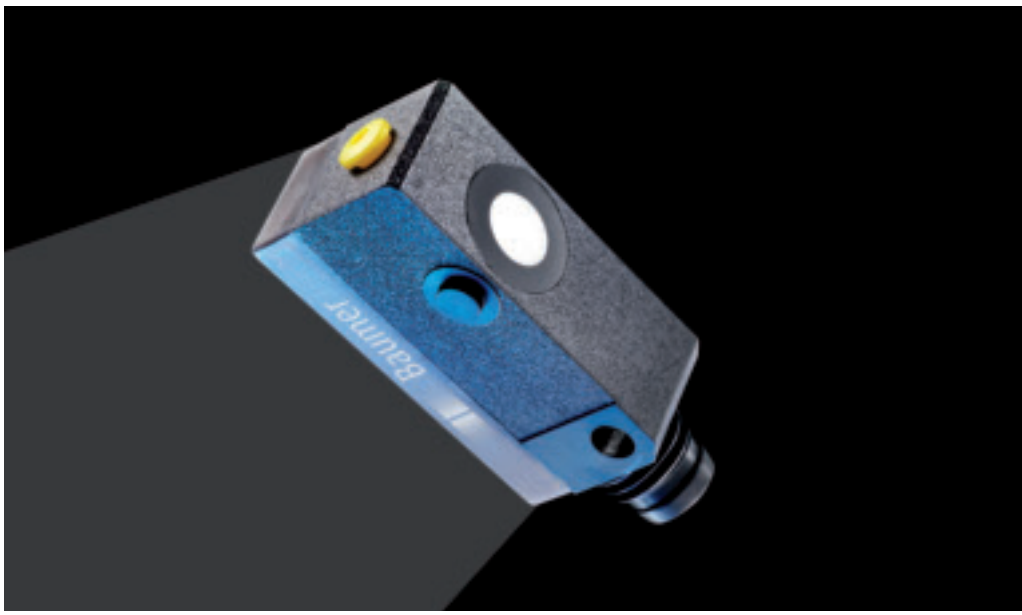
Baumer

Compact, multi-purpose, robust.
Ultrasonic sensors.



Sensor Solutions
Motion Control
Vision Technologies

Most ultrasonic sensors are based on the principle of measuring the propagation time of sound in air. Packages of ultrasonic sound, so-called bursts, are emitted by the sensor, reflected by an object and received again by the sensor. The transducers in the sensors, with sonic frequencies far outside the range of human hearing, constantly change between transmission and reception during operation. The returned echo signals are evaluated by the integrated electronics of the sensor. Depending on the sensor type, either digital or analog information is then issued at the output.

Unlike optical sensors, influences such as changing colors, transparency or high reflectivity have no bearing on the detection of objects. Ultrasonic sensors maintain their excellence even in harsh environments. They are extremely resistant to dirt, and process reliability is not impaired by dust, smoke, vapors, or other contaminants.

The following types are available:

- Ultrasonic proximity sensors with one or two outputs
- Ultrasonic retro-reflective sensors
- Ultrasonic through beam sensors
- Measuring ultrasonic sensors with analog output signals

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Ultrasonic through beam sensors

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Miniature sensors – When space is scarce!

In this modern age of automation, Baumer ultrasonic sensors are the answer to the continuing trend towards miniaturization and higher integration.

This trend has led Baumer's small and compact ultrasonic sensors, with their hardy performance, to enjoy a major focus of interest.

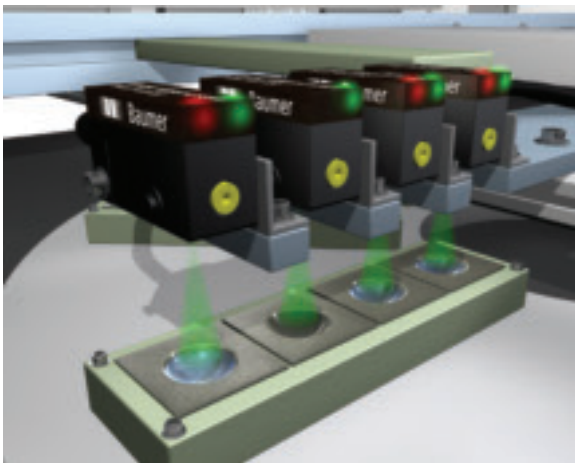
This performance is available in four different types:

- Ultrasonic proximity switches
- Ultrasonic retro-reflective sensors
- Ultrasonic through beam sensors
- Distance measuring ultrasonic sensors with analog output signals

Despite the extra emphasis placed on its miniature design, no compromises of any kind need be made when applying these mighty minis.

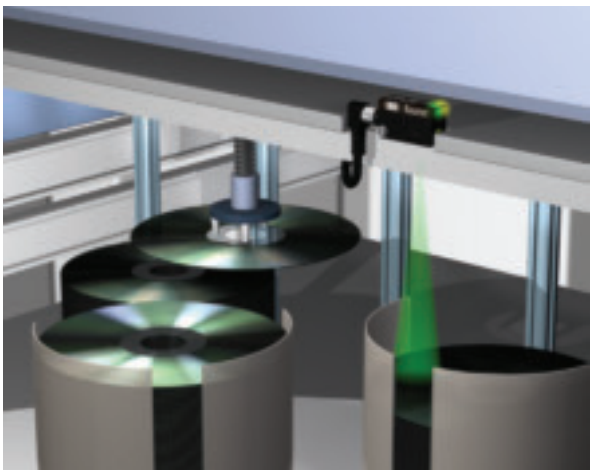
- Distinctly narrow sonic cone profiles enable the sensors to look and measure into smallest cavities
- Mutual influence between sensors mounted closely is minimized thanks to synchronized and multiplexed operation
- Some housing types are mechanically compatible with sensors using different technologies. They could be exchanged on short notice should the need arise in case of changing application conditions
- All miniature sensor variations feature Teach-in technology using a standardized Teach-in routine

Miniature sensor applications



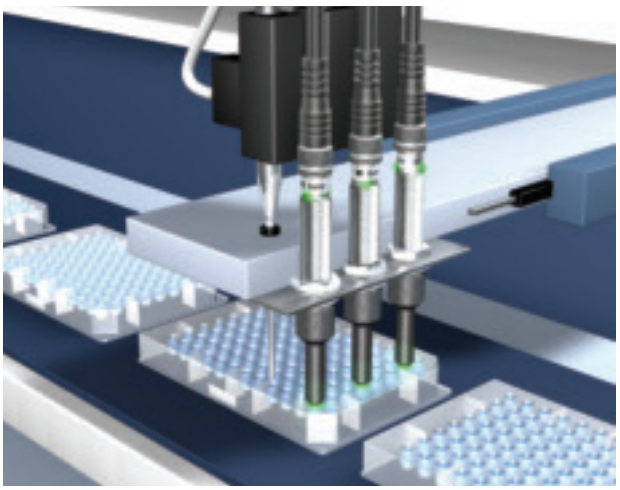
Liquid level detection

- Miniaturized ultrasonic sensors are ideally suited to measure liquid levels in small containers. The miniature housing design allows the installation of several sensors in close proximity.



Height measurement

- Distance to objects can be reliably measured regardless of the surface color, reflectivity or transparency with miniaturized ultrasonic sensors.

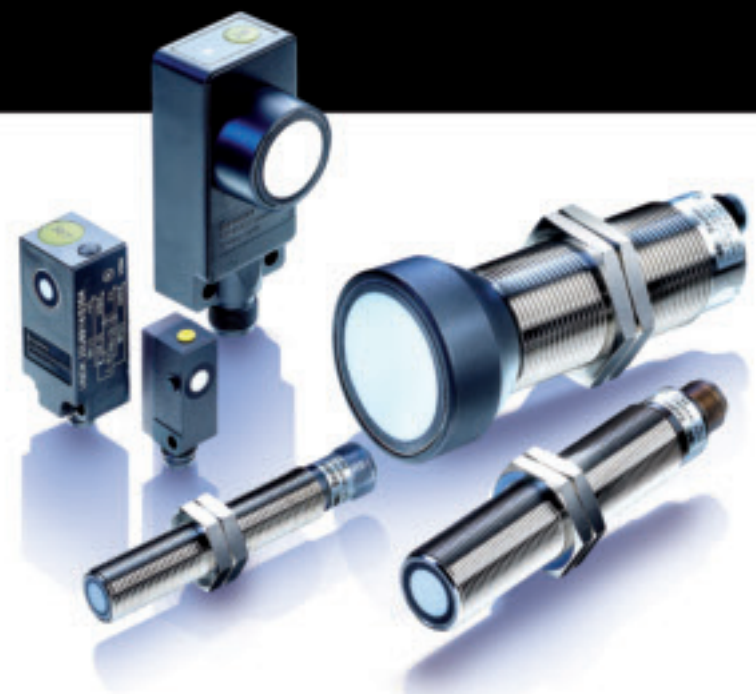


Looking into small cavities

- The M12 sensor equipped with the screw-on beam columnator has been especially designed for:
  - liquid level detection in test tubes and small bottles
  - liquid level detection in micro titration

  Versions with analog or digital output signals are available.

Distance measuring sensors – Detecting more!



Ultrasonic distance measuring sensors provide information on an absolute position of a target or moving object. For shiny surfaces, for transparent objects, or environment with dust and high humidity, the ultrasonic technologies are often the only alternative to mechanical probing.

Applications for ultrasonic distance measuring sensors include level detection, stack height control as well as absolute position feedback.

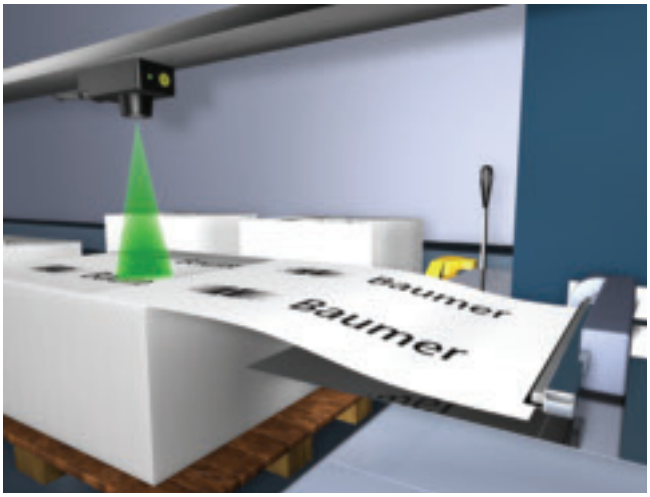
Baumer offers a broad selection of ultrasonic distance measuring sensors:

- Sensing range Sd of 20…200 mm up to Sd of 400…2500 mm
- A constant resolution of 0,3 mm applies across the entire family
- Distinctly narrow sonic cone profiles enable the sensors to look and measure into smallest cavities
- Available output signals 0…10 VDC and 4…20 mA or inverted from 10…0 VDC and 20…4 mA
- Output signals adjusted to required sensing range of an object - through potentiometer, Teach-in button or remote Teach-in input

Distance measuring sensor applications

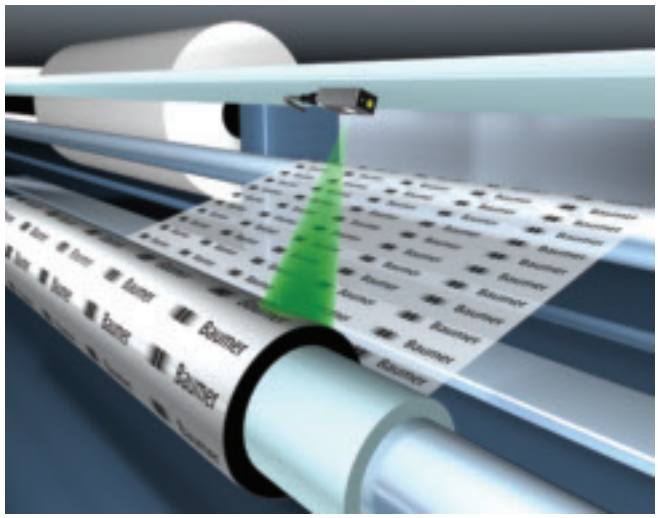
Distance detection

- With its small shape and low weight, the miniaturized ultrasonic sensors can also be installed in small microgrippers with limited space to accomodate ultrasonic sensors.



Stacking level control

- Utrasonic sensors with analog outputs provide a distance proportional output signal highly independent of the target material encountered. The resolution is a uniform 0,3 mm even for the maximum scanning range of 2000 mm.



Determination of roll diameter

- In winding and unwinding operations distance measuring ultrasonic sensors accurately measure the outer diameter of rolls containing materials such as plastic films, sheet metal, paper and cardboard, veneer etc.

Through beam and retro-reflective sensors

For the detection of sound absorbing or fast moving objects the range of ultrasonic barriers is perfectly featured. Used for counting or the detection of a jam on conveyor belts, these sensors allow the recognition of objects which could not even be detected by simple ultrasonic proximity or optical sensors.

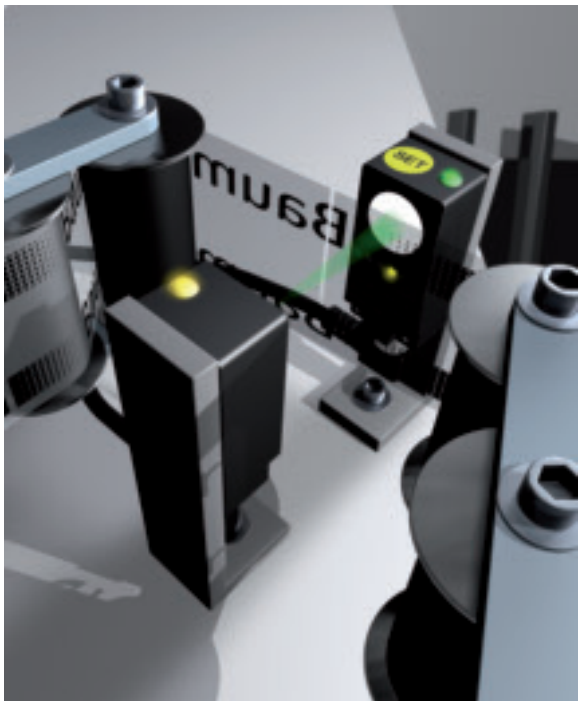
Through beam sensors, often used for the rupture control of paper, fabric, metal- or plastic films are capable to detect even high transparent objects.

In front of a reference surface retro reflective sensors recognize all kinds of objects reliably, no matter if sound absorbing or sound dispersing.

Generally the following features characterize the Baumer range of ultrasonic sensors

- No blind range in front of the active sensing face
- Sensing range Sd 0…200 mm up to 0…3000 mm
- Short response time of less than 5 ms
- Any kind of sound reflecting material can be used as reference surface (retro-reflective sensors)

Through beam and retro-reflective sensors applications

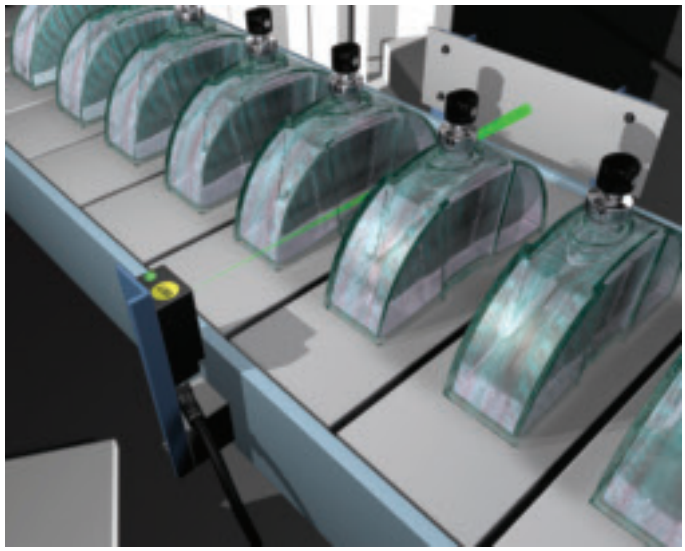


Through beam sensors

- Due to their non-pulsed operation, through beam sensors, consisting of emitter and receiver, exhibit the fastest response time of all ultrasonic sensors.

Applications include:

- detection of objects following each other in quick succession
- counting of objects made of materials which are difficult to detect (glass jars, PET bottles)
- monitoring transparent materials like plastic and glass
- film rupture control



Retro-reflective sensors

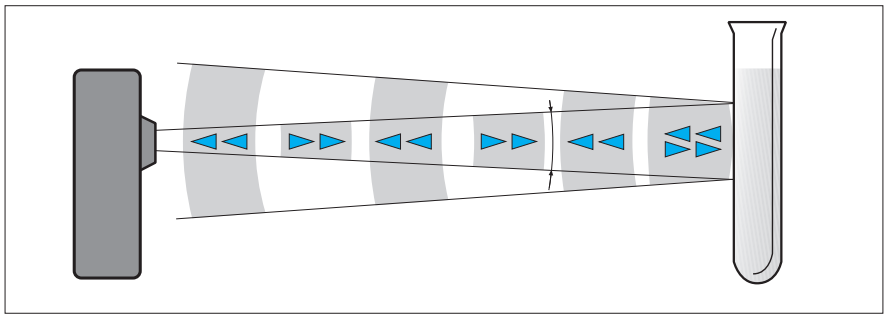
- Retro-reflective sensors require a fixed reflector or reference target for operation.

They are ideally suited to reliably detect:

- odd shaped and non-aligned objects
- sound deflecting targets
- sound absorbing materials like cotton-wool and foam rubber

Design and operation

A special sonic transducer is used for the ultrasonic proximity sensors, which allows for alternate transmission and reception of sound waves. The transducer emits a number of sonic waves which are reflected by an object, back to the transducer. After emission of the sound waves, the ultrasonic sensor will switch to receive mode. The time elapsed between emitting and receiving is proportional to the distance of the object from the sensor.



Digital and analog output

Sensing is only possible within the detection area. The required sensing range can be adjusted with the sensor's potentiometer or by electronic Teach-in (Teach-in button or remote Teach-in). If an object is detected within the set area, the output changes its state. The built-in LED indicates this change.

Target detection

Sonic waves are best reflected from hard surfaces. Targets may be solids, liquids, granules or powders. In fact, ultrasonic sensors are used in many applications where objects are difficult to detect with optical devices.

Standard target

The standard target is defined as a square flat object of following sizes:

- 15 x 15 mm for Sde up to 250 mm
- 30 x 30 mm for Sde up to 1000 mm
- 100 x 100 mm for Sde > 1000 mm

The target should be mounted perpendicular to the axis of the sensor.

Size

To ensure a reliable object detection, the reflected signal must be large enough. The intensity of the signal depends on the size of the object. Using a standard object, the full scanning range Sd is available.

Surfaces

Detection of sound absorbent materials will result in a reduction of the maximum sensing distance.

The maximum sensing distance can be achieved as long as the maximum roughness of the object does not exceed 0,2 mm.

Typical sound absorbing materials are:

- foam rubber
- cotton / wool / cloth / felt
- very porous materials

Typical sonic cone profile

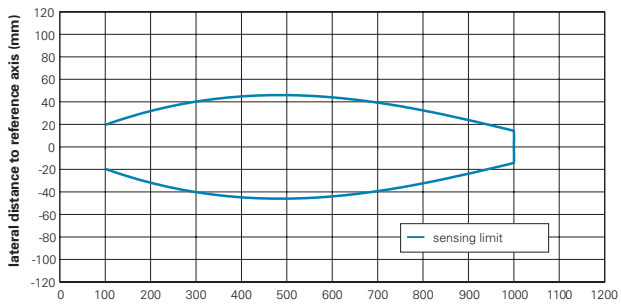
Sonic cone profiles

The sonic cone profile charts as found in the spec sheets of this catalog represent the active sensing areas for ultrasonic sensors. The charts demonstrate the short-range sonic side lobes, which widen the sensor's close-range aperture angle. Due to sound absorption and air diffusion, the lobes decrease at longer ranges.

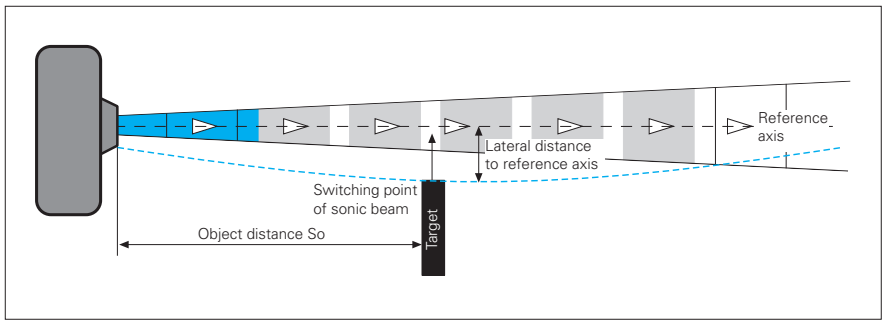
Size, shape, surface properties and the direction of target detection have very high influence on the lateral detecting region of an ultrasonic sensor.

Sonic beam profiles are typical for their whole family, eg. the profile for 100 - 1000 mm represents all types - digital and analog outputs, etc. of sensors with that sensing range.

typical sonic beam of ultrasonic sensors with sensing range 100...1000 mm
standard target with 30 x 30 mm, directed rectangular to sensor's reference axis



Measuring method



When determining the shape of typical sonic cone profiles standard square targets made of steel are used.

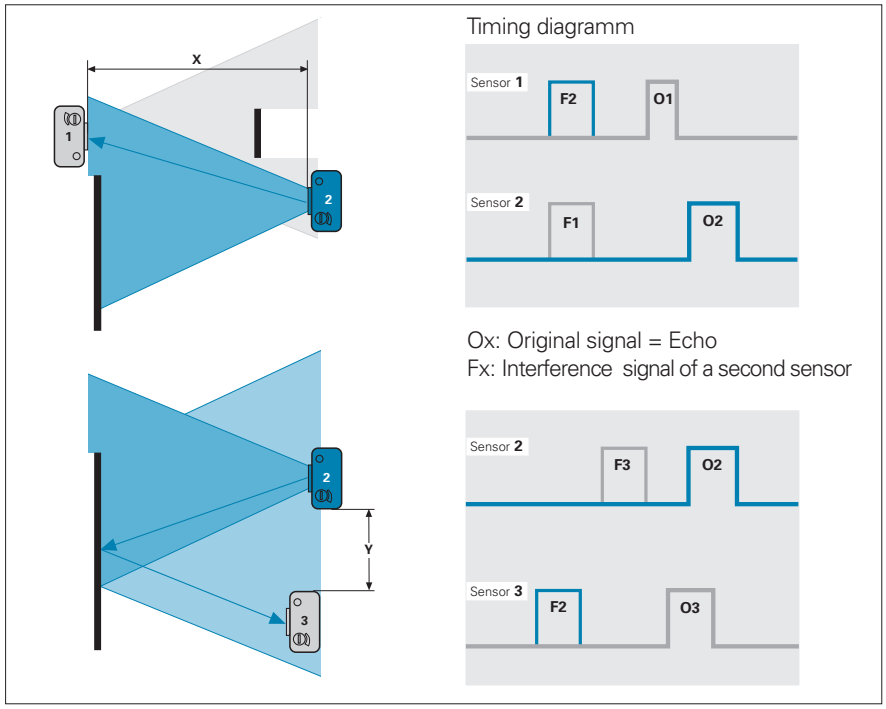
- 15 x 15 mm for Sde up to 250 mm
- 30 x 30 mm for Sde up to 1000 mm
- 100 x 100 mm for Sde > 1000 mm

The targets are positioned perpendicularly to the sensor's reference axis, approached sideways at different distances. The sonic cone profile is then plotted by connecting the measured points with a line.

The cone shape can vary if round or differently shaped objects are detected.

Minimum spacings

Possible errors caused by the installation of two sensors



Minimum spacings table

Sensor type	x	y	max. no. of sensors	Action to take	Order reference	max. control wire	Response time
Standard - without multiplex or synch.	3 x Sd	2 x Sd	no limit	none	all standard sensors	-	according to technical specs.
with multiplex feature	2 x Sd	no space required	2	connect control pin	Uxxx xxxx8xx	5 m	2 x technical specs.
with synchronization feature	3 x Sd	1 x Sd	8	connect control pin	Uxxx xxxx7xx	7 m	according to technical specs.

Synchronization feature

Link the control pin of all sensors within a limited area to each other. This triggers the measurement of all sensors at the same time. Interference signals which arrive due to their longer sensing distance later at the sensor, will be ignored. Up to eight sensors can be synchronized via control pin.

Multiplex feature

Link the control pin of both sensors to each other. While the first sensor is measuring, the second is enabled. After the first measurement is completed, the second sensor is allowed to send and receive its signals. In maximum two sensors can be interconnected. The multiplex function increase the sensor response time to the double of the specified value.

Note: At sensors with synchronization or multiplex feature, the control pin must not stay open. If the feature is not in use the pin must be connected to following potential to assure the standard response time:

Synchronization: Connect the control pin to supply voltage (+Vs)
Multiplex: Connect the control pin to ground (GND)

Multiplexing ultrasonic sensors

In this mode two sensors may be mounted without any spacing, since they operate alternately. The response and release time of the specific sensors is therefore doubled. The connecting “control” wire must be connected to ground, if the sensor is not multiplexed.

Installation

Synchronization and multiplexing operations are accomplished by connecting the fourth wire (control) of the specific sensors. Only two ultrasonic sensors may be multiplexed at a time; when using the synchronization mode, eight sensors may be used in conjunction. The maximum length of the connecting wire should not exceed 5 meters.

Stand-alone operation synchronous and multiplex sensors

If these sensors are used as stand-alone devices, the "control" connection wire must be connected to +Vs in the synchronous type and to GND in the multiplex type to achieve the maximum possible reaction speed.

Adjustment aid

The LED indicates the intensity of the signal which has been reflected by the object, as well as the switching state of the output.

LED on
The object is reliably detected with a signal strength reserve of 50%. The output is switched.

LED off
No target detected, output is not switched.

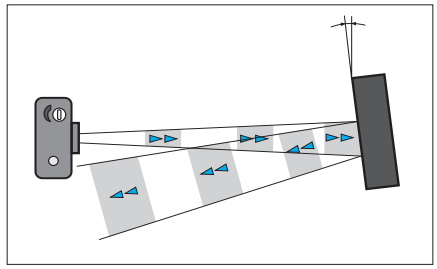
LED flashing
Unreliable detection of the target. The output is activated / switched.

Teach-in locking

The Teach-in locking is active 5 minutes after power-up or after the end of the last Teach-in process. Teach-in locking is reset by disconnecting the power supply.

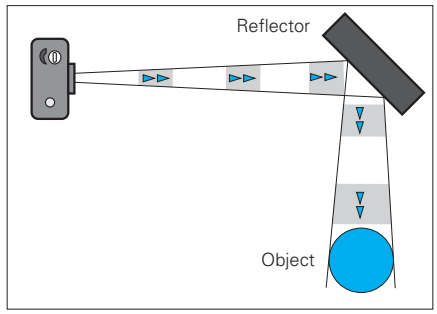
Angular deflection

Sound waves, like light waves, are reflected from flat surfaces. It is therefore possible that the reflected sonic beam from an angled surface might be too small for the accurate recognition of a target.
The influence of tilting increases when the distance between the sensor and the target increases.



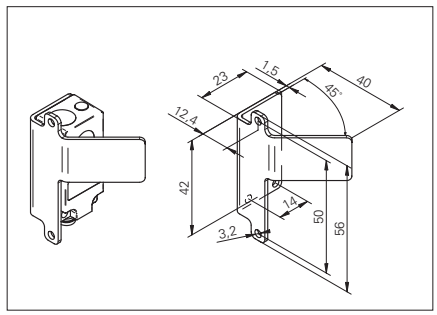
This effect can also be used to advantage as shown here to remotely detect a target.

The reflector must be large enough and have smooth surfaces and edges.

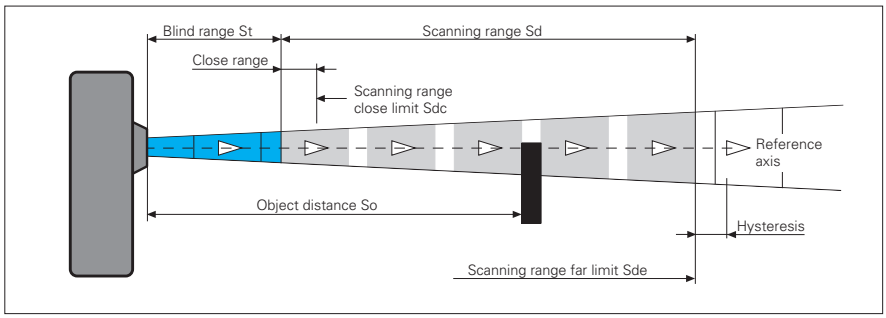


Sonic beam deflector Series 20

- see accessories section



Technical definitions and environmental influences



Blind range St

Reliable object recognition is not possible within the blind range (St). Objects within this blind range may cause false switching of the sensor.

Scanning range Sd

Objects within the scanning range (Sd) are correctly detected up to the set far limit (Sde) of the scanning range.

Scanning range close limit Sdc

The close limit (Sdc) can be programmed by a Teach-in button.

Scanning range far limit Sde

By means of a built-in potentiometer or a Teach-in button the user can change the far limit (Sde) of the scanning range (Sd).

Object distance So

The object distance is defined as the distance between the front end of the sensor and the object itself.

Hysteresis

After recognizing the object the effective scanning range (Sd) is enlarged in the axial direction by the hysteresis value.

Repeatability

Repeatability is defined as the difference between two subsequent measurements under identical circumstances and with a standard object.

Sensitivity to noise

The extremely high sonic frequency used for ultrasonic sensors ensures that most extraneous noise will not affect operational accuracy. Pressurized air might interfere with the proper operation of the sensor under extreme conditions.

Humidity

A relative humidity up to 90 % has nominal effect on the sensing distance of the sonic sensors. Direct moisture or dirt however may lead to a reduction of the scanning range Sd.

Air stream

The narrow sonic beam angle may be affected by strong air streams in excess of 10 m/second.

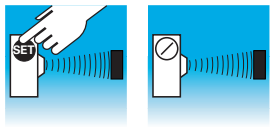
Temperature

Heat radiation from hot targets produces strong air turbulence. This can affect the sonic propagation and hence, the proper recognition of an object.

Temperature drift

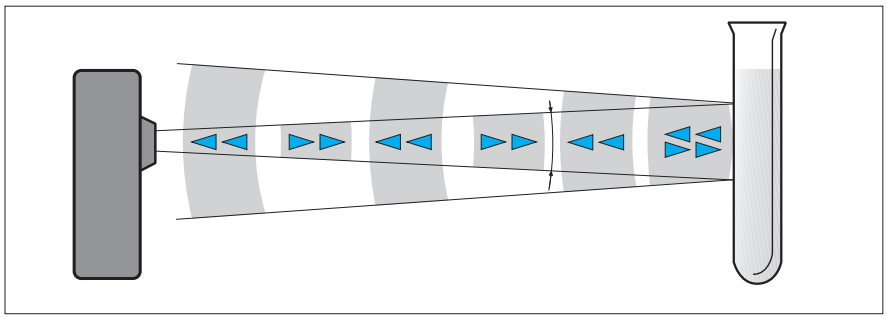
The speed of sound depends on temperature. Deviation can be up to 0,18%/K. Temperature drift of the ambient air is mostly compensated within the sensor itself. The specification for temperature compensation is valid for stationary conditions.

Ultrasonic proximity sensors



Design and operation

A special sonic transducer is used for the ultrasonic proximity sensors, which allows for alternate transmission and reception of sound waves. The transducer emits a number of sonic waves which are reflected by an object, back to the transducer. After emission of the sound waves, the ultrasonic sensor will switch to receive mode. The time elapsed between emitting and receiving is proportional to the distance of the object from the sensor.



Digital output

Sensing is only possible within the detection area. The required sensing range can be adjusted with the sensor's potentiometer. If an object is detected within the set area, the output changes its state. The built-in LED indicates this change.

... with Teach-in

Teach-in procedures

All adjustments are carried out via the internal Teach-in button or the external Teach-in wire.

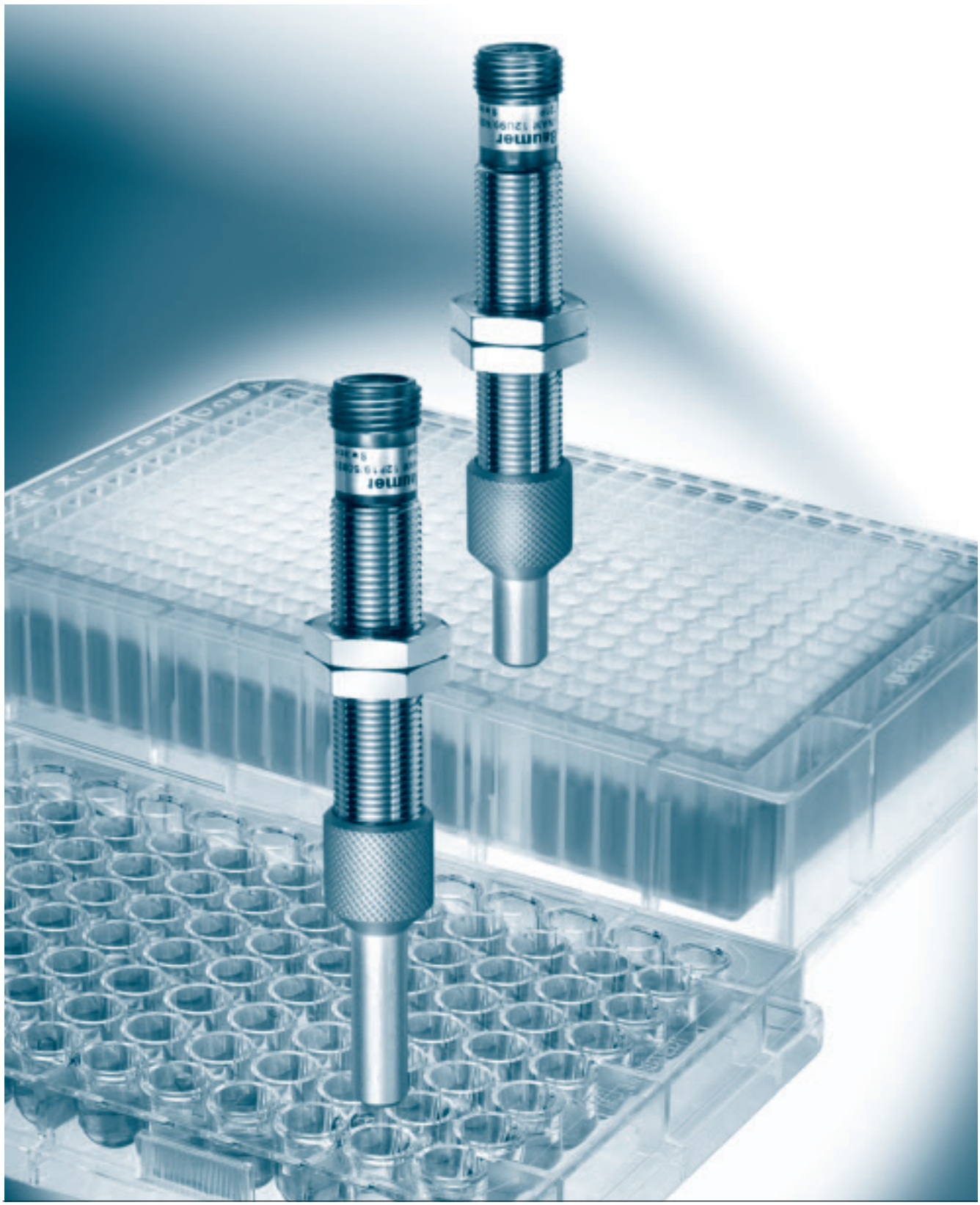
Adjustment switching point Sde

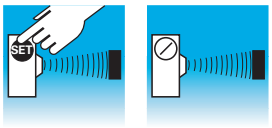
1. Adjustment mode:
   Press the Teach-in button or connect the white Teach-in wire to +Vs for approx. 2 secs until the LED flashes green. Release the button or disconnect Teach-in wire.
2. LED flashes green. Place the target at the required scanning range and press the Teach-in button or connect the external white Teach-in wire shortly to +Vs.
3. Succesful completion of Teach-in procedure is confirmed by LED being „on“ for approx. 2 secs.

In order to re-teach the sensor it must be shortly disconnected from the power supply.

Resetting to original factory settings

Holding the button down or connecting the white Teach-in wire to +Vs for > 6 secs, will automatically restore the original factory setting. Fast flashing of the green LED indicates successful completion of the resetting.





rectangular designs

product family	UNDK 10	UNDK 20	UNDK 20	UNDK 20	UNDK 30	UNDK 30	UNDK 30
							
	SONUS						
width / diameter	10,4 mm	20 mm	20 mm	20 mm	30 mm	30 mm	30 mm
sensing range sd	10 ... 200 mm	10 ... 200 mm	40 ... 400 mm	100 ... 1000 mm	30 ... 250 mm	60 ... 400 mm	100 ... 1000 mm
potentiometer					■	■	■
Teach-in	■	■	■	■			
repeatability	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm
operating temperature	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C	-10 ... +60 °C
housing material	plastic (ASA)	polyester	polyester	polyester	polyester / die-cast zinc	polyester / die-cast zinc	polyester / die-cast zinc
cable	■				■	■	■
flylead connector M8	■						
connector M8	■	■	■	■			
connector M12					■	■	■
protection class	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67
Page	**580**	**581**	**582**	**583**	**584**	**585**	**586**

cylindrical designs

product family	UNAM 12	UNAM 12	UNAM 12	UNAR 18	UNAM 18	UNAM 18	UNAR 18
							
width / diameter	12 mm	12 mm	12 mm	18 mm	18 mm	18 mm	18 mm
sensing range sd	5 ... 70 mm	10 ... 200 mm	40 ... 400 mm	60 ... 400 mm	100 ... 700 mm	100 ... 1000 mm	100 ... 1000 mm
potentiometer					■		
external Teach-in	■	■	■				
Teach-in				■		■	■
repeatability	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 1 mm	< 0,5 mm	< 0,5 mm
operating temperature	0 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	0 ... +60 °C	-20 ... +60 °C	-10 ... +60 °C	0 ... +60 °C
housing material	brass nickel plated	brass nickel plated	brass nickel plated	stainless steel 1.4435 (A4)	brass nickel plated	brass nickel plated	stainless steel 1.4435 (A4)
cable					■		
connector M12	■	■	■	■		■	■
protection class	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67
Page	**587**	**588**	**589**	**594**	**590**	**591**	**595**

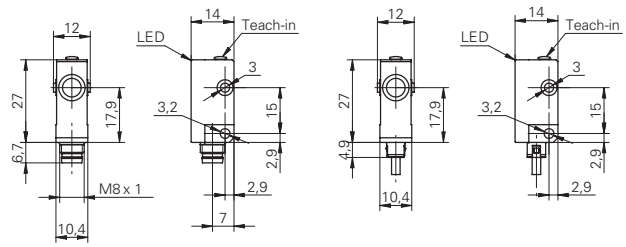
UNAM 30	UNAM 50
	
30 mm	30 mm
200 ... 1500 mm	350 ... 2500 mm
■	■
< 1 mm	< 1 mm
-25 ... +60 °C	-25 ... +60 °C
brass nickel plated	brass nickel plated
■	■
■	■
IP 67	IP 67
592	**593**

Sd = 200 mm

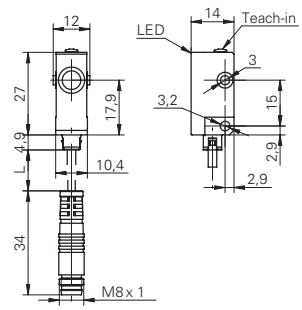
- small housing dimensions
- very low mass (4 g)
- long sensing range/small blind range

general data	
sensing range sd	10 ... 200 mm
scanning range far limit Sde	30 ... 200 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	Teach-in
response time ton	< 15 ms
release time toff	< 15 ms
alignment aid	target display flashing
sonic frequency	380 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	plastic (ASA)
width / diameter	10,4 mm
height / length	27 mm
depth	14 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

dimension drawings

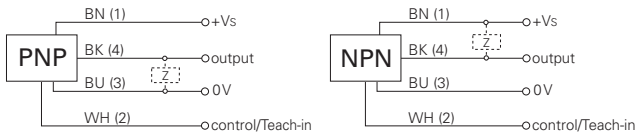


flylead connector version

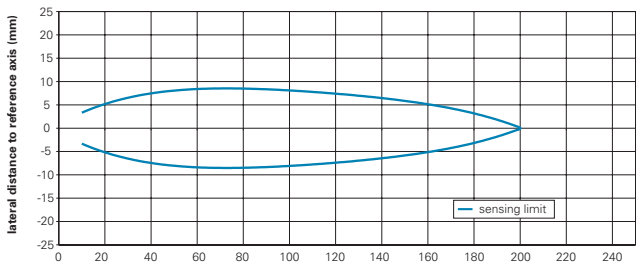


standard cable length 200 mm

connection diagrams



typical sonic cone profile



standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

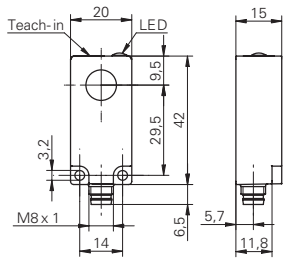
order reference	output circuit	connection types
UNDK 10N8914	NPN make function (NO) / break function (NC)	cable
UNDK 10N8914/KS35A	NPN make function (NO) / break function (NC)	flylead connector M8
UNDK 10N8914/S35A	NPN make function (NO) / break function (NC)	connector M8
UNDK 10P8914	PNP make function (NO) / break function (NC)	cable
UNDK 10P8914/KS35A	PNP make function (NO) / break function (NC)	flylead connector M8
UNDK 10P8914/S35A	PNP make function (NO) / break function (NC)	connector M8

Sd = 200 mm

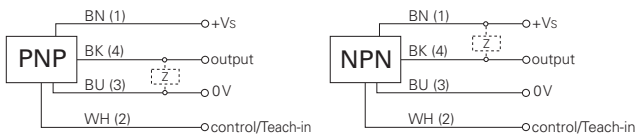
- internal and external Teach-in
- small sonic beam angle

general data	
sensing range sd	10 ... 200 mm
scanning range far limit Sde	30 ... 200 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	Teach-in
response time ton	< 10 ms
release time toff	< 10 ms
alignment aid	target display flashing
sonic frequency	380 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

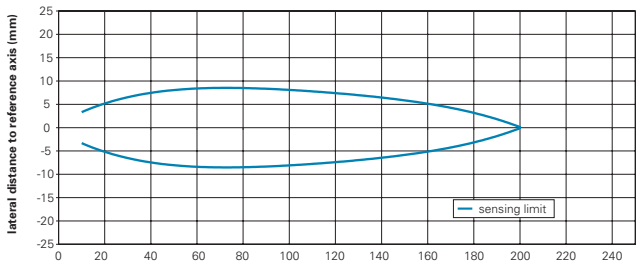
dimension drawing



connection diagrams



typical sonic cone profile



object distance (So) from sensor front (mm)

standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

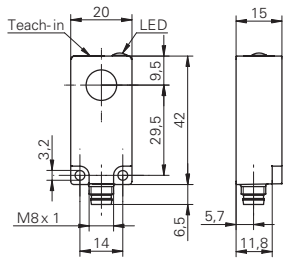
order reference	output circuit
UNDK 20N6914/S35A	NPN make function (NO)
UNDK 20N7914/S35A	NPN break function (NC)
UNDK 20P6914/S35A	PNP make function (NO)
UNDK 20P7914/S35A	PNP break function (NC)

Sd = 400 mm

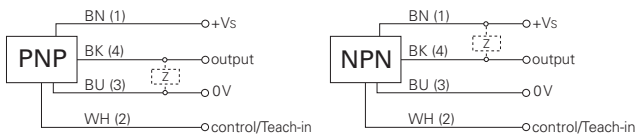
- internal and external Teach-in
- wide sonic beam angle

general data	
sensing range sd	40 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	Teach-in
response time ton	< 25 ms
release time toff	< 25 ms
alignment aid	target display flashing
sonic frequency	290 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

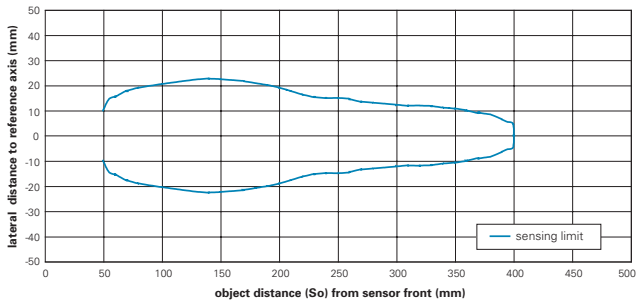
dimension drawing



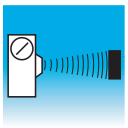
connection diagrams



typical sonic cone profile



order reference	output circuit
UNDK 20N6912/S35A	NPN make function (NO)
UNDK 20N7912/S35A	NPN break function (NC)
UNDK 20P6912/S35A	PNP make function (NO)
UNDK 20P7912/S35A	PNP break function (NC)



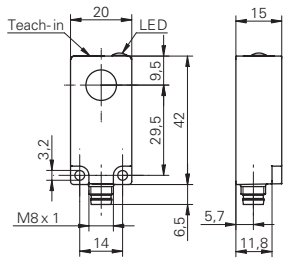
Sd = 1000 mm

- internal and external Teach-in
- long sensing range

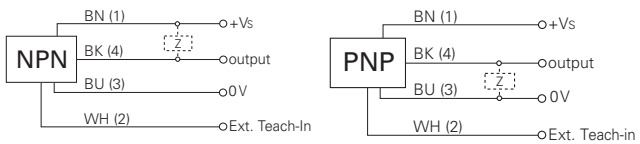
general data	
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	Teach-in
response time ton	< 50 ms
release time toff	< 50 ms
alignment aid	target display flashing
sonic frequency	240 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	output circuit
UNDK 20N6903/S35A	NPN make function (NO)
UNDK 20N7903/S35A	NPN break function (NC)
UNDK 20P6903/S35A	PNP make function (NO)
UNDK 20P7903/S35A	PNP break function (NC)

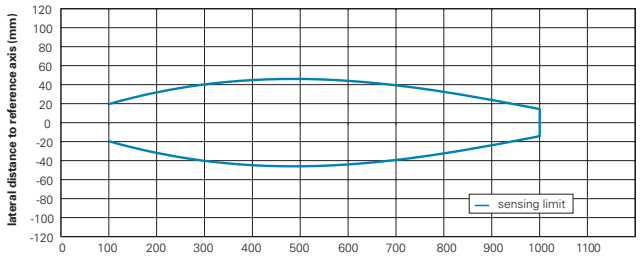
dimension drawing



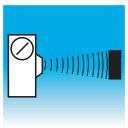
connection diagrams



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

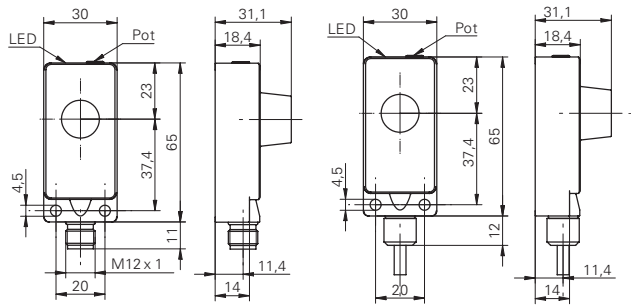


Sd = 250 mm

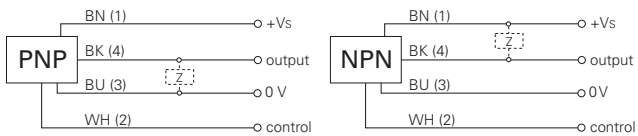
- potentiometer
- synchronization output
- small blind range

general data	
sensing range sd	30 ... 250 mm
scanning range far limit Sde	30 ... 250 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
synchronization	yes
multiplex version	on request
temperature drift	< 0,18% Sde/K
adjustment	potentiometer
response time ton (synch on)	< 10 ms
release time toff (sync on)	< 10 ms
alignment aid	target display flashing
sonic frequency	300 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-25 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

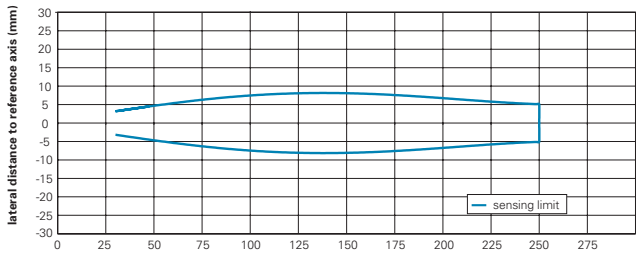
dimension drawings



connection diagrams

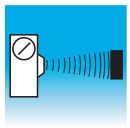


typical sonic cone profile



standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

order reference	output circuit	connection types
UNDK 30N1713	NPN make function (NO)	cable
UNDK 30N1713/S14	NPN make function (NO)	connector M12
UNDK 30N3713	NPN break function (NC)	cable
UNDK 30N3713/S14	NPN break function (NC)	connector M12
UNDK 30P1713	PNP make function (NO)	cable
UNDK 30P1713/S14	PNP make function (NO)	connector M12
UNDK 30P3713	PNP break function (NC)	cable
UNDK 30P3713/S14	PNP break function (NC)	connector M12

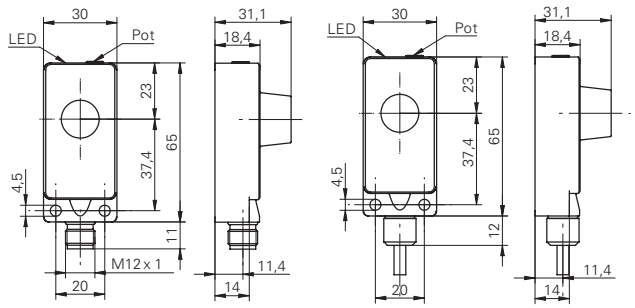


Sd = 400 mm

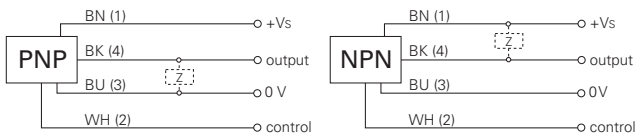
- potentiometer
- synchronisation output

general data	
sensing range sd	60 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
synchronization	yes
multiplex version	on request
temperature drift	< 0,18% Sde/K
adjustment	potentiometer
response time ton (synch on)	< 25 ms
release time toff (sync on)	< 25 ms
alignment aid	target display flashing
sonic frequency	400 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-25 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

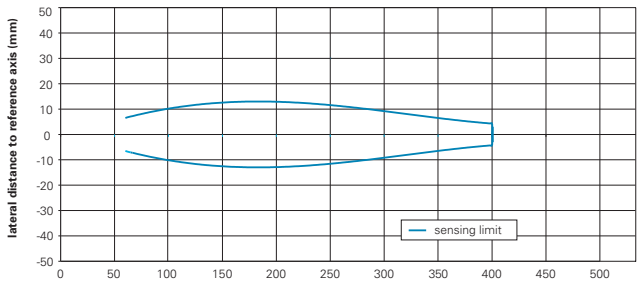
dimension drawings



connection diagrams

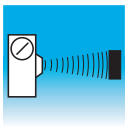


typical sonic cone profile



standard target with 30 x 30mm, directed rectangular to sensor's reference axis

order reference	output circuit	connection types
UNDK 30N1712	NPN make function (NO)	cable
UNDK 30N1712/S14	NPN make function (NO)	connector M12
UNDK 30N3712	NPN break function (NC)	cable
UNDK 30N3712/S14	NPN break function (NC)	connector M12
UNDK 30P1712	PNP make function (NO)	cable
UNDK 30P1712/S14	PNP make function (NO)	connector M12
UNDK 30P3712	PNP break function (NC)	cable
UNDK 30P3712/S14	PNP break function (NC)	connector M12

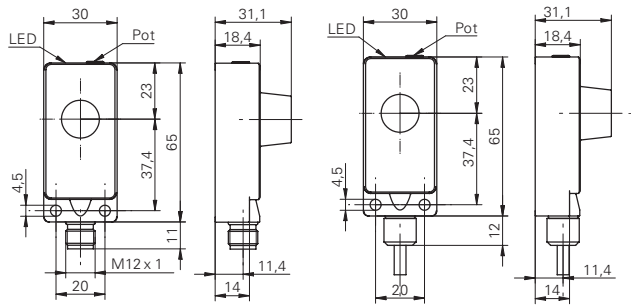


Sd = 1000 mm

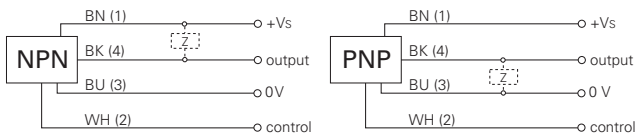
- potentiometer
- synchronisation output
- temperature compensation

general data	
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
synchronization	yes
multiplex version	on request
temperature drift	< 0,1% Sde/K
adjustment	potentiometer
response time ton (synch on)	< 50 ms
release time toff (sync on)	< 50 ms
alignment aid	target display flashing
sonic frequency	240 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

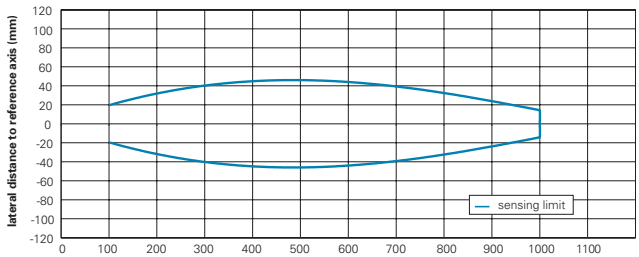
dimension drawings



connection diagrams



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

order reference	output circuit	connection types
UNDK 30N1703	NPN make function (NO)	cable
UNDK 30N1703/S14	NPN make function (NO)	connector M12
UNDK 30N3703	NPN break function (NC)	cable
UNDK 30N3703/S14	NPN break function (NC)	connector M12
UNDK 30P1703	PNP make function (NO)	cable
UNDK 30P1703/S14	PNP make function (NO)	connector M12
UNDK 30P3703	PNP break function (NC)	cable
UNDK 30P3703/S14	PNP break function (NC)	connector M12

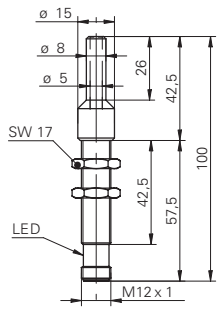
Sd = 70 mm

- with beam columnator for measurement in very small containers
- external Teach-in

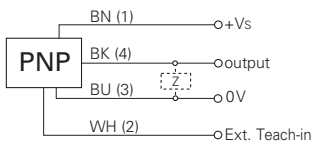
general data	
special type	with beam columnator
sensing range sd	5 ... 70 mm
scanning range far limit Sde	5 ... 70 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	external Teach-in
response time ton	< 10 ms
release time toff	< 10 ms
alignment aid	target display flashing
sonic frequency	380 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output circuit	PNP make function (NO)
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	12 mm
height / length	70 mm
connection types	connector M12
ambient conditions	
operating temperature	0 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A
Teach-in-adapter	Nr. 141584

order reference
UNAM 12P1914/S14D

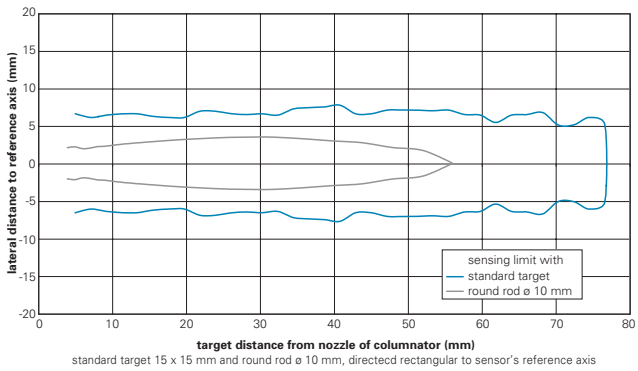
dimension drawing



connection diagram



typical sonic cone profile



target distance from nozzle of columnator (mm)

standard target 15 x 15 mm and round rod ø 10 mm, directecd rectangular to sensor's reference axis

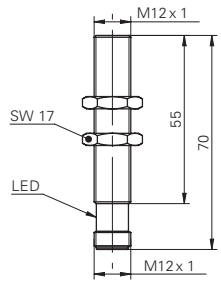
Sd = 200 mm

- external Teach-in
- Teach-in adapter
- small sonic beam angle

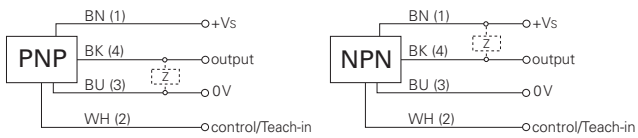
general data	
sensing range sd	10 ... 200 mm
scanning range far limit Sde	30 ... 200 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	external Teach-in
response time ton	< 10 ms
release time toff	< 10 ms
alignment aid	target display flashing
sonic frequency	380 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	12 mm
height / length	70 mm
connection types	connector M12
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A
Teach-in-adapter	Nr. 141584

order reference	output circuit
UNAM 12N1914/S14	NPN make function (NO)
UNAM 12N3914/S14	NPN break function (NC)
UNAM 12P1914/S14	PNP make function (NO)
UNAM 12P3914/S14	PNP break function (NC)

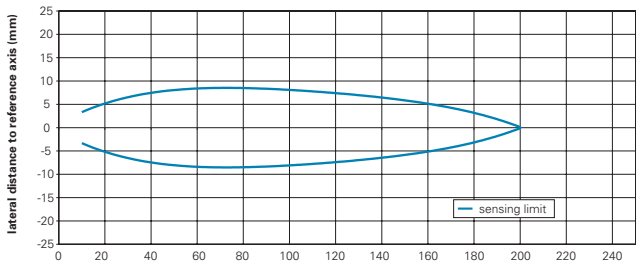
dimension drawing



connection diagrams



typical sonic cone profile



object distance (So) from sensor front (mm)

standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

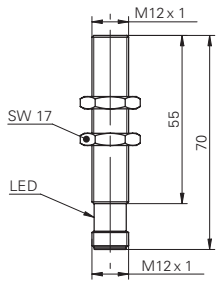
Sd = 400 mm

- external Teach-in
- Teach-in adapter
- wide sonic beam angle

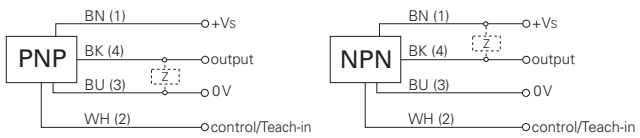
general data	
sensing range sd	40 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	external Teach-in
response time ton	< 25 ms
release time toff	< 25 ms
alignment aid	target display flashing
sonic frequency	290 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	12 mm
height / length	70 mm
connection types	connector M12
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A
Teach-in-adapter	Nr. 141584

order reference	output circuit
UNAM 12N1912/S14	NPN make function (NO)
UNAM 12N3912/S14	NPN break function (NC)
UNAM 12P1912/S14	PNP make function (NO)
UNAM 12P3912/S14	PNP break function (NC)

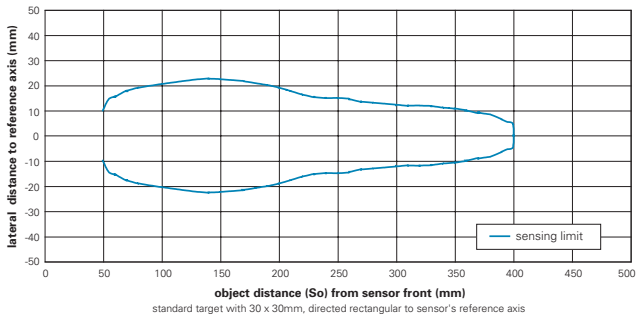
dimension drawing



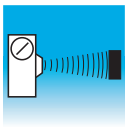
connection diagrams



typical sonic cone profile



standard target with 30 x 30mm, directed rectangular to sensor's reference axis



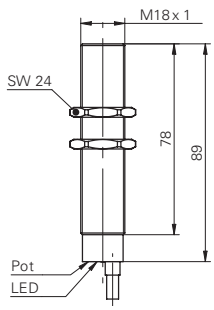
Sd = 700 mm

- potentiometer
- synchronisation output

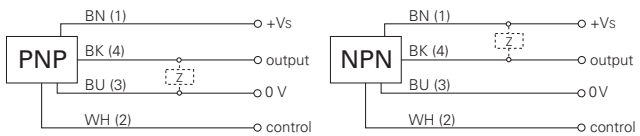
general data	
sensing range sd	100 ... 700 mm
scanning range far limit Sde	110 ... 700 mm
hysteresis typ.	4% Sde
repeatability	< 1 mm
synchronization	yes
temperature drift	< 0,18% Sde/K
adjustment	potentiometer
response time ton (synch on)	< 100 ms
release time toff (sync on)	< 100 ms
alignment aid	target display flashing
sonic frequency	230 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	30 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	18 mm
height / length	89 mm
connection types	cable
ambient conditions	
operating temperature	-20 ... +60 °C
protection class	IP 67

order reference	output circuit
UNAM 18N1703	NPN make function (NO)
UNAM 18N3703	NPN break function (NC)
UNAM 18P1703	PNP make function (NO)
UNAM 18P3703	PNP break function (NC)

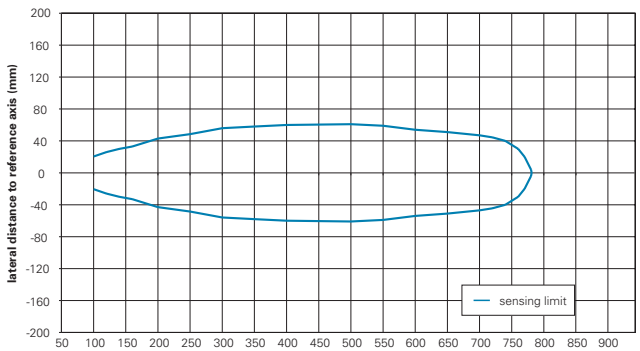
dimension drawing



connection diagrams



typical sonic cone profile



standard square target, size 30 x 30 mm, positioned perpendicularly to sensor's reference axis

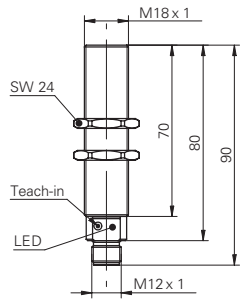
Sd = 1000 mm

- internal and external Teach-in

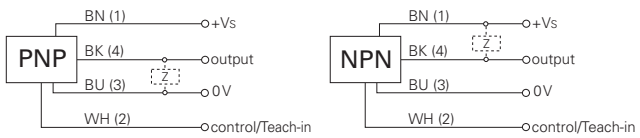
general data	
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	Teach-in
response time ton	< 50 ms
release time toff	< 50 ms
alignment aid	target display flashing
sonic frequency	240 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	18 mm
height / length	90 mm
connection types	connector M12
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

order reference	output circuit
UNAM 18N6903/S14	NPN make function (NO)
UNAM 18N7903/S14	NPN break function (NC)
UNAM 18P6903/S14	PNP make function (NO)
UNAM 18P7903/S14	PNP break function (NC)

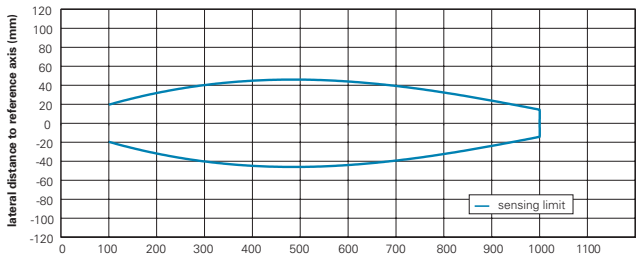
dimension drawing



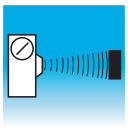
connection diagrams



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

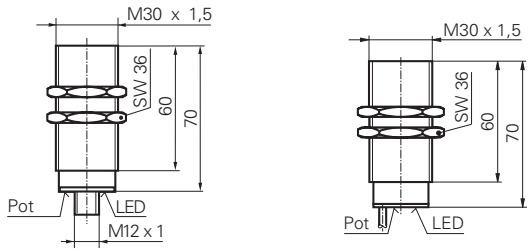


Sd = 1500 mm

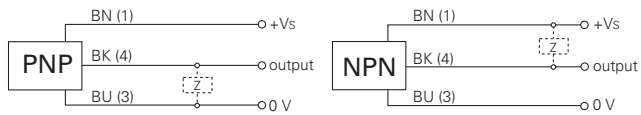
- potentiometer
- increased sensing range

general data	
sensing range sd	200 ... 1500 mm
scanning range far limit Sde	200 ... 1500 mm
hysteresis typ.	4% Sde
repeatability	< 1 mm
temperature drift	< 0,18% Sde/K
adjustment	potentiometer
response time ton	< 100 ms
release time toff	< 100 ms
alignment aid	target display flashing
sonic frequency	200 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	30 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	30 mm
height / length	70 mm
ambient conditions	
operating temperature	-25 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

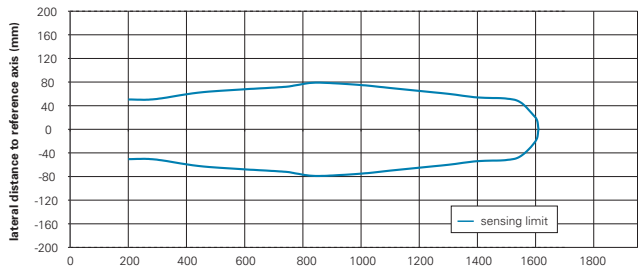
dimension drawings



connection diagrams

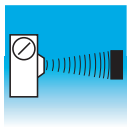


typical sonic cone profile



standard target 100 x 100 mm, positioned perpendicularly to sensor's reference axis

order reference	output circuit	connection types
UNAM 30N1104	NPN make function (NO)	cable
UNAM 30N1104/S14	NPN make function (NO)	connector M12
UNAM 30N3104	NPN break function (NC)	cable
UNAM 30N3104/S14	NPN break function (NC)	connector M12
UNAM 30P1104	PNP make function (NO)	cable
UNAM 30P1104/S14	PNP make function (NO)	connector M12
UNAM 30P3104	PNP break function (NC)	cable
UNAM 30P3104/S14	PNP break function (NC)	connector M12

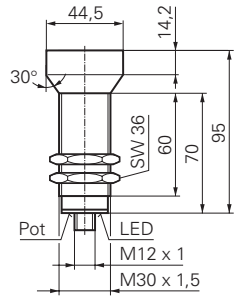


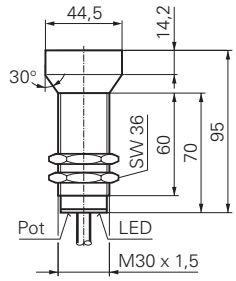
Sd = 2500 mm

- potentiometer
- synchronisation output
- long sensing range

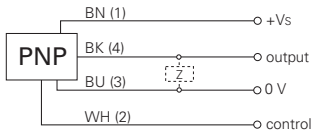
general data	
sensing range sd	350 ... 2500 mm
scanning range far limit Sde	350 ... 2500 mm
hysteresis typ.	4% Sde
repeatability	< 1 mm
synchronization	yes
temperature drift	< 0,18% Sde/K
adjustment	potentiometer
response time ton	< 160 ms
release time toff	< 160 ms
alignment aid	target display flashing
sonic frequency	120 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	30 mm
height / length	95 mm
ambient conditions	
operating temperature	-25 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

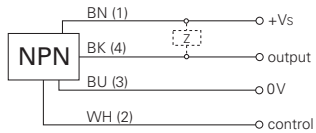
dimension drawings



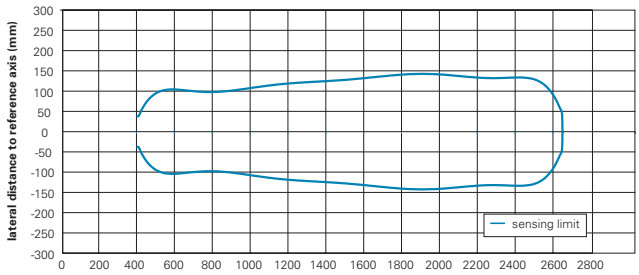


connection diagrams





typical sonic cone profile



standard target with 100 x 100 mm, positioned perpendicularly to sensor's reference axis

order reference	output circuit	connection types
UNAM 50N1721	NPN make function (NO)	cable
UNAM 50N1721/S14	NPN make function (NO)	connector M12
UNAM 50N3721	NPN break function (NC)	cable
UNAM 50N3721/S14	NPN break function (NC)	connector M12
UNAM 50P1721	PNP make function (NO)	cable
UNAM 50P1721/S14	PNP make function (NO)	connector M12
UNAM 50P3721	PNP break function (NC)	cable
UNAM 50P3721/S14	PNP break function (NC)	connector M12

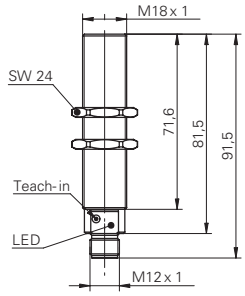
Sd = 400 mm

- internal and external Teach-in
- sensorfront chemically resistant
- stainless steel housing

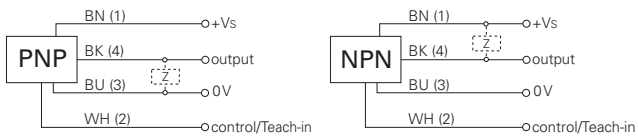
general data	
special type	chemically resistant
sensing range sd	60 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	Teach-in
response time ton	< 60 ms
release time toff	< 60 ms
alignment aid	target display flashing
sonic frequency	400 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	stainless steel 1.4435 (A4)
coating active face	Parylene
material O-Ring	FFKM
width / diameter	18 mm
height / length	91,5 mm
connection types	connector M12
ambient conditions	
operating temperature	0 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

order reference	output circuit
UNAR 18N6912/S14G	NPN make function (NO)
UNAR 18N7912/S14G	NPN break function (NC)
UNAR 18P6912/S14G	PNP make function (NO)
UNAR 18P7912/S14G	PNP break function (NC)

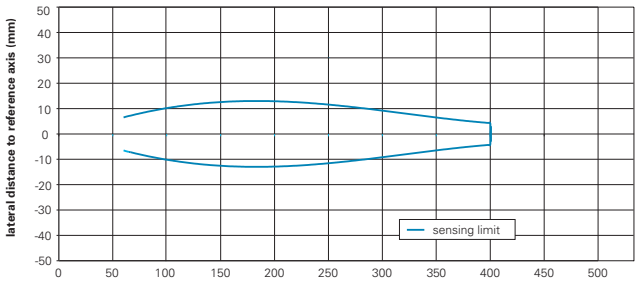
dimension drawing



connection diagrams



typical sonic cone profile



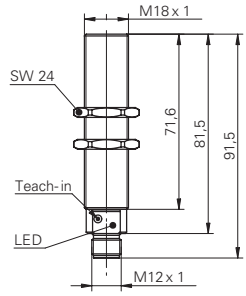
standard target with 30 x 30mm, directed rectangular to sensor's reference axis

Sd = 1000 mm

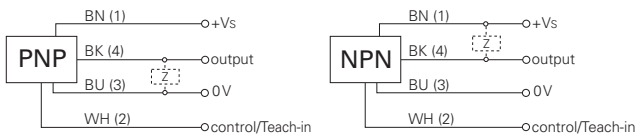
- internal and external Teach-in
- sensorfront chemically resistant
- stainless steel housing

general data	
special type	chemically resistant
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 0,18% Sde/K
adjustment	Teach-in
response time ton	< 80 ms
release time toff	< 80 ms
alignment aid	target display flashing
sonic frequency	240 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	stainless steel 1.4435 (A4)
coating active face	Parylene
material O-Ring	FFKM
width / diameter	18 mm
height / length	91,5 mm
connection types	connector M12
ambient conditions	
operating temperature	0 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

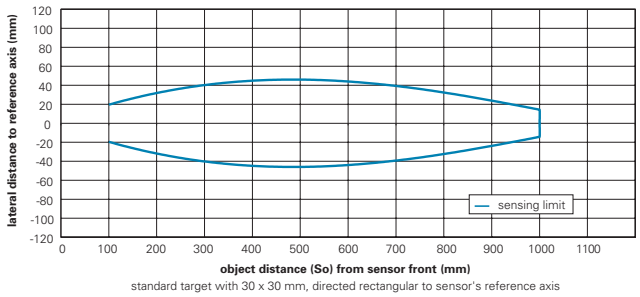
dimension drawing



connection diagrams



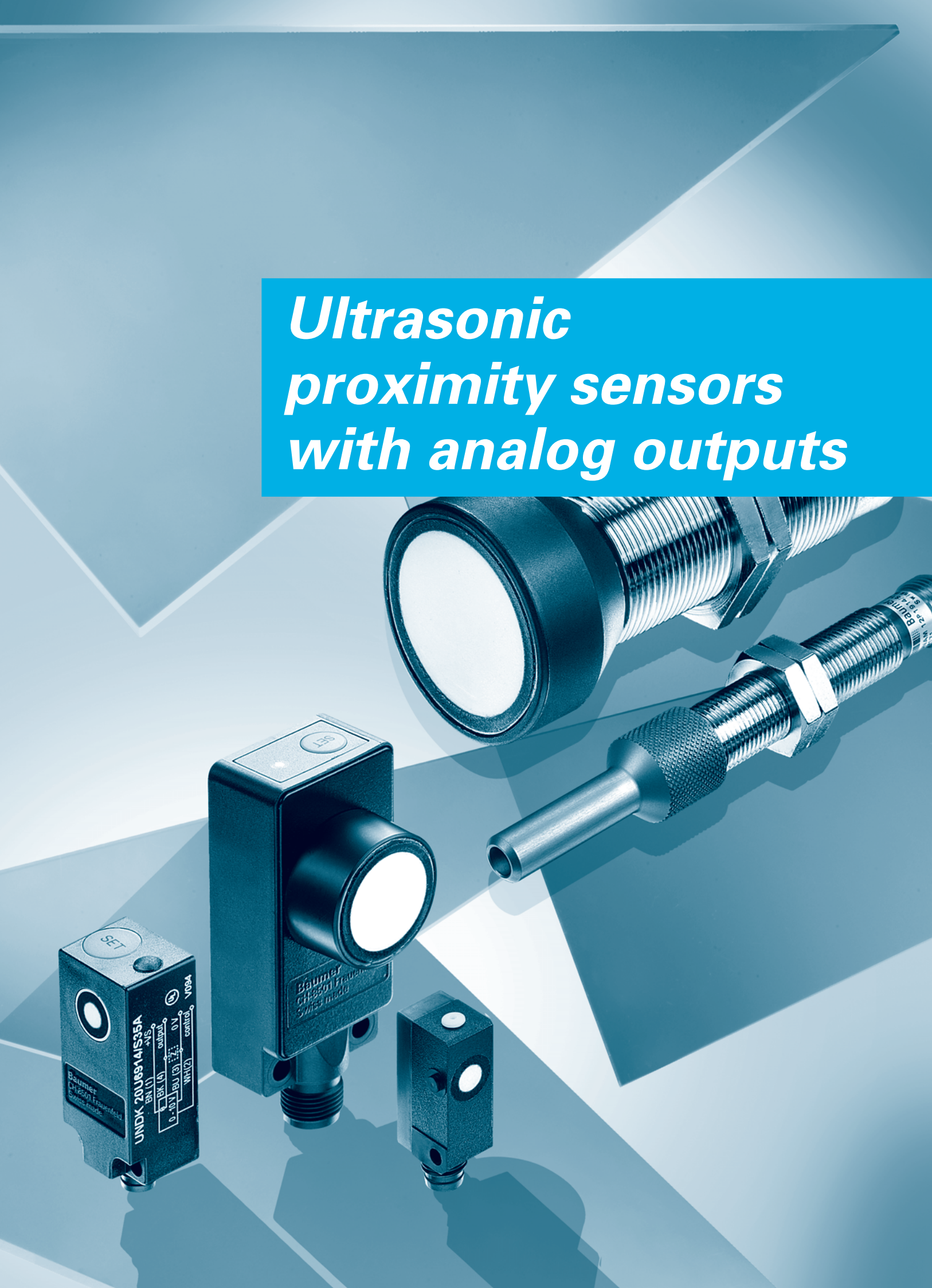
typical sonic cone profile



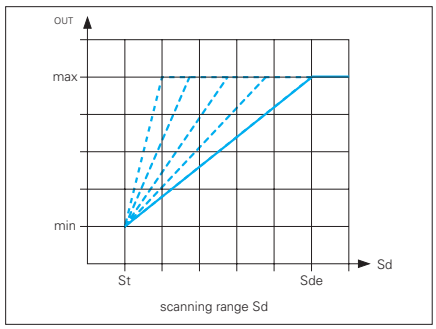
standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

order reference	output circuit
UNAR 18N6903/S14G	NPN make function (NO)
UNAR 18N7903/S14G	NPN break function (NC)
UNAR 18P6903/S14G	PNP make function (NO)
UNAR 18P7903/S14G	PNP break function (NC)

Ultrasonic proximity sensors with analog outputs



Sensors with potentiometer

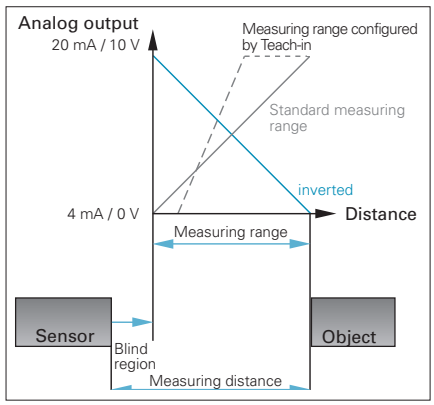


The sensor provides a distance proportional analog current or analog voltage output, allowing simply applied, non-contact distance measurement. The user can change the slope of the output curve using the built-in potentiometer. By doing so, they are able to define the required resolution. Sensor versions, which have a built-in D/A-Converter, generate output signals divided into discrete steps. Applications having long cable runs where there might be EMI or RFI interferences, should use sensors with an analog current output.

Sensors with Teach-in

Adjustment of 0 ... 10 V output function

To switch the sensor into Teach mode, hold the Teach-in button, or connect the external Teach-in wire (WH) to +VS for 2 seconds or more. Successful entry into Teach-mode is signaled by the flashing bicolor LED. Upon release of the Teach button or disconnection of external Teach wire from the +VS source, the red LED will flash. At this point, you may set the close limit (Sdc) by placing the target at the required distance from the sensor (the closest the target will be to the sensor face) and briefly pushing the button or connecting the Teach-in wire with +VS. The LED will then flash Amber. Far limit (Sde) may now be programmed by placing the target at the farthest required distance from the sensor by briefly pressing the button or connecting the Teach-in wire with + VS. Both LEDs will be „on“ for 2 seconds to confirm proper completion of Teach-in process.



Programmable output curve

Optional on request

Separate digital PNP output with one switching point which may be set using the Teach-in function.

Inverting the output function to 10 ... 0 V

Sensor output signal can be inverted to 10 ... 0 V by teaching the far limit Sde first and the sensor close limit Sdc second.

Resetting to original factory settings or improper set up

Teaching the sensor without an object within its scanning range, teaching only one instead of the required two limits of the scanning range or simply pressing the button for more than 6 seconds will automatically restore the original factory settings. Fast flashing of both LEDs indicates successful completion of the resetting.

Linearity

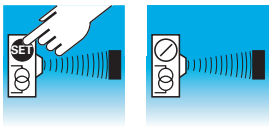
Deviations in linearity are mainly generated within the sensor and by changes in ambient temperature. Resolution, temperature drift and repeatability define the linearity error.

Minimum load resistance

The voltage drop across the load resistance is proportional to the current, using a sensor with current output. To ensure a proper functioning of the output stage do not exceed the maximum permissible load resistance as stated in the data sheet.

Resolution

Defines the smallest position change of the object which causes a change in voltage or current at the sensor output.



rectangular designs

product family	UNDK 10	UNDK 20	UNDK 20	UNDK 20	UNDK 30	UNDK 30	UNDK 30
							
	SONUS						
width / diameter	10,4 mm	20 mm	20 mm	20 mm	30 mm	30 mm	30 mm
sensing range sd	20 ... 200 mm	20 ... 200 mm	60 ... 400 mm	100 ... 1000 mm	30 ... 250 mm	60 ... 400 mm	100 ... 1000 mm
potentiometer					■	■	■
Teach-in	■	■	■	■	■	■	■
repeatability	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm
operating temperature	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C
housing material	plastic (ASA)	polyester	polyester	polyester	polyester / die-cast zinc	polyester / die-cast zinc	polyester / die-cast zinc
cable	■				■	■	■
flylead connector M8	■						
connector M8	■	■	■	■			
connector M12					■	■	■
protection class	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67
Page	**602**	**603**	**604**	**605**	**606**	**607**	**608**

cylindrical designs

product family	UNAM 12	UNAM 12	UNAM 12	UNAR 18	UNAM 18	UNAR 18	UNAM 30
							
width / diameter	12 mm	12 mm	12 mm	18 mm	18 mm	18 mm	30 mm
sensing range sd	2 ... 82 mm	20 ... 200 mm	60 ... 400 mm	60 ... 400 mm	100 ... 1000 mm	100 ... 1000 mm	100 ... 1000 mm
potentiometer							■
external Teach-in	■	■	■				
Teach-in				■	■	■	■
repeatability	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 0,5 mm
operating temperature	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	0 ... +60 °C	-10 ... +60 °C	0 ... +60 °C	-10 ... +60 °C
housing material	brass nickel plated	brass nickel plated	brass nickel plated	stainless steel 1.4435 (A4)	brass nickel plated	stainless steel 1.4435 (A4)	brass nickel plated
cable							■
connector M12	■	■	■	■	■	■	■
protection class	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67
Page	**610**	**611**	**612**	**616**	**613**	**617**	**614**

UNDK 30

30 mm
200 ... 2000 mm
■
< 1 mm
-10 ... +60 °C
polyester / die-cast zinc
■
■
IP 67
609

UNAM 50

30 mm
400 ... 2500 mm
■
■
< 1 mm
-10 ... +60 °C
brass nickel plated
■
■
IP 67
615

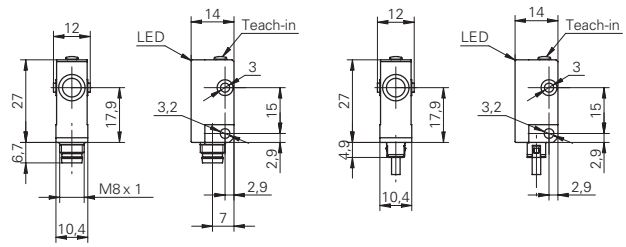
Sd = 200 mm

- small housing dimensions
- very low mass (4 g)
- high resolution

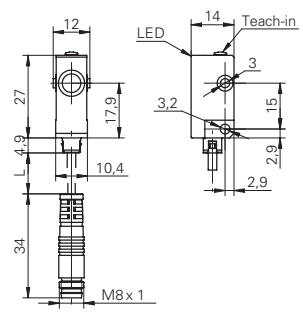
general data	
sensing range sd	20 ... 200 mm
scanning range close limit Sdc	20 ... 200 mm
scanning range far limit Sde	20 ... 200 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	Teach-in
sonic frequency	380 kHz
response time ton	< 60 ms
release time toff	< 60 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	35 mA
output circuit	voltage output
output signal	0 ... 10 V / 10 ... 0 V
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	plastic (ASA)
width / diameter	10,4 mm
height / length	27 mm
depth	14 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	connection types
UNDK 10U6914	cable
UNDK 10U6914/KS35A	flylead connector M8
UNDK 10U6914/S35A	connector M8

dimension drawings

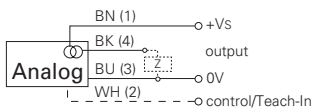


flylead connector version

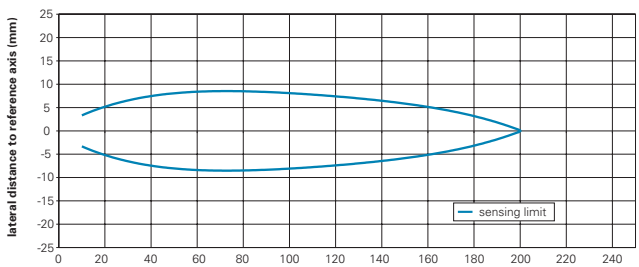


standard cable length 200 mm

connection diagram



typical sonic cone profile



object distance (So) from sensor front (mm)

standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

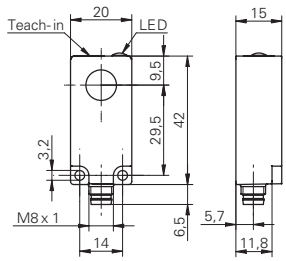
Sd = 200 mm

- internal and external Teach-in
- 0 ... 10 V / 4 ... 20 mA invertible
- small sonic beam angle

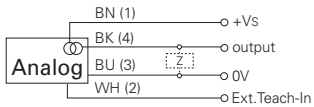
general data	
sensing range sd	20 ... 200 mm
scanning range close limit Sdc	20 ... 200 mm
scanning range far limit Sde	20 ... 200 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	Teach-in
sonic frequency	380 kHz
response time ton	< 30 ms
release time toff	< 30 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	35 mA
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
output signal	0 ... 10 V / 10 ... 0 V
current output	
output signal	4 ... 20 mA / 20 ... 4 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	output circuit
UNDK 20I6914/S35A	current output
UNDK 20U6914/S35A	voltage output

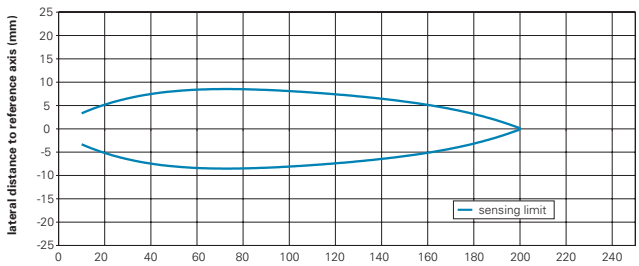
dimension drawing



connection diagram



typical sonic cone profile



object distance (So) from sensor front (mm)

standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

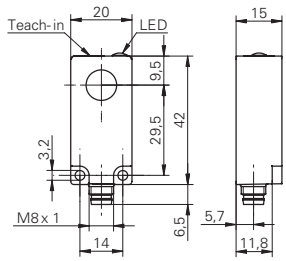
Sd = 400 mm

- internal and external Teach-in
- 0 ... 10 V / 4 ... 20 mA invertible
- wide sonic beam angle

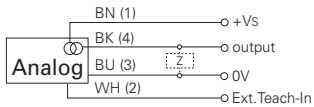
general data	
sensing range sd	60 ... 400 mm
scanning range close limit Sdc	60 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	Teach-in
sonic frequency	290 kHz
response time ton	< 60 ms
release time toff	< 60 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	55 mA
output signal	4 ... 20 mA / 20 ... 4 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	output circuit
UNDK 20I6912/S35A	current output
UNDK 20U6912/S35A	voltage output

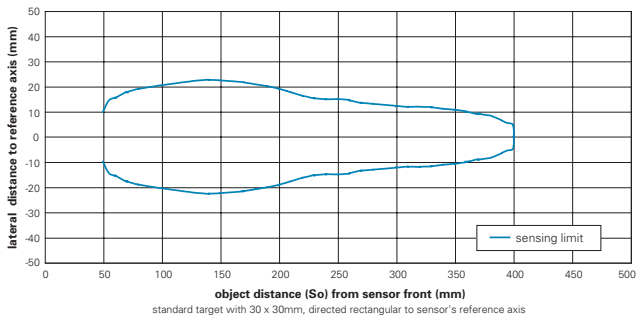
dimension drawing



connection diagram



typical sonic cone profile



standard target with 30 x 30mm, directed rectangular to sensor's reference axis

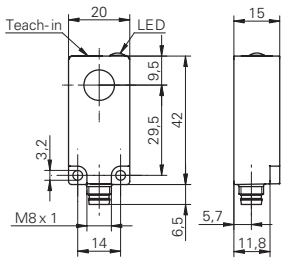
Sd = 1000 mm

- internal and external Teach-in
- 0 ... 10 V / 4 ... 20 mA invertible
- long sensing distance

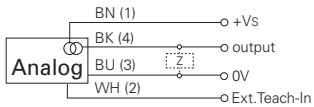
general data	
sensing range sd	100 ... 1000 mm
scanning range close limit Sdc	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	Teach-in
sonic frequency	240 kHz
response time ton	< 80 ms
release time toff	< 80 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	55 mA
output signal	4 ... 20 mA / 20 ... 4 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	output circuit
UNDK 20I6903/S35A	current output
UNDK 20U6903/S35A	voltage output

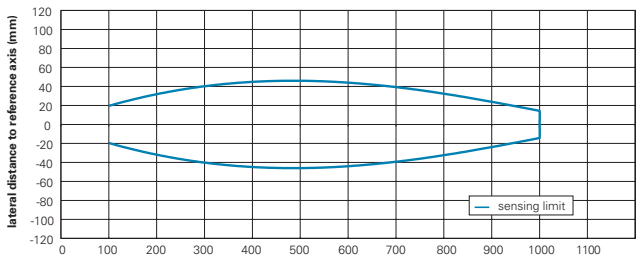
dimension drawing



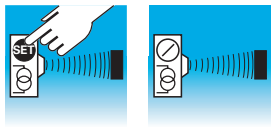
connection diagram



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

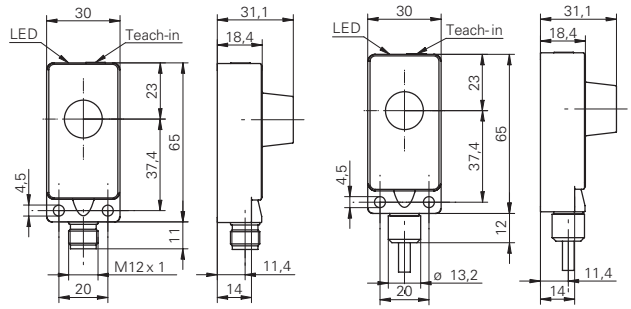


Sd = 250 mm

- Teach-in or potentiometer
- 0 ... 10 V / 4 ... 20 mA
- output of Teach-in version invertible

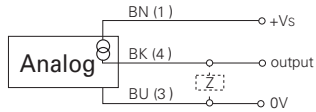
general data	
sensing range sd	30 ... 250 mm
scanning range far limit Sde	30 ... 250 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
sonic frequency	300 kHz
response time ton	< 50 ms
release time toff	< 50 ms
alignment aid	target display flashing
temperature drift	< 2% of distance to target So
potentiometer	
light indicator	LED green
Teach-in	
scanning range close limit Sdc	30 ... 250 mm
light indicator	yellow LED / red LED
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
current output	
current consumption max.	55 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33S, ESG 34S

dimension drawings

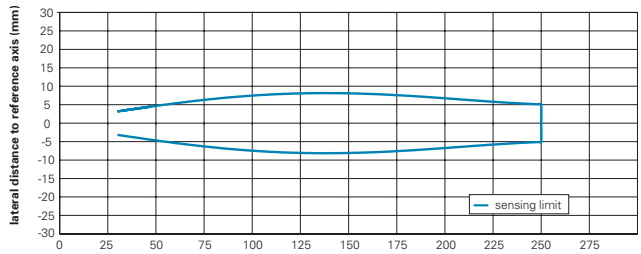


Teach-in = Teach-in or potentiometer

connection diagram

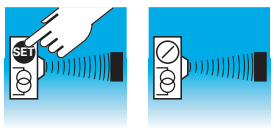


typical sonic cone profile



standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

order reference	adjustment	output circuit	output signal	connection types
UNDK 30I6113	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	cable
UNDK 30I6113/S14	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	connector M12
UNDK 30U6113	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	cable
UNDK 30U6113/S14	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	connector M12
UNDK 30U9113	potentiometer	voltage output	0 ... 10 VDC	cable
UNDK 30U9113/S14	potentiometer	voltage output	0 ... 10 VDC	connector M12

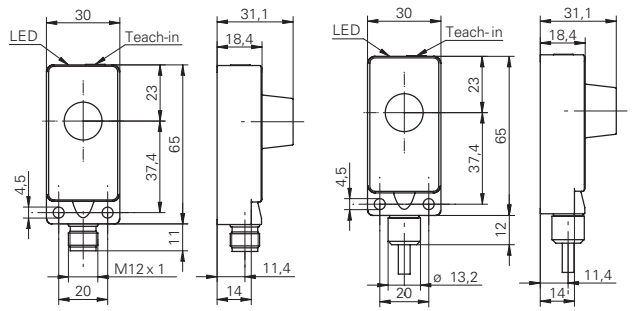


Sd = 400 mm

- Teach-in or potentiometer
- 0 ... 10 V / 4 ... 20 mA
- output of Teach-in version invertible

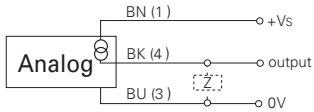
general data	
sensing range sd	60 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
sonic frequency	400 kHz
response time ton	< 60 ms
release time toff	< 60 ms
alignment aid	target display flashing
temperature drift	< 2% of distance to target So
potentiometer	
light indicator	LED green
Teach-in	
scanning range close limit Sdc	60 ... 400 mm
light indicator	yellow LED / red LED
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
current output	
current consumption max.	55 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33S, ESG 34S

dimension drawings

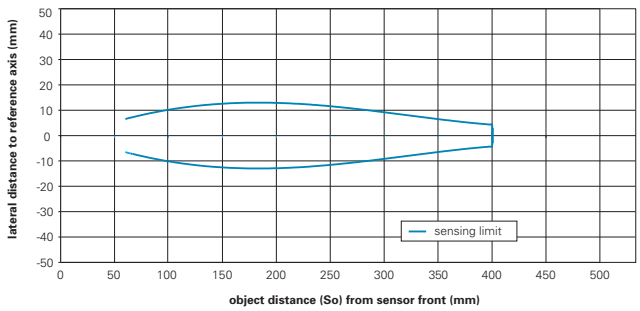


Teach-in = Teach-in or potentiometer

connection diagram

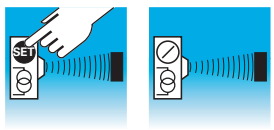


typical sonic cone profile



standard target with 30 x 30mm, directed rectangular to sensor's reference axis

order reference	adjustment	output circuit	output signal	connection types
UNDK 30I6112	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	cable
UNDK 30I6112/S14	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	connector M12
UNDK 30U6112	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	cable
UNDK 30U6112/S14	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	connector M12
UNDK 30U9112	potentiometer	voltage output	0 ... 10 VDC	cable
UNDK 30U9112/S14	potentiometer	voltage output	0 ... 10 VDC	connector M12

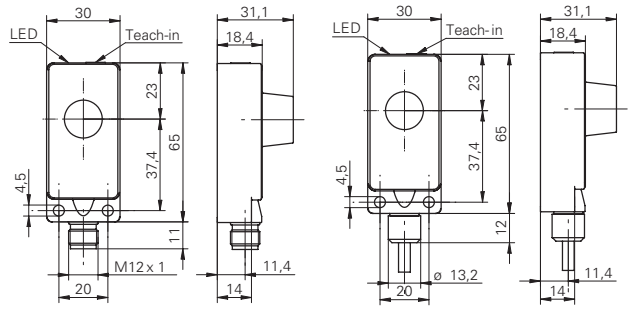


Sd = 1000 mm

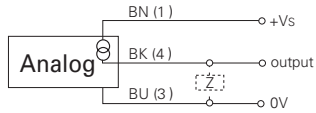
- Teach-in or potentiometer
- 0 ... 10 V / 4 ... 20 mA
- output of Teach-in version invertible

general data	
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
sonic frequency	240 kHz
response time ton	< 80 ms
release time toff	< 80 ms
alignment aid	target display flashing
temperature drift	< 2% of distance to target So
potentiometer	
light indicator	LED green
Teach-in	
scanning range close limit Sdc	100 ... 1000 mm
light indicator	yellow LED / red LED
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
current output	
current consumption max.	55 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33A, ESG 34A

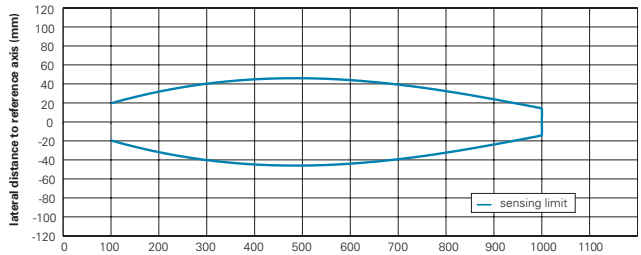
dimension drawings



connection diagram



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

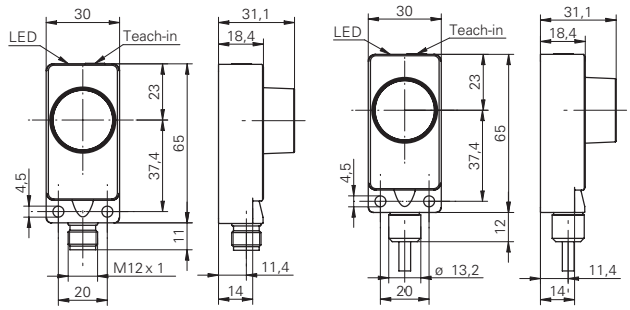
order reference	adjustment	output circuit	output signal	connection types
UNDK 30I6103	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	cable
UNDK 30I6103/S14	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	connector M12
UNDK 30U6103	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	cable
UNDK 30U6103/S14	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	connector M12
UNDK 30U9103	potentiometer	voltage output	0 ... 10 VDC	cable
UNDK 30U9103/S14	potentiometer	voltage output	0 ... 10 VDC	connector M12

Sd = 2000 mm

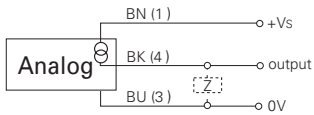
- Teach-in
- 0 ... 10 V / 4 ... 20 mA
- output of Teach-in version invertible

general data	
sensing range sd	200 ... 2000 mm
scanning range close limit Sdc	200 ... 2000 mm
scanning range far limit Sde	200 ... 2000 mm
repeatability	< 1 mm
resolution	< 0,5 mm
adjustment	Teach-in
sonic frequency	200 kHz
response time ton	< 150 ms
release time toff	< 150 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	55 mA
output signal	4 ... 20 mA / 20 ... 4 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33A, ESG 34A

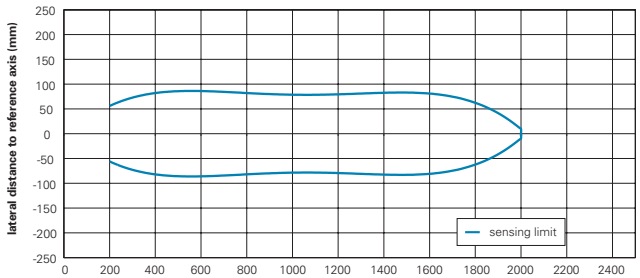
dimension drawings



connection diagram



typical sonic cone profile



standard target with 100 x 100 mm, positioned perpendicularly to sensor's reference axis

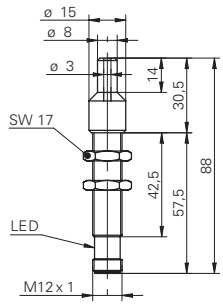
order reference	output circuit	connection types
UNDK 30I6104/S14	current output	connector M12
UNDK 30U6104	voltage output	cable
UNDK 30U6104/S14	voltage output	connector M12

Sd = 82 mm

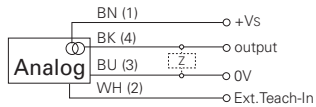
- external Teach-in
- with beam columnator for measurement in very small containers

general data	
special type	with beam columnator
sensing range sd	2 ... 82 mm
scanning range close limit Sdc	2 ... 82 mm
scanning range far limit Sde	2 ... 82 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	external Teach-in
sonic frequency	380 kHz
response time ton	< 30 ms
release time toff	< 30 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	35 mA
output circuit	voltage output
output signal	0 ... 10 V / 10 ... 0 V
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	12 mm
height / length	70 mm
connection types	connector M12
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
Teach-in-adapter	Nr. 141584
connectors	ESW 33A, ESG 34A

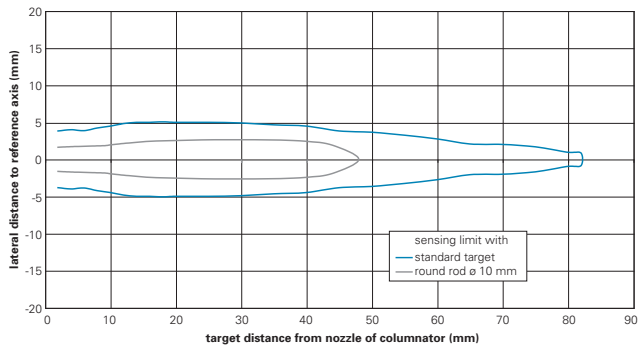
dimension drawing



connection diagram



typical sonic cone profile



standard target 15 x 15 mm and round rod ø 10 mm, directecd rectangular to sensor's reference axis

order reference
UNAM 12U9914/S14D

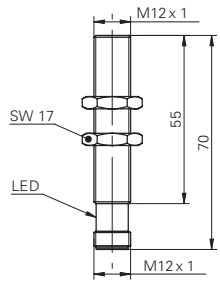
Sd = 200 mm

- external Teach-in
- 0 ... 10 V / 0 ... 10 mA invertible
- Teach-in adapter

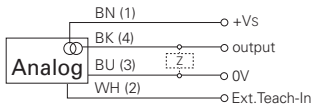
general data	
sensing range sd	20 ... 200 mm
scanning range close limit Sdc	20 ... 200 mm
scanning range far limit Sde	20 ... 200 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	external Teach-in
sonic frequency	380 kHz
response time ton	< 30 ms
release time toff	< 30 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	45 mA
output signal	0 ... 10 mA / 10 ... 0 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	12 mm
height / length	70 mm
connection types	connector M12
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
Teach-in-adapter	Nr. 141584
connectors	ESW 33A, ESG 34A

order reference	output circuit
UNAM 12I9914/S14	current output
UNAM 12U9914/S14	voltage output

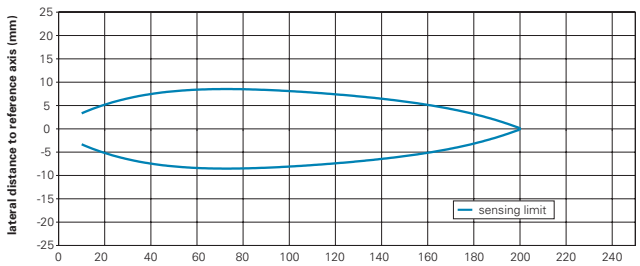
dimension drawing



connection diagram



typical sonic cone profile



object distance (So) from sensor front (mm)

standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

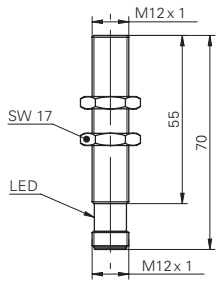
Sd = 400 mm

- external Teach-in
- 0 ... 10 V / 0 ... 10 mA invertible
- Teach-in adapter

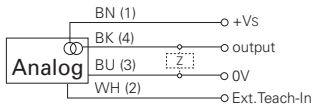
general data	
sensing range sd	60 ... 400 mm
scanning range close limit Sdc	60 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	external Teach-in
sonic frequency	290 kHz
response time ton	< 60 ms
release time toff	< 60 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	45 mA
output signal	0 ... 10 mA / 10 ... 0 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	12 mm
height / length	70 mm
connection types	connector M12
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
Teach-in-adapter	Nr. 141584
connectors	ESW 33A, ESG 34A

order reference	output circuit
UNAM 12I9912/S14	current output
UNAM 12U9912/S14	voltage output

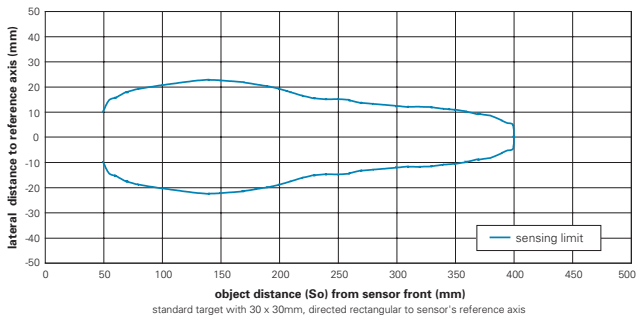
dimension drawing



connection diagram



typical sonic cone profile



standard target with 30 x 30mm, directed rectangular to sensor's reference axis

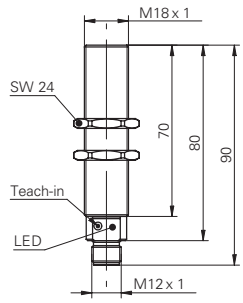
Sd = 1000 mm

- internal and external Teach-in
- 0 ... 10 V / 4 ... 20 mA
- output signals invertible

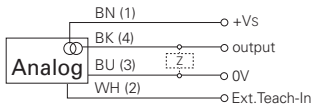
general data	
sensing range sd	100 ... 1000 mm
scanning range close limit Sdc	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	Teach-in
sonic frequency	240 kHz
response time ton	< 80 ms
release time toff	< 80 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	55 mA
output signal	4 ... 20 mA / 20 ... 4 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	18 mm
height / length	90 mm
connection types	connector M12
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33A, ESG 34A

order reference	output circuit
UNAM 18I6903/S14	current output
UNAM 18U6903/S14	voltage output

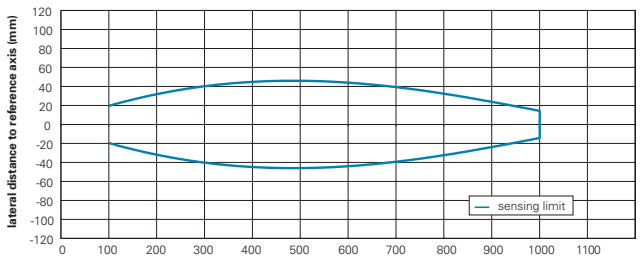
dimension drawing



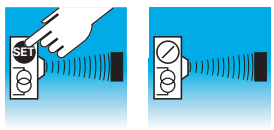
connection diagram



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

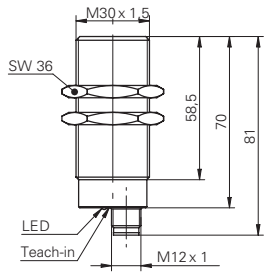


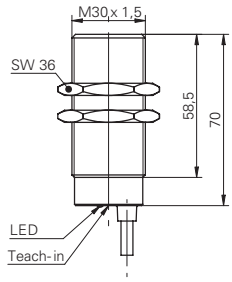
Sd = 1000 mm

- Teach-in or potentiometer
- 0 ... 10 V / 4 ... 20 mA
- signals of Teach-in version invertible

general data	
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
sonic frequency	240 kHz
response time ton	< 80 ms
release time toff	< 80 ms
alignment aid	target display flashing
temperature drift	< 2% of distance to target So
potentiometer	
light indicator	LED green
Teach-in	
scanning range close limit Sdc	100 ... 1000 mm
light indicator	yellow LED / red LED
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
current output	
current consumption max.	55 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	30 mm
height / length	70 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33S, ESG 34S

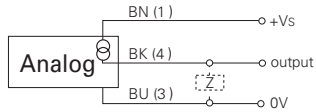
dimension drawings



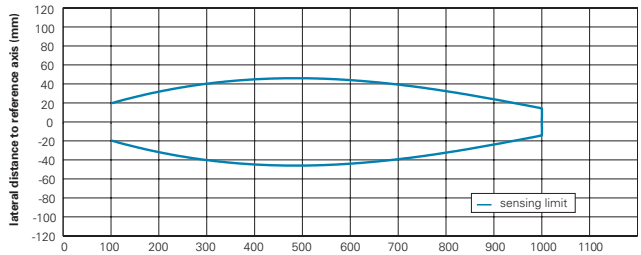


Teach-in = Teach-in or potentiometer

connection diagram

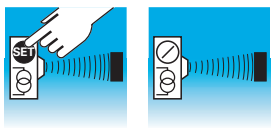


typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

order reference	version	adjustment	output circuit	output signal	connection types
UNAM 30I6103	standard	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	cable
UNAM 30I6103/S14	standard	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	connector M12
UNAM 30I6803/S14	multiplex version	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	connector M12
UNAM 30U6103	standard	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	cable
UNAM 30U6103/S14	standard	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	connector M12
UNAM 30U9103	standard	potentiometer	voltage output	0 ... 10 VDC	cable
UNAM 30U9103/S14	standard	potentiometer	voltage output	0 ... 10 VDC	connector M12

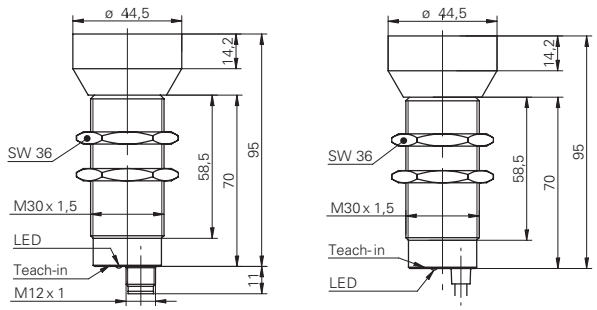


Sd = 2500 mm

- Teach-in or potentiometer
- 0 ... 10 V / 4 ... 20 mA
- signals of Teach-in version invertible

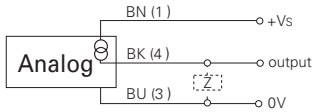
general data	
sensing range sd	400 ... 2500 mm
scanning range far limit Sde	400 ... 2500 mm
repeatability	< 1 mm
resolution	< 0,3 mm
sonic frequency	120 kHz
response time ton	< 160 ms
release time toff	< 160 ms
alignment aid	target display flashing
temperature drift	< 2% of distance to target So
potentiometer	
light indicator	LED green
Teach-in	
scanning range close limit Sdc	400 ... 2500 mm
light indicator	yellow LED / red LED
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
current output	
current consumption max.	55 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	30 mm
height / length	95 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33S, ESG 34S

dimension drawings

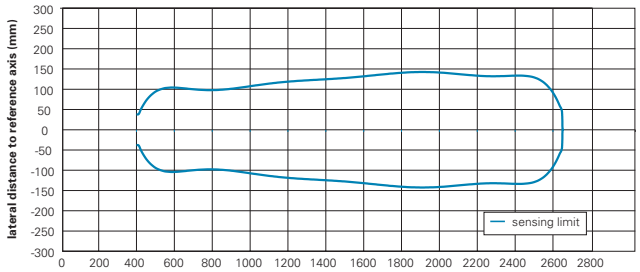


Teach-in = Teach-in or potentiometer

connection diagram



typical sonic cone profile



standard target with 100 x 100 mm, positioned perpendicularly to sensor's reference axis

order reference	adjustment	output circuit	output signal	connection types
UNAM 50I6121	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	cable
UNAM 50I6121/S14	Teach-in	current output	4 ... 20 mA / 20 ... 4 mA	connector M12
UNAM 50U6121	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	cable
UNAM 50U6121/S14	Teach-in	voltage output	0 ... 10 V / 10 ... 0 V	connector M12
UNAM 50U9121	potentiometer	voltage output	0 ... 10 VDC	cable
UNAM 50U9121/S14	potentiometer	voltage output	0 ... 10 VDC	connector M12

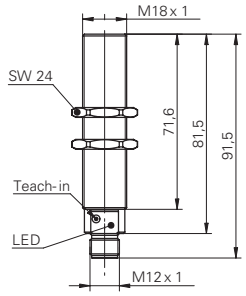
Sd = 400 mm

- internal and external Teach-in
- sensorfront chemically resistant
- stainless steel housing

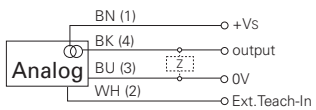
general data	
special type	chemically resistant
sensing range sd	60 ... 400 mm
scanning range close limit Sdc	60 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	Teach-in
sonic frequency	400 kHz
response time ton	< 60 ms
release time toff	< 60 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	55 mA
output signal	4 ... 20 mA / 20 ... 4 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	cylindrical
housing material	stainless steel 1.4435 (A4)
coating active face	Parylene
material O-Ring	FFKM
width / diameter	18 mm
height / length	91,5 mm
connection types	connector M12
ambient conditions	
operating temperature	0 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33A, ESG 34A

order reference	output circuit
UNAR 18I6912/S14G	current output
UNAR 18U6912/S14G	voltage output

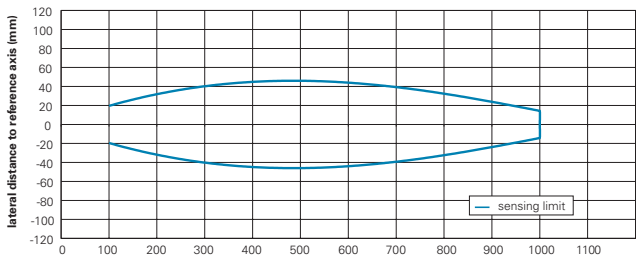
dimension drawing



connection diagram



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

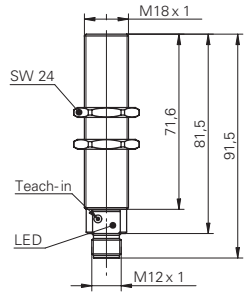
Sd = 1000 mm

- internal and external Teach-in
- sensorfront chemically resistant
- stainless steel housing

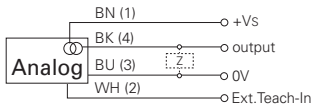
general data	
special type	chemically resistant
sensing range sd	100 ... 1000 mm
scanning range close limit Sdc	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
repeatability	< 0,5 mm
resolution	< 0,3 mm
adjustment	Teach-in
sonic frequency	240 kHz
response time ton	< 80 ms
release time toff	< 80 ms
alignment aid	target display flashing
light indicator	yellow LED / red LED
temperature drift	< 2% of distance to target So
electrical data	
voltage supply range +Vs	15 ... 30 VDC
output current	< 20 mA
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
voltage output	
current consumption max.	35 mA
output signal	0 ... 10 V / 10 ... 0 V
current output	
current consumption max.	55 mA
output signal	4 ... 20 mA / 20 ... 4 mA
load resistance +Vs max.	< 1100 Ohm
load resistance +Vs min.	< 400 Ohm
mechanical data	
type	cylindrical
housing material	stainless steel 1.4435 (A4)
coating active face	Parylene
material O-Ring	FFKM
width / diameter	18 mm
height / length	91,5 mm
connection types	connector M12
ambient conditions	
operating temperature	0 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 33A, ESG 34A

order reference	output circuit
UNAR 18I6903/S14G	current output
UNAR 18U6903/S14G	voltage output

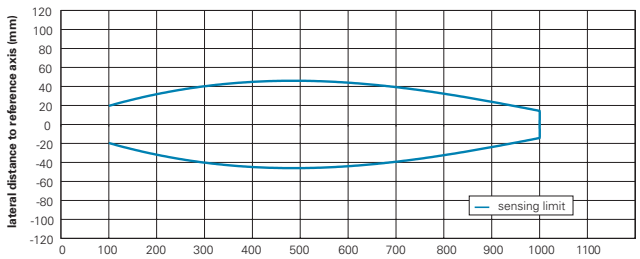
dimension drawing



connection diagram



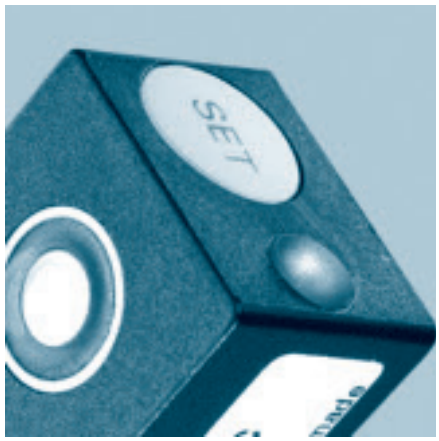
typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

Ultrasonic 2 point proximity switch

The button that thinks



Ultrasonic sensors with the "Teach-in" function are similar to the standard range of products but have the added versatility of a simple touch key set up. The switching points (Sde 1 and Sde 2) may be easily programmed within the sensing range by means of the built-in Teach-in button.

Simple operation

Adjustment switching point Sde 1

1. Adjustment mode:

   Press the Teach-in button for approximately 2 secs until the LED flashes green. Release button.
2. LED flashes green. Place the target at the required scanning range and press the Teach-in button.
3. Successful completion of Teach-in procedure is confirmed by LED „on“ for approximately 2 secs.

Adjustment switching point Sde 2

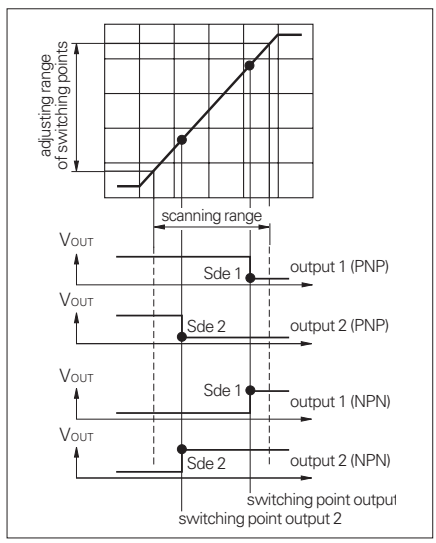
1. Adjustment mode:

   Press the Teach-in button for approximately 4 secs until the LED flashes yellow. Release button.
2. LED flashes yellow. Place the target at the required scanning range and press the Teach-in button.
3. Successful completion of Teach-in procedure is confirmed by LED „on“ for approximately 2 secs.

Resetting to original factory settings

Holding the button down for > 6 secs, will automatically restore the original factory setting. Fast flashing of the green/yellow LED indicates successful completion of the resetting.

Functional diagram



Options

- Remote Teach-in input
- Synchronization- / Multiplex output

Advantages

- Set up configuration is saved on an internal EEPROM ensuring long term stability.
- Simple one button set up, no tools required.
- Teach-in locking: the Teach-in function is locked five minutes after power up or five minutes after the end of the last Teach-in process.

rectangular designs

product family	UZDK 30	UZDK 30	UZDK 30	UZDK 30
				
width / diameter	30 mm	30 mm	30 mm	30 mm
sensing range sd	30 ... 250 mm	60 ... 400 mm	100 ... 1000 mm	200 ... 2000 mm
Teach-in	■	■	■	■
repeatability	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 1 mm
operating temperature	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C
housing material	polyester / die-cast zinc	polyester / die-cast zinc	polyester / die-cast zinc	polyester / die-cast zinc
cable	■	■	■	■
connector M12	■	■	■	■
protection class	IP 67	IP 67	IP 67	IP 67
Page	**622**	**623**	**624**	**625**

cylindrical designs

product family	UZAM 30	UZAM 50
		
width / diameter	30 mm	30 mm
sensing range sd	100 ... 1000 mm	350 ... 2500 mm
Teach-in	■	■
repeatability	< 0,5 mm	< 1 mm
operating temperature	-10 ... +60 °C	-10 ... +60 °C
housing material	brass nickel plated	brass nickel plated
cable	■	■
connector M12	■	■
protection class	IP 67	IP 67
Page	**626**	**627**

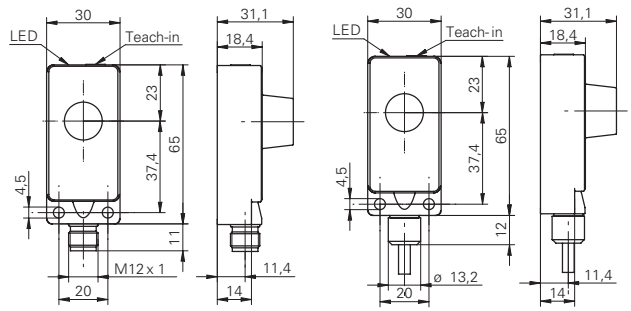
Sd = 250 mm

- Teach-in
- small blind range
- two separate outputs

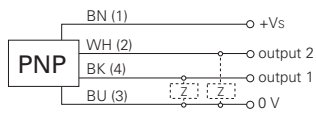
general data	
special type	2 point proximity switch
sensing range sd	30 ... 250 mm
scanning range far limit Sde	30 ... 250 mm
hysteresis typ.	5% Sde
repeatability	< 0,5 mm
temperature drift	< 2% Sde
adjustment	Teach-in
response time ton	< 20 ms
release time toff	< 20 ms
alignment aid	target display flashing
sonic frequency	300 kHz
output indicator	green / yellow LED
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	40 mA
output circuit	PNP make function (NO)
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

order reference	connection types
UZDK 30P6113	cable
UZDK 30P6113/S14	connector M12

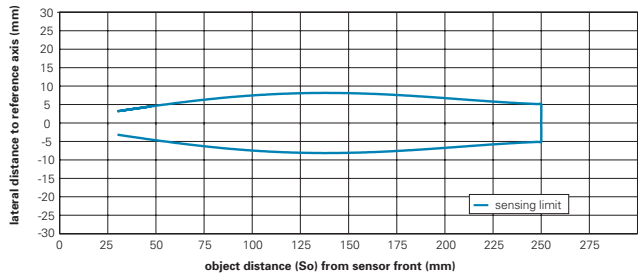
dimension drawings



connection diagram



typical sonic cone profile



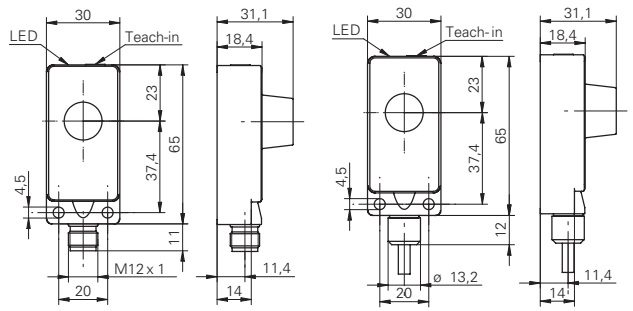
standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

Sd = 400 mm

- Teach-in
- two separate outputs

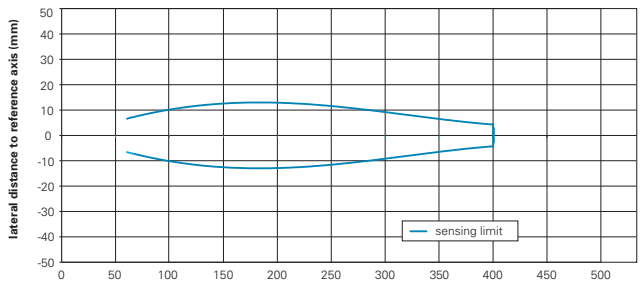
general data	
special type	2 point proximity switch
sensing range sd	60 ... 400 mm
scanning range far limit Sde	60 ... 400 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 2% Sde
adjustment	Teach-in
response time ton	< 30 ms
release time toff	< 30 ms
alignment aid	target display flashing
sonic frequency	400 kHz
output indicator	green / yellow LED
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	40 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

dimension drawings



connection diagrams

typical sonic cone profile



standard target with 30 x 30mm, directed rectangular to sensor's reference axis

order reference	output circuit	connection types
UZDK 30N6112/S14	NPN make function (NO)	connector M12
UZDK 30P6112	PNP make function (NO)	cable
UZDK 30P6112/S14	PNP make function (NO)	connector M12

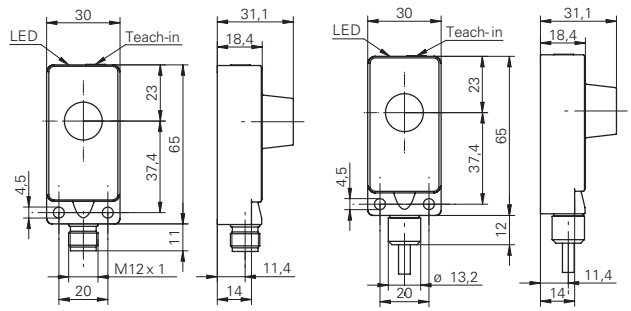
Sd = 1000 mm

- Teach-in
- two separate outputs

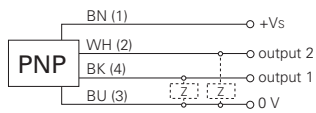
general data	
special type	2 point proximity switch
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 2% Sde
adjustment	Teach-in
response time ton	< 40 ms
release time toff	< 40 ms
alignment aid	target display flashing
sonic frequency	240 kHz
output indicator	green / yellow LED
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	40 mA
output circuit	PNP make function (NO)
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

order reference	connection types
UZDK 30P6103	cable
UZDK 30P6103/S14	connector M12

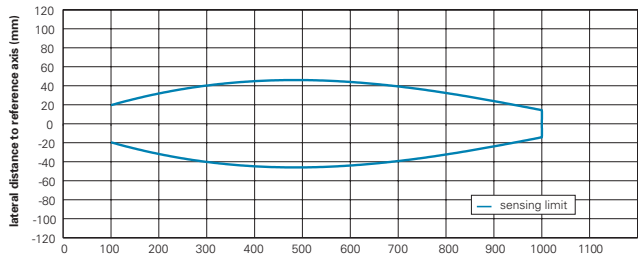
dimension drawings



connection diagram



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

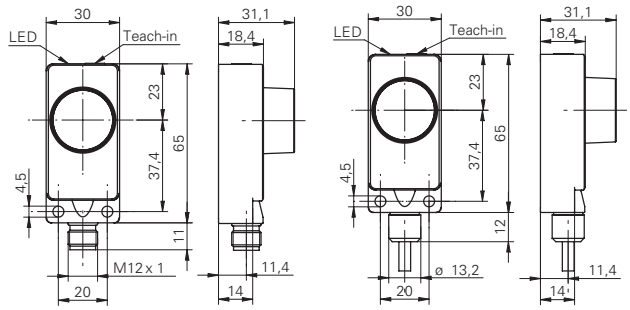
Sd = 2000 mm

- Teach-in
- two separate outputs

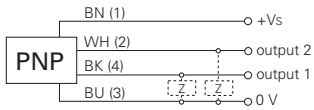
general data	
special type	2 point proximity switch
sensing range sd	200 ... 2000 mm
scanning range far limit Sde	200 ... 2000 mm
hysteresis typ.	4% Sde
repeatability	< 1 mm
temperature drift	< 2% Sde
adjustment	Teach-in
response time ton	< 80 ms
release time toff	< 80 ms
alignment aid	target display flashing
sonic frequency	200 kHz
output indicator	green / yellow LED
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	40 mA
output circuit	PNP make function (NO)
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

order reference	connection types
UZDK 30P6104	cable
UZDK 30P6104/S14	connector M12

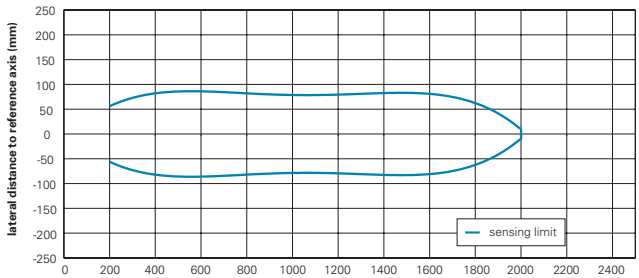
dimension drawings



connection diagram



typical sonic cone profile



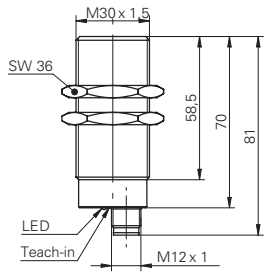
standard target with 100 x 100 mm, positioned perpendicularly to sensor's reference axis

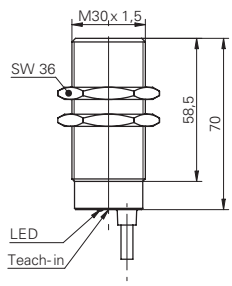
Sd = 1000 mm

- Teach-in
- two separate outputs
- multiplex-function

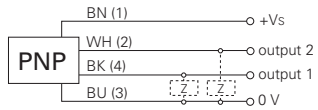
general data	
special type	2 point proximity switch
sensing range sd	100 ... 1000 mm
scanning range far limit Sde	100 ... 1000 mm
hysteresis typ.	4% Sde
repeatability	< 0,5 mm
temperature drift	< 2% Sde
adjustment	Teach-in
response time ton	< 40 ms
release time toff	< 40 ms
alignment aid	target display flashing
sonic frequency	240 kHz
output indicator	green / yellow LED
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	30 mm
height / length	70 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
standard	
connectors	ES 14, ESW 33A, ESG 34A
multiplex version	
connectors	ES 33C, ES 34C

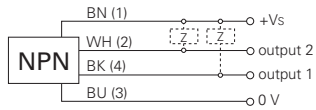
dimension drawings



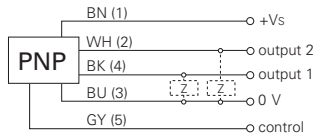


connection diagrams

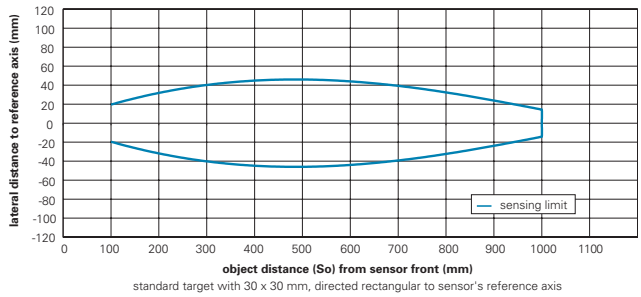




connection diagram multiplex version



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

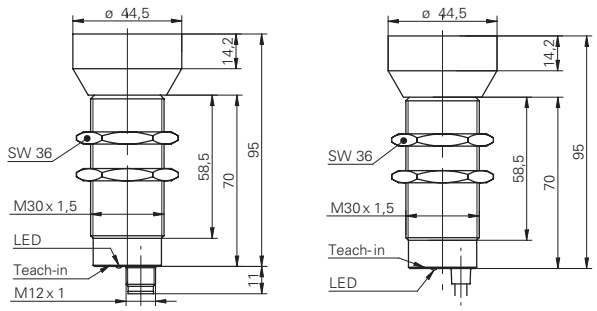
order reference	version	output circuit	connection types
UZAM 30N6103/S14	standard	NPN make function (NO)	connector M12
UZAM 30P6103	standard	PNP make function (NO)	cable
UZAM 30P6103/S14	standard	PNP make function (NO)	connector M12
UZAM 30P6803	multiplex version	PNP make function (NO)	cable
UZAM 30P6803/S14C	multiplex version	PNP make function (NO)	connector M12

Sd = 2500 mm

- Teach-in
- two separate outputs
- long sensing distance

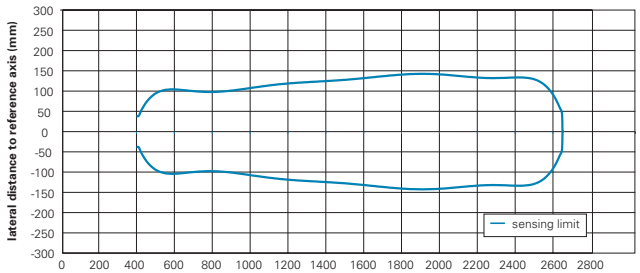
general data	
special type	2 point proximity switch
sensing range sd	350 ... 2500 mm
scanning range far limit Sde	350 ... 2500 mm
hysteresis typ.	4% Sde
repeatability	< 1 mm
temperature drift	< 2% Sde
adjustment	Teach-in
response time ton	< 160 ms
release time toff	< 160 ms
alignment aid	target display flashing
sonic frequency	120 kHz
output indicator	green / yellow LED
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	40 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	30 mm
height / length	95 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

dimension drawings



connection diagrams

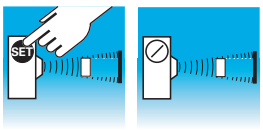
typical sonic cone profile



standard target with 100 x 100 mm, positioned perpendicularly to sensor's reference axis

order reference	output circuit	connection types
UZAM 50N6121	NPN make function (NO)	cable
UZAM 50N6121/S14	NPN make function (NO)	connector M12
UZAM 50P6121	PNP make function (NO)	cable
UZAM 50P6121/S14	PNP make function (NO)	connector M12

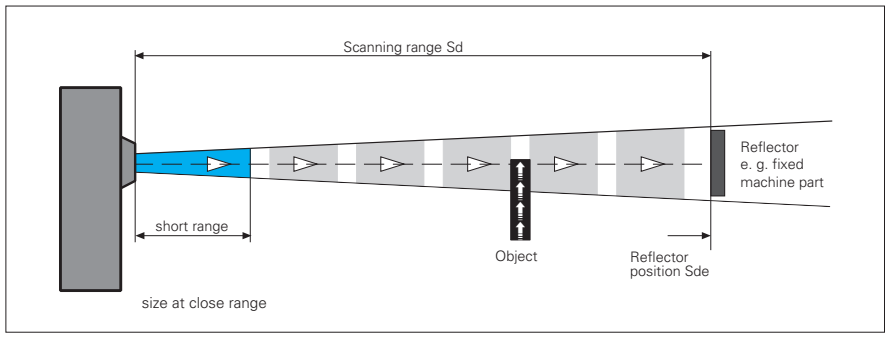
Ultrasonic retro-reflective sensors



Description

The retro-reflective ultrasonic sensor is similar in operation to the ultrasonic proximity sensor. The distance from the sensor to the reflector or to an object within the sensing distance is determined by measuring the propagation time. Any sound reflecting, stationary object can be used as a reflector. The sensing distance Sd (distance sensor-reflector) can be adjusted to the set up conditions with the sensor's potentiometer.

As long as the measured propagation time of the ultrasonic signal corresponds to the distance from the sensor to the reflector, the device is in the non-active state. When an object comes within the sensing distance, the propagation time changes and the sensor changes to the active state. This also allows detection of sound absorbent and sound deflecting objects.

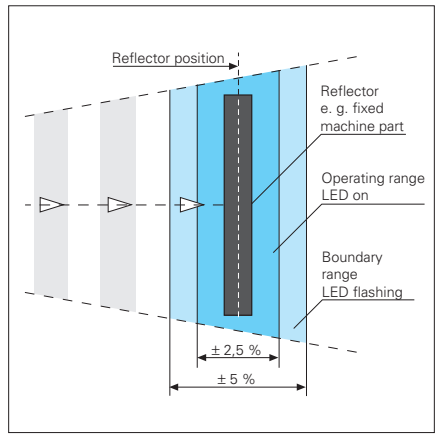


Setting Sde reflector distance

The sensor's potentiometer allows the user to adjust the set up conditions for a specific reflector position (Sde). The output LED is also an adjustment aid as follows:

1. Reflector in operating range
If the setting of Sde deviates from the actual reflector position by less than ±2,5%, the reflector is in the operating range. The LED lights steadily, the output is inactive.

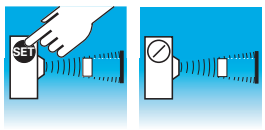
2. Reflector in the boundary range
Up to a deviation of ±5% the output remains inactive but the LED flashes. This indicates that the setting of Sde is not optimal and needs to be corrected.



Retro-reflective sensor with Teach-in

All adjustments are made using the single built-in Teach-in button.

Teach-in of reflector's position
To enter the adjustment mode, push the Teach-in button for more than two seconds. You will know you have pushed it long enough by the indicating LED flashing green. When the button is released, the LED continues to flash. Any subsequent push of the button will teach the position of the reflector.



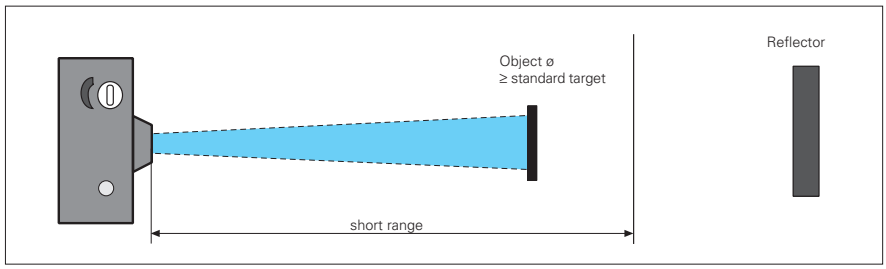
Object detection

Standard object /reflector

The standard target is defined as a square, level object with an edge length of 30 mm (Sde > 1000 mm: 100 mm edge length, Sde ≥ 2500 mm: 300 mm edge length) which is perpendicular to the sensor reference axis. The reflector must be made of a material with good sound reflection properties and be at least the same size as the target.

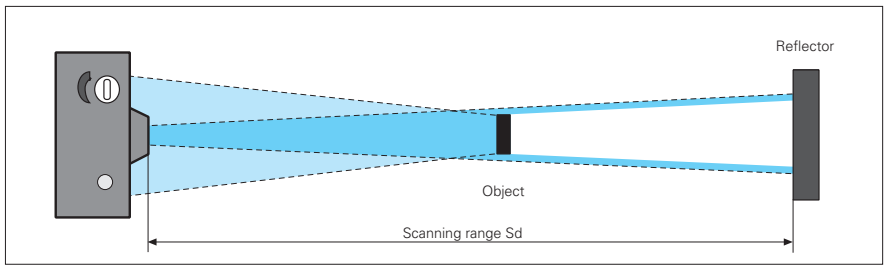
Object at close range

For reliable detection, the sound cone must be covered completely so that no echo is returned from the reflector. The object diameter necessary for this is at least 30 mm in URDK 30 and at least 100 mm in URAM 50.



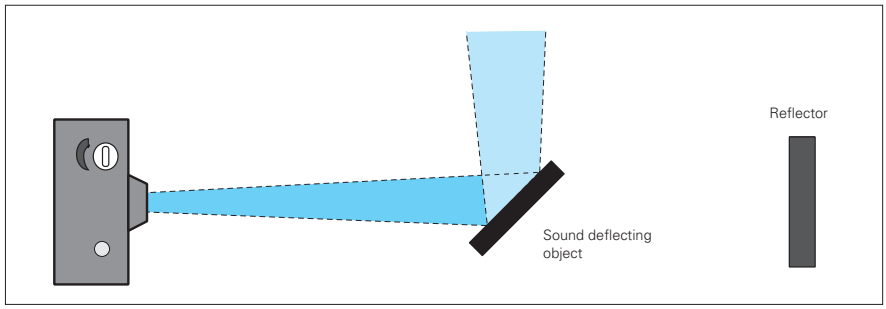
Object in the rest of the operating range

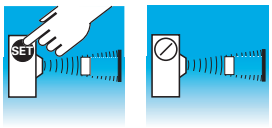
To ensure reliable object detection, the reflected signal must be strong enough. The strength of the reflected signal is dependent on the size of the object. For a standard object, or larger, the full sensing distance Sd is available.



Advantages

- Easy detection even for 100% sound absorbent materials
- Reliable detection of sound deflecting objects
- No blind region in front of the sensor for objects ≥ standard object





rectangular designs

product family	URDK 10	URDK 20	URDK 20	URDK 20	URDK 30
					
	SONUS				
width / diameter	10,4 mm	20 mm	20 mm	20 mm	30 mm
sensing range sd	0 ... 200 mm	0 ... 200 mm	0 ... 400 mm	0 ... 1000 mm	0 ... 1000 mm
potentiometer					■
Teach-in	■	■	■	■	
repeatability	< 1,5 mm	< 1,5 mm	< 1,5 mm	< 1,5 mm	< 3 mm
operating temperature	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C
housing material	plastic (ASA)	polyester	polyester	polyester	polyester / die-cast zinc
cable	■				■
flylead connector M8	■				
connector M8	■	■	■	■	
connector M12					■
protection class	IP 67	IP 67	IP 67	IP 67	IP 67
Page	**633**	**634**	**635**	**636**	**637**

cylindrical designs

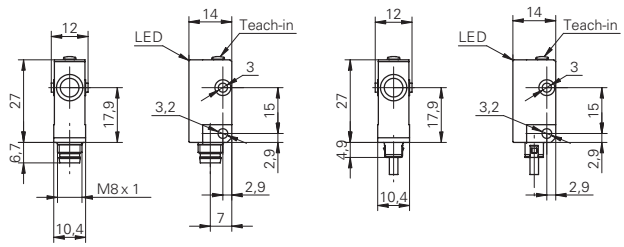
product family	URAM 50
	
width / diameter	30 mm
sensing range sd	0 ... 3000 mm
potentiometer	■
Teach-in	■
repeatability	< 3 mm
operating temperature	-10 ... +60 °C
housing material	brass nickel plated
cable	■
connector M12	■
protection class	IP 67
Page	**638**

Sd = 200 mm

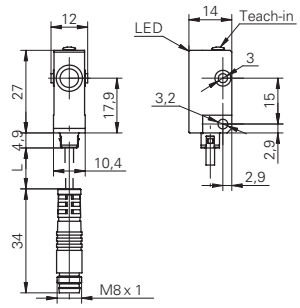
- small housing dimensions
- very low mass (4 g)
- low sensing range/no blind range

general data	
sensing range sd	0 ... 200 mm
reflector position Sde	40 ... 200 mm
adjusting range reflector (operating range)	± 2,5% Sde
adjusting range reflector (limit range)	± 5% Sde
repeatability	< 1,5 mm
alignment aid	target display flashing
adjustment	Teach-in
temperature drift	< 2% Sde
response time ton	< 15 ms
release time toff	< 15 ms
sonic frequency	380 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	30 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	plastic (ASA)
width / diameter	10,4 mm
height / length	27 mm
depth	14 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

dimension drawings

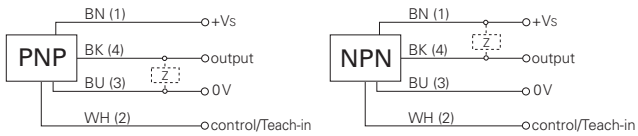


flylead connector version

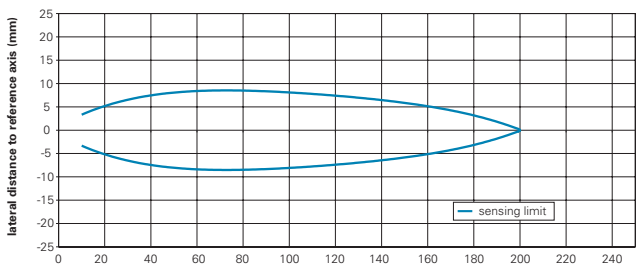


standard cable length 200 mm

connection diagrams



typical sonic cone profile



standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

order reference	output circuit	connection types
URDK 10N8914	NPN make function (NO) / break function (NC)	cable
URDK 10N8914/KS35A	NPN make function (NO) / break function (NC)	flylead connector M8
URDK 10N8914/S35A	NPN make function (NO) / break function (NC)	connector M8
URDK 10P8914	PNP make function (NO) / break function (NC)	cable
URDK 10P8914/KS35A	PNP make function (NO) / break function (NC)	flylead connector M8
URDK 10P8914/S35A	PNP make function (NO) / break function (NC)	connector M8

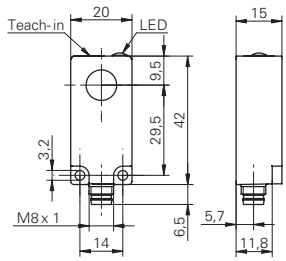
Sd = 200 mm

- internal and external Teach-in
- small sonic beam angle
- compact housing

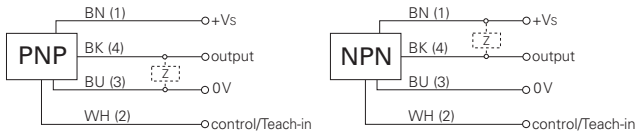
general data	
sensing range sd	0 ... 200 mm
reflector position Sde	40 ... 200 mm
adjusting range reflector (operating range)	± 2,5% Sde
adjusting range reflector (limit range)	± 5% Sde
repeatability	< 1,5 mm
alignment aid	target display flashing
adjustment	Teach-in
temperature drift	< 2% Sde
response time ton	< 10 ms
release time toff	< 10 ms
sonic frequency	380 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	output circuit
URDK 20N6914/S35A	NPN make function (NO)
URDK 20N7914/S35A	NPN break function (NC)
URDK 20P6914/S35A	PNP make function (NO)
URDK 20P7914/S35A	PNP break function (NC)

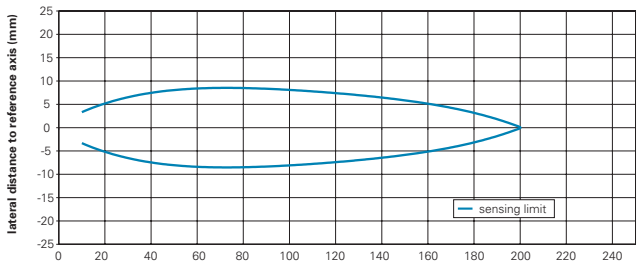
dimension drawing



connection diagrams



typical sonic cone profile



standard square target, size 15 x 15 mm, positioned perpendicularly to sensor's reference axis

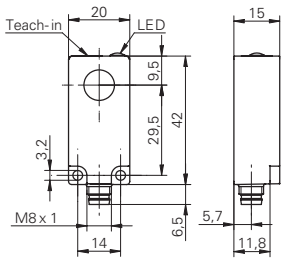
Sd = 400 mm

- internal and external Teach-in
- wide sonic beam angle
- compact housing

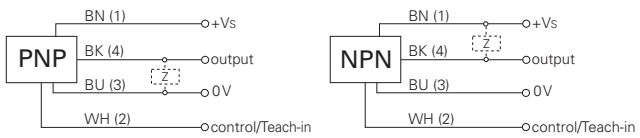
general data	
sensing range sd	0 ... 400 mm
reflector position Sde	100 ... 400 mm
adjusting range reflector (operating range)	± 2,5% Sde
adjusting range reflector (limit range)	± 5% Sde
repeatability	< 1,5 mm
alignment aid	target display flashing
adjustment	Teach-in
temperature drift	< 2% Sde
response time ton	< 25 ms
release time toff	< 25 ms
sonic frequency	290 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	output circuit
URDK 20N6912/S35A	NPN make function (NO)
URDK 20N7912/S35A	NPN break function (NC)
URDK 20P6912/S35A	PNP make function (NO)
URDK 20P7912/S35A	PNP break function (NC)

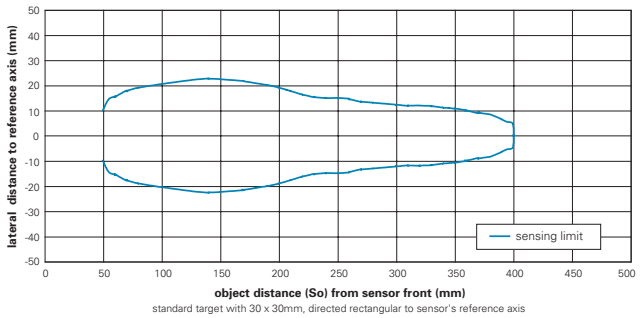
dimension drawing



connection diagrams



typical sonic cone profile



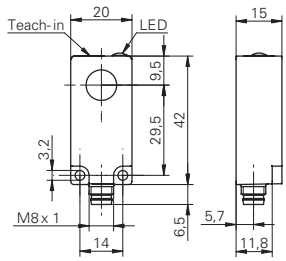
Sd = 1000 mm

- internal and external Teach-in
- small sonic beam angle
- compact housing

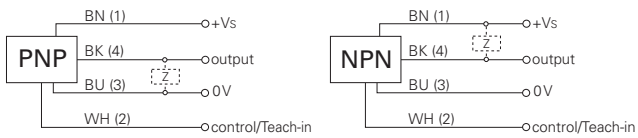
general data	
sensing range sd	0 ... 1000 mm
reflector position Sde	200 ... 1000 mm
adjusting range reflector (operating range)	± 2,5% Sde
adjusting range reflector (limit range)	± 5% Sde
repeatability	< 1,5 mm
alignment aid	target display flashing
adjustment	Teach-in
temperature drift	< 2% Sde
response time ton	< 50 ms
release time toff	< 50 ms
sonic frequency	240 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	output circuit
URDK 20N6903/S35A	NPN make function (NO)
URDK 20N7903/S35A	NPN break function (NC)
URDK 20P6903/S35A	PNP make function (NO)
URDK 20P7903/S35A	PNP break function (NC)

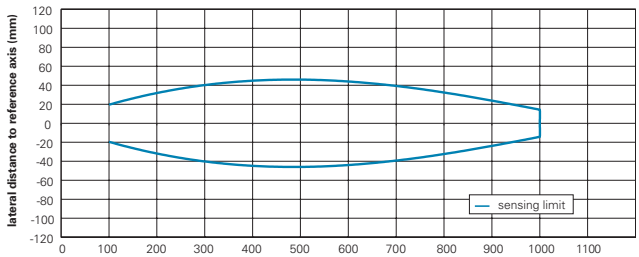
dimension drawing



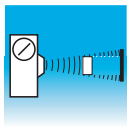
connection diagrams



typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

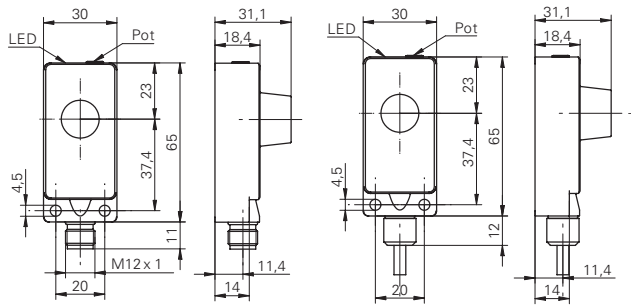


Sd = 1000 mm

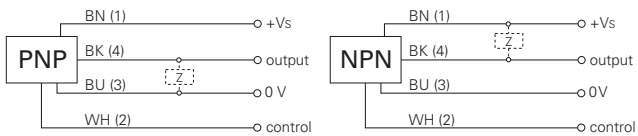
- potentiometer
- synchronisation output
- detects sound absorbing objects

general data	
sensing range sd	0 ... 1000 mm
reflector position Sde	200 ... 1000 mm
limit range (reflector)	± 5% Sde
adjusting range reflector (operating range)	± 2,5% Sde
adjusting range reflector (limit range)	yes
repeatability	< 3 mm
alignment aid	target display flashing
adjustment	potentiometer
temperature drift	< 2% Sde
synchronization	yes
multiplex version	on request
response time ton (synch on)	< 50 ms
release time toff (sync on)	< 50 ms
sonic frequency	240 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	31 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

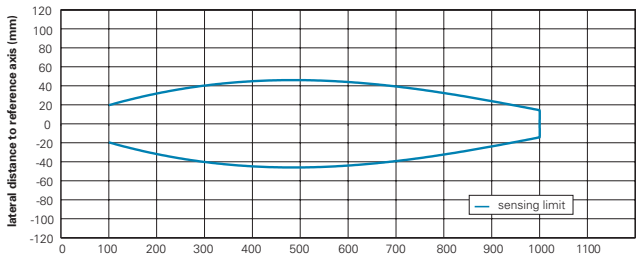
dimension drawings



connection diagrams

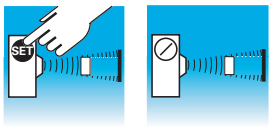


typical sonic cone profile



standard target with 30 x 30 mm, directed rectangular to sensor's reference axis

order reference	output circuit	connection types
URDK 30N1703	NPN make function (NO)	cable
URDK 30N1703/S14	NPN make function (NO)	connector M12
URDK 30N3703	NPN break function (NC)	cable
URDK 30N3703/S14	NPN break function (NC)	connector M12
URDK 30P1703	PNP make function (NO)	cable
URDK 30P1703/S14	PNP make function (NO)	connector M12
URDK 30P3703	PNP break function (NC)	cable
URDK 30P3703/S14	PNP break function (NC)	connector M12

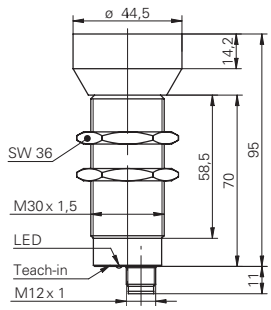


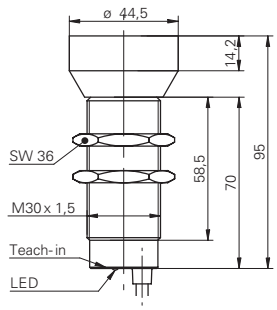
Sd = 3000 mm

- Teach-in or potentiometer
- synchronisation output
- long sensing distance

general data	
sensing range sd	0 ... 3000 mm
reflector position Sde	600 ... 3000 mm
limit range (reflector)	± 6% Sde
adjusting range reflector (operating range)	± 4% Sde
adjusting range reflector (limit range)	yes
repeatability	< 3 mm
alignment aid	target display flashing
synchronization	yes
multiplex version	on request
response time ton	< 160 ms
release time toff	< 160 ms
sonic frequency	120 kHz
output indicator	LED green
electrical data	
voltage supply range +Vs	12 ... 30 VDC
current consumption max.	35 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
mechanical data	
type	cylindrical
housing material	brass nickel plated
width / diameter	30 mm
height / length	95 mm
ambient conditions	
operating temperature	-10 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

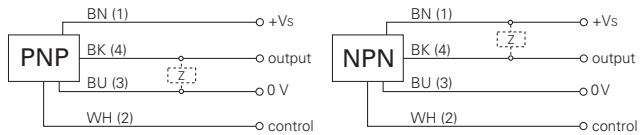
dimension drawings



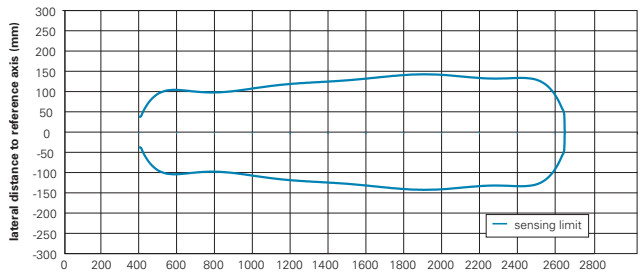


Teach-in = Teach-in or potentiometer

connection diagrams



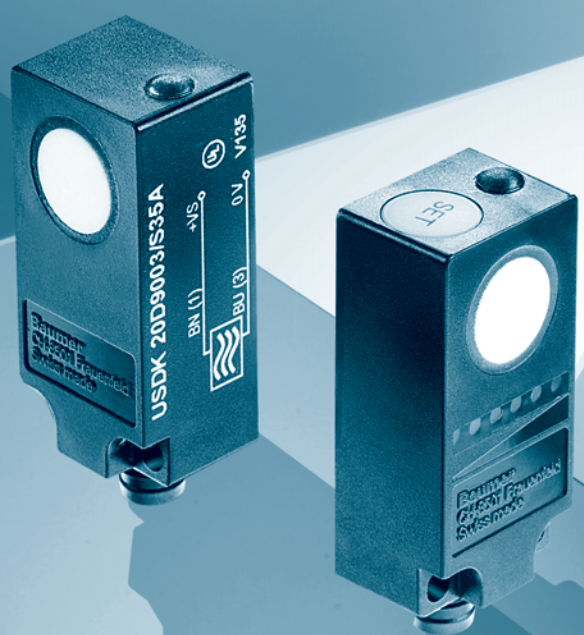
typical sonic cone profile

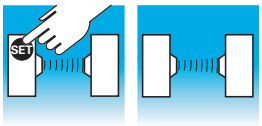


standard target with 100 x 100 mm, positioned perpendicularly to sensor's reference axis

order reference	adjustment	output circuit	temperature drift	connection types
URAM 50N1721	potentiometer	NPN make function (NO)	< 0,18% Sde/K	cable
URAM 50N1721/S14	potentiometer	NPN make function (NO)	< 0,18% Sde/K	connector M12
URAM 50N3721	potentiometer	NPN break function (NC)	< 0,18% Sde/K	cable
URAM 50N3721/S14	potentiometer	NPN break function (NC)	< 0,18% Sde/K	connector M12
URAM 50P1721	potentiometer	PNP make function (NO)	< 0,18% Sde/K	cable
URAM 50P1721/S14	potentiometer	PNP make function (NO)	< 0,18% Sde/K	connector M12
URAM 50P3721	potentiometer	PNP break function (NC)	< 0,18% Sde/K	cable
URAM 50P3721/S14	potentiometer	PNP break function (NC)	< 0,18% Sde/K	connector M12
URAM 50P6121	Teach-in	PNP make function (NO)	< 2% Sde	cable
URAM 50P6121/S14	Teach-in	PNP make function (NO)	< 2% Sde	connector M12
URAM 50P7121	Teach-in	PNP break function (NC)	< 2% Sde	cable
URAM 50P7121/S14	Teach-in	PNP break function (NC)	< 2% Sde	connector M12

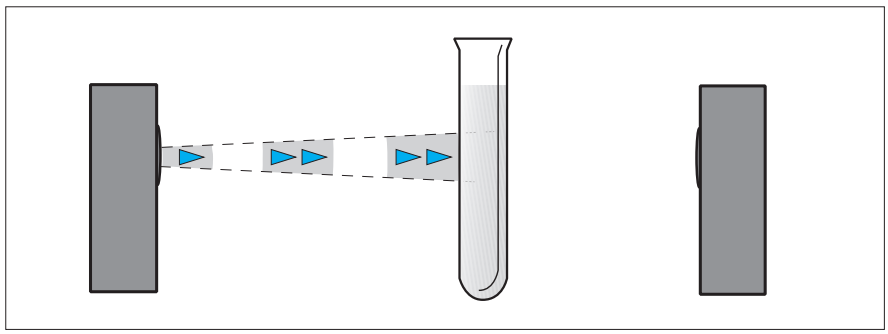
Ultrasonic through beam sensors





Description

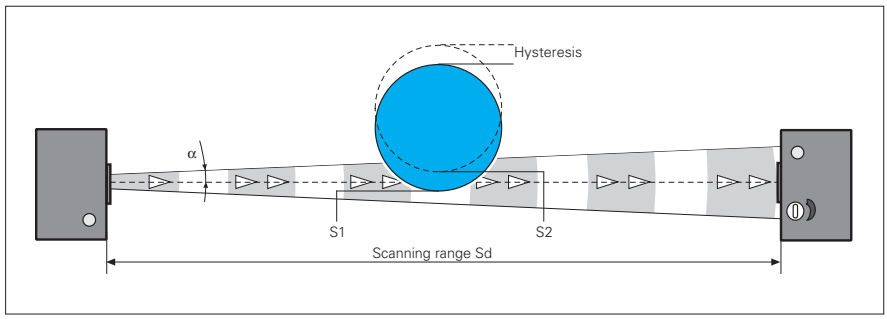
The emitter and the receiver are in two separate housings. The emitter sends a continuous signal which is picked up by the receiver.
When an object interrupts the sonic beam, the receiver will react and give an output signal. With the help of the built in potentiometer, the user can adjust the amplification of the input signal, as necessary.
The state of the output stage as well as the signal intensity are indicated by an LED.

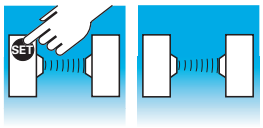


Hysteresis
Hysteresis is the difference between the operating point (S1) and the release point (S2). If an object interrupts the sonic beam, the signal level must be increased by about 75% in order to reset the output signal. Objects which follow one another in quick succession can therefore be easily detected.

Sonic beam angle α
The sonic beam angle (α) defines the boundaries of the emitted conical beam of the ultrasonic through beam sensor.

Repeatability
Due to the narrow angle of the sonic beam the repeatability of the switching point of two successive targets, under identical conditions, is better than 3 mm.





Teach-in procedure Series 20

All adjustments can be made with the internal Teach-in key.

Sensitivity Adjustment

The LEDs on the display indicate the receiver's sensitivity. The sensitivity can be called up at any time by pressing the Teach-in key, even when the Teach-in function is locked out.

Move the emitter and receiver to the desired position.

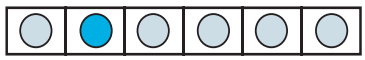
Switch the emitter to its adjustment mode by pressing and holding the Teach-in key for approx. two seconds until the green LED begins flashing. Release the Teach-in key. The green LED now indicates the switching state. Press the Teach-in key repeatedly until the desired sensitivity is achieved and the green LED is continuously on. Sensitivity is indicated by the yellow LEDs on the display.

To complete the Teach-in process, press and hold the Teach-in key for approx. two seconds until the green LED begins flashing rapidly. Release the Teach-in key. The LED goes out!

Response Time

Switch the sensor to its adjustment mode by pressing and holding the Teach-in key for approx. four seconds until the red LED begins flashing. Release the Teach-in key. The red LED now stays on continuously. Press the Teach-in key repeatedly until the desired response time is achieved.

LED display:



1 2 3 4 5 6

no LED on; approximately 5 ms response time delay
1. LED on; approximately 10 ms response time delay
2. LED on; approximately 20 ms response time delay
3. LED on; approximately 40 ms response time delay
4. LED on; approximately 80 ms response time delay
5. LED on; approximately 160 ms response time delay
6. LED on; approximately 320 ms response time delay

To complete the Teach-in process, press and hold the Teach-in key for approx. two seconds until the red LED begins flashing rapidly. Release the Teach-in key. The response time is now set.

Resetting the receiver to its original factory settings

Pressing and holding the Teach-in key for longer than six seconds will return the sensor to its factory settings. This is indicated on the receiver by the rapid flashing of the green/red LED.

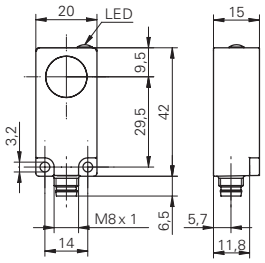
Sd = 1000 mm

- Teach-in
- LED Display
- response time adjustable <=5 … 320 ms

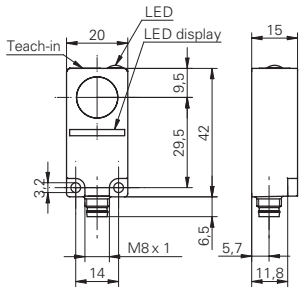
general data	
sensing range sd	0 ... 1000 mm
scanning range far limit Sde	0 ... 1000 mm
alignment aid	target display flashing
receiver	
object size (at Sd = 50 mm)	> 2 cm²
hysteresis typ.	5 mm
repeatability	< 3 mm
response time ton	< 5 ms
release time toff	< 5 ms
adjustment	Teach-in
output indicator	LED green
emitter	
sonic frequency	250 kHz
power on indication	LED yellow
electrical data	
voltage supply range +Vs	15 ... 30 VDC
residual ripple	< 10% Vs
short circuit protection	yes
reverse polarity protection	yes
receiver	
current consumption max.	30 mA
output circuit	PNP make function (NO)
output current	< 200 mA
voltage drop Vd	< 2 VDC
emitter	
current consumption max.	40 mA
mechanical data	
type	rectangular
housing material	polyester
width / diameter	20 mm
height / length	42 mm
depth	15 mm
connection types	connector M8
ambient conditions	
operating temperature	0 ... +60 °C
protection class	IP 67
accessories	
connectors	ESW 31A, ESG 32A

order reference	emitter / receiver
UEDK 20P6103/S35A	receiver
USDK 20D9003/S35A	emitter

dimension drawings

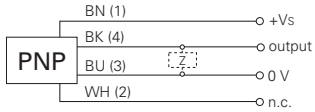


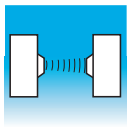
emitter



receiver

connection diagram



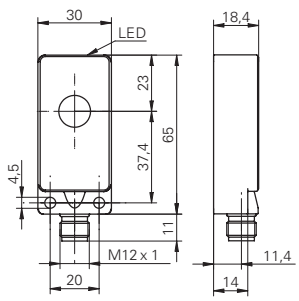


Sd = 700 mm

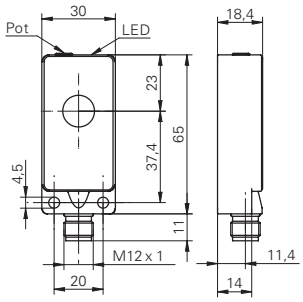
- potentiometer
- complementary outputs
- response time <= 5 ms

general data	
sensing range sd	0 ... 700 mm
scanning range far limit Sde	0 ... 700 mm
alignment aid	target display flashing
receiver	
object size (at Sd = 50 mm)	> 2 cm²
hysteresis typ.	5 mm
repeatability	< 3 mm
response time ton	< 5 ms
release time toff	< 5 ms
adjustment	potentiometer
output indicator	LED green
emitter	
sonic frequency	220 kHz
power on indication	LED yellow
electrical data	
voltage supply range +Vs	12 ... 30 VDC
residual ripple	< 10% Vs
reverse polarity protection	yes
receiver	
current consumption max.	30 mA
output current	< 200 mA
voltage drop Vd	< 2 VDC
short circuit protection	yes
emitter	
current consumption max.	22 mA
mechanical data	
type	rectangular
housing material	polyester / die-cast zinc
width / diameter	30 mm
height / length	65 mm
depth	18,5 mm
ambient conditions	
operating temperature	0 ... +60 °C
protection class	IP 67
accessories	
connectors	ES 14, ESW 33A, ESG 34A

dimension drawings connector

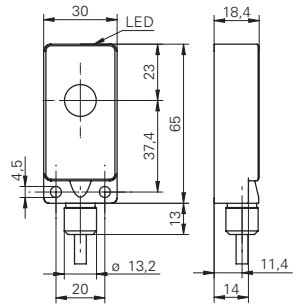


emitter

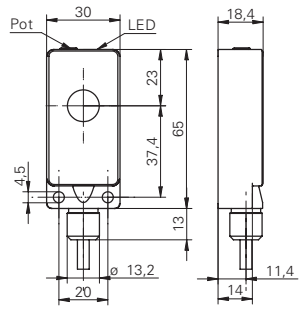


receiver

dimension drawings cable

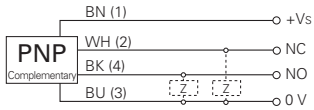


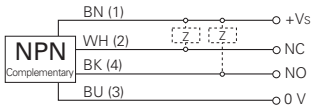
emitter



receiver

connection diagrams





order reference	emitter / receiver	output circuit	connection types
UEDK 30N5103	receiver	NPN complementary	cable
UEDK 30N5103/S14	receiver	NPN complementary	connector M12
UEDK 30P5103	receiver	PNP complementary	cable
UEDK 30P5103/S14	receiver	PNP complementary	connector M12
USDK 30D9003	emitter	-	cable
USDK 30D9003/S14	emitter	-	connector M12