be used to synchronise multiple zws sensors with each other. The SyncBox2, which is available as an accessory, generates a synchronisation signal output on pin 2. This permits up to 50 zws sensors to be autonomously synchronised (see under Accessories).



Synchronisation of up to 50 zws sensors

The temperature compensation of the analogue sensors

profits from a significant improvement. The sensors reach their operating point only 45 seconds after activation of the operating voltage.

High counting frequencies, short response times - no problem for the zws-7 ultrasonic sensor

zws-7: 250 Hz switching frequency for fast measurement

At a maximum detection range of 100 mm, the zws-7 can achieve a switching frequency of 250 Hz.

This allows both detection of objects with a high counting frequency and extremely narrow gaps between two objects at fast machinery speeds. The zws-7 responds under **3 ms**.

Additionally fitting the new SoundPipe to the zws-7 markedly raises the power to detect narrow gaps between two objects at high machine speeds.

Fast zws-7 - Fast zws-7/-15 with SoundPipe

The zws-7, with a 250 Hz switching frequency, is particularly suitable for counting tasks at high machine speeds.

Technical data:

Operating range: 70 mm

Maximum range: 100 mm

Switching frequency: 250 Hz

Response time: < 3 ms

zws-15 with SoundPipe - 1st place for sound field focusing (e.g. for level control)

Brings on intensively bundled sound field directly to the measuring point

The SoundPipe can be used with any zws-15 or zws-7 sensor. It directs sound to the measuring point thus allowing measurements to be taken in drill holes and openings with diameters under **5 mm**.

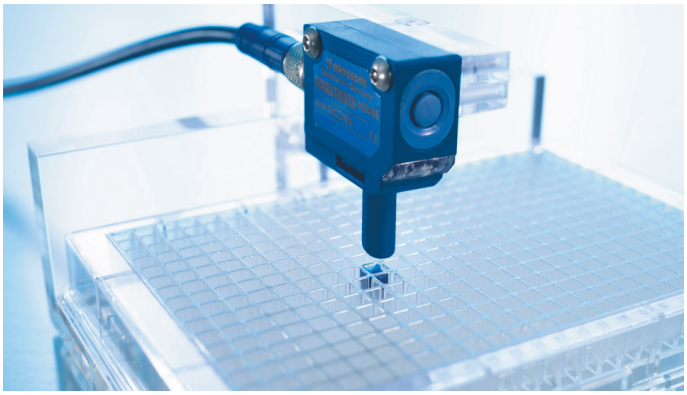
Measurement can be carried out directly before the sound exit opening, since the blind zone is inside the SoundPipe.

The SoundPipe is attached to the front of the zws-15 or zws-7 sensor and fastened with plastic adhesive (see under

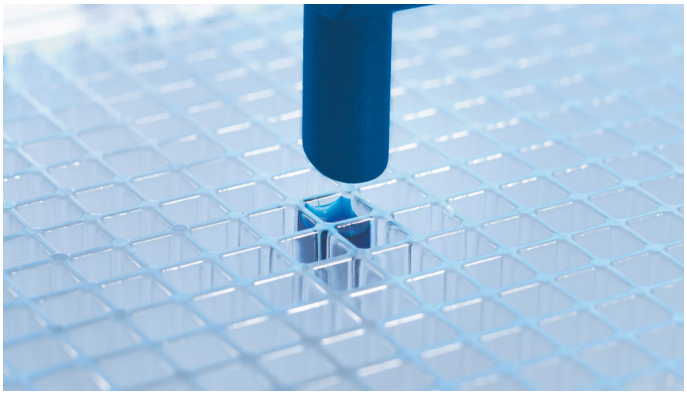
accessories).

A typical field of application is measuring levels in microplate wells which are used in medical analysis technology. The SoundPipe can be directly placed over the opening; this makes exact positioning that much easier. The attachment can also be used in scanning gaps of only a few millimetres in width between two objects.

The zws sensors are ideal for probing of circuit boards and wafers in the electronic industry or for use in packaging machines in which high-transparency films must be detected.



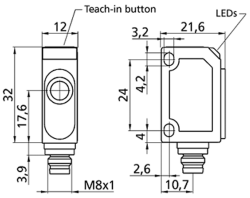
With the SoundPipe, the zws-15 sensor can measure fill levels in the smallest of openings.



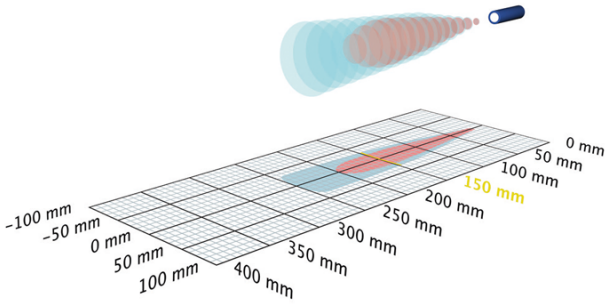
The SoundPipe is directly positioned over the measuring point.

zws-15/CD/QS

scale drawing



detection zone



1 x pnp

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.20 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

zws-15/CD/QS

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

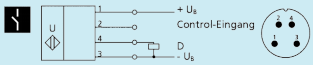
inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g
further versions	high chemical resistance cable connection (on request)
further versions	crz-15/CD/QS zws-15/CD/QS /K0.15 zws-15/CD/QS /K10,0

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal design narrow sound field

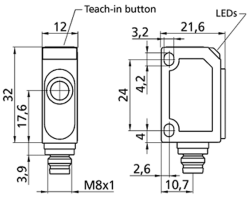
zws-15/CD/QS

documentation (download)

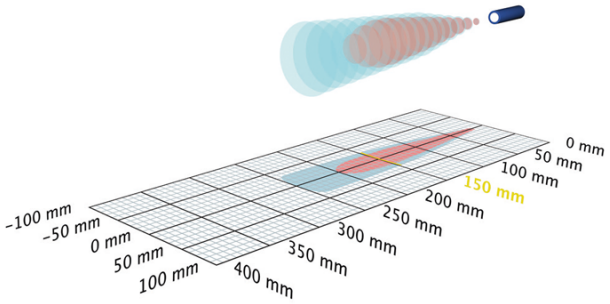
pin assignment	
order no.	zws-15/CD/QS

zws-15/CE/QS

scale drawing



detection zone



1 x npn

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.20 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

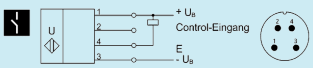
zws-15/CE/QS

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

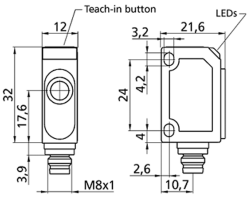
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal design narrow sound field

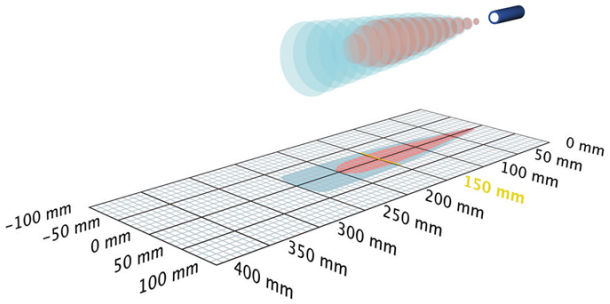
documentation (download)	
pin assignment	
order no.	**zws-15/CE/QS**

zws-15/CI/QS

scale drawing



detection zone



1 x analogue 4-20 mA

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.056 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

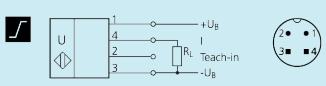
zws-15/CI/QS

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	50 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

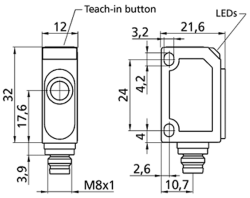
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g
further versions	high chemical resistance
further versions	zws-15/SI/CI/QS crz-15/CI/QS

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	small cuboidal design narrow sound field

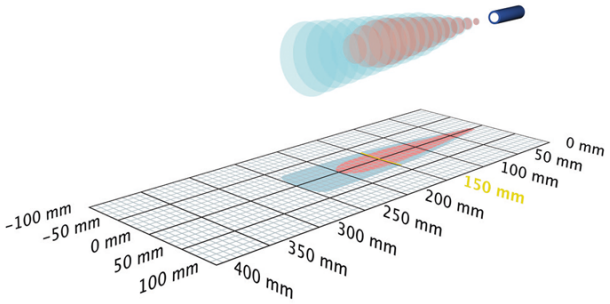
documentation (download)	
pin assignment	
order no.	**zws-15/CI/QS**

zws-15/CU/QS

scale drawing



detection zone



1 x analogue 0-10 V

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.056 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

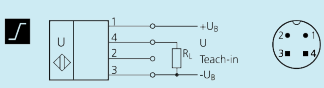
zws-15/CU/QS

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	50 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

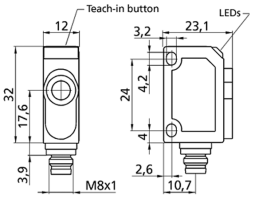
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g
further versions	high chemical resistance
further versions	zws-15/SI/CU/QS crz-15/CU/QS

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	small cuboidal design narrow sound field

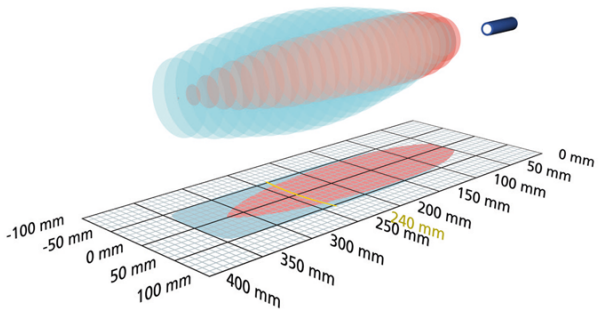
documentation (download)	
pin assignment	
order no.	**zws-15/CU/QS**

zws-24/CD/QS

scale drawing



detection zone



1 x pnp

350 mm

operating range	50 - 240 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	50 mm
operating range	240 mm
maximum range	350 mm
resolution/sampling rate	0.20 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

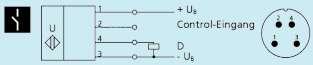
zws-24/CD/QS

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

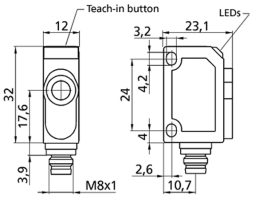
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal design narrow sound field

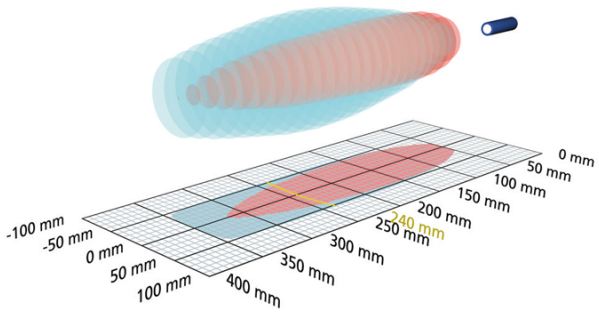
documentation (download)	
pin assignment	
order no.	**zws-24/CD/QS**

zws-24/CE/QS

scale drawing



detection zone



1 x npn

operating range	50 - 240 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	50 mm
operating range	240 mm
maximum range	350 mm
resolution/sampling rate	0.20 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

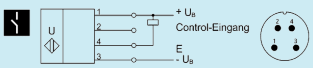
zws-24/CE/QS

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

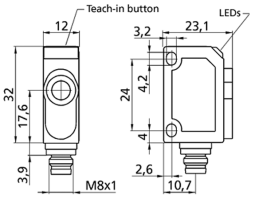
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal design narrow sound field

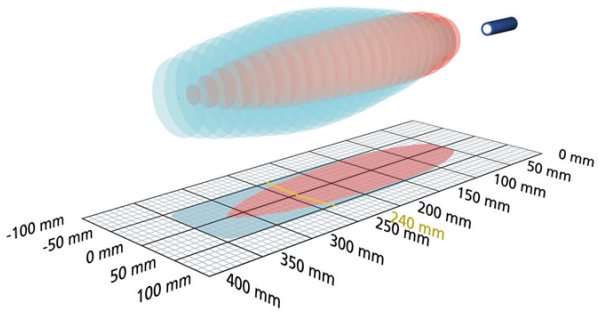
documentation (download)	
pin assignment	
order no.	**zws-24/CE/QS**

zws-24/CI/QS

scale drawing



detection zone



1 x analogue 4-20 mA

operating range	50 - 240 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	50 mm
operating range	240 mm
maximum range	350 mm
resolution/sampling rate	0.037 mm to 0.072 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

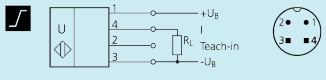
zws-24/CI/QS

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	50 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

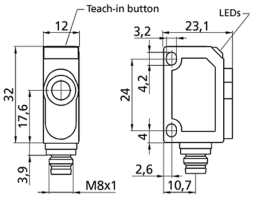
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	small cuboidal design narrow sound field

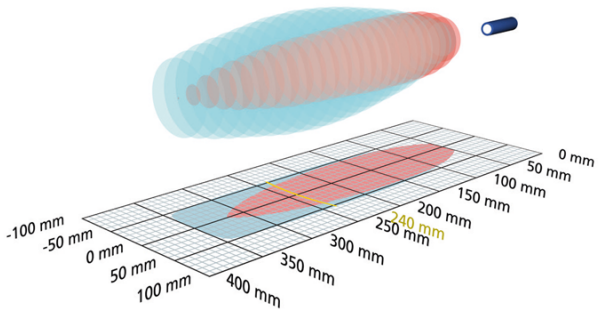
documentation (download)	
pin assignment	
order no.	**zws-24/CI/QS**

zws-24/CU/QS

scale drawing



detection zone



1 x analogue 0-10 V

operating range	50 - 240 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	50 mm
operating range	240 mm
maximum range	350 mm
resolution/sampling rate	0.037 mm to 0.072 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

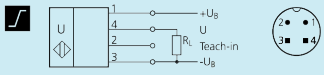
zws-24/CU/QS

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	50 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

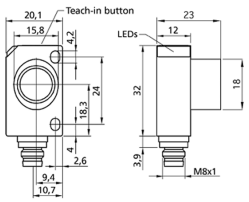
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	small cuboidal design narrow sound field

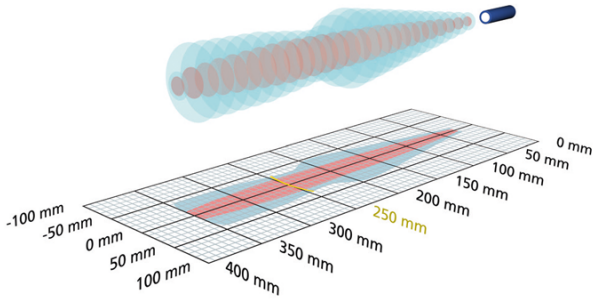
documentation (download)	
pin assignment	
order no.	**zws-24/CU/QS**

zws-25/CD/QS

scale drawing



detection zone



1 x pnp

350 mm

operating range	30 - 250 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.20 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 35 mA
type of connection	4-pin M8 initiator plug

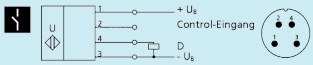
zws-25/CD/QS

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

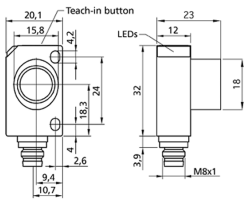
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	11 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal design narrow sound field

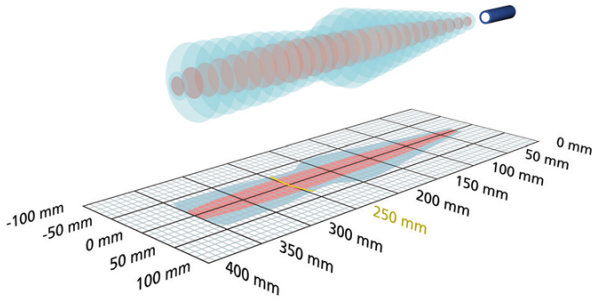
documentation (download)	
pin assignment	
order no.	**zws-25/CD/QS**

zws-25/CE/QS

scale drawing



detection zone



1 x npn

350 mm

operating range	30 - 250 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.20 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 35 mA
type of connection	4-pin M8 initiator plug

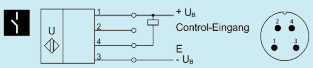
zws-25/CE/QS

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

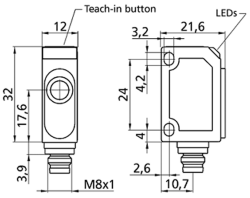
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	11 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal design narrow sound field

documentation (download)	
pin assignment	
order no.	**zws-25/CE/QS**

zws-7/CD/QS

scale drawing



detection zone

100 mm

1 x pnp

operating range	20 - 70 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	250 Hz switching frequency small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	70 mm
maximum range	100 mm
resolution/sampling rate	0.08 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

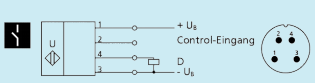
zws-7/CD/QS

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	250 Hz
response time	3 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

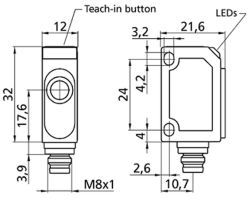
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	250 Hz switching frequency small cuboidal design narrow sound field

documentation (download)	
pin assignment	
order no.	**zws-7/CD/QS**

zws-7/CE/QS

scale drawing



detection zone

1 x npn

operating range	20 - 70 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	250 Hz switching frequency small cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	70 mm
maximum range	100 mm
resolution/sampling rate	0.08 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

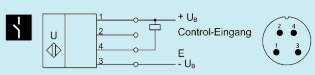
zws-7/CE/QS

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	250 Hz
response time	3 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

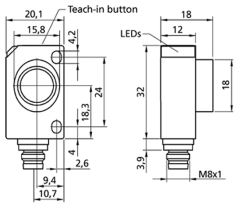
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	10 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	250 Hz switching frequency small cuboidal design narrow sound field

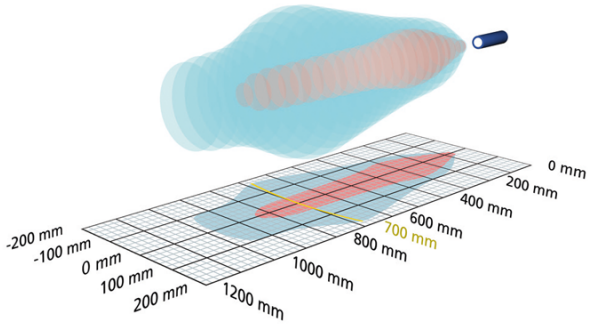
documentation (download)	
pin assignment	
order no.	**zws-7/CE/QS**

zws-70/CD/QS

scale drawing



detection zone



1 x pnp

1,000 mm

operating range	120 - 700 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal type

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	300 kHz
blind zone	120 mm
operating range	700 mm
maximum range	1,000 mm
resolution/sampling rate	0.08 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

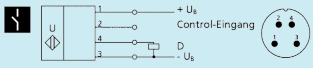
zws-70/CD/QS

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	14 Hz
response time	42 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

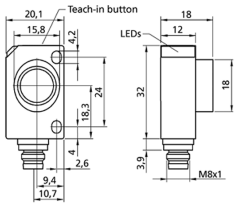
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	11 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal type

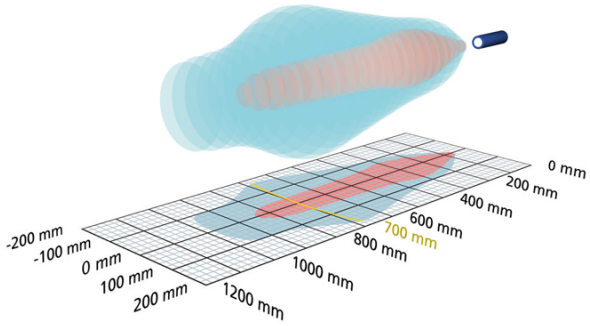
documentation (download)	
pin assignment	
order no.	**zws-70/CD/QS**

zws-70/CE/QS

scale drawing



detection zone



1 x npn

1,000 mm

operating range	120 - 700 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	small cuboidal type

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	300 kHz
blind zone	120 mm
operating range	700 mm
maximum range	1,000 mm
resolution/sampling rate	0.08 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

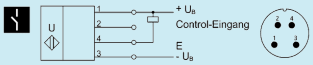
zws-70/CE/QS

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	14 Hz
response time	42 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

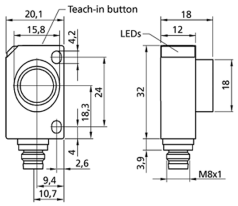
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	11 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	small cuboidal type

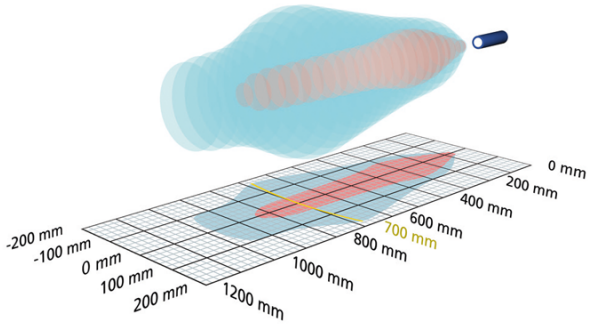
documentation (download)	
pin assignment	
order no.	**zws-70/CE/QS**

zws-70/CI/QS

scale drawing



detection zone



1 x analogue 4-20 mA

1,000 mm

operating range	120 - 700 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	small cuboidal type

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	300 kHz
blind zone	120 mm
operating range	700 mm
maximum range	1,000 mm
resolution/sampling rate	0.037 mm to 0.215 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

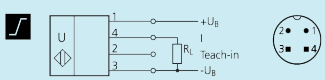
zws-70/CI/QS

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

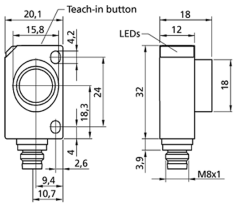
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	11 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	small cuboidal type

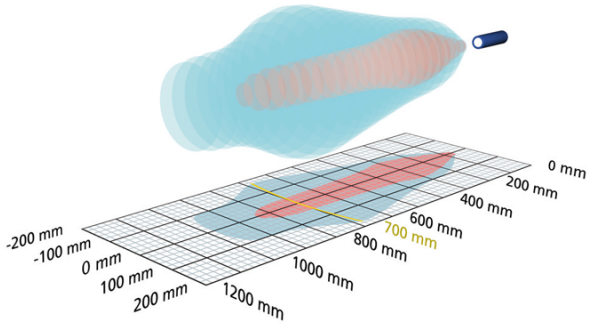
documentation (download)	
pin assignment	
order no.	**zws-70/CI/QS**

zws-70/CU/QS

scale drawing



detection zone



1 x analogue 0-10 V

1,000 mm

operating range	120 - 700 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	small cuboidal type

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	300 kHz
blind zone	120 mm
operating range	700 mm
maximum range	1,000 mm
resolution/sampling rate	0.037 mm to 0.215 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M8 initiator plug

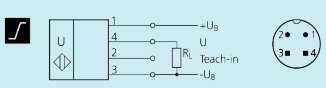
zws-70/CU/QS

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
description	external synchronisation from rectangular signal with a defined pulse width
input 1	synchronisation input

housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	11 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	yes
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: object in the window
particularities	small cuboidal type

documentation (download)	
pin assignment	
order no.	**zws-70/CU/QS**

Our "smallest sensor": The sks sensor in cuboidal housing.

HIGHLIGHTS

› Very small housing dimensions with two M3 threaded sleeves

› Installation-compatible with many optical sensors › a true alternative for critical applications

› Improved temperature compensation › adjustment to working conditions within 45 seconds

BASICS

› 1 switching output in pnp or npn variant

› Analogue output 4-20 mA or 0-10 V

› microsonic Teach-in using a button

› 0.1 mm resolution

› 20–30 V operating voltage

Description

The sks sensors

are the smallest cuboidal ultrasonic sensors from microsonic and feature a housing design reduced by 33% compared to the zws sensors.

The miniature housing of the sks ultrasonic sensor fits in constricted installation locations e.g. for sampling conductor boards and wafer in the electronics industry, for presence checks on conveyor bands or fill-level measurement in small containers. When capacitive or optical sensors come up against their physical limits, installation compatibility of ultrasonic sensors with many optical sensors enable their deployment: simply secured with two M3 screw sockets.

For the sks sensor range

two output versions are available:

1 switching output, optionally in pnp or npn circuitry

1 analogue output 4–20 mA or 0–10 V

The temperature compensation

of the analogue sensors profits from a significant improvement. The sensors reach their operating point only 45 seconds after activation of the operating voltage. We now compensate for the influence of self-heating and installation conditions. This brings improved precision shortly after activation of the supply voltage and in running operation.

The Teach-in button

on the top of the sensor allows for the convenient configuration of the desired switching distance and operating mode.

Two LEDs

show the operating state of the sensor.

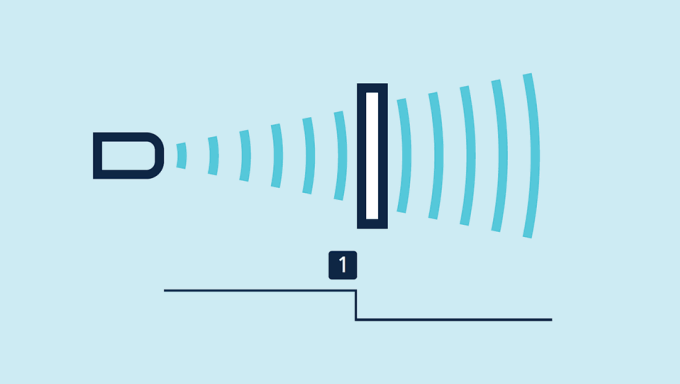
The sks sensor with switching output has three operating modes:

› Single switching point,
› Two-way reflective barrier and
› Window mode

permit configuration using the usual microsonic Teach-in procedure.

The switched output is set by:

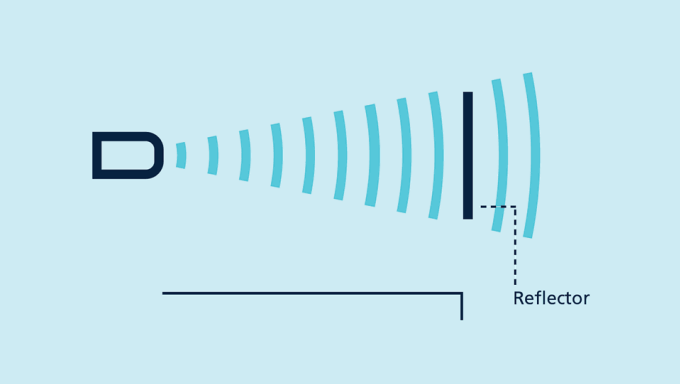
positioning the object to be detected within the desired distance (1) to the sensor, pressing the button for approx. 3 seconds and then pressing it once more for approx. 1 second. Ready.



Teach-in of a switching point

A two-way reflective barrier

can be set up with the help of a permanently mounted reflector by mounting the sks sensor and the reflector. Then press the button for approx. 3 seconds and then pressing it once more for approx. 10 seconds. Now, the two-way reflective barrier has been set.



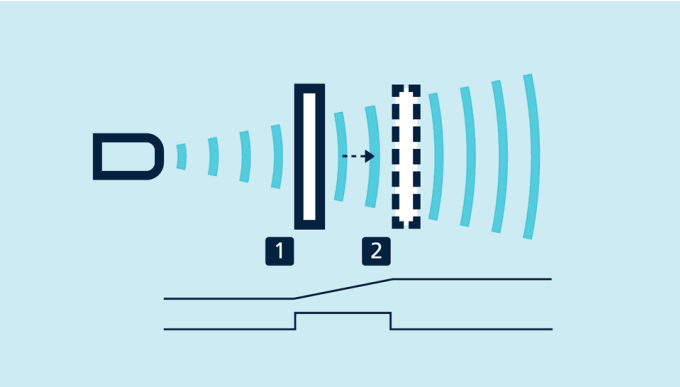
Teach-in of a two-way reflective barrier

Set a window

by initially positioning the object to be detected on the sensor-close window limit (1), pressing the button for approx. 3 seconds, shifting the object to the sensor-distant window limit and pressing the button once more for approx. 1 second. Ready.

Set the analogue output

by initally positioning the object to the detected on the sensor-close window limit (1), pressing the button for approx. 3 seconds, shifting the object to the sensor-distant window limit and pressing the button once more for approx. 1 second. Ready.



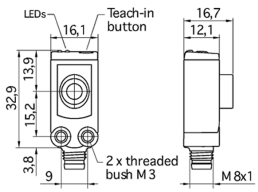
Teach-in of a window with two switching points or of an analogue characteristic

NCC/NOC

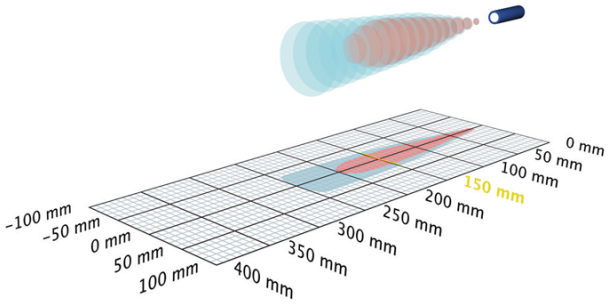
and rising/ falling analogue characteristic curve can also be set using the button.

sks-15/CD

scale drawing



detection zone



1 x pnp

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	minimum cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

sks-15/CD

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

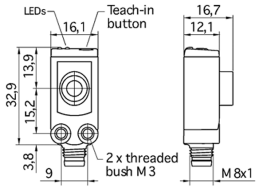
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	8 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	no
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	minimum cuboidal design narrow sound field

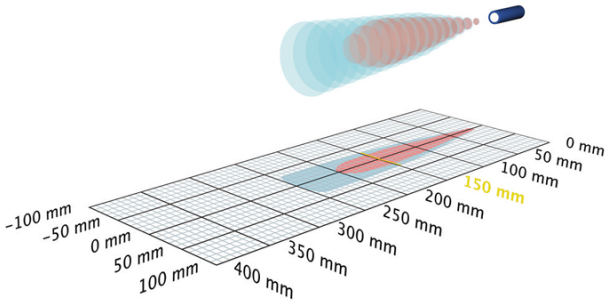
documentation (download)	
pin assignment	
order no.	**sks-15/CD**

sks-15/CE

scale drawing



detection zone



1 x npn

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	minimum cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

sks-15/CE

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

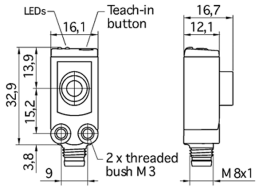
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	8 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	no
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	minimum cuboidal design narrow sound field

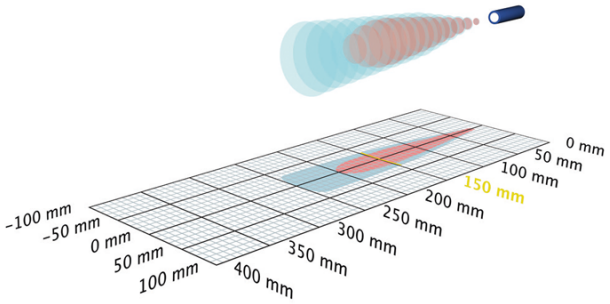
documentation (download)	
pin assignment	
order no.	**sks-15/CE**

sks-15/CI

scale drawing



detection zone



1 x analogue 4-20 mA

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	minimum cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	15 V bis 30 V DC, verpolfest
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

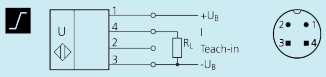
sks-15/CI

outputs	
output 1	analogue output current: 4-20 mA switchable rising/falling
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

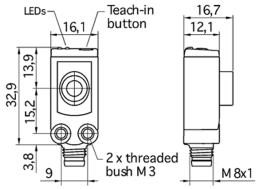
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	8 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	ja, über externen Taktgenerator
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	minimum cuboidal design narrow sound field

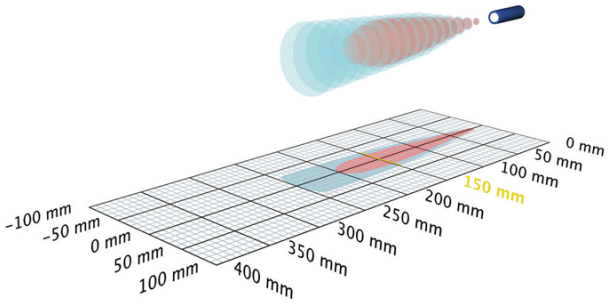
documentation (download)	
pin assignment	
order no.	**sks-15/CI**

sks-15/CU

scale drawing



detection zone



1 x analogue 0-10 V

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	analogue distance measurements
particularities	minimum cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	15 V bis 30 V DC, verpolfest
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M8 initiator plug

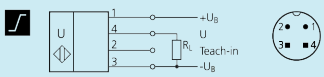
sks-15/CU

outputs	
output 1	analogue output voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

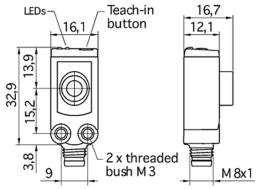
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	8 g

technical features/characteristics	
temperature compensation	yes
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	ja, über externen Taktgenerator
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	minimum cuboidal design narrow sound field

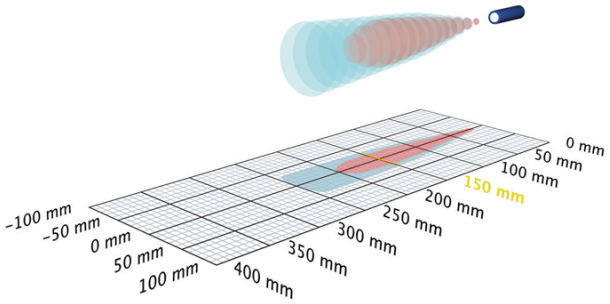
documentation (download)	
pin assignment	
order no.	**sks-15/CU**

sks-15/D

scale drawing



detection zone



1 x pnp

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	minimum cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	3-pin M8 initiator plug

sks-15/D

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

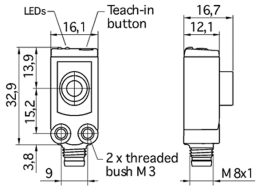
housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	8 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	no
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	minimum cuboidal design narrow sound field

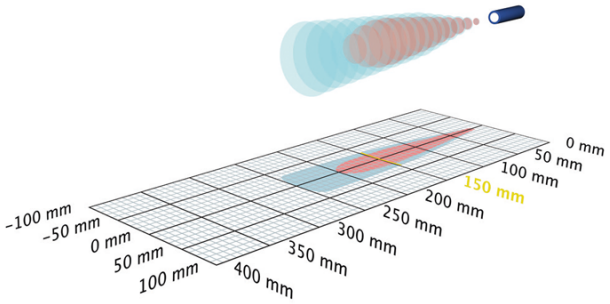
documentation (download)	
pin assignment	
order no.	**sks-15/D**

sks-15/E

scale drawing



detection zone



1 x npn

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	minimum cuboidal design narrow sound field

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	3-pin M8 initiator plug

sks-15/E

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

housing	
material	ABS
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	8 g

technical features/characteristics	
temperature compensation	no
controls	1 push-button
scope for settings	Teach-in via push-button
Synchronisation	no
multiplex	no
indicators	1 x LED green: working, 1 x LED yellow: switch status
particularities	minimum cuboidal design narrow sound field

documentation (download)	
pin assignment	
order no.	**sks-15/E**

The ucs sensors in a sturdy metal housing are mechanically compatible with the industrial standard of opto sensors.

HIGHLIGHTS

› Robust metal housing › for harsh usage conditions

› Dovetail design › for fast installation

› Mechanically compatible with the industry standard › a true alternative to the optical sensor

› Automatic synchronisation › for simultaneous operation of up to ten sensors in close quarters

BASICS

› 2 anti-valent switching outputs in pnp or npn variant

› microsonic Teach-in using a button

› 0.1 mm resolution

› Temperature compensation

› 10–30 V operating voltage

› LinkControl › for configuration of sensors from a PC

Description

The sturdy metal housing

of the ucs sensors is mechanically compatible with the industrial standard of optical sensors.

The rotatable circular connector

allows for flexible selection of the mounting location and facilitates flexible wiring.

The ucs sensors

are available with 2 anti-valent pnp or npn switching outputs.

With the anti-valent switching behaviour of the two switching outputs, the first output works as an NO contact and the second works complementarily as an NC contact.

The Teach-in button

on the sensor´s top allows for a convenient setting of the desired detection distance and operating mode.

A dual LED

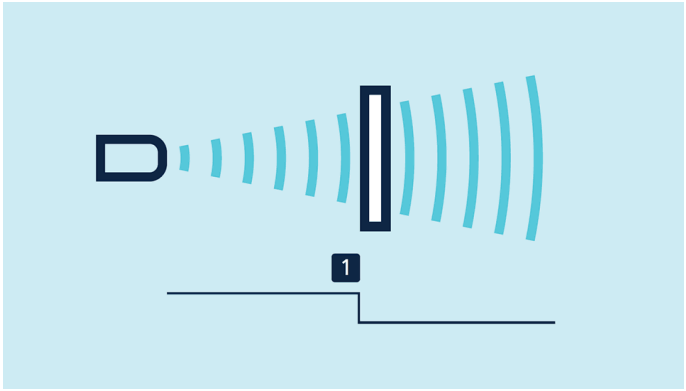
indicates the switching status of the two anti-valent switching outputs.

The ucs sensors have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

The switched output is set

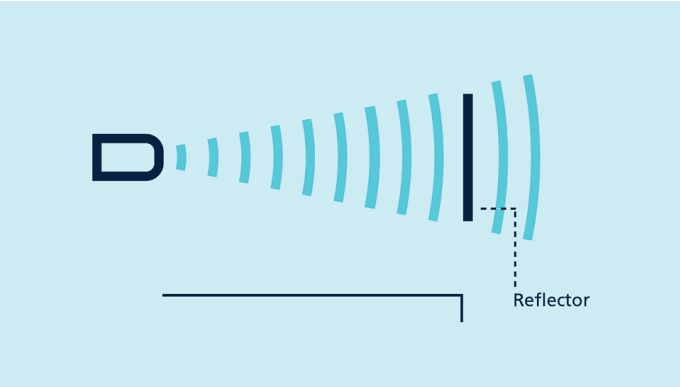
by positioning the object to be detected within the desired distance (1) to the sensor, pressing the button for approx. 3 seconds and then pressing it once more for approx. 1 second. Ready.



Teach-in of a switching point

A two-way reflective barrier

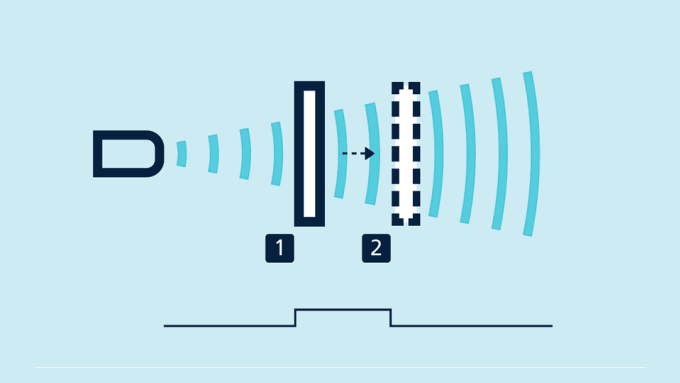
can be set up with the help of a permanently mounted reflector by mounting the ucs sensor and the reflector, then pressing the button for approx. 3 seconds and then pressing it once more for approx. 10 seconds. Now, the two-way reflective barrier has been set.



Teach-in of a two-way reflective barrier

Set a window

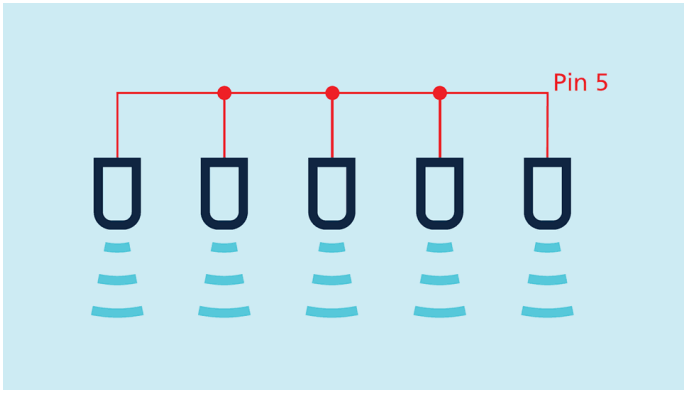
by initially positioning the object to be detected on the sensor-close window limit (1), pressing the button for approx. 3 seconds, shifting the object to the sensor-distant window limit (2) and pressing the button once more for approx. 1 second. Ready.



Teach-in of a window with two switching points

Up to ten sensors

can be synchronised with one another. To do this, all the sensors are electrically connected on pin 5 on the M12 circular connector.



Synchronisation using pin 5

If more than 10 sensors must be synchronised, this can be carried out with the SyncBox1, which is available as an accessory.

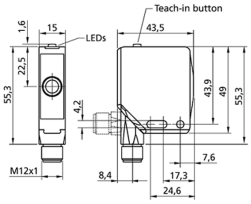
LinkControl

optionally permits the extensive parameterisation of ucs sensors. The LCA-2 LinkControl adapter, which is available as an accessory, can be used to connect ucs sensors to the PC.

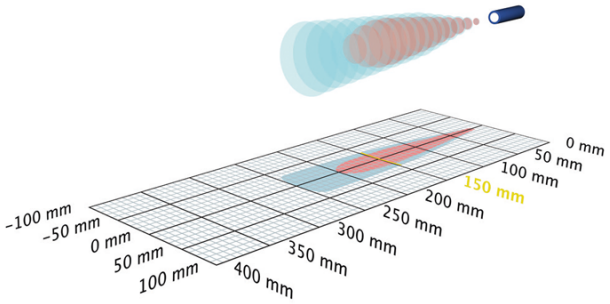
Sensor connected to the PC via LCA-2 for programming

ucs-15/CDD/QM

scale drawing



detection zone



2 x pnp

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	quaderförmig schlankes Schallfeld

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

ucs-15/CDD/QM

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

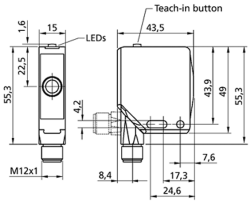
housing	
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	75 g

technical features/characteristics	
temperature compensation	yes
controls	1 Taster Com-Eingang
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x Duo-LED; green: working / yellow: switch status
particularities	quaderförmig schlankes Schallfeld

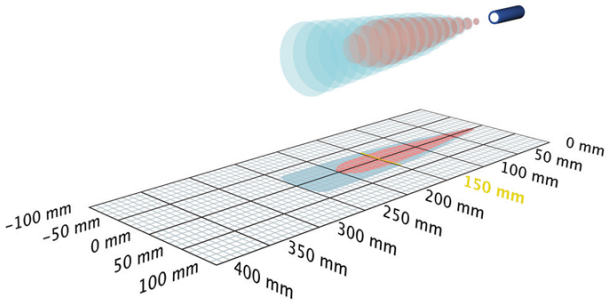
documentation (download)	
pin assignment	
order no.	**ucs-15/CDD/QM**

ucs-15/CEE/QM

scale drawing



detection zone



2 x npn

250 mm

operating range	20 - 150 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	quaderförmig schlankes Schallfeld

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	380 kHz
blind zone	20 mm
operating range	150 mm
maximum range	250 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

ucs-15/CEE/QM

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

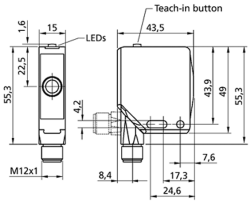
housing	
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	75 g

technical features/characteristics	
temperature compensation	yes
controls	1 Taster Com-Eingang
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x Duo-LED; green: working / yellow: switch status
particularities	quaderförmig schlankes Schallfeld

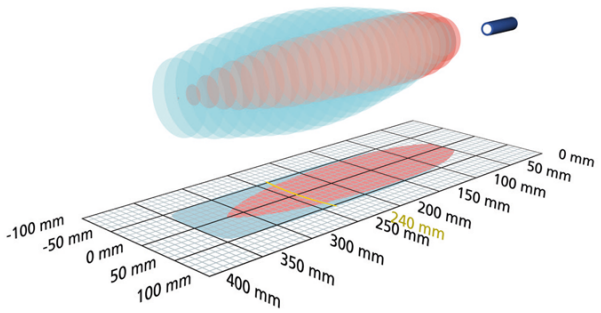
documentation (download)	
pin assignment	
order no.	**ucs-15/CEE/QM**

ucs-24/CDD/QM

scale drawing



detection zone



2 x pnp

operating range	55 - 240 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	cuboidal

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	55 mm
operating range	240 mm
maximum range	350 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

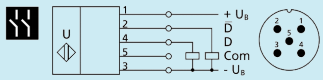
ucs-24/CDD/QM

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

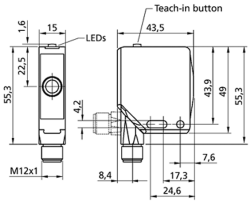
housing	
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	75 g

technical features/characteristics	
temperature compensation	yes
controls	1 Taster Com-Eingang
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x Duo-LED; green: working / yellow: switch status
particularities	cuboidal

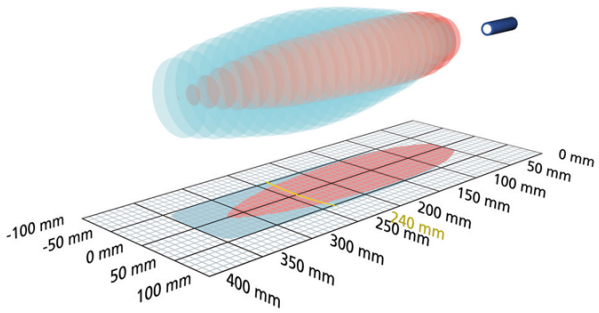
documentation (download)	
pin assignment	
order no.	**ucs-24/CDD/QM**

ucs-24/CEE/QM

scale drawing



detection zone



2 x npn

operating range	55 - 240 mm
design	cuboidal
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	cuboidal

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	500 kHz
blind zone	55 mm
operating range	240 mm
maximum range	350 mm
resolution/sampling rate	0.10 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 40 mA
type of connection	5-pin M12 initiator plug

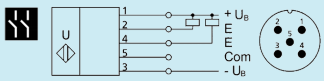
ucs-24/CEE/QM

outputs	
output 1	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	2.0 mm
switching frequency	25 Hz
response time	24 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input

housing	
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	75 g

technical features/characteristics	
temperature compensation	yes
controls	1 Taster Com-Eingang
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	yes
multiplex	no
indicators	1 x Duo-LED; green: working / yellow: switch status
particularities	cuboidal

documentation (download)	
pin assignment	
order no.	**ucs-24/CEE/QM**

Wear-resistant PEEK film protects the sensor membrane from chemicals, contamination and caking.

HIGHLIGHTS

› Ultrasonic transducer protected by PEEK film › for simple cleaning and high resistance to wear

› Stainless-steel housing

› Digital display with direct measured value output in mm/cm or %

› Numeric configuration of the sensor using digital display › permits the complete advance configuration of the sensor

› Automatic synchronisation and multiplex operation › for simultaneous operation of up to ten sensors in close quarters

BASICS

› 1 or 2 switching outputs in pnp variant

› Analogue output 4–20 mA and 0–10 V › with automatic switching between current and voltage outputs

› 5 detection ranges with a measurement range of 30 mm to 8 m

› microsonic Teach-in using T1 or T2 buttons

› 0.025 mm to 2.4 mm resolution

› Temperature compensation

› 9–30 V operating voltage

› LinkControl › for configuration of sensors from a PC

Description

Sensor membrane with wear-resistant protective film

In many filling processes, spray on the sensor membrane simply cannot be avoided. These sprays often harden so that after longer periods of operation contamination can only be removed from the sensor membrane by mechanical means. The new protective film of the crm+ sensors now makes it easy to remove caked-on soiling, such as hardened casting compound and cement spatter.

The protective film is also highly resistant to corrosive media. The threaded sleeve is made of 1.4571 stainless steel.

TouchControl with LED display - Wear-resistant PEEK protective film

There are three output stages available for all five detection ranges:

1 pnp switching output

2 pnp switching outputs

1 analogue output 4–20 mA and 0–10 V

The crm+ sensors with switching output have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

With TouchControl

all configuration can be done right at the sensor. The easily legible three-digit LED display continually shows the current

distance value and automatically switches between millimetre and centimetre displays.

Setting a switching or analogue output

can optionally be carried out by numeric input of the desired distance values, or using a teach-in procedure. This permits the user to select the configuration method preferred.

The crm+ sensors support synchronisation and multiplex operation and have extensive parameterisation options via LinkControl. For detailed information, please see at mic+ sensors .

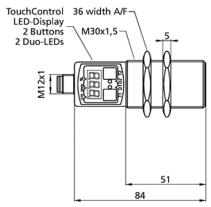
LinkControl

consists of the LinkControl adapter and the LinkControl software and facilitates the configuration of the crm+ sensors via a PC or laptop with any conventional Windows® operating system.

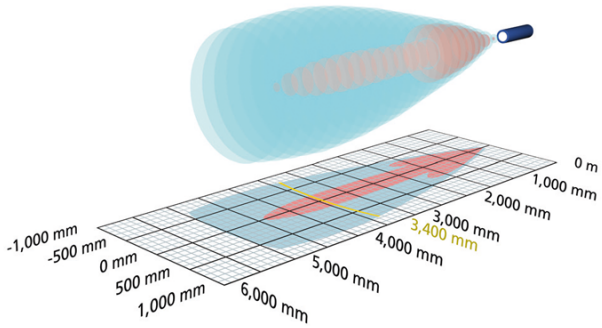
Sensor connected to the PC via LCA-2 for programming

crm+130/D/TC/E

scale drawing



detection zone



1 x pnp

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

crm+130/D/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

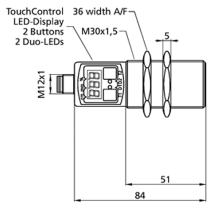
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

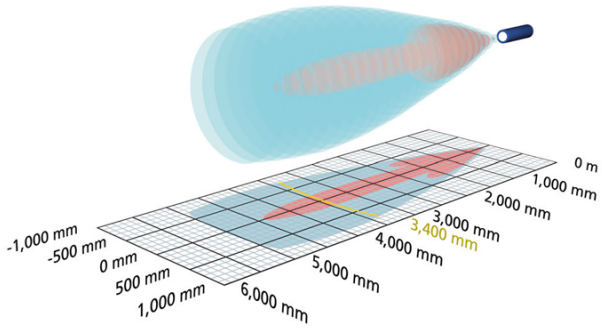
documentation (download)	
pin assignment	
order no.	**crm+130/D/TC/E**

crm+130/DD/TC/E

scale drawing



detection zone



2 x pnp

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

crm+130/DD/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	6 Hz
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

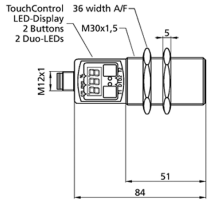
technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

crm+130/DD/TC/E

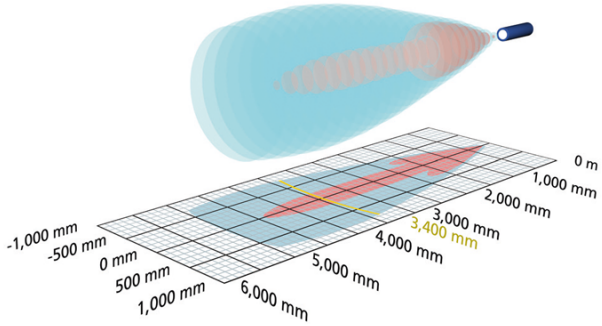
documentation (download)	
pin assignment	
order no.	crm+130/DD/TC/E

crm+130/IU/TC/E

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

crm+130/IU/TC/E

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	110 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

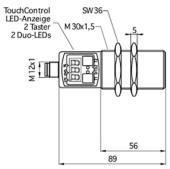
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

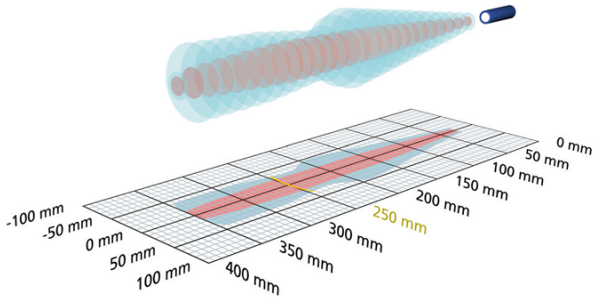
documentation (download)	
pin assignment	
order no.	**crm+130/IU/TC/E**

crm+25/D/TC/E

scale drawing



detection zone



1 x pnp

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

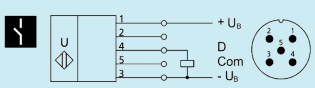
crm+25/D/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

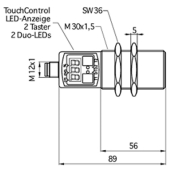
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

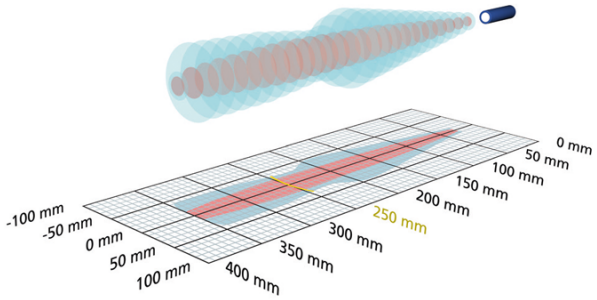
documentation (download)	
pin assignment	
order no.	**crm+25/D/TC/E**

crm+25/DD/TC/E

scale drawing



detection zone



2 x pnp

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

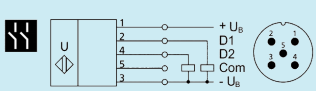
crm+25/DD/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	25 Hz
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

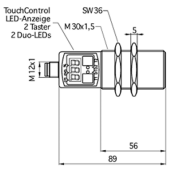
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

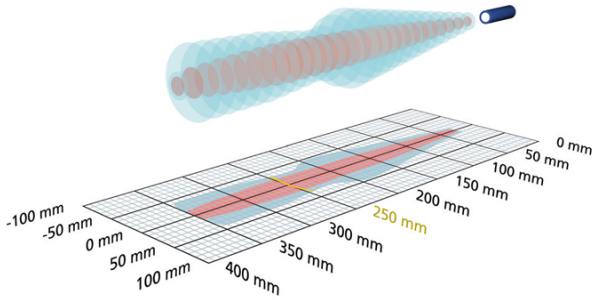
documentation (download)	
pin assignment	
order no.	**crm+25/DD/TC/E**

crm+25/IU/TC/E

scale drawing



detection zone



1 x pnp

350 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

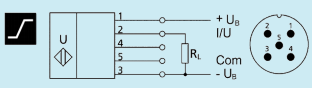
crm+25/IU/TC/E

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	32 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

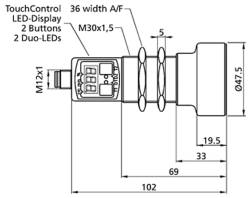
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

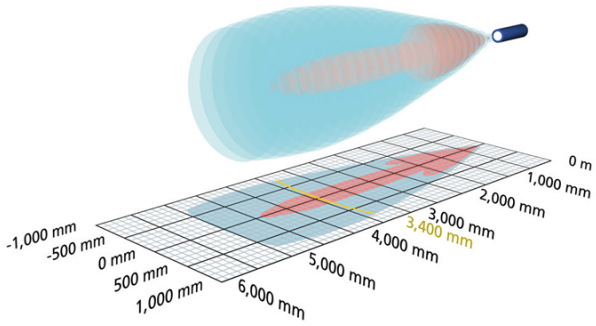
documentation (download)	
pin assignment	
order no.	**crm+25/IU/TC/E**

crm+340/D/TC/E

scale drawing



detection zone



1 x pnp

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

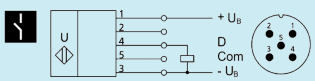
crm+340/D/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 380 ms

inputs	
input 1	com input synchronisation input

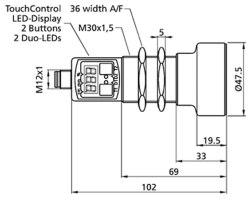
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

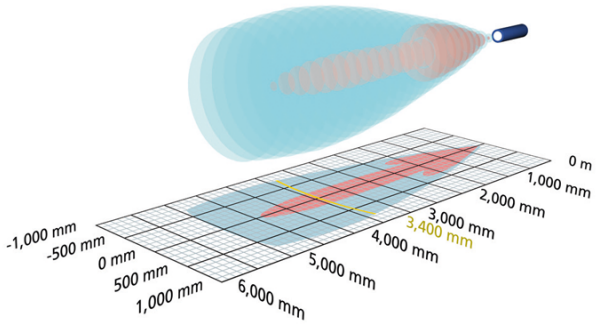
documentation (download)	
pin assignment	
order no.	**crm+340/D/TC/E**

crm+340/DD/TC/E

scale drawing



detection zone



2 x pnp

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

crm+340/DD/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	180 ms
delay prior to availability	< 380 ms

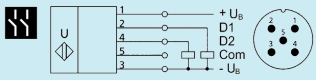
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

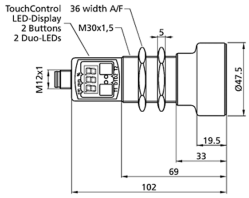
crm+340/DD/TC/E

documentation (download)

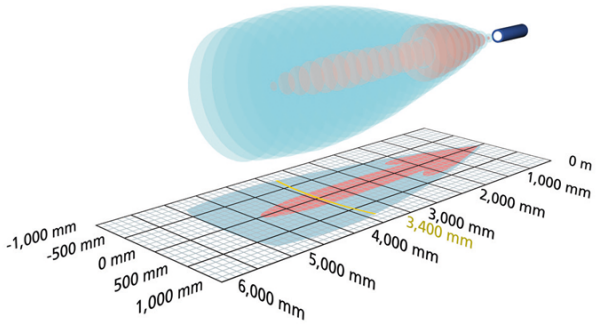
pin assignment	
order no.	crm+340/DD/TC/E

crm+340/IU/TC/E

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

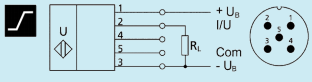
crm+340/IU/TC/E

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	180 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

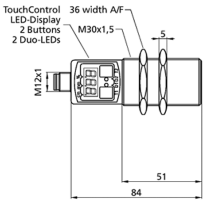
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

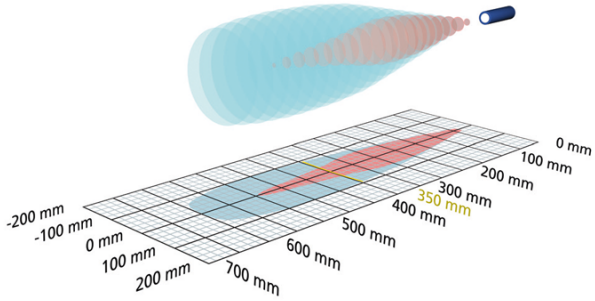
documentation (download)	
pin assignment	
order no.	**crm+340/IU/TC/E**

crm+35/D/TC/E

scale drawing



detection zone



1 x pnp

600 mm

operating range	85 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	360 kHz
blind zone	85 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

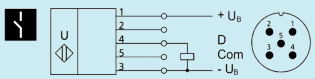
crm+35/D/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

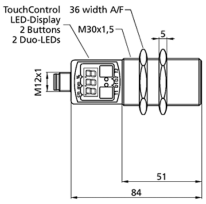
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

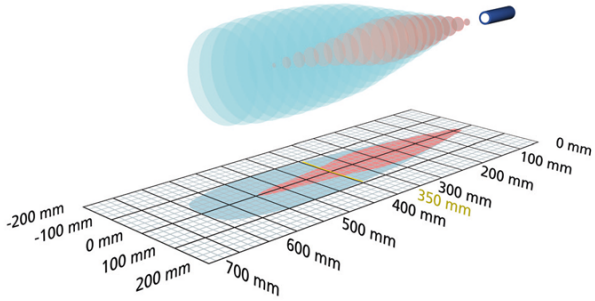
documentation (download)	
pin assignment	
order no.	**crm+35/D/TC/E**

crm+35/DD/TC/E

scale drawing



detection zone



2 x pnp

600 mm

operating range	85 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	360 kHz
blind zone	85 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

crm+35/DD/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	8 Hz
response time	70 ms
delay prior to availability	< 300 ms

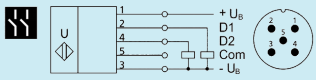
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

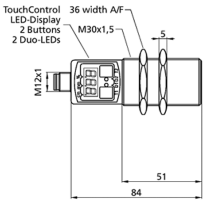
crm+35/DD/TC/E

documentation (download)

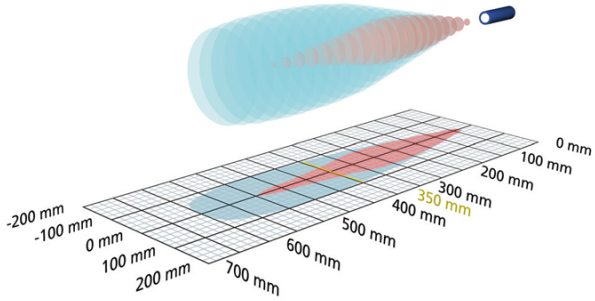
pin assignment	
order no.	crm+35/DD/TC/E

crm+35/IU/TC/E

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

600 mm

operating range	85 - 350 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	360 kHz
blind zone	85 mm
operating range	350 mm
maximum range	600 mm
resolution/sampling rate	0.069 mm to 0.16 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

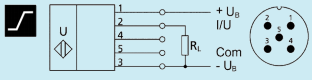
crm+35/IU/TC/E

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	70 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

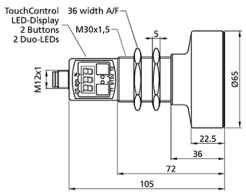
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	110 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

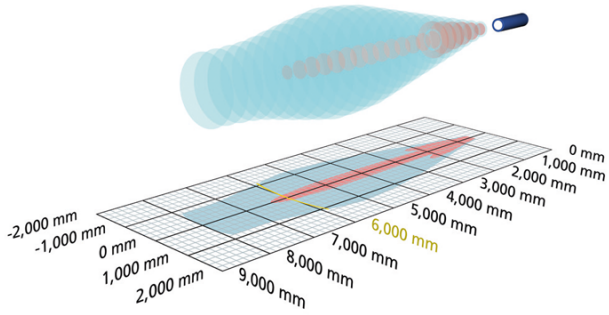
documentation (download)	
pin assignment	
order no.	**crm+35/IU/TC/E**

crm+600/D/TC/E

scale drawing



detection zone



1 x pnp

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

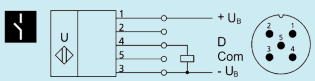
crm+600/D/TC/E

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

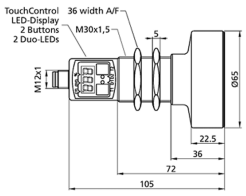
housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

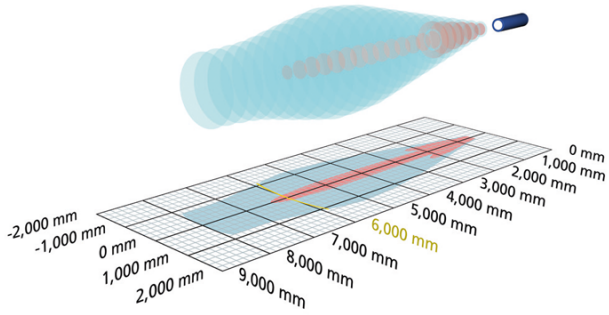
documentation (download)	
pin assignment	
order no.	**crm+600/D/TC/E**

crm+600/DD/TC/E

scale drawing



detection zone



2 x pnp

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

crm+600/DD/TC/E

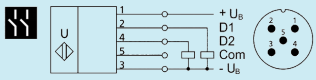
outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	100 mm
switching frequency	2 Hz
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	230 g
further versions	cable connection (on request)

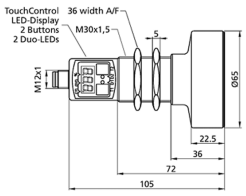
technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

crm+600/DD/TC/E

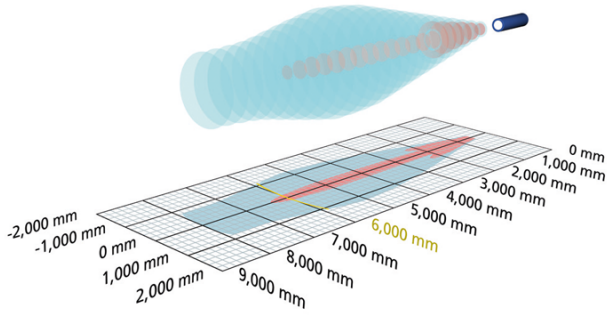
documentation (download)	
pin assignment	
order no.	crm+600/DD/TC/E

crm+600/IU/TC/E

scale drawing



detection zone



1 x analogue 4-20 mA + 0-10 V

8,000 mm

operating range	600 - 6,000 mm
design	cylindrical M30
operating mode	analogue distance measurements
particularities	high chemical resistance stainless steel version display

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	600 mm
operating range	6,000 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

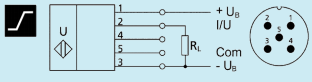
crm+600/IU/TC/E

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V (at $U_B \geq 15$ V), short-circuit-proof switchable rising/falling
response time	240 ms
delay prior to availability	< 450 ms

inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PEEK film, PTFE O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	210 g
further versions	cable connection (on request)

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	high chemical resistance stainless steel version display

documentation (download)	
pin assignment	
order no.	**crm+600/IU/TC/E**

hps+ in safety gear - When you need chemically resistant, pressure-resistant sensors.

HIGHLIGHTS

- Optionally used in normal pressure or overpressure
- Teflon membrane › for protection against aggressive media
- Stainless-steel or optional PVDF housing for hps+340 › for use in the food industry
- Sealed against the housing with an O-ring made from FFKM › for the highest possible chemical resistance
- Digital display with direct measured value output in mm/cm or %
- Numeric configuration of the sensor using digital display

BASICS

- 2 switching outputs in pnp variant
- Analogue output plus 1 pnp switching output
- 4 detection ranges with a measurement range of 30 mm to 8 m
- microsonic Teach-in using T1 or T2 buttons
- 0.025 mm to 2.4 mm resolution
- Temperature compensation
- 9–30 V operating voltage
- LinkControl › for configuration of sensors from a PC

Description

For fill level measurements of aggressive media and in overpressure

the ultrasonic transducers of the new hps+ sensors are now fitted out - as standard - with a Teflon film. It is sealed with a FFKM O-ring against the housing made of 1.4571 stainless steel or PVDF. This ensures a high degree of resistance to aggressive media.

Fill level measurement in tanks

The hps+ sensors can be used for fill level measurement under normal pressure or in tanks and containers with an overpressure of up to 6 bar. Its special software filters also allow its use in containers filled from above or that have a stirring system.

Pressure-tight installation in a tank is undertaken by means of a 1“ threaded flange or a 2“ one in the case of hps+340.

Chemical resistance

and seal tightness were tested through being stored over cellulose thinner and 1,000,000 alternating pressure stresses. Cellulose thinner is extremely corrosive and has a high rate of penetration.

hps+340 in highly resistant PVDF housing - PTFE protective film sealed with an O-ring made from FFKM against the housing

Two different output stages are available for four detection ranges:

2 switching outputs in pnp switching technology

1 analogue output with an additional pnp switching output

The hps+ sensors with switching output have three operating modes:

- Single switching point
- Two-way reflective barrier
- Window mode

Two three-colour LEDs

always show the current state of the switching outputs or the analogue output.

With TouchControl

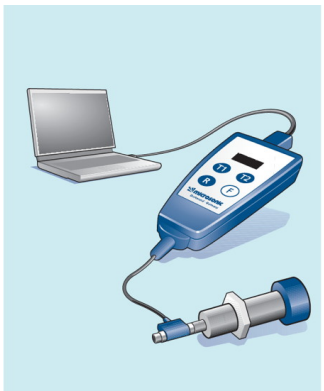
all configuration can be done right at the sensor. The easily legible three-digit LED display continually shows the current distance value and automatically switches between millimetre and centimetre displays.

Setting a switching or analogue output

can optionally be carried out by numeric input of the desired distance values, or using a Teach-in procedure. This permits the user to select the configuration method preferred. The hps+ sensors support synchronisation and multiplex operation and have extensive parameterisation options via LinkControl.
Further information on how to set up hps+ sensors can be found at mic+ sensors.

LinkControl

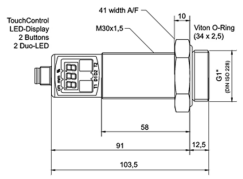
consists of the LinkControl adapter and the LinkControl software and facilitates the configuration of the hps+ sensors via a PC or laptop with any conventional conventional Windows® operating system.



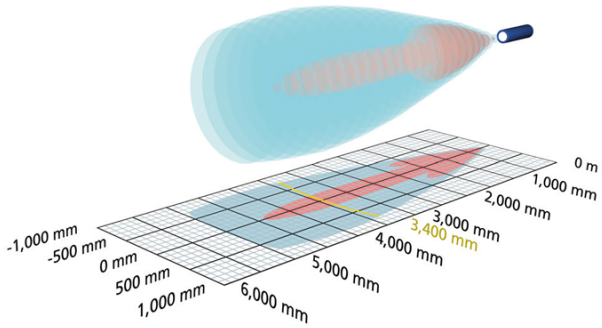
Sensor connected to the PC via LCA-2 for programming

hps+130/DD/TC/E/G1

scale drawing



detection zone



2 x pnp

5,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	180 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+130/DD/TC/E/G1

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	5 Hz
response time	160 ms
delay prior to availability	< 300 ms

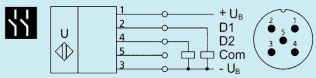
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	210 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

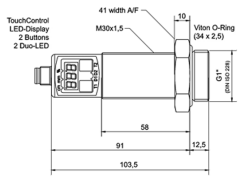
hps+130/DD/TC/E/G1

documentation (download)

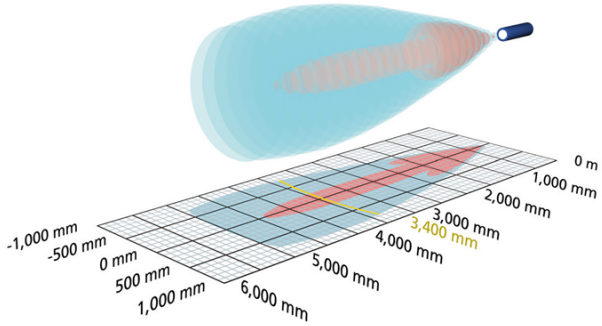
pin assignment	
order no.	hps+130/DD/TC/E/G1

hps+130/DIU/TC/E/G1

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

5,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	180 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	5,000 mm
resolution/sampling rate	0.18 mm to 1.5 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+130/DIU/TC/E/G1

hps+130/DIU/TC/E/G1

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	20 mm
switching frequency	5 Hz
response time	160 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	210 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

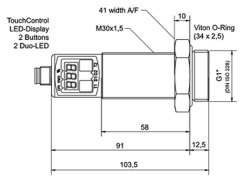
hps+130/DIU/TC/E/G1

documentation (download)

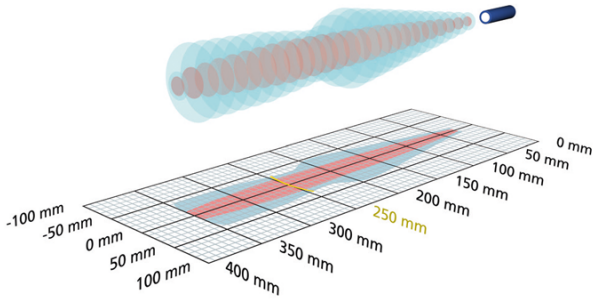
pin assignment	
order no.	hps+130/DIU/TC/E/G1

hps+25/DD/TC/E/G1

scale drawing



detection zone



2 x pnp

990 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	990 mm
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+25/DD/TC/E/G1

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	11 Hz
response time	68 ms
delay prior to availability	< 300 ms

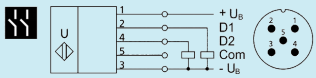
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	210 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

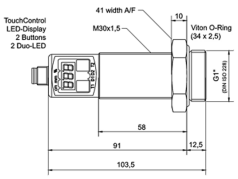
hps+25/DD/TC/E/G1

documentation (download)

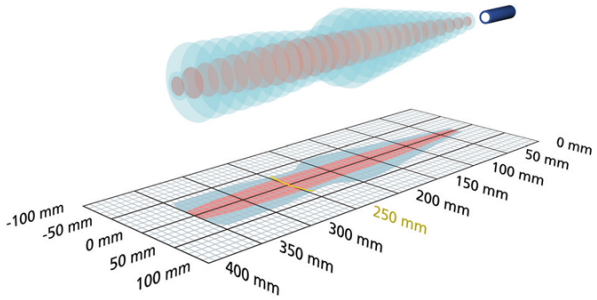
pin assignment	
order no.	hps+25/DD/TC/E/G1

hps+25/DIU/TC/E/G1

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

990 mm

operating range	30 - 250 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	990 mm
resolution/sampling rate	0.025 mm to 0.30 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+25/DIU/TC/E/G1

hps+25/DIU/TC/E/G1

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	3 mm
switching frequency	11 Hz
response time	68 ms
delay prior to availability	< 300 ms

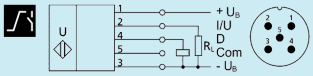
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	210 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

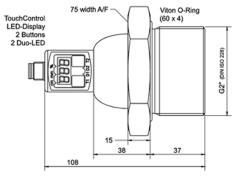
hps+25/DIU/TC/E/G1

documentation (download)

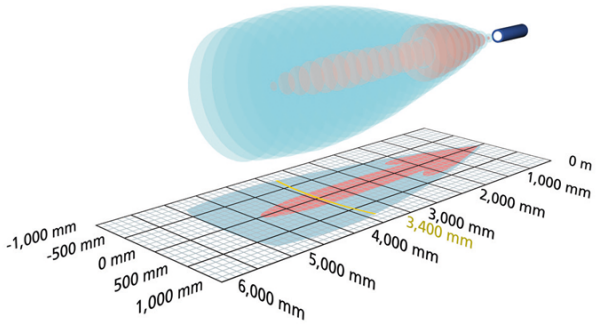
pin assignment	
order no.	hps+25/DIU/TC/E/G1

hps+340/DD/TC/E/G2

scale drawing



detection zone



2 x pnp

8,000 mm

operating range	350 - 3,400 mm
design	cylindrical
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G2

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+340/DD/TC/E/G2

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	240 ms
delay prior to availability	< 380 ms

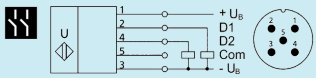
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	1,200 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G2

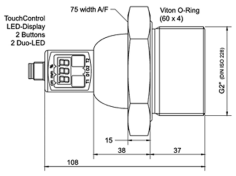
hps+340/DD/TC/E/G2

documentation (download)

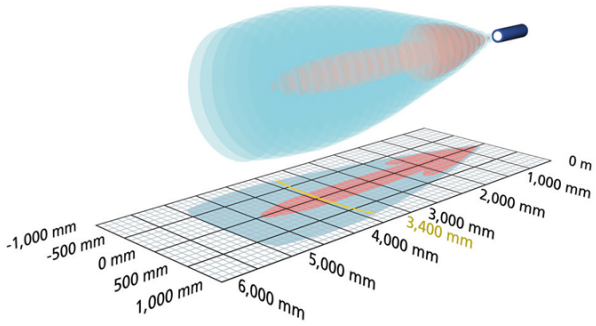
pin assignment	
order no.	hps+340/DD/TC/E/G2

hps+340/DD/TC/G2

scale drawing



detection zone



2 x pnp

8,000 mm

operating range	350 - 3,400 mm
design	cylindrical
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	pressure-resistant high chemical resistance PVDF housing display process connection G2

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+340/DD/TC/G2

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	240 ms
delay prior to availability	< 380 ms

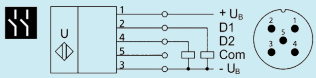
inputs	
input 1	com input synchronisation input

housing	
material	PVDF, PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	350 g
further versions	stainless steel
further versions	hps+340/DD/TC/E/G2

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance PVDF housing display process connection G2

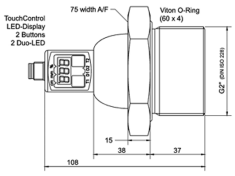
hps+340/DD/TC/G2

documentation (download)

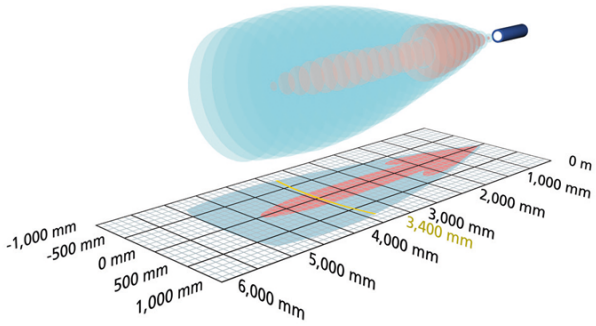
pin assignment	
order no.	hps+340/DD/TC/G2

hps+340/DIU/TC/E/G2

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

8,000 mm

operating range	350 - 3,400 mm
design	cylindrical
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G2

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm to 2.4 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+340/DIU/TC/E/G2

hps+340/DIU/TC/E/G2

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	240 ms
delay prior to availability	< 450 ms

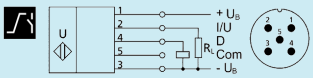
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	1,200 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G2

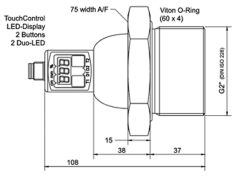
hps+340/DIU/TC/E/G2

documentation (download)

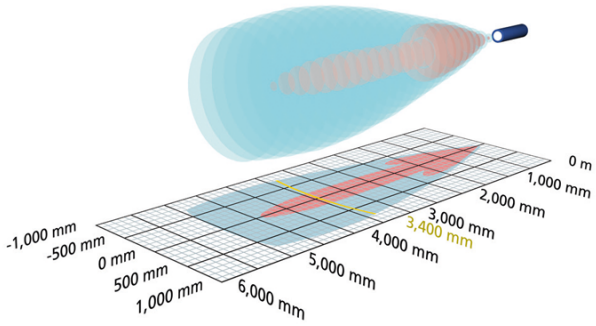
pin assignment	
order no.	hps+340/DIU/TC/E/G2

hps+340/DIU/TC/G2

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

8,000 mm

operating range	350 - 3,400 mm
design	cylindrical
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	pressure-resistant high chemical resistance PVDF housing display process connection G2

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	8,000 mm
resolution/sampling rate	0.18 mm to 2.4 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+340/DIU/TC/G2

hps+340/DIU/TC/G2

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	50 mm
switching frequency	3 Hz
response time	240 ms
delay prior to availability	< 450 ms

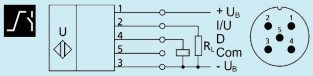
inputs	
input 1	com input synchronisation input

housing	
material	PVDF, PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	350 g
further versions	stainless steel
further versions	hps+340/DIU/TC/E/G2

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance PVDF housing display process connection G2

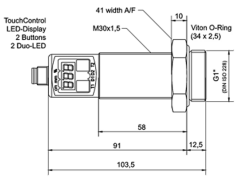
hps+340/DIU/TC/G2

documentation (download)

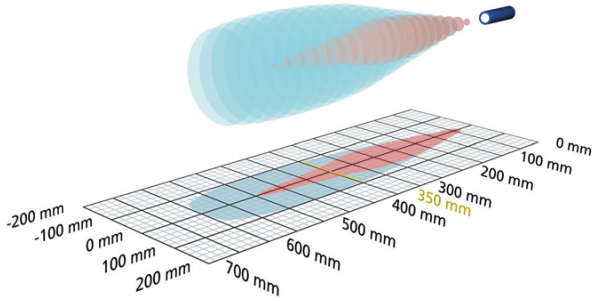
pin assignment	
order no.	hps+340/DIU/TC/G2

hps+35/DD/TC/E/G1

scale drawing



detection zone



2 x pnp

1,500 mm

operating range	85 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	85 mm
operating range	350 mm
maximum range	1,500 mm
resolution/sampling rate	0.18 mm to 0.45 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+35/DD/TC/E/G1

outputs	
output 1	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	9 Hz
response time	84 ms
delay prior to availability	< 300 ms

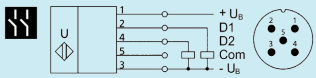
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	210 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

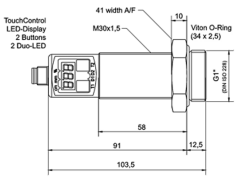
hps+35/DD/TC/E/G1

documentation (download)

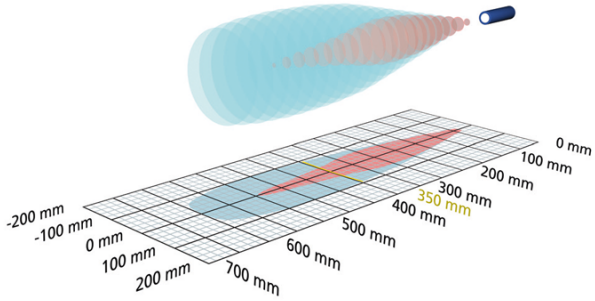
pin assignment	
order no.	hps+35/DD/TC/E/G1

hps+35/DIU/TC/E/G1

scale drawing



detection zone



1 x pnp + 1 x analogue 4-20 mA / 0-10 V

1,500 mm

operating range	85 - 350 mm
design	cylindrical M30
operating mode	proximity switch/reflective mode reflective barrier window mode analogue distance measurement
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	85 mm
operating range	350 mm
maximum range	1,500 mm
resolution/sampling rate	0.18 mm to 0.45 mm, depending on the analogue window
reproducibility	± 0.15 %
accuracy	± 1 % (temperature drift internally compensated)

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 80 mA
type of connection	5-pin M12 initiator plug

hps+35/DIU/TC/E/G1

hps+35/DIU/TC/E/G1

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
switching hysteresis	5 mm
switching frequency	9 Hz
response time	84 ms
delay prior to availability	< 300 ms

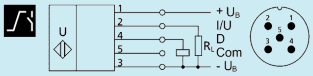
inputs	
input 1	com input synchronisation input

housing	
material	stainless steel, plastic parts: PBT, TPU
ultrasonic transducer	coated with PTFE film, FFKM O-ring
class of protection to EN 60529	IP 67
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	210 g

technical features/characteristics	
temperature compensation	yes
controls	2 push-buttons + LED display (TouchControl)
scope for settings	Teach-in and numeric configuration via TouchControl LCA-2 with LinkControl
Synchronisation	yes
multiplex	yes
indicators	3-digit LED display, 2 x three-colour LED
particularities	pressure-resistant high chemical resistance stainless steel version display process connection G1

hps+35/DIU/TC/E/G1

documentation (download)

pin assignment	
order no.	hps+35/DIU/TC/E/G1

The wms sensors are designed for use in microprocessor controllers with signal evaluation performed by the customer.

HIGHLIGHTS

› Trigger input › for control of the ultrasonic transmitter

› Echo output › for customer-provided evaluation in the controller

BASICS

› 1 echo output › with a load up to 10 mA

› 5 detection ranges with a measurement range of 30 mm to 8 m

› 0.36 mm resolution

› 9–30 V operating voltage

Description

The wms sensors

require connection to the customer's own control and signal evaluation equipment.

wms - the inexpensive alternative

to a self-contained sensor when the sensor must be controlled by the customer's system. A microprocessor control is normally required for this.

The "transmitter" signal input

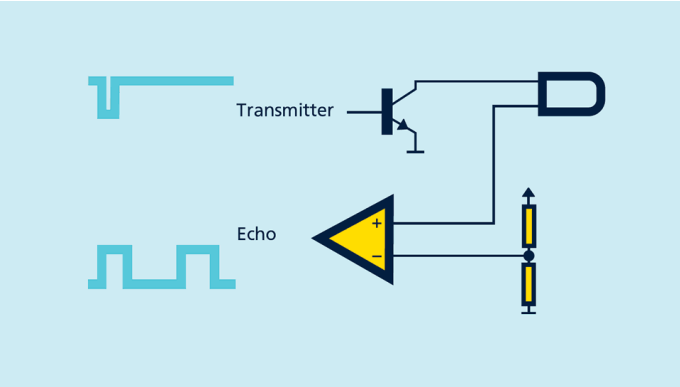
briefly has to be set to $-U_B$ by the control unit via an open-collector circuit. As a result, an the wms sensor emits a sound pulse for the time of this signal.

The "echo" signal output

subsequently transmits all echo signals received depending on their duration as 1 bit values (echo yes/no). This takes between 8 and 65 ms depending on the type of sensor. The positive-switched (pnp) output can be loaded with 10 mA. The computation of the distance and subsequent processing is carried out in the customer's control system.

Our project engineers

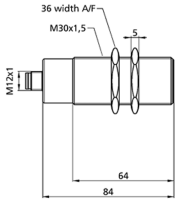
will be happy to assist you in integrating a wms sensor into your control system.



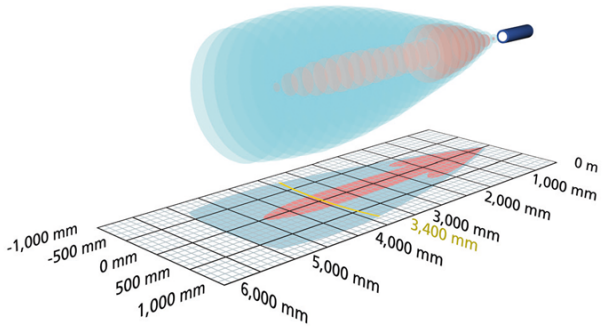
Triggering a wms sensor from the customer's control system

wms-130/RT

scale drawing



detection zone



echo output

2,000 mm

operating range	200 - 2.000 mm
design	cylindrical M30
operating mode	sensor for evaluators

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	200 kHz
blind zone	200 mm
operating range	1,300 mm
maximum range	2,000 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M12 initiator plug

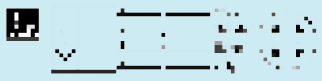
wms-130/RT

outputs	
output 1	signal output echo pnp: I_{max} = 10 mA (signal output echo)

inputs	
recommended transmitted pulse length	150 µs
recommended measuring cycle time	20 ms
description	controlled by open collector (npn), $I_C \geq 3$ mA, $U_{CE} \geq 30$ V
input 1	signal input - transmitter

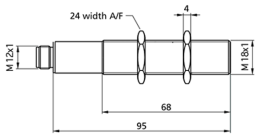
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	stainless steel cable connection (on request)

technical features/characteristics	
controls	no
scope for settings	no
Synchronisation	yes
multiplex	yes
indicators	no

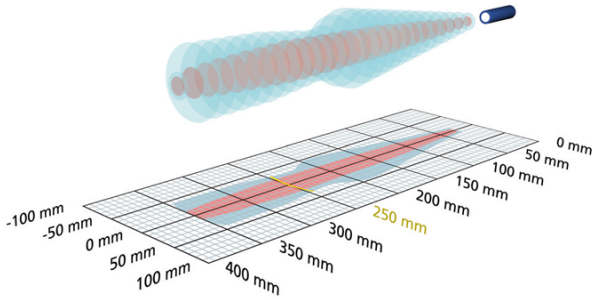
documentation (download)	
pin assignment	
order no.	**wms-130/RT**

wms-25/RT/HV/M18

scale drawing



detection zone



echo output

350 mm

operating range	30 - 250 mm
design	cylindrical M18
operating mode	sensor for evaluators

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	320 kHz
blind zone	30 mm
operating range	250 mm
maximum range	350 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	10 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M12 initiator plug

wms-25/RT/HV/M18

outputs	
output 1	signal output echo pnp: I_{max} = 10 mA (signal output echo)

inputs	
recommended transmitted pulse length	25 µs
recommended measuring cycle time	8 ms
description	controlled by open collector (npn), $I_C \geq 3$ mA, $U_{CE} \geq 30$ V
input 1	signal input - transmitter

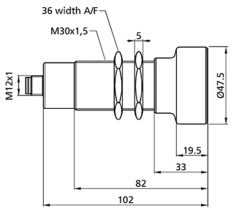
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-20°C to +70°C
storage temperature	-40°C to +85°C
weight	60 g
further versions	stainless steel
further versions	wms-25/RT/HV/M18E

technical features/characteristics	
temperature compensation	durch Ulraschall-Referenzmessung
controls	no
scope for settings	no
Synchronisation	yes
multiplex	yes
indicators	no

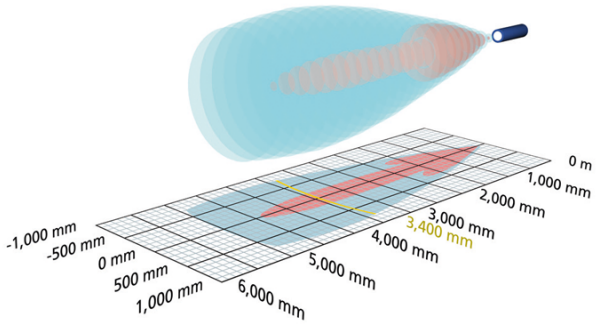
documentation (download)	
pin assignment	
order no.	**wms-25/RT/HV/M18**

wms-340/RT

scale drawing



detection zone



echo output

5,000 mm

operating range	350 - 3,400 mm
design	cylindrical M30
operating mode	sensor for evaluators

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	120 kHz
blind zone	350 mm
operating range	3,400 mm
maximum range	5,000 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M12 initiator plug

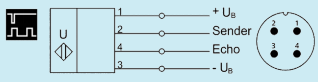
wms-340/RT

outputs	
output 1	signal output echo pnp: I_{max} = 10 mA (signal output echo)

inputs	
recommended transmitted pulse length	300 µs
recommended measuring cycle time	40 ms
description	controlled by open collector (npn), $I_C \geq 3$ mA, $U_{CE} \geq 30$ V
input 1	signal input - transmitter

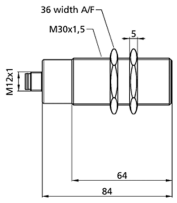
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	200 g
further versions	stainless steel cable connection (on request)

technical features/characteristics	
controls	no
scope for settings	no
Synchronisation	yes
multiplex	yes
indicators	no

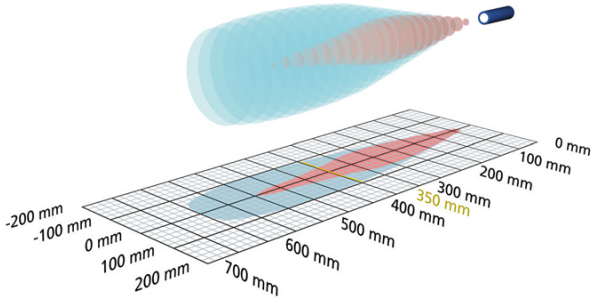
documentation (download)	
pin assignment	
order no.	**wms-340/RT**

wms-35/RT

scale drawing



detection zone



echo output

600 mm

operating range	65 - 350 mm
design	cylindrical M30
operating mode	sensor for evaluators

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	400 kHz
blind zone	65 mm
operating range	350 mm
maximum range	600 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M12 initiator plug

wms-35/RT

outputs	
output 1	signal output echo pnp: I_{max} = 10 mA (signal output echo)

inputs	
recommended transmitted pulse length	80 µs
recommended measuring cycle time	12 ms
description	controlled by open collector (npn), $I_C \geq 3$ mA, $U_{CE} \geq 30$ V
input 1	signal input - transmitter

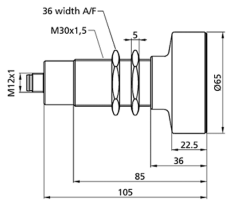
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	140 g
further versions	stainless steel high chemical resistance cable connection (on request)

technical features/characteristics	
controls	no
scope for settings	no
Synchronisation	yes
multiplex	yes
indicators	no

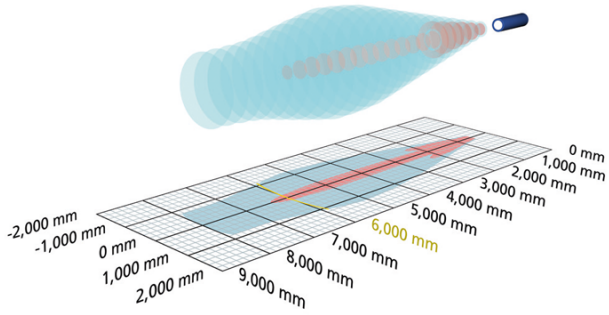
documentation (download)	
pin assignment	
order no.	**wms-35/RT**

wms-600/RT

scale drawing



detection zone



echo output

8,000 mm

operating range	800 - 6,000 mm
design	cylindrical M30
operating mode	sensor for evaluators

ultrasonic -specific

means of measurement	echo propagation time measurement
transducer frequency	80 kHz
blind zone	800 mm
operating range	6,000 mm
maximum range	8,000 mm
reproducibility	± 0.15 %
accuracy	temperature drift 0.17 %/K

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 30 mA
type of connection	4-pin M12 initiator plug

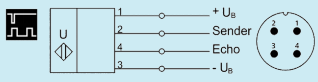
wms-600/RT

outputs	
output 1	signal output echo pnp: I_{max} = 10 mA (signal output echo)

inputs	
recommended transmitted pulse length	350 µs
recommended measuring cycle time	65 ms
description	controlled by open collector (npn), $I_C \geq 3$ mA, $U_{CE} \geq 30$ V
input 1	signal input - transmitter

housing	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	-25°C to +70°C
storage temperature	-40°C to +85°C
weight	260 g
further versions	stainless steel cable connection (on request)

technical features/characteristics	
controls	no
scope for settings	no
Synchronisation	yes
multiplex	yes
indicators	no

documentation (download)	
pin assignment	
order no.	**wms-600/RT**

The new ultrasonic double-sheet control dbk+4 combines multiple variants of its predecessor into a single unit, opening up entirely new possibilities for use.

HIGHLIGHTS

- 3 control inputs › for trigger, Teach-in and external sensitivity settings for the material
- Teach-in option › e.g. for probing wafers stuck together by a water film
- Variant with 90° angled head › for individual installation situations
- Variant with external M18 receiving transducer
- Variants with very compact transmitters and receivers in the M12 threaded sleeve

BASICS

- Reliable detection of single and double sheets
- No Teach-in needed (plug and play)
- Double sheet and missing sheet output
- Working distance between the transmitter and the receiver selectable from 20 to 60 mm
- Trigger option › for applications in warehouse flow
- LinkControl › for configuration of sensors from a PC

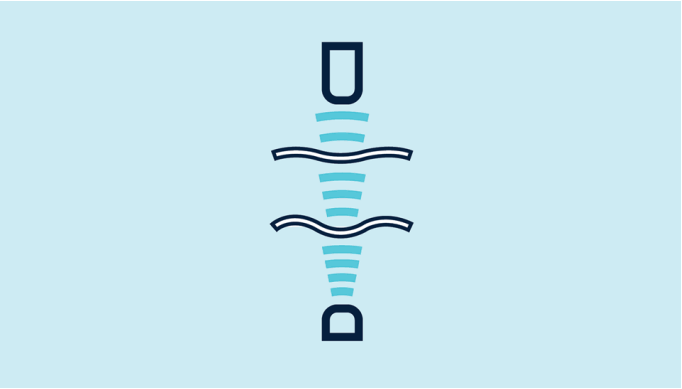
Description

The task

of double-sheet control is to identify two or more pieces or sheets inadvertently adhering together.

The functional principle

A high-frequency ultrasonic transmitter beams against the sheet from the underside. The beamed signal induces the material to vibrate. The effect of these vibrations is a very small sonic wave on the other side of the sheet being spread. This wave is evaluated by the ultrasonic receiver on the opposite side. The signal from the stacked sheet ("double sheet") is so weak that it hardly gets to the receiver. The dbk+4 detects missing, single and double sheet.



Functional principle

The working ranges

The new dbk+4 has 3 control inputs by means of which 3 working range can be preselected. The standard working ranges covers the sheet material weight range from 20 g/m2 to 1,200 g/m2. Extremely thin materials such as Bible printing paper with a weight per unit area of less than 20 g/m2 are scanned with the use of the "Thin" setting.
The "Thick" setting is available for paperboard containers and fine-corrugated card. Changes between the working ranges can be undertaken under on-going operations. A Teach-in for the material to be scanned is not necessary.
If the 3 control inputs stay unconnected, then the dbk+4 operates in the standard working range. As such, a very broad material spectrum can be scanned.

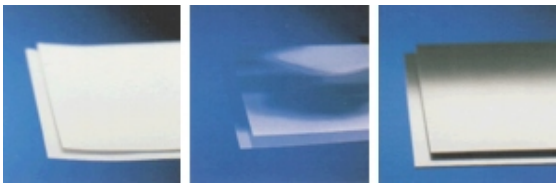
Teach-in

The Teach-in function is additionally available for materials which cannot be scanned with one of the three working ranges. A material Teach-in is done by inserting a single sheet into the double-sheet control. The C3 control input is then placed to logic 1 level for at least 3 seconds. Materials with non-homogeneous elements must be moved during the Teach-in phase so that the dbk+4 detect them. Success with a Teach-in operation is shown by a green LED. The material can now be scanned. The Teach-in makes it possible to scan material from thin Washi to wafers glued with a water film.

Range of uses of dbk+4:

› Sheet-printing machines

- Assembly machines
- Folding machines
- Paper-processing machines
- Manufacturing of solar cells and silicon wafers
- Labelling
- PCB manufacturing



Paper, Film, Sheet material

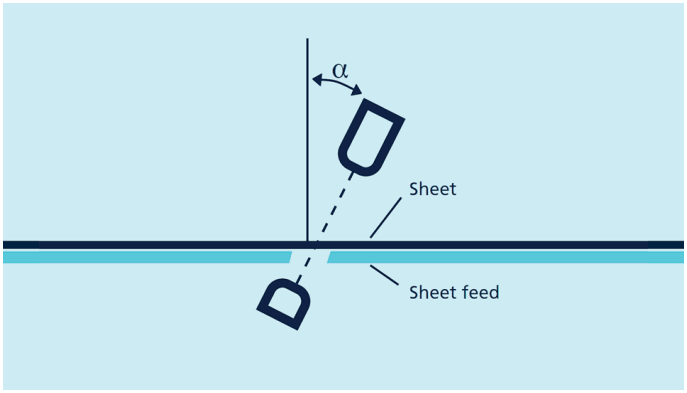
The mounting

The recommended spacing between transmitter and receiver is 40 mm (or 20 mm with dbk+4/M12/CD/M18 ER+S).
If needed, this spacing can be adapted to the local conditions in the 20 to 60 mm range. For the matter of commissioning, this can be done by means of a simple Teach-in or with the LinkControl parameterisation software.

Double-sheet control

Material-conditioned fitting position

With papers and thin films, the double-sheet control is effected perpendicularly to the material; flapping does not impair the function. In the case of fine-corrugated card, thin sheet metal, wafers or thicker plastic films (e. g. credit cards), the dbk+4 should to be mounted at a specific angle of inclination α to the material running through.



Fine-corrugated card can be optimally dimensioned at an inclination of α ≥ 35°, thin sheet metal or thicker plastic films at 27° and wafers at an angle of 11°

The free-run mode

The dbk+4 operates as standard in the free-run mode. This means that the dbk+4 cyclically carries out measurements at a high measuring rate. Under ongoing operations, the working range can be changed and a teach-in carried out by means of the C1 to C3 control inputs.

	C1	C2	C3
Standard	0	0	0
Thick	0	1	0
Thin	1	0	0
Teach-in mode	1	1	0
Teach-in	1	1	1

Free-run mode – selection of the working range

The trigger mode

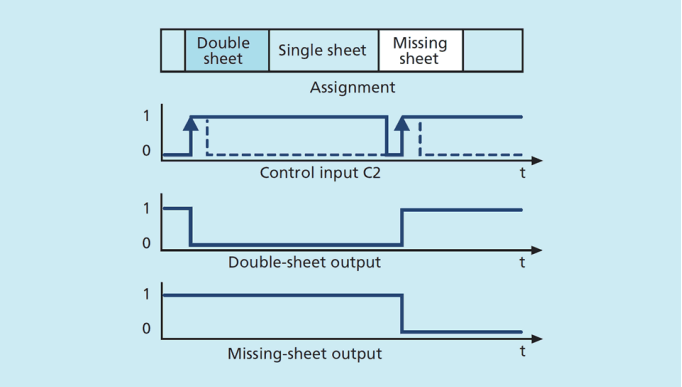
Should, on the other hand, measurements be undertaken in applications with continous feed, then an external trigger signal can trigger a measurement. This function is parameterised with the aid of the LinkControl software. A choice can be made between edge trigger and level trigger. The C2 control input then assumes the function of the trigger input (tr).

	C1	C2	C3
Standard	0	tr	0
Thin	0	tr	1

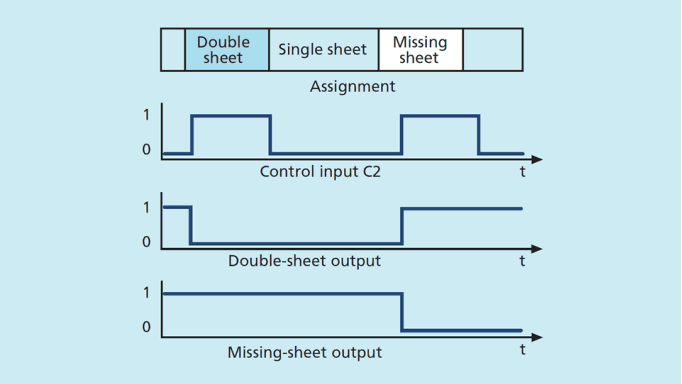
	C1	C2	C3
Teach-in mode	1	tr	0
Teach-in	1	tr	1

Trigger mode – selection of the working range

Under ongoing operations, the working range can be changed by means of the C3 control input.



Trigger mode – edge-controlled



Trigger mode – level-controlled

Support through LinkControl

dbk+4 can be comprehensively parameterised with the aid of the LinkControl software. To this end, the dbk+4 is connected to the LCA-2 LinkControl adapter. Using the LinkControl software, a USB cable connects the LCA-2 to the PC.

The following parameters can be individually adapted:

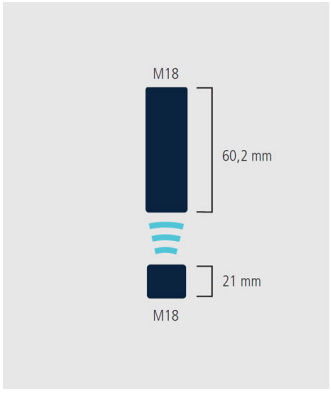
- Spacing between transmitter and receiver
- Double sheet - NOC/NCC
- Single sheet or missing sheet NOC/NCC
- Trigger mode on/off
- Edge-controlled trigger: falling/ rising edge

› Level-controlled trigger: high/low active
› Switch-on delay for detecting double sheet
› Switch-off delay for detecting double sheet
› Threshold values for the working ranges

Four housing variants

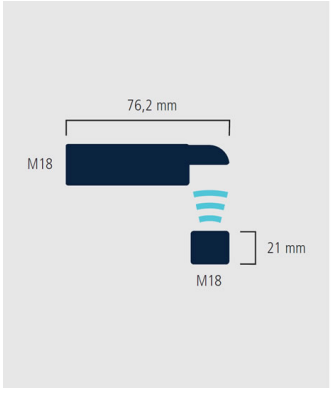
Four housing variants cover all imaginable fitting positions.

a) Standard: dbk+4/3CDD/M18 E+S



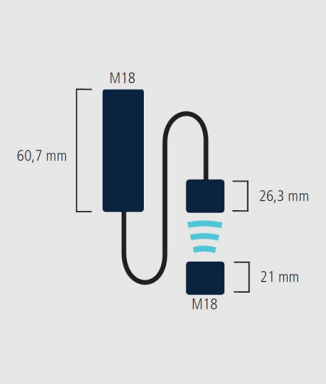
The standard: receiver and all the evaluation electronics are housed in an M18 threaded sleeve, which is only 60.2 mm long. The transmitter is housed in an M18x21 mm threaded sleeve and a 2-pin plug connects it to the receiver.

b) Receiver with 90° angular head: dbk+4/WK/3CDD/M18 E+S



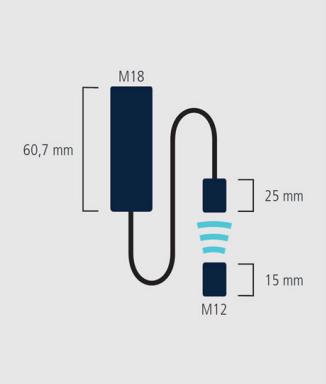
As with the standard, but here the receiver is arranged at right angles to the M18 threaded sleeve.

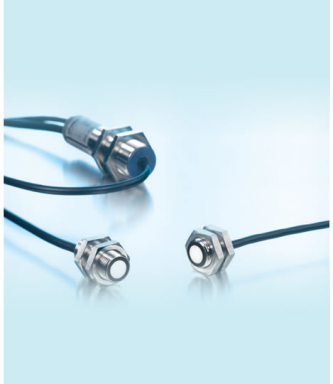
dbk+4/M18/3CDD/M18 E+S



In the case of cramped fitting positions, 2 variants are available. They feature transmitter and receiver outsourced in either short M18 or M12 threaded sleeves and the receivers connected with double shielding cables to the evaluation electronics.

dbk+4/M12/3CDD/M18 E+S

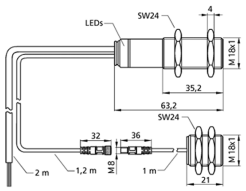




The M12-heads variant has an optimum spacing of 20 mm between transmitter and receiver.

dbk+4/3BEE/M18 E+S

scale drawing



detection zone

2 x npn

design	cylindrical M18
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

dbk+4/3BEE/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

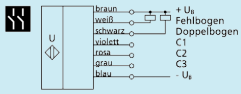
inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	130 g
further versions	90° angular head swapped-out transmitter/receiver single transmitter/receiver
further versions	dbk+4/WK/3BEE/M18 E+S dbk+4/M18/3BEE/M18 E+S dbk+4/Sender/M18/K1 dbk+4/Empf/3BEE/M18

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected

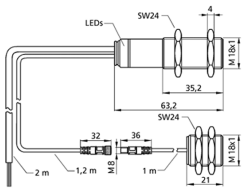
dbk+4/3BEE/M18 E+S

documentation (download)

pin assignment	
order no.	dbk+4/3BEE/M18 E+S

dbk+4/3CDD/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

dbk+4/3CDD/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	130 g
further versions	90° angular head swapped-out transmitter/receiver single transmitter/receiver
further versions	dbk+4/WK/3CDD/M18 E+S dbk+4/M18/3CDD/M18 E+S dbk+4/Sender/M18/K1 dbk+4/Empf/3CDD/M18

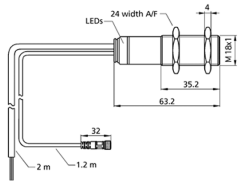
technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected

dbk+4/3CDD/M18 E+S

documentation (download)	
pin assignment	
order no.	dbk+4/3CDD/M18 E+S

dbk+4/Empf/3BEE/M18

scale drawing



detection zone

2 x npn

design	cylindrical M18
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1.2 m PUR cable with M8 initiator plug

dbk+4/Empf/3BEE/M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

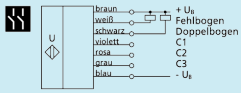
inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	100 g
further versions	90°-Winkelkopf ausgelagerter Sender/Empfänger
further versions	dbk+4/Empf/WK/3BEE/ M18 dbk+4/Empf/M18/3BEE/ M18

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

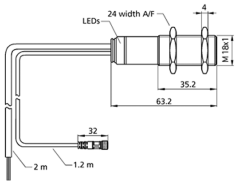
dbk+4/Empf/3BEE/M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/3BEE/M18

dbk+4/Empf/3CDD/M18

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1.2 m PUR cable with M8 initiator plug

dbk+4/Empf/3CDD/M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

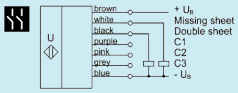
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	100 g
further versions	90° angular head swapped-out transmitter/receiver different cable length
further versions	dbk+4/Empf/WK/3CDD/ M18 dbk+4/Empf/M18/3CDD/ M18 dbk+4/Empf/3CDD/M18/ K7K2

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

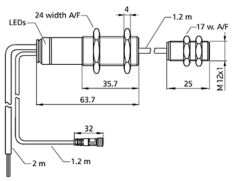
dbk+4/Empf/3CDD/M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/3CDD/M18

dbk+4/Empf/M12/3BEE/ M18

scale drawing



detection zone

2 x npn

design	cylindrical M12 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	5 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1 m PUR cable with M8 initiator plug to the transmitter, 1.2 m PVC cable to the swapped out receiver

dbk+4/Empf/M12/3BEE/ M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

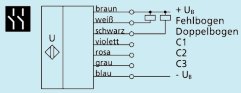
inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 40 mm; optimal: 20 mm ± 2 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	140 g

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

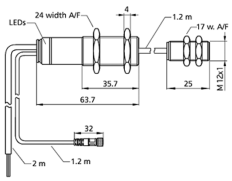
dbk+4/Empf/M12/3BEE/ M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/M12/3BEE/ M18

dbk+4/Empf/M12/3CDD/ M18

scale drawing



detection zone

2 x pnp

design	cylindrical M12 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	5 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1 m PUR cable with M8 initiator plug to the transmitter, 1.2 m PVC cable to the swapped out receiver

dbk+4/Empf/M12/3CDD/ M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

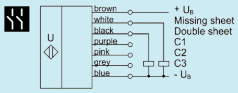
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 40 mm; optimal: 20 mm ± 2 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	140 g

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

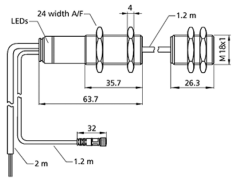
dbk+4/Empf/M12/3CDD/ M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/M12/3CDD/ M18

dbk+4/Empf/M18/3BEE/ M18

scale drawing



detection zone

2 x npn

design	cylindrical M18 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1 m PUR cable with M8 initiator plug to the transmitter, 1.2 m PVC cable to the swapped out receiver

dbk+4/Empf/M18/3BEE/ M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

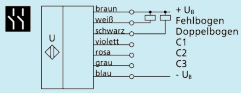
inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	135 g

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

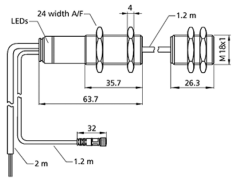
dbk+4/Empf/M18/3BEE/ M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/M18/3BEE/ M18

dbk+4/Empf/M18/3CDD/ M18

scale drawing



detection zone

2 x pnp

design	cylindrical M18 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1 m PUR cable with M8 initiator plug to the transmitter, 1.2 m PVC cable to the swapped out receiver

dbk+4/Empf/M18/3CDD/ M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

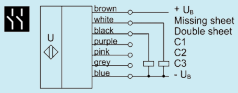
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	135 g

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver for ultrasonic double sheet control distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

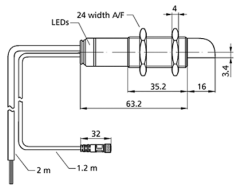
dbk+4/Empf/M18/3CDD/ M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/M18/3CDD/ M18

dbk+4/Empf/WK/3BEE/ M18

scale drawing



detection zone

2 x npn

design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected 90° angular head

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1.2 m PUR cable with M8 initiator plug

dbk+4/Empf/WK/3BEE/ M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

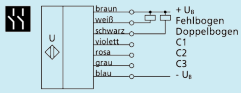
inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	100 g

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected 90° angular head

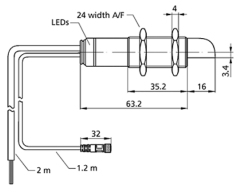
dbk+4/Empf/WK/3BEE/ M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/WK/3BEE/ M18

dbk+4/Empf/WK/3CDD/ M18

scale drawing



detection zone

2 x pnp

design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected 90° angular head

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1.2 m PUR cable with M8 initiator plug

dbk+4/Empf/WK/3CDD/ M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

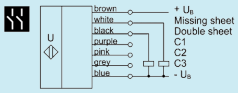
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	100 g

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected 90° angular head

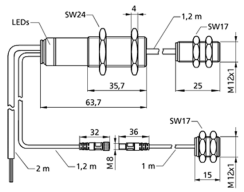
dbk+4/Empf/WK/3CDD/ M18

documentation (download)

pin assignment	
order no.	dbk+4/Empf/WK/3CDD/ M18

dbk+4/M12/3BEE/M18 E+S

scale drawing



detection zone

2 x npn

design	cylindrical M12 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	5 mm in front of transmitter and receiver

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder; zum ausgelagerten Empfangswandler: 1,2 m PVC-Kabel

dbk+4/M12/3BEE/M18 E+S

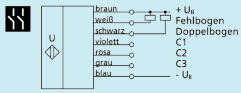
outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 40 mm; optimal: 20 mm ± 2 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	160 g
further versions	single transmitter/receiver
further versions	dbk+4/Sender/ M12/K1 dbk+4/Empf/M12/3BEE/ M18

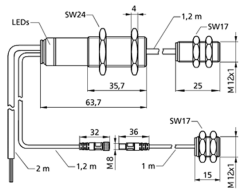
technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

dbk+4/M12/3BEE/M18 E+S

documentation (download)	
pin assignment	
order no.	dbk+4/M12/3BEE/M18 E+S

dbk+4/M12/3CDD/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M12 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	5 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder; zum ausgelagerten Empfangswandler: 1,2 m PVC-Kabel

dbk+4/M12/3CDD/M18 E+S

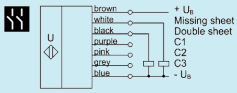
outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 40 mm; optimal: 20 mm ± 2 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	160 g
further versions	single transmitter/receiver
further versions	dbk+4/Sender/ M12/K1 dbk+4/Empf/M12/3CDD/ M18

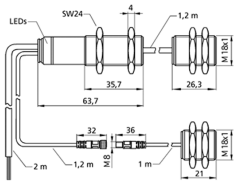
technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer M12

dbk+4/M12/3CDD/M18 E+S

documentation (download)	
pin assignment	
order no.	dbk+4/M12/3CDD/M18 E+S

dbk+4/M18/3BEE/M18 E+S

scale drawing



detection zone

2 x npn

design	cylindrical M18 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder; zum ausgelagerten Empfangswandler: 1,2 m PVC-Kabel

dbk+4/M18/3BEE/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

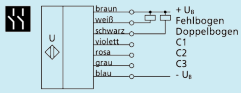
inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	single transmitter/receiver
further versions	dbk+4/Sender/M18/K1 dbk+4/Empf/M18/3BEE/ M18

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

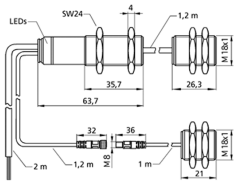
dbk+4/M18/3BEE/M18 E+S

documentation (download)

pin assignment	
order no.	dbk+4/M18/3BEE/M18 E+S

dbk+4/M18/3CDD/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M18 with a swapped-out ultrasonic transducer
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

dbk+4/M18/3CDD/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

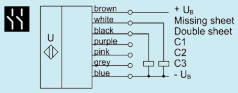
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	165 g
further versions	single transmitter/receiver
further versions	dbk+4/Sender/M18/K1 dbk+4/Empf/M18/3CDD/ M18

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected swapped-out ultrasonic transducer

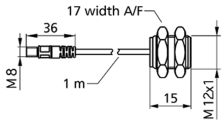
dbk+4/M18/3CDD/M18 E+S

documentation (download)

pin assignment	
order no.	dbk+4/M18/3CDD/M18 E+S

dbk+4/Sender/ M12/K1

scale drawing



detection zone

design	cylindrical M12
operating mode	double sheet control
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected M12

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

transmitter cable	1 m PUR cable with M8 initiator plug

housing

transmitter/receiver spacing	20 - 40 mm; optimal: 20 mm ± 2 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	20 g

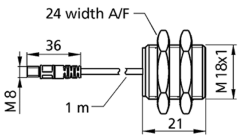
dbk+4/Sender/ M12/K1

technical features/characteristics	
controls	not necessary
scope for settings	not necessary
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected M12

documentation (download)	
order no.	**dbk+4/Sender/ M12/K1**

dbk+4/Sender/M18/K1

scale drawing



detection zone

design	cylindrical M18
operating mode	double sheet control
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

transmitter cable	1 m PUR cable with M8 initiator plug

housing

transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	30 g
further versions	different cable length
further versions	dbk-4/Sender/M18/K2

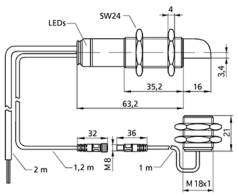
dbk+4/Sender/M18/K1

technical features/characteristics	
controls	not necessary
scope for settings	not necessary
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected

documentation (download)	
order no.	**dbk+4/Sender/M18/K1**

dbk+4/WK/3BEE/M18 E+S

scale drawing



detection zone

2 x npn

design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected 90° angular head

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

dbk+4/WK/3BEE/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 750 ms

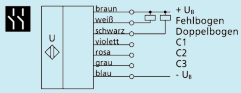
inputs	
description	< -U_B+6 V: logic 1; > -U_B+10 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	130 g
further versions	single transmitter/receiver
further versions	dbk+4/Sender/M18/K1 dbk+4/Empf/WK/3BEE/ M18

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected 90° angular head

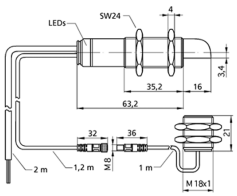
dbk+4/WK/3BEE/M18 E+S

documentation (download)

pin assignment	
order no.	dbk+4/WK/3BEE/M18 E+S

dbk+4/WK/3CDD/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M18 with radially-arranged ultrasonic transducer (90° angular head)
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected 90° angular head

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

dbk+4/WK/3CDD/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs in trigger mode, 2.5 ms in free-run mode
delay prior to availability	< 300 ms

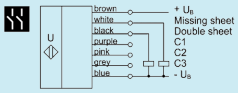
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

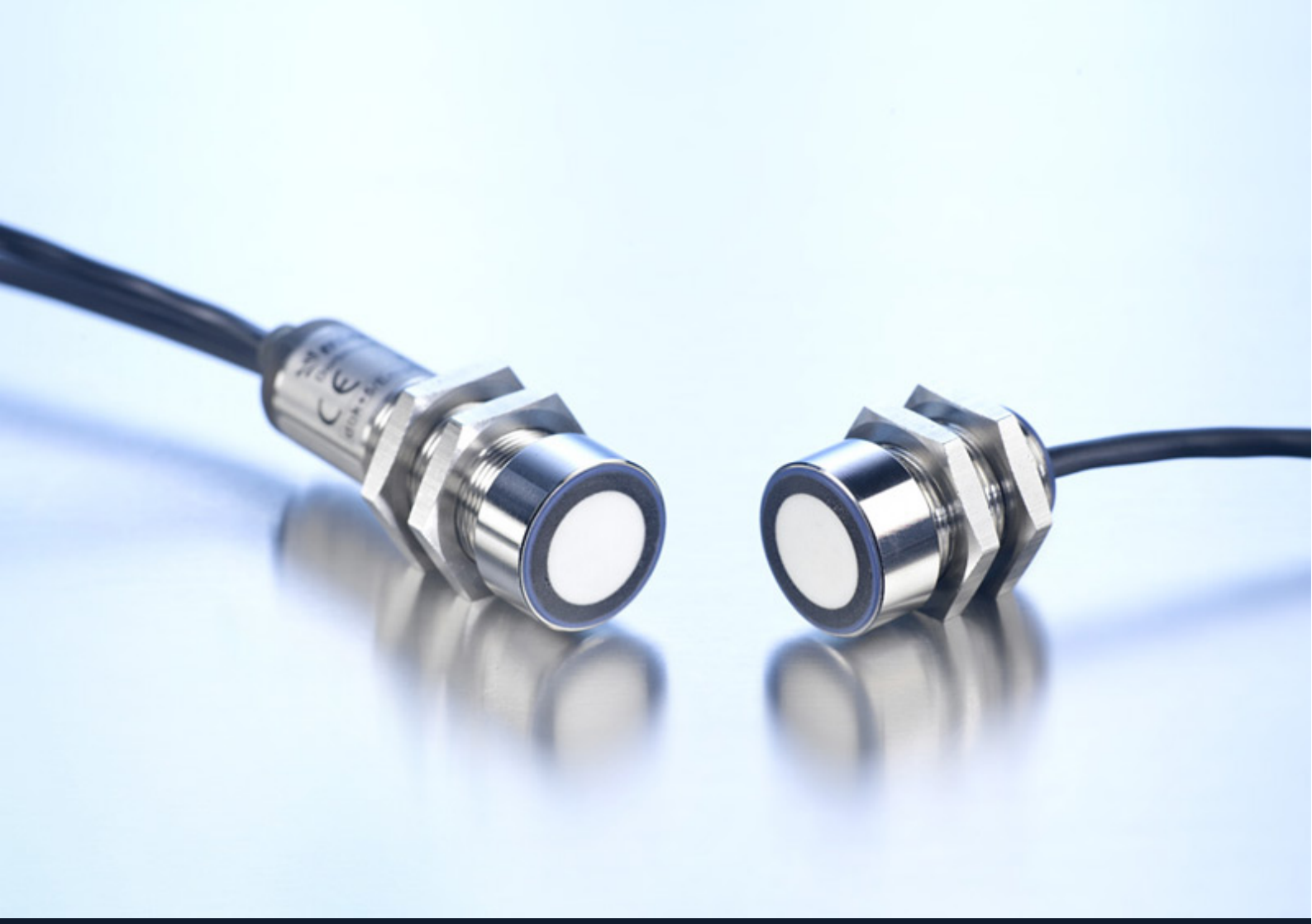
housing	
transmitter/receiver spacing	20 - 60 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	130 g
further versions	single transmitter/receiver
further versions	dbk+4/Sender/M18/K1 dbk+4/Empf/WK/3CDD/ M18

technical features/characteristics	
controls	control input
scope for settings	working range selection via control inputs Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected 90° angular head

dbk+4/WK/3CDD/M18 E+S

documentation (download)

pin assignment	
order no.	dbk+4/WK/3CDD/M18 E+S



The dbk+5 extends the area of application of double sheet controls to heavy carton, corrugated cardboard, and plastic sheets.

HIGHLIGHTS

- High-performance ultrasonic double-sheet control › especially for the probing of corrugated cardboard as well as plastic plates several mm thick
- 3 control inputs › for Teach-in, trigger, and external sensitivity settings for the material
- Teach-in option › e.g. for probing plates stuck together with an oil film
- Compact design in M18 x 1 threaded tube

BASICS

- Reliable detection of single and double sheets
- No Teach-in needed (plug and play)
- Double-sheet and missing-sheet output
- Working distance between the transmitter and the receiver selectable from 30 to 70 mm
- Trigger option › for applications in warehouse flow
- LinkControl › for configuration of sensors from a PC

Description

The dbk+5 ultrasonic double-sheet control

is designed for scanning thin sheet metal, plastic sheets and corrugated cardboard with thicknesses exceeding the working range of the dbk+4 sensors. The principle behind the operation is the same as for the dbk+4 sensors. The main difference between the systems lies in the materials to the detected. (For further information, see dbk+4.)

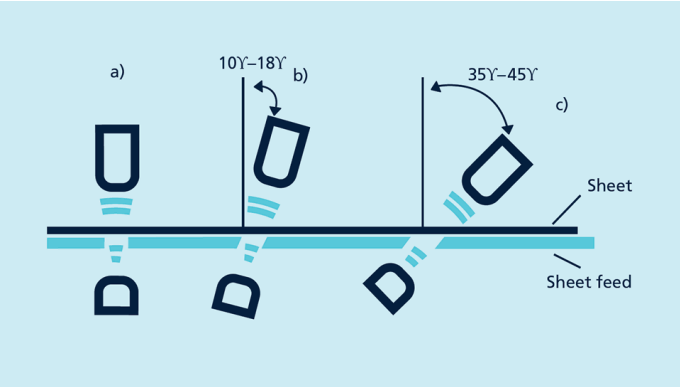
Typical materials

in the range of applications of the dbk+5 are sheet metal up to approx. 2 mm thick (depending on the type of metal), plastic sheets and boards for printed circuits up to a thickness of several millimetres, and coarse corrugated card.

Papers require the sensors to be mounted perpendicular to the passing sheets. But in the case of sheet metal, plastic sheets and boards for printed circuits, it is preferable to mount the dbk+5 at an angle of 10–18° to the passing sheets. The optimum angle should be determined by way of trials. Corrugated cards should be scanned at an angle of 35–45° to the corrugations.

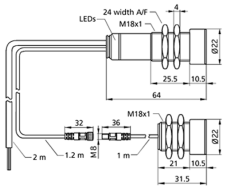
Transmitter and receiver

are housed in M18 x 1 mm threaded sleeves which should be mounted from 30 to 70 mm apart.



dbk+5/3BEE/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

dbk+5/3BEE/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 750 ms

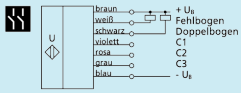
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	150 g
further versions	single transmitter/receiver
further versions	dbk+5/Sender/M18/K1 dbk+5/Empf/3BEE/M18

technical features/characteristics	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected

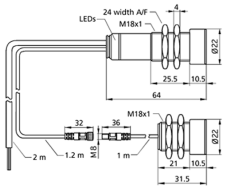
dbk+5/3BEE/M18 E+S

documentation (download)

pin assignment	
order no.	dbk+5/3BEE/M18 E+S

dbk+5/3CDD/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

dbk+5/3CDD/M18 E+S

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 300 ms

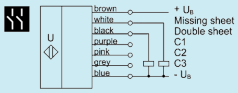
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	150 g
further versions	single transmitter/receiver
further versions	dbk+5/Sender/M18/K1 dbk+5/Empf/3CDD/M18

technical features/characteristics	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected

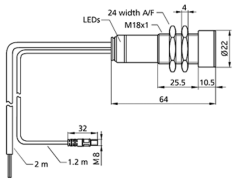
dbk+5/3CDD/M18 E+S

documentation (download)

pin assignment	
order no.	dbk+5/3CDD/M18 E+S

dbk+5/Empf/3BEE/M18

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1.2 m PUR cable with M8 initiator plug

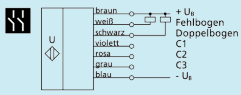
dbk+5/Empf/3BEE/M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: I_{max} = 200 mA (-U_B+2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 750 ms

inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

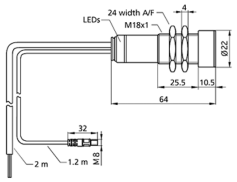
housing	
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C

technical features/characteristics	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

documentation (download)	
pin assignment	
order no.	**dbk+5/Empf/3BEE/M18**

dbk+5/Empf/3CDD/M18

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1.2 m PUR cable with M8 initiator plug

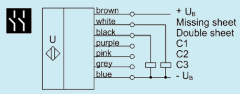
dbk+5/Empf/3CDD/M18

outputs	
output 1	double sheet output npn: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 500 µs im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 300 ms

inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

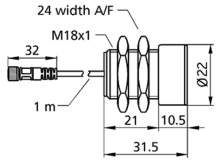
housing	
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C

technical features/characteristics	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected

documentation (download)	
pin assignment	
order no.	**dbk+5/Empf/3CDD/M18**

dbk+5/Sender/M18/K1

scale drawing



detection zone

design	cylindrical M18
operating mode	double sheet control
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

transmitter cable	1 m PUR cable with M8 initiator plug

housing

transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	50 g

technical features/characteristics

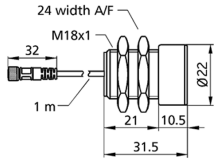
controls	not necessary
scope for settings	not necessary
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected

dbk+5/Sender/M18/K1

documentation (download)	
order no.	dbk+5/Sender/M18/K1

dbk+5/Sender/M18/K2

scale drawing



detection zone

design	cylindrical M18
operating mode	double sheet control
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

transmitter cable	1 m PUR cable with M8 initiator plug

housing

transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	50 g

technical features/characteristics

controls	not necessary
scope for settings	not necessary
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected

dbk+5/Sender/M18/K2

documentation (download)	
order no.	dbk+5/Sender/M18/K2

esp-4: Label and splice sensor compact in a single unit, optionally with M12 sensor heads.

HIGHLIGHTS

› 3 Teach-in methods › to be able to configure the sensor individually for any task

› Response time < 300 µs › for use at high web and label speeds

› Splice detection even for thick band materials

› Variants with very compact transmitters and receivers in the M12 threaded sleeve

BASICS

› Label and splice sensor in a single unit

› 2 switching outputs › for label/splice detection and web break monitoring

› LinkControl › as optional assistance for installation and commissioning

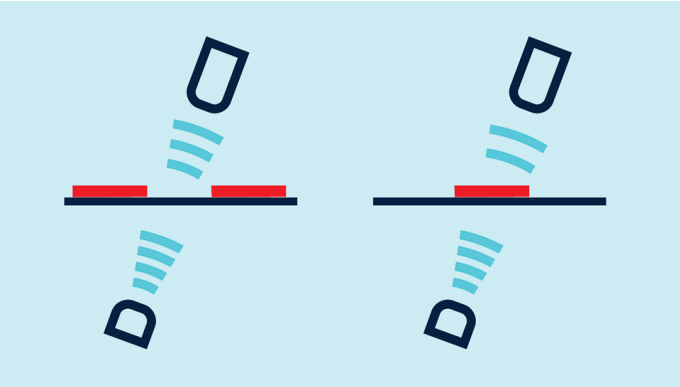
Description

esp-4 – one unit for all cases:

Label and splice sensor in one appliance

With a rapid pulse sequence, an ultrasonic transmitter beams upwards against the backing material. The effect of the sound pulses inducing the backing material to vibrate is for a markedly weakened sonic wave to be emitted on the opposite side.

The receiver receives this sonic wave and analyses it. The backing material signal level is different to that of the label or splice. And this difference in signal is analysed by the esp-4. The difference between backing material and a label or between sheeting and splice can be very slight indeed. In order to differentiate, the esp-4 sensor has to learn the signal level for the backing material or sheeting.

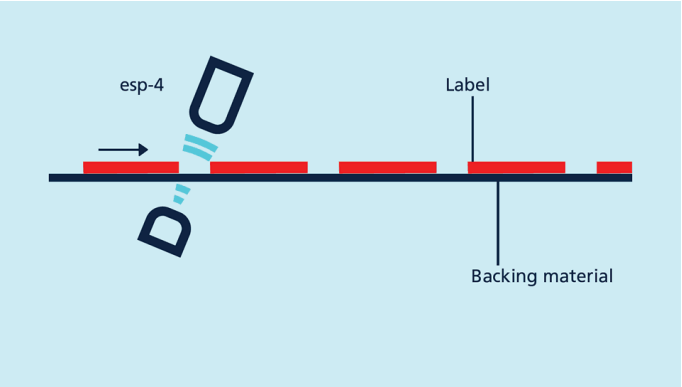


Backing material with label provides an attenuated signal level

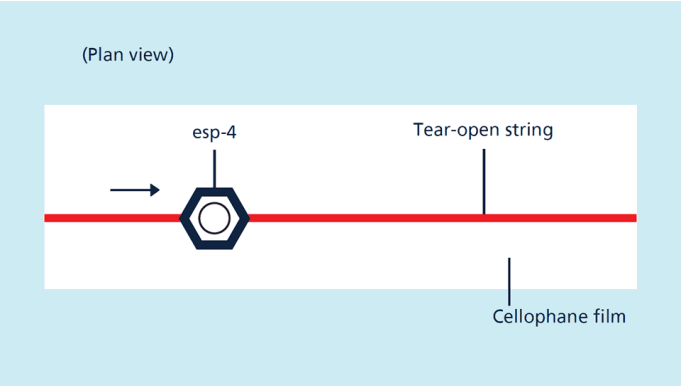
The esp-4 sensors can be used as a label and splice sensor. The 3 Teach-in methods permit the esp-4 sensor to be optimally set for each and every assignment.

A) Dynamic Teach-in of backing material and label

During Teach-in, the backing material with the labels is led at a constant speed through the esp-4 sensor. The esp-4 sensor automatically learns signal levels for the labels and for the gaps between them. This Teach-in method is also suitable for Teach-in of a tear-open string on a cellophane film. Here, during Teach-in, the tear-open string on the cellophane film is moved a number of times through the sensor. This enables the esp-4 to gauge the changing between cellophane film and tear-open string.



esp-4 as label sensor



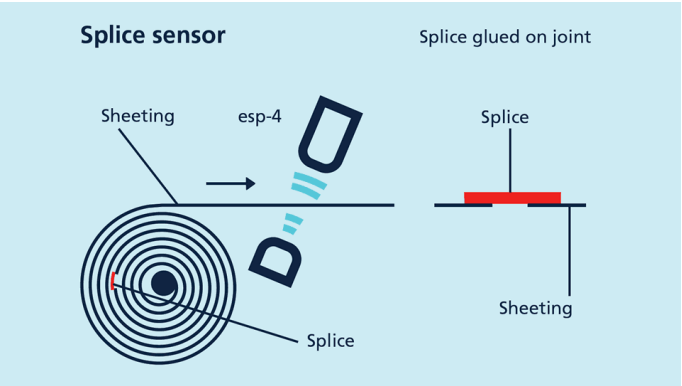
esp-4 as thread sensor

B) Separate Teach-in for backing material and labels

The signal level difference for the backing material and labels might be very slight. In order to still scan labels with very little difference in signals, Teach-in for the signal levels is done separately: Teach-in is first done for the backing material and then for the label on it. The switching threshold then lies between these two signal levels.

C) Teach-in only for sheeting

Sheeting is usually processed from the roll. Then the splice to be detected for setting the esp-4 is somewhere inaccessible in this roll. A separate Teach-in method is available here in which the Teach-in only applies to the sheeting. The esp-4 detects the splice from this difference in sound level and sets its output.



esp-4 as splice sensor

Two housing designs with different ultrasonic frequencies

The esp-4/3CDD/M18 E+S as a receiving transducer integrated directly into the evaluation electronics is typically used for the detection of splices in thick sheetings.

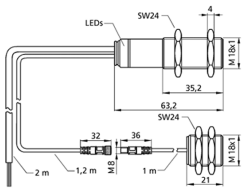
The esp-4/M12/3CDD/M18 E+S has an external receiving transducer. The transmitter and receiver are each housed in M12 threaded sleeves. The variant with M12 sensor heads is preferred for the detection of labels.

With LinkControl

the esp-4 can optionally be parameterised. Measured values can also be shown grafically.

esp-4/3CDD/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	label/splice detection

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

esp-4/3CDD/M18 E+S

outputs	
output 1	switching output label/splice detected pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 600 µs

inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 40 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	recommended mounting angle: ± 15 ° (± 10 ° to ± 45 °) from what is normal for the material
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	130 g
further versions	single transmitter/receiver

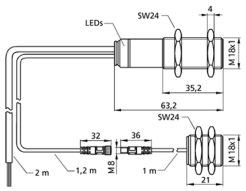
technical features/characteristics	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break

esp-4/3CDD/M18 E+S

documentation (download)	
pin assignment	
order no.	esp-4/3CDD/M18 E+S

esp-4/Empf/3CDD/M18

scale drawing



detection zone

2 x pnp

design	cylindrical M18
operating mode	label/splice detection
particularities	receiver for ultrasonic label/splice sensor

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	400 kHz
blind zone	7 mm in front of transmitter and receiver

electrical data

voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1.2 m PUR cable with M8 initiator plug

esp-4/Empf/3CDD/M18

outputs	
output 1	switching output label/splice detected pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 600 µs

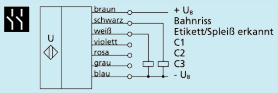
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 40 mm; optimal: 40 mm ± 3 mm
permissible angular deviation	recommended mounting angle: ± 15 ° (± 10 ° to ± 45 °) from what is normal for the material
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	100 g

technical features/characteristics	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break
particularities	receiver for ultrasonic label/splice sensor

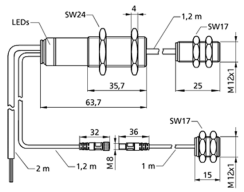
esp-4/Empf/3CDD/M18

documentation (download)

pin assignment	
order no.	esp-4/Empf/3CDD/M18

esp-4/Empf/M12/3CDD/ M18

scale drawing



detection zone

2 x pnp

design	cylindrical M12 with a swapped-out ultrasonic transducer
operating mode	label/splice detection
particularities	receiver for ultrasonic double sheet control swapped-out ultrasonic transducer M12

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	5 mm in front of transmitter and receiver

electrical data

voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	1 m PUR cable with M8 initiator plug to the transmitter, 1.2 m PVC cable to the swapped out receiver

esp-4/Empf/M12/3CDD/ M18

outputs	
output 1	switching output label/splice detected pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 600 µs

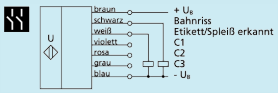
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 30 mm; optimal: 20 mm ± 3 mm
permissible angular deviation	recommended mounting angle: ± 15 ° (± 10 ° to ± 45 °) from what is normal for the material
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	140 g

technical features/characteristics	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break
particularities	receiver for ultrasonic double sheet control swapped-out ultrasonic transducer M12

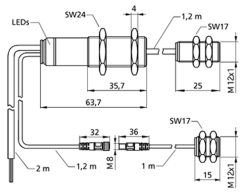
esp-4/Empf/M12/3CDD/ M18

documentation (download)

pin assignment	
order no.	esp-4/Empf/M12/3CDD/ M18

esp-4/M12/3CDD/M18 E+S

scale drawing



detection zone

2 x pnp

design	cylindrical M12 with a swapped-out ultrasonic transducer
operating mode	label/splice detection
particularities	swapped-out ultrasonic transducer M12

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz
blind zone	5 mm in front of transmitter and receiver

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm^2
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder; zum ausgelagerten Empfangswandler: 1,2 m PVC-Kabel

esp-4/M12/3CDD/M18 E+S

outputs	
output 1	switching output label/splice detected pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
output 2	switching output web break pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	< 600 µs

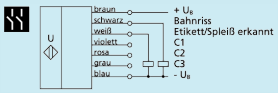
inputs	
description	< -U_B+18 V: logic 1; > -U_B+13 V or control input open: logic 0
input 1	control input
input 2	control input
input 3	control input

housing	
transmitter/receiver spacing	20 - 30 mm; optimal: 20 mm ± 3 mm
permissible angular deviation	recommended mounting angle: ± 15 ° (± 10 ° to ± 45 °) from what is normal for the material
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
max. tightening torque of nuts	M18: 15 Nm, M12: 3 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	160 g
further versions	single transmitter/receiver

technical features/characteristics	
controls	control input
scope for settings	Teach-in via control inputs LCA-2 with LinkControl
indicators	1 x Duo-LED; green: working / red: label/splice detected / flashing red: web break
particularities	swapped-out ultrasonic transducer M12

esp-4/M12/3CDD/M18 E+S

documentation (download)

pin assignment	
order no.	esp-4/M12/3CDD/M18 E+S

The esf-1 fork sensor can detect labels reliably even at high label speeds.

HIGHLIGHTS

- 3 Teach-in methods › for the detection of labels even outside the standard
- Response time < 300 µs: › for use at high web speeds
- Housing in fork format with very compact dimensions
- Quick Teach

BASICS

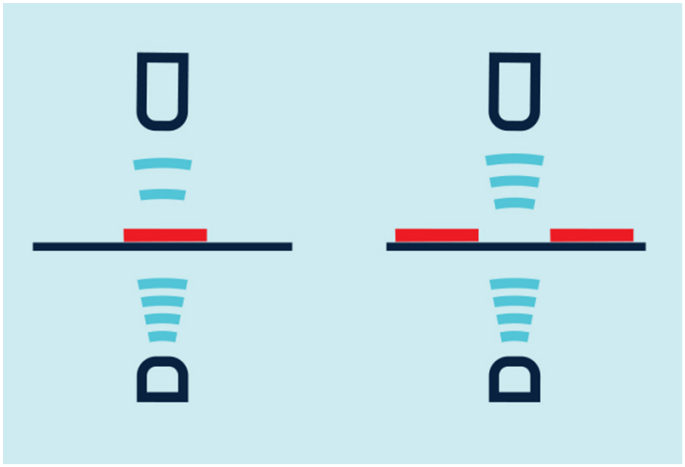
- Label and splice sensor as a fork sensor
- 2 switching outputs › for label/ splice detection and web break monitoring
- 3 LEDs and 1 button on the top of the housing
- Teach-in optionally via button or pin 5
- LinkControl › as optional assistance for installation and commissioning

Description

The functional principle

Labels are guided through the fork. An ultrasonic transmitter in the lower leg of the fork beams a fast sequence of pulses through the backing material. The sound pulses cause the backing material to vibrate such that a greatly attenuated sound save is beamed from the opposite side. The receiver in the upper leg of the fork receives this sound wave.

The backing material transmits a different signal level from the label. This signal difference is evaluated by the esf-1. The signal difference between the backing material and the label can be very slight. To ensure a reliable distinction, the esf-1 has to learn the label.



Backing material with a label provides an attenuated signal level

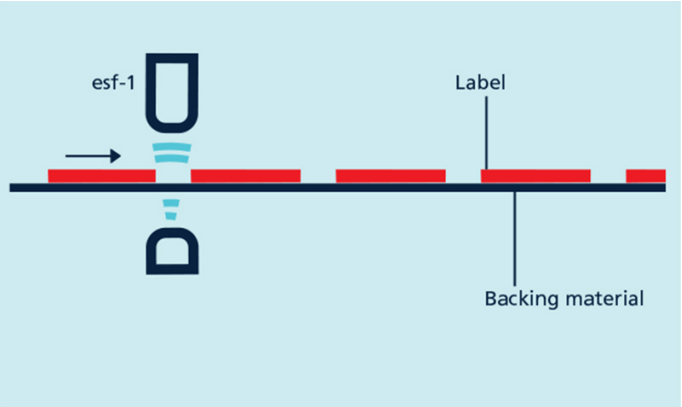
The esf-1

can reliably detect high-transparency, reflective materials as well as metallised labels and labels of any colour. The measurement cycle time automatically self-adjusts to the sound power required. For thin labels and backing materials, the esf-1 can work at its maximum speed, with a response time of < 300 µs.

To be able to detect special labels, for example labels with punches or perforations, there are three different Teach-in methods available.

A) Learn both backing material and label dynamically

During the Teach-in process, the backing material and its labels are guided through the fork at a constant speed. The esf-1 sensor automatically learns the signal level for the labels and for the gaps between the labels. This is the standard Teach-in for labels.



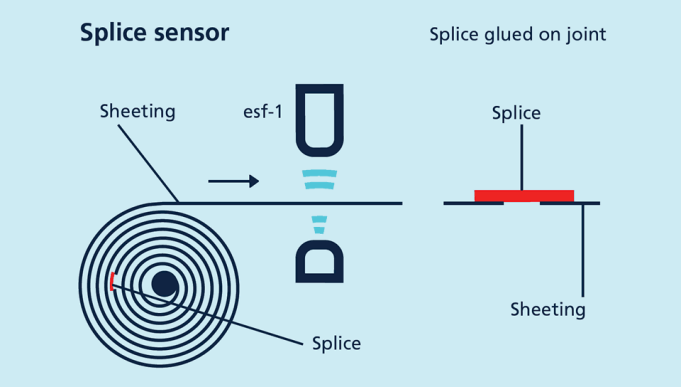
esf-1 as label sensor

B) Separate Teach-in for backing material and labels

The signal level difference for the backing material and labels might be very slight. In order to still scan labels with very little difference in signals, Teach-in for the signal levels is done separately: Teach-in is first done for the backing material and then for the label on it. The switching threshold then lies between these two signal levels.

C) Learn web material only

Web material is generally processed from a roll. The splice to be detected is hidden somewhere in the roll. There is a separate Teach-in method available for this purpose, in which only the sheeting is learned. The esf-1 detects the level difference at the splice and sets its output.



esf-1 as splice sensor

The Teach-in procedure

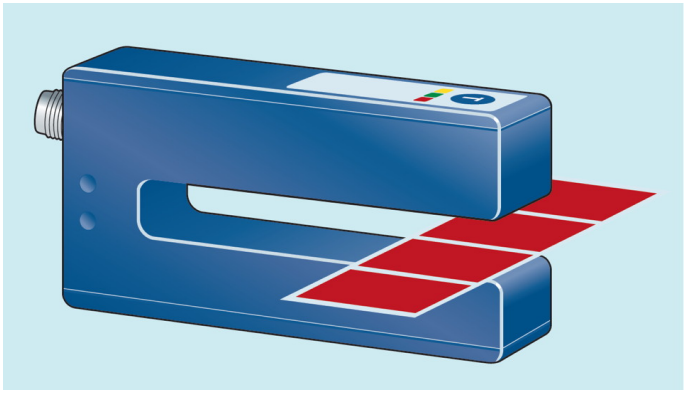
can optionally be carried out with the button on the top of the housing or with pin 5 on the unit's connector.

For QuickTeach

the esf-1 learns the material for the duration that the button is pushed or pin 5 is controlled.

With LinkControl

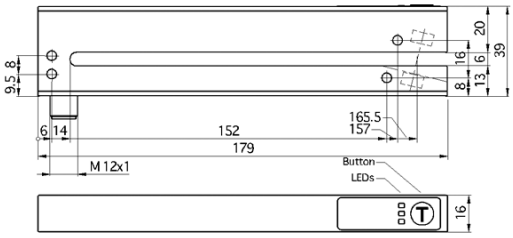
the esf-1 can optionally be parameterised. Measured values can also be shown graphically.



Labels are guided through the fork. The esf-1 reacts to the signal difference between the backing material and the label.

esf-1/15/CDF

scale drawing



detection zone

1 x Push-Pull + 1 x pnp

design	fork-like
operating mode	label/splice detection

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
Leerlaufstromaufnahme	≤ 50 mA
type of connection	5-pin M12 initiator plug

esf-1/15/CDF

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	300 µs up to 2,25 ms, dependent on the material
delay prior to availability	< 300 ms

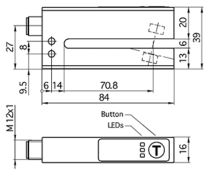
housing	
fork width	6 mm
fork depth	149,5 mm
material	aluminium anodized
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	90 g

technical features/characteristics	
controls	1 Taster Com-Eingang
scope for settings	Teach-in via push-button Teach-in via com input on pin 5 LCA-2 with LinkControl
indicators	1 x LED green: working, 1 x LED yellow: label/splice detected, 1 x LED red: web break

documentation (download)	
pin assignment	
order no.	**esf-1/15/CDF**

esf-1/CDF

scale drawing



detection zone

1 x Push-Pull + 1 x pnp

design	fork-like
operating mode	label/splice detection

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
Leerlaufstromaufnahme	≤ 50 mA
type of connection	5-pin M12 initiator plug

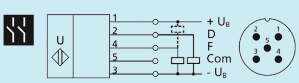
esf-1/CDF

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
output 2	switching output pnp: I_{max} = 200 mA (U_B-2V) NOC/NCC adjustable, short-circuit-proof
response time	300 µs up to 2,25 ms, dependent on the material
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input

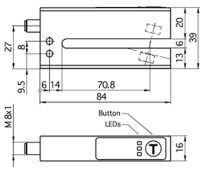
housing	
fork width	6 mm
fork depth	67 mm
material	aluminium anodized
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	90 g
further versions	larger fork width/depth
further versions	esf-1/15/CDF

technical features/characteristics	
controls	1 Taster Com-Eingang
scope for settings	Teach-in via push-button Teach-in via com input on pin 5 LCA-2 with LinkControl
indicators	1 x LED green: working, 1 x LED yellow: label/splice detected, 1 x LED red: web break

documentation (download)	
pin assignment	
order no.	**esf-1/CDF**

esf-1/CF

scale drawing



detection zone

1 x Push-Pull

design	fork-like
operating mode	label/splice detection

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	500 kHz

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
Leerlaufstromaufnahme	≤ 50 mA
type of connection	4-pin M8 initiator plug

esf-1/CF

outputs	
output 1	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
response time	300 µs up to 2,25 ms, dependent on the material
delay prior to availability	< 300 ms

inputs	
input 1	com input

housing	
fork width	6 mm
fork depth	67 mm
material	aluminium anodized
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	90 g

technical features/characteristics	
controls	1 push-button
scope for settings	Teach-in via push-button Teach-in via com input on pin 2 LCA-2 with LinkControl
indicators	1 x LED green: working, 1 x LED yellow: label/splice detected, 1 x LED red: web break

documentation (download)	
pin assignment	
order no.	**esf-1/CF**

The bks+ edge sensor facilitates the contact-free web edge scanning of foils, paper and other soundimpermeable materials.

HIGHLIGHTS

- 2 housing designs › with 30 and 60 mm fork width
- Available in 12 mm or 40 mm measurement range
- IO-Link interface › for support of the new industry standard
- 0.01 mm to 0.02 mm resolution
- Very compact housing dimensions

BASICS

- Contact-free detection of the path edge › for regulation of the web path
- Analogue output 4–20 mA and 0–10 V › switchable between current and voltage output
- 3 LEDs and 1 button on the top of the housing
- Parameterisable with LinkControl
- Robust metal housing

Description

The bks+ ultrasonic web edge sensor

is a fork sensor for scanning the edges of sound-impermeable materials such as foil or paper.
This is why the bks+ is ideally suited for the web control of high-transparency foils, light-sensitive materials, materials with greatly varying transparency and paper subject to high paper dust loads.

The functional principle

Both transducer and receiver are placed in a single, slim fork housing. The transducer in the lower leg is emits short, cyclical sound pulses. These are detected by the ultrasonic receiver in the upper leg of the fork. A material embedded in the fork covers the sound gap and thereby dampens the receiving signal in depending on the coverage. This is analysed by internal electronics.
An analogue signal is output depending of coverage, resp. data word via IO-Link.

1 Push-Pull switching output with pnp or npn switching technology and 1 analogue output 4–20 mA and 0–10 V

The working range for the bks+3/FIU is 12 mm and for the bks+6/FIU is 40 mm.

Using the Teach-in button

on the upper side of the edge sensor sets the zero point for the local edge. This calibration can be done in two ways:

- clear the fork completey of any web material,
- push the button for approx. 3 seconds
- cover the fork sensor completely and push the button briefly (< 1s). Ready. Or
- adjust the path edge within the fork to both markings so that 50 % of the sound gap is covered,
- then push the button for approx. 6 seconds. Ready.

The edge sensor bks+3 has a fork width of 30 mm and a fork depth of 43 mm. The bks+6 web edge sensor has a fork width of 60 mm and a fork depth of 73 mm. Other fork widths and depths are available upon request. The housing side is equipped with two consistent bores for the edge sensor's mounting. The electrical connection is established via an M12 circular plug.

Three LEDs

show the position of the web material within the fork. When using light-sensitive materials, the LEDs can be switched off.

With a fork width of only 30 mm and 60 mm respectively and a depth of 33 mm and 73 mm respectively, it has a very compact design. Its working range of 12 mm and 40 mm respectively and its high accuracy of 0.1 mm permit a wide variety of applications.

Swichting over

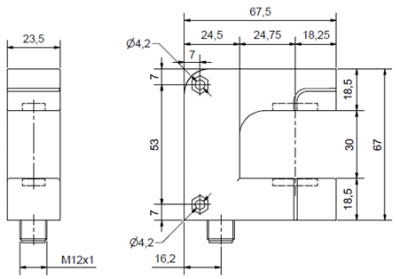
between current and voltage outputs is done by using the button or LinkControl. The bks+ is preset and can be used immediately. Optionally, it can also be comprehensively parameterised using LinkControl adapter LCA-2 (see accessories).

IO-Link version 1.1

is integrated as standard.

bks+3/FIU

scale drawing



detection zone

1 x Push-Pull + 1 x analogue 4-20 mA / 0-10 V

design	fork-like
operating mode	path edge detection
particularities	IO-Link

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	170 kHz
blind zone	5 mm in front of transmitter and receiver
resolution/sampling rate	0,01 mm
reproducibility	± 0,1 mm bei konstanten Umgebungsbedingungen

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA
type of connection	5-pin M12 initiator plug

bks+3/FIU

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
response time	5,1 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

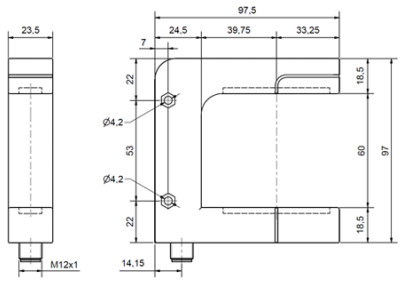
housing	
fork width	30 mm
fork depth	43 mm
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	190 g
further versions	larger fork width/depth

technical features/characteristics	
controls	1 push-button
scope for settings	Teach-in via push-button LCA-2 with LinkControl IO-Link
particularities	IO-Link

documentation (download)	
order no.	**bks+3/FIU**

bks+6/FIU

scale drawing



detection zone

1 x Push-Pull + 1 x analogue 4-20 mA / 0-10 V

design	fork-like
operating mode	path edge detection
particularities	IO-Link

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	310 kHz
blind zone	5 mm in front of transmitter and receiver
resolution/sampling rate	0,02 mm
reproducibility	± 0,1 mm bei konstanten Umgebungsbedingungen

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 60 mA
type of connection	5-pin M12 initiator plug

bks+6/FIU

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
output 2	Schaltausgang Push-Pull, U_B-3 V, -U_B+3 V,I_{max} = 100 mA
response time	6 ms
delay prior to availability	< 300 ms

inputs	
input 1	com input synchronisation input teach-in input

housing	
fork width	60 mm
fork depth	73 mm
material	zinc die-casting, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	280 g

technical features/characteristics	
controls	1 push-button
scope for settings	Teach-in via push-button LCA-2 with LinkControl IO-Link
particularities	IO-Link

documentation (download)	
order no.	**bks+6/FIU**

The bks edge sensor facilitates the contact-free web edge scanning of foils, paper and other soundimpermeable materials.

HIGHLIGHTS

- Compact design with only 30 mm fork width
- 0.025 mm resolution
- 0.1 mm relative accuracy
- 4 ms response time
- 8 mm working range

BASICS

- Contact-free detection of the path edge
- Analogue output 4–20 mA and 0–10 V
- 3 LEDs and 1 button on the top of the housing
- Parameterisable with LinkControl
- Robust metal housing
- for harsh usage conditions

Description

The bks ultrasonic edge sensor

is a fork sensor for scanning the edges of sound-impermeable materials such as foil or paper.
This is why the bks is ideally suited for the web control of highly transparent foils, light-sensitive materials, materials with greatly varying transparency and paper subject to high paper dust loads.

The functional principle

The fork's lower leg is equipped with an ultrasonic transmitter which cyclically emits short sound impulses, which are detected by the ultrasonic receiver arranged in the upper fork leg. Material passing through the fork covers this sound path and thus attenuates the receiving signal depending on the coverage, which is evaluated by the internal electronics. An analogue signal is output in dependence of the coverage degree.

The analogue output can both deliver voltage 0–10 V as well as current 4–20 mA.

The operating range amounts to 8 mm (±4 mm).

Via the Teach-in button

on the edge sensor's top, the zero position of the edge to be controlled is set. There are two options for calibration:

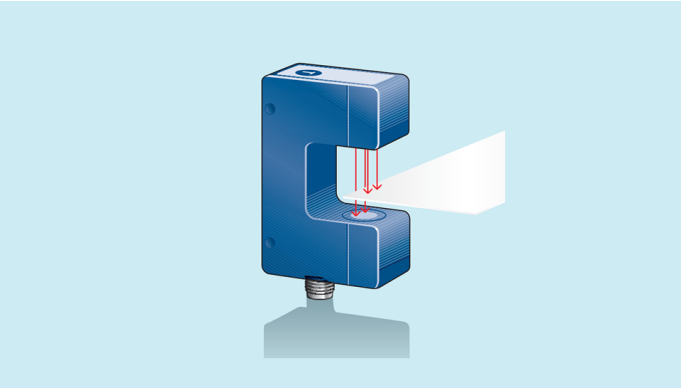
- completely freeing the fork from the web material,
- pressing the button for approx. 3 seconds until the two yellow LEDs flash alternately. Ready. Or
- aligning the web edge inside the fork with the two marks to ensure a 50% coverage of the sound path,
- then pressing the button for approx. 10 seconds until the two yellow LEDs remain lit. Ready.

The bks edge sensor has a fork width of 30 mm and a fork depth of 33 mm. Other fork widths and depths are available upon request. The housing side is equipped with two consistent bores for the edge sensor's mounting. The electrical connection is established via an M12 circular connector.

Three LEDs

indicate the position of the web material inside the fork. For the application of light-sensitive materials, the LEDs can also be switched off.

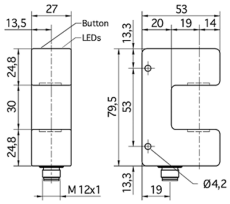
The bks is pre-set and immediately ready for operation. Optionally, it can also be comprehensively parameterised with the help of the LinkControl adapter LCA-2 and LinkControl software (see accessories).



With a fork width of only 30 mm and a depth of 33 mm, it has a very compact design. Its working range of 8 mm and its high accuracy of 0.1 mm permit a wide variety of applications.

bks-3/CIU

scale drawing



detection zone

1 x analogue 4-20 mA + 0-10 V

design	fork-like
operating mode	path edge detection

ultrasonic -specific

means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver
resolution/sampling rate	0.025 mm
reproducibility	± 0.15 %
accuracy	± 0,1 mm bei konstanten Umgebungsbedingungen

electrical data

operating voltage U_B	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 50 mA
type of connection	5-pin M12 initiator plug

bks-3/CIU

outputs	
output 1	analogue output current: 4-20 mA / voltage: 0-10 V, short-circuit-proof switchable rising/falling
response time	2 ms
delay prior to availability	< 300 ms

inputs	
description	deactivated: U_E >9 V DC; activated: < U_E < 4 V DC or control input open
input 1	com input enable input

housing	
fork width	30 mm
fork depth	33 mm
material	aluminium anodized
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	190 g
further versions	larger fork width/depth

technical features/characteristics	
controls	1 push-button
scope for settings	Teach-in via push-button LCA-2 with LinkControl
Synchronisation	no
multiplex	no
indicators	1 x LED green: center position, 2 x LED yellow: deviation from center position

documentation (download)	
pin assignment	
order no.	**bks-3/CIU**

The LCA-2 facilitates the comfortable setting of numerous microsonic sensor series (nice to have).

HIGHLIGHTS

› Three-digit digital display › for the display of measured distance values in mm or cm

› TeachBox with four-button operation › for programming of the sensor without a PC

› LinkCopy function › for copying the sensor settings from one sensor to another without a PC

› Uniform microsonic teach-in for all microsonic sensors › to keep easy things easy

BASICS

› Handy adapter › for the programming of ultrasonic sensors

› USB interface › for connection to a PC

› T plug › to insert the adapter between the connector cable and the sensor

› LinkControl software › free download of the current version on the Internet

› Backwards-compatible › so sensors that have been in the field for a long time can still be programmed

› Future-proof › since the LinkControl adapter will also support future generations of sensors

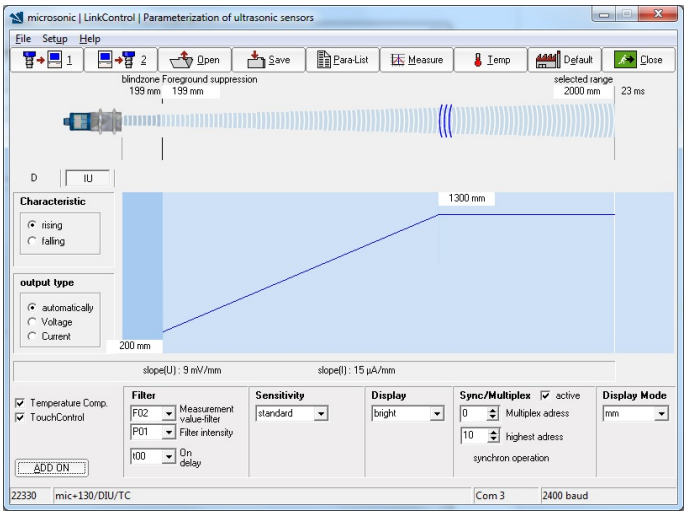
Description

The LinkControl adapter LCA-2

is equipped with a USB interface for connection to a PC or laptop.

With the LinkControl software,

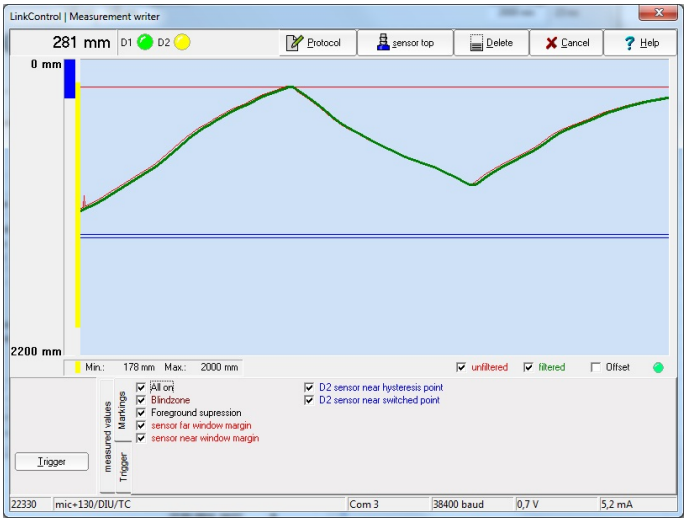
the ultrasonic sensors of the mic+, mic-, pico+, lpc, nano, lcs+, lcs, ucs, crm+, hps+, bks+, bks, dbk+, esp, esf series can be parameterised under Windows®.



LinkControl software: input mask

The current measurement values

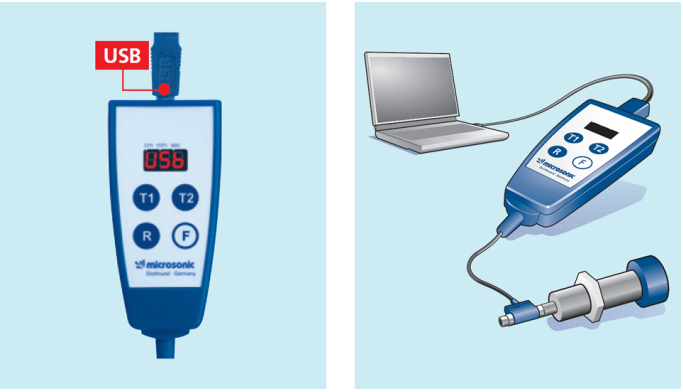
of the ultrasonic sensors can be graphically visualised in the LinkControl software in the form of three different output graphics.



LinkControl software: measurement plotter

The LinkCopy function

allows the download of parameters from the sensor to the LCA-2 and the subsequent upload of these parameters to a different sensor. This way, sensor settings can be conveniently copied from one sensor to the other.

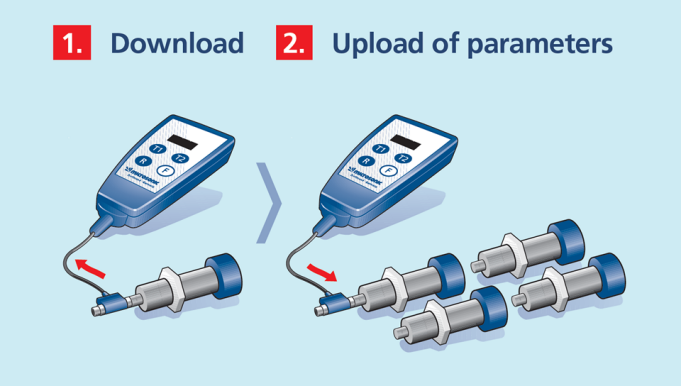


USB interface for PC connection

Offline programming within LinkCopy

With some sensor series, the sensor settings copied to the LCA-2 can be directly indicated and edited via the digital display before being written back into a sensor.

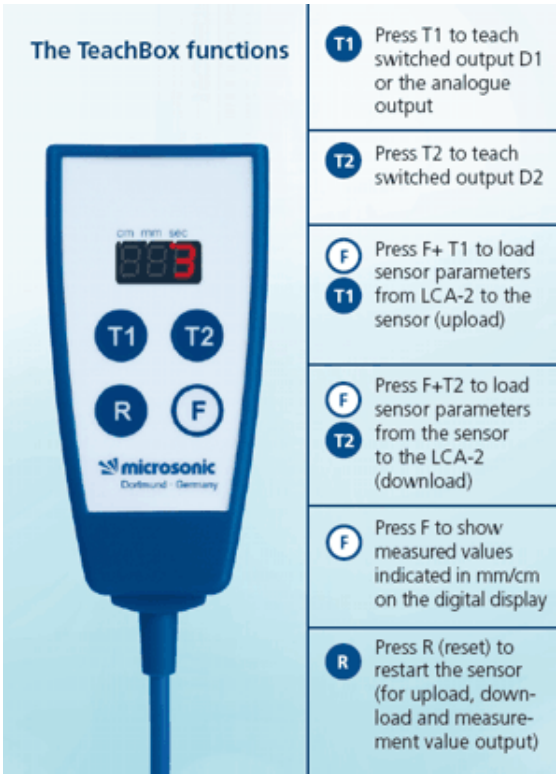
For the LinkCopy function, the LinkControl adapter need not be connected to a PC. The LCA-2 reads the parameters out of the sensor and saves them internally to its EEPROM. The data are thus safely stored in the LinkControl adapter even after supply voltage disconnection and can consequently also be used as a sensor setting archive.



LinkCopy: Copying of sensor settings

Via the integrated TeachBox,

all ultrasonic sensors which are taught via pin 5 at the sensor plug (mic, pico+, lpc, lcs, esf) can be comfortably set. The Link-Control adapter LCA-2 is looped in between the sensor connection line and the sensor; a PC or laptop is not required. During the teach-in process via buttons T1 and T2, the length of the button stroke is indicated in seconds on the display.



The TeachBox & LinkCopy

LCA-2

scale drawing	detection zone
operating mode	accessories

electrical data	
operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M12 initiator plug

inputs	
description	USB interface
input 1	com input

housing	
material	ABS
class of protection to EN 60529	IP 20
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	150 g

technical features/characteristics	
controls	2 push-buttons + LED display (TouchControl)
indicators	3-digit LED display

documentation (download)	
order no.	**LCA-2**

LCA-2 Koffer

scale drawing | detection zone

operating mode	accessories
description	Set for convenient setting of a number of microsonic sensor families. Contents: LCA-2 - Adaptor for sensors with cable connection (lcs) incl. cable clamps - Adapter for power supply incl. cable clamps - Power supply 90-240VAC/24VDC, 625 mA, with 2,5 m cable - four exchangeable AC-plugs for use in Europe, USA, Great Britain and Australia - USB - cable A-plug to B-plug - Installation CD with LinkControl software - Manual (German / English)
particularities	incl. adapter cable and 24V power pack

electrical data

operating voltage U_B	9 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
Leerlaufstromaufnahme	≤ 25 mA
type of connection	4-pin M12 initiator plug

inputs

description	USB interface
input 1	com input

housing

material	ABS
class of protection to EN 60529	IP 20
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	1,700 g

technical features/characteristics

controls	2 push-buttons + LED display (TouchControl)
indicators	3-digit LED display
particularities	incl. adapter cable and 24V power pack

documentation (download)

order no.	**LCA-2 Koffer**

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