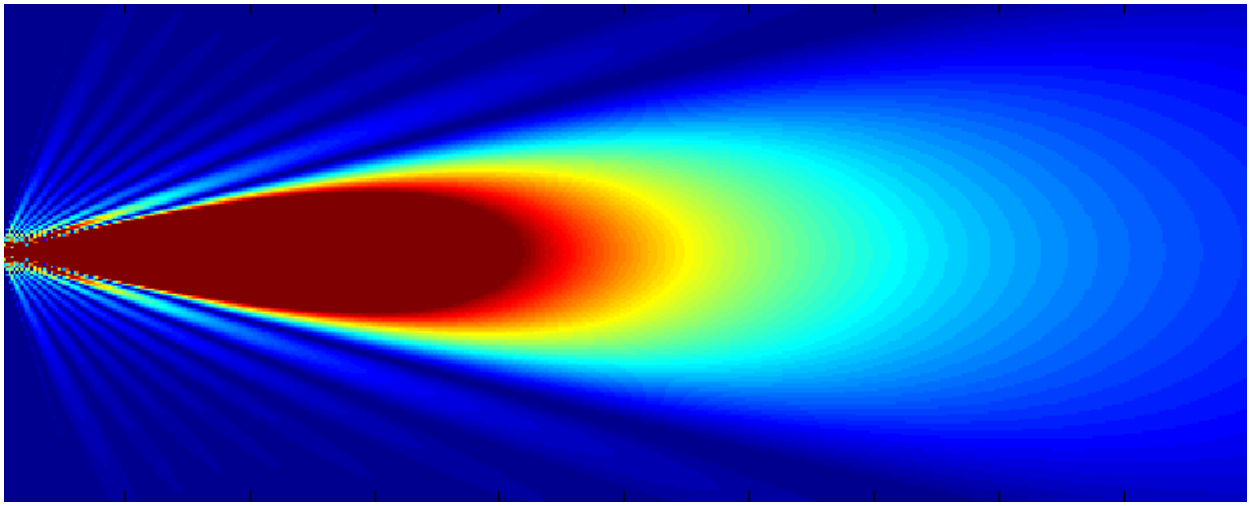
SNT SENSORTECHNIK AG

Sensors for Process Automation



Sonic field of a UPK ultrasonic sensor: measurably higher sound power!

Our products

- Your specialist for ultrasonic sensors ***SONARANGE®***
- Your specialist for optical sensors ***OPTORANGE®***

Our markets

- Machine manufacturing
- Factory automation (assembling machines, robots)
- Process control (chemistry, food, construction)
- Door automation
- Person detection
- Vehicle detection
- ... and much more

Our strengths

- Fit, fast, flexible, no bureaucracy, customer oriented
- Rugged sensors with high performance
- Know-how and production of ultrasonic transducers in-house
- Well established Swiss quality worldwide since 20 years
- Standard product range as well as customized solutions

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SONARANGE® Ultrasonic Sensors

UPK Series

- The top series
- Highest detection sensitivity
- Very low profile, small size
- Measuring distances 80mm…>6m (3.15”…>20ft)
- Versions with analogue and/or binary outputs
- Versions with synchronisation input

The UPK series is characterized by its high acoustic power combined with small sensor size. This is achieved with new optimized ***SONARANGE®*** transducers, working at high electrical voltages. Thus also small, moving and poorly reflecting objects can be safely detected. Moreover the sensors work also under high contamination. With a length of <40mm (1.5”) the UPK sensors are the most compact ultrasonic sensors for such high measuring ranges.

UPR Series

- The medium series
- Small size M18x1
- Versions with 90° radial transducer
- Measuring distances from 160mm up to 1.5m (7…60”)
- Versions with analogue and/or binary outputs
- Versions with synchronisation input
- Versions with chemically resistant PTFE housing

Outstanding features of the UPR series are the compact M18 size and the version with 90° radial ***SONARANGE®*** transducer for confine mounting conditions. The sensors are available as pure proximity switches and as distance sensors with V or mA analogue output as well. Typical applications are detection of objects as well as distance and level measurement.

UPX / UPS / UPL Series

- The miniature sensors
- Detection ranges 20...500mm
- Small size (popular ‚R-shape’, M12, M30)
- Versions with analogue or binary outputs

UPX
Universal proximity switches with fast reaction time t_{on}
UPS
Miniature sensors (M12) with narrow detection beam
UPL
Good value ultrasonic proximity switch with fixed switching distance.
UPY
Non contact ultrasonic switch for door automation

UPB / UPF Series

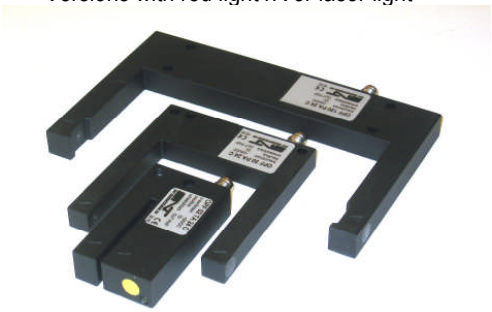
- The ultrasonic barriers
- Large detection range combined with high speed
- No blind zone
- For detection of fast objects and objects with small mutual distance
- For detection of non right-angled objects
- Adjustable transmitter power and switching delay

The high measuring speed combined with the large measuring range of 1500mm (5ft) are the outstanding characteristics of the UPB ultrasonic barrier.
Die UPF barrier with analogue output is well suited for edge detection on web guiding systems.

OPTORANGE® Optical Sensors

OPF Series

- Fast and precise fork light barriers
- Simple and quick mounting and Teach-In
- Detection of smallest objects
- Fork widths 2...120mm
- High switching frequency up to 4kHz
- Versions with red light IR or laser light



Fork light barriers have several advantages compared to standard light barriers. Transmitter and receiver are perfectly aligned. Mounting is therefore very easy. There is no mechanical misalignment possible after mounting. Furthermore each version of fork width is optimized in light intensity, sensitivity and measuring frequency. Thus fork light barriers have a high resolution and reproducibility. They are ideally suited for detection of small parts and for precise edge detection.
The versions with laser instead of red light are even approx. 10 times more precise.

OPE / OPD Series

The OP… proximity switches are the basic electronics for the SNT optical wave guides types FOY and FOI
They can be used as a stand-alone proximity switch as well
Switching distances up to 1500mm without wave guide
Least susceptible to parasitic light sources thanks to infrared light
Teach-In
Versions for 110/230VAC with relay output

Optical wave guide sensors are ideally suited when objects have to be detected in confine conditions. The sensor is separated from the small scanner head. Glass-fibre wave guides are more robust and have longer service life compared to plastic guides. They have lower attenuation and thus allow also very long wave guides.

FOY Series

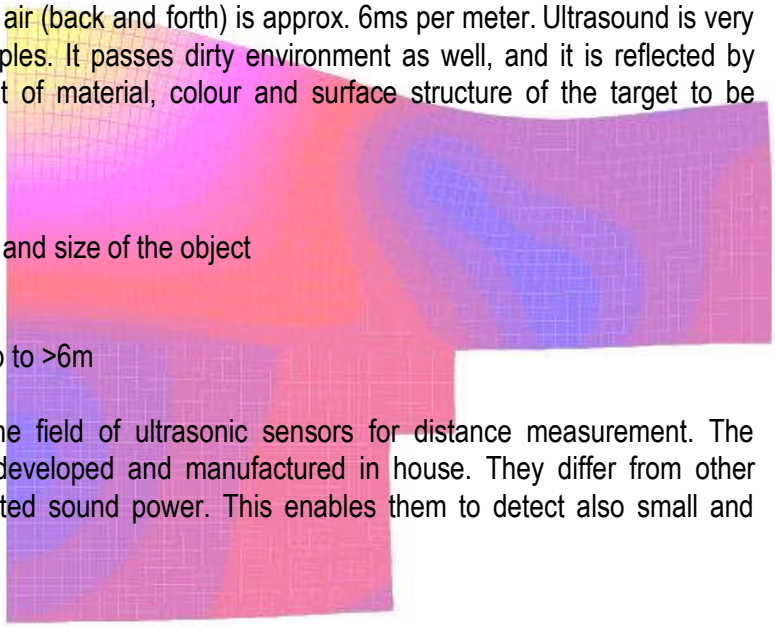
- Miniature glass-fibre scanners
- For detection under very confine conditions
- High scanning distances
- High temperature range, ATEX
- No aging
- Various cross sections and scanner heads
- Smallest diameters 1mm
- Lenghts from 25cm to >5m
- Customized versions offered
- Operates together with OP… proximity switches

FOI Series

- Miniature glass-fibre light barriers
- For barrier widths up to 1500mm
- Very robust thanks to glass instead of plastic
- High temperature range, ATEX
- No aging
- Various cross sections and scanner heads
- Smallest diameters 1mm
- Various lenghts
- Customized versions offered
- Operates together with OP… proximity switches

SONARANGE® Ultrasonic Sensors

Ultrasonic sensors are mainly used in machine manufacturing and process control for distance measurement, as proximity switch or for room supervision. They work after the principle of time of flight measurement of sound. The time of flight in air (back and forth) is approx. 6ms per meter. Ultrasound is very robust compared to other measuring principles. It passes dirty environment as well, and it is reflected by almost all surfaces. Thus it is independent of material, colour and surface structure of the target to be detected.



Why ultrasound?

- Independent of material, surface, colour and size of the object
- Works under dust, dirt, fog, bright light
- Detects transparent and shining objects
- Wide measuring ranges from few mm up to >6m

SNT Sensortechnik AG is a pioneer in the field of ultrasonic sensors for distance measurement. The ***SONARANGE***® ultrasonic transducers are developed and manufactured in house. They differ from other products especially through their high emitted sound power. This enables them to detect also small and moving objects.

Why SNT ultrasonic sensors?

- SNT develops and produces the ***SONARANGE***® transducers in-house.
- The result is a measurably higher sound power achieved with high transmitter voltage.
- Thus the sensors are more sensitive and detect also moving and badly detectable and small targets, and they work under high contamination.
- SNT offers a wide range of sensors and versions.
- SNT offers customized solutions.

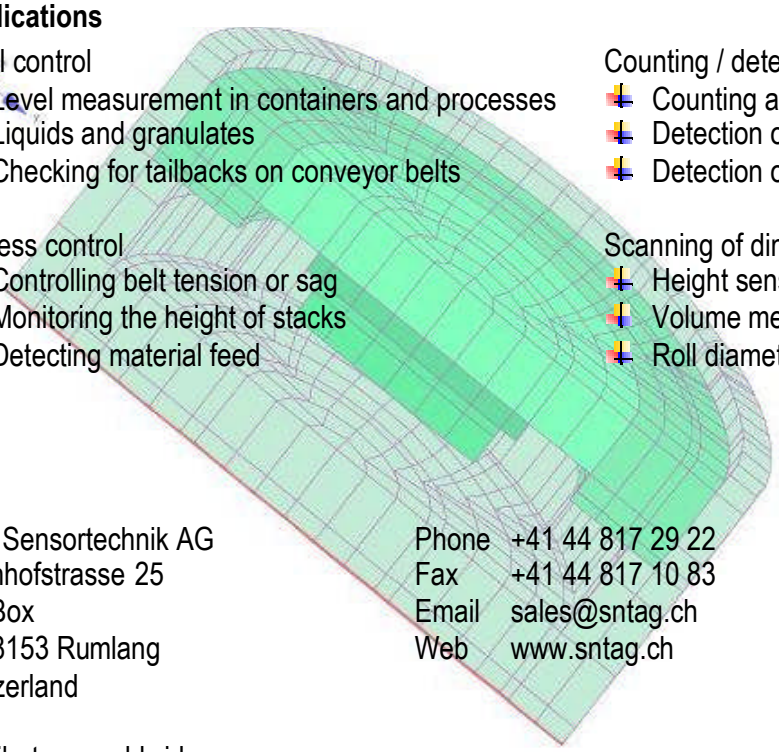
Applications

Level control
- Level measurement in containers and processes
- Liquids and granulates
- Checking for tailbacks on conveyor belts

Process control
- Controlling belt tension or sag
- Monitoring the height of stacks
- Detecting material feed

Counting / detection
- Counting and detection of parts and vehicles
- Detection of persons, door automation
- Detection of objects with 'difficult' surface

Scanning of dimensions
- Height sensing
- Volume measurement
- Roll diameter measurement



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The actual data sheets of all SNT products are available on our web site www.sntag.ch.

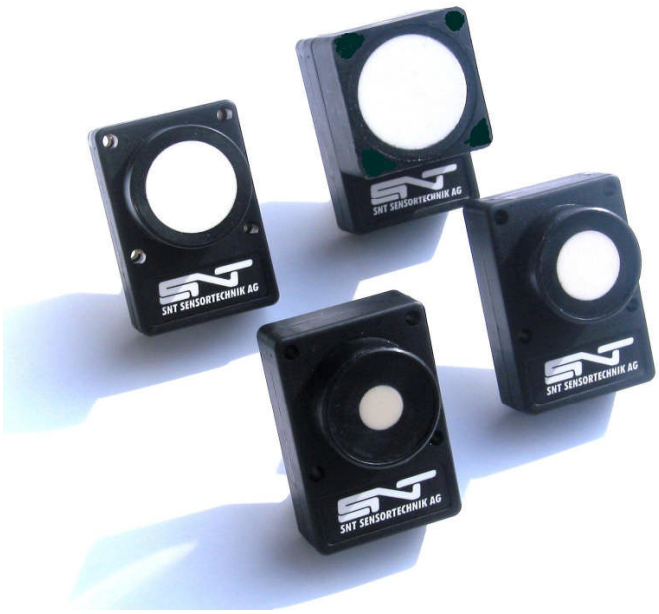
SONARANGE

UPK 08.07e

SNT SENSORTECHNIK AG

Ultrasonic distance and proximity sensors
UPK Series

- Measuring distances from 80mm up to >5m
- High detection sensitivity
- Very low profile, small size
- Versions with analogue and/or binary output
- Versions with synchronisation input
- Measurement independent of material, surface, colour and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects
- Protection class IP 67, fully watertight, robust
- M8 connector for screw or snap-on
- Versions with shielded integrated cable
- Customized versions available!
- Swiss made



Technical specifications		**UPK 500**	**UPK 1000**	**UPK 2500**	**UPK 5000**
Detection range nominal, with standard versions	mm	80...500	135...1000	250...2500	400...5000
Detection range POR-Version for bigger objects	mm	80...~800	135...~1500	250...>3000	400...>6500
Blind range (no reasonable analogue signal)	mm	0...80	0...135	0...250	0...400
Adjustment range of binary output (with potentiometer)	mm	80...500	135...1000	250...2500	400...5000
Hysteresis of binary output, axial, @ $FS_{nom.}$	mm	~15	~25	~40	~80
Resolution	%FS	~0.2%	~0.1%	~0.1%	~0.1%
Linearity	%FS	<±0.5%			
Temperature error –20...+50°C	%	<1			
Over all accuracy in whole temperature range	%FS	~±1			
Operating frequency	kHz	~180	~180	~120	~80
Status indicator	-	LED red/green			
Binary output, short circuit proof, max. 0.1A	-	by choice PNP, NPN, NO, NC			
Switching speed max.	Hz	~8	~5	~3	~2
t_{on} / t_{off} (binary output @ 50%FS, wo. background)	ms	~50 / 80	~130 / 90	~200 / 120	~700 / 140
Analogue output in detection range (Versions)					
R_L min. 10kΩ with V output	V	(0)...10 bzw. (10)...0V			
R_L max. 400Ω with mA output	mA	(4)...20mA bzw. (20)...4mA			
Ripple of analogue output @ $FS_{nom.}$	mV	~±60	~±20	~±15	~±20
Tracking speed of analogue output	s/95%FS	0.06	0.25	0.4	<2
Power supply voltage (reversal polarity protection)	VDC	15...30			
Ripple of supply voltage	%	<10			
Mean consumption, switched wo. load	mA	~60	~60	~60	~65
		version with mA output +20mA			
Peak current, switched wo. load	mA	~85/0.1ms	~85/0.1ms	~95/0.2ms	~100/0.3ms
Temperature coefficient of air path	%/°K	-0.17 (increasing temperature → output decreases)			
Ambient temperature during operation	°C	-20...+50			
Sensor temperature during operation	°C	-20...+70			
Pressure range	$mbar_{abs}$	~900...1100			

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Technical specifications (continued)		**UPK 500**	**UPK 1000**	**UPK 2500**	**UPK 5000**
Mass wo. cable	g	~90	~90	~90	~105
Protection class	-	IP67			
Housing material	-	Polyamide glass-fibre reinforced			
Electrical connection	-	M8 connector 4-pin or integrated cable			

High power density

The outstanding feature of the UPK series is its high acoustic power combined with small sensor size. This is achieved with new optimized ***SONARANGE*** transducers, working at high electrical voltages. Thus also small, moving and poorly reflecting objects can be safely detected. Moreover the sensors work also under high contamination. With a length of <40mm the UPK sensors are the most compact ultrasonic sensors for such high measuring ranges.

AGC (Automatic Gain Control)

AGC is exclusively used in the UPK series. It adjusts automatically the detection sensitivity to the reflected signal intensity, allowing the detection of very small objects, too.

Temperature compensation

The temperature coefficients of the electronics and the transducer as well are compensated thanks to a spezial circuit.

Choice of model

The UPK versions differ particularly by their different measuring ranges. Besides the following versions are available for each measuring range:

- Fixed analogue output and 1 adjustable binary output
- 2 individually adjustable binary outputs
- Analogue output with adjustable zero and FS

The analogue outputs are available with 0...10V or 4...20mA and furthermore with inverted analogue outputs 10...0V or 20...4mA. Other versions available on demand.

Binary outputs

Binary outputs become active, i.e. they switch on or off, when a scanned object falls below the set distance or if it exceeds it. Each switch point has a hysteresis (see technical specifications). This is the difference between switch on and switch off point during approach or departure. Hysteresis is necessary for an appropriate switching behaviour.

Synchronisation input (Y versions)

The ultrasonic signals can disturb each other when several sensors are focused on he same target or when sensors are mounted close together. This can be avoided by synchronizing the sending pulses. The synchronisation leads of all sensors are connected to each other by shielded cables as short as possible. Since all sensors send then simultaneously, the current consumption increases heavily. Not used synchronisation leads shall be isolated.

Blind range

The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range no distance measurement is possible! However the pure function as proximity switch (binary output) is possible in the blind range with certain restrictions (only bigger objects).

Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

Cable

All standard versions have a 4-pin M8 connector for screw or snap-on connection. The Y-versions with synchronisation input have a shielded integrated cable (l=2m). Special cable lengths and integrated cables instead of connector are available on demand. The cable should be kept as short as possible. Maximum cable length is approx. 100m, if cross section area is appropriate (peak current <100mA!, use 470µF/35V backup capacitor close to sensor). The cable should not be mounted parallel or close to high current cables.
Cables for connection to the M8 connector have to be ordered separately.

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Mounting

The UPK sensors have 4 threaded holes on their rear side of the housing. They can be mounted with M4 screws. 4 screws M4x20 are scope of delivery. The UPK 5000 versions shall be mounted with the damping rubber (scope of delivery) in order to avoid acoustic cross talk. Optionally a mounting bracket Type UPM made of glass fibre reinforced plastic can be ordered.

Power supply

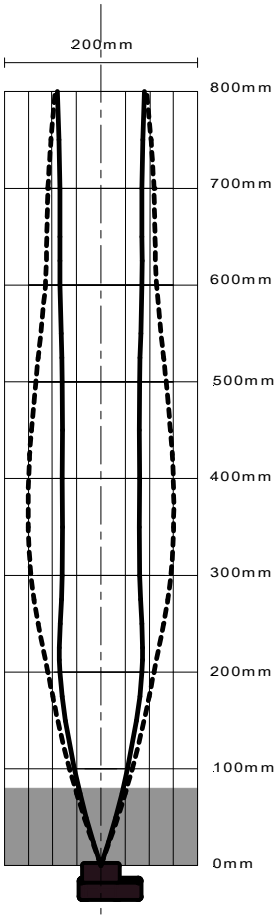
Ideally a power supply is used exclusively for the sensor. The power supply must be able to supply the short peak current of 80…100mA for each sensor. In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

Detection beams

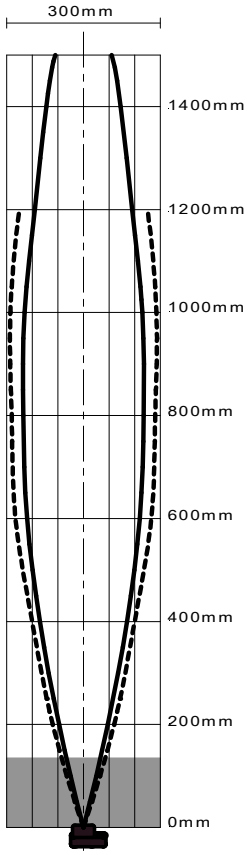
The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. Below typical cone shapes are shown for each sensor type. The solid line shows the range, where the sensor detects flat objects of size A4 (UPK 500/1000) or A3 (UPK 2500/5000) which are perpendicular to the sensor axis. In the dotted range the sensor UPK 500/1000 detects round objects (Ø10mm). For UPK 2500/5000 the dotted range is the area where the sensor detects only large and very well reflecting objects. Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam. **The extended measuring range (above nominal range) is only available with the POR versions!**

No other ultrasonic sensor working at the same frequency shall be within the cone or close to it or opposite to it. This is only allowed when using the synchronisation option (Y-versions).

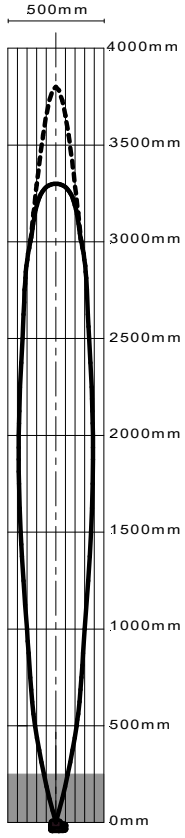
UPK 500



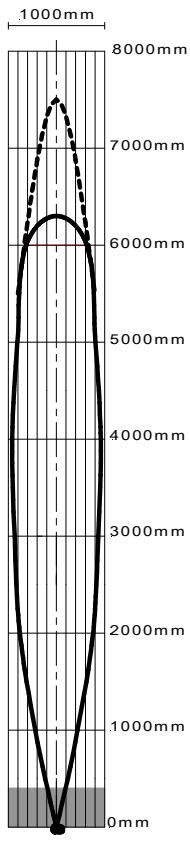
UPK 1000



UPK 2500



UPK 5000



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Settings

Binary outputs:
The switching distance is set with a 4-turn potentiometer. An object with reasonable size and perpendicularly to the sensor axis is placed at the desired distance from the sensor. First the potentiometer is turned min. 4x counter clockwise to zero (no stop). Then the potentiometer is slowly turned clockwise until the LED illuminates (NO) or expires (NO). Thus the switching distance for the binary output is set. Red corresponds to the output 1 and green to the output 2. The versions with two binary outputs have a bi-colour LED (red/green).

Adjustable analogue outputs:
Zero and full scale (FS) of the analogue outputs can be set on the POR versions with two 4-turn potentiometers. The analogue output has to be monitored with a multi-meter.

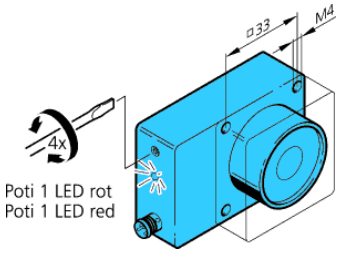
Zero (= limit close to the sensor):
Zero (e.g. 0V) is at the position of the sensor diaphragm when potentiometer No. 1 is turned at least 4x counter clockwise (no stop). If zero shall be in some distance from the sensor, one has to place there an object with reasonable size. The potentiometer is turned min. 4x clockwise (no stop). The reading must then be e.g. 0V or a very small residual value (approx. 0.04V). Then one turns slowly counter clockwise until the reading starts to increase. This is then the correct setting for the zero.

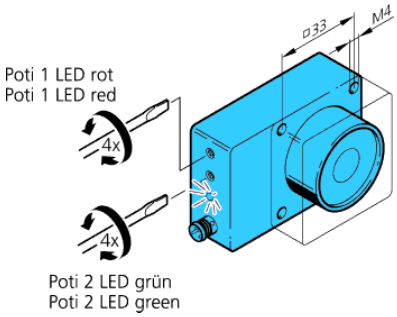
Full scale (FS, = far limit):
An object with reasonable size is placed at the desired distance. With potentiometer No. 2 the desired reading (e.g. 10V) is then set.

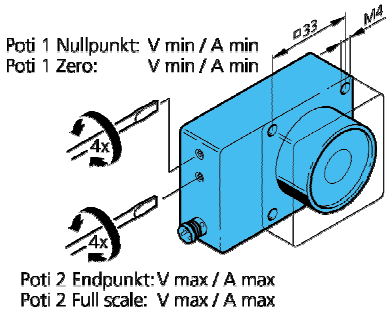
The zero can be varied approx. from 0 to 50% of the nominal detection range and the full scale approx. from 20% to 150%. However in the range >100% the sensor will detect only bigger objects and above a certain distance no objects at all. FS must always be above zero. If the analogue output shall be inverted, i.e. zero above FS, then the inverted version 'V' must be used.

Type	Zero 0V or 4mA		Full scale (FS) 10V or 20mA	
	Min. [mm]	Max. [mm]	Min. [mm]	Max. (theoretical) [mm]
UPK 500	0	300	100	800
UPK 1000	0	500	200	1500
UPK 2500	0	1500	500	3800
UPK 5000	0	3000	1000	8000

Use the miniature screw driver which is scope of delivery for adjustment of the potentiometers!







Type

UPK xxxx PVPS 24 CA	UPK xxxx PDPS 24 C	UPK xxxx POR 24 CAI
UPK xxxx PVPS 24 CI	UPK xxxx PDPA 24 C	UPK xxxx POR 24 CVAI
UPK xxxx PVPS 24 CVA		
UPK xxxx PVPS 24 CVI		

Outputs

1 binary output, 1 analogue output	2 binary outputs	2 analogue outputs (V und mA)

Setting elements

1 potentiometer, 1 LED	2 potentiometers, 1 bi-colour LED	2 potentiometers, no LED

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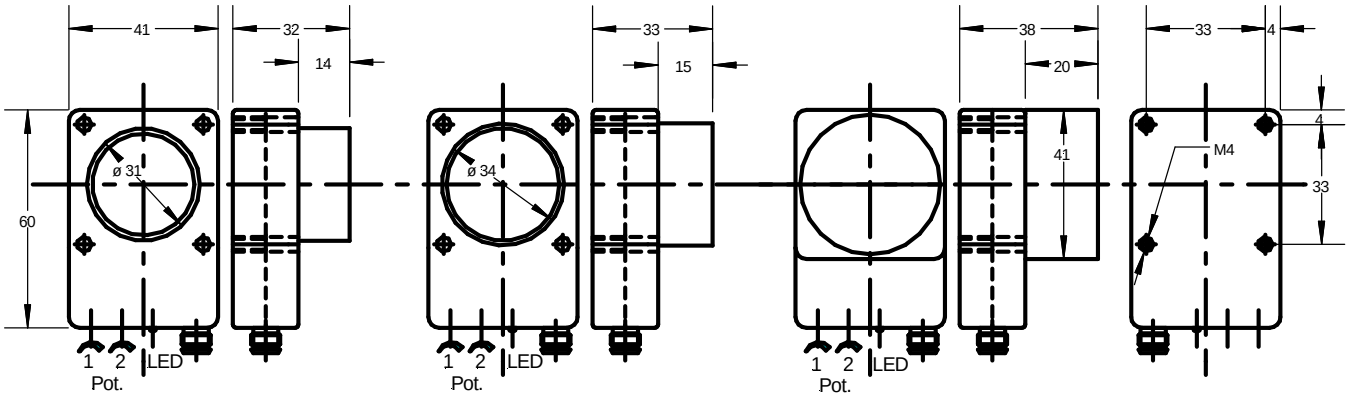
Dimensions



UPK 500/1000 UPK 2500 UPK 5000

Standard versions

1 analogue output + 1 binary output		**Schema**
UPK XXXX PVPS 24 CA	1 binary output, PNP NO, 1 analogue output 0...10V, 4-pin connector, 1 pot., 1 LED	A
UPK XXXX PVPS 24 CI	1 binary output, PNP NO, 1 analogue output 4...20mA, 4-pin connector, 1 pot., 1 LED	A
UPK XXXX PVPS 24 CVA	1 binary output, PNP NO, 1 analogue output 10...0V, 4-pin connector, 1 pot., 1 LED	A
UPK XXXX PVPS 24 CVI	1 binary output, PNP NO, 1 analogue output 20...4mA, 4-pin connector, 1 pot., 1 LED	A
2 binary outputs		
UPK XXXX PDPS 24 C	2 binary outputs, PNP NO, 4-pin connector, 2 pot., 1 bi-colour LED	B
UPK XXXX PDPA 24 C	1 binary output, PNP NO, 1 binary output, PNP NC, 4-pin connector, 2 pot., 1 bi-colour LED	B
2 analogue outputs		
UPK XXXX POR 24 CAI	1 analogue output 0…10V, 1 analogue output 4…20mA, zero and FS adjustable, 4-pin connector, 2 pot., no LED	C
UPK XXXX POR 24 CVAI	1 analogue output 10...0V, 1 analogue output 20...4mA, zero and FS adjustable, 4-pin connector, 2 pot., no LED	C
Option synchronisation input		
All versions UPK ..... Y	additionally synchronisation input, integrated shielded cable 2m	D

Basically nearly all possible versions are available according to the following product key.
Nominal detection range: XXXX: 500 = 500mm, XXXX: 1000 = 1000mm, XXXX: 2500 = 2500mm, XXXX: 5000 = 5000mm

UPK XXXX P □ □ □ 24 □ □ □ □

Synchronisation input	Y
Analogue output 10V Analogue output 20mA	A I
Inverted analogue output	V
M8 connector (else cable)	C
Binary output NO Binary output NC Binary outputs NO+NC	S O A
Binary output PNP Binary output NPN Analogue output with adjustable FS	P N R
1 Binary output 2 Binary outputs Analogue output with adjustable zero	V D O

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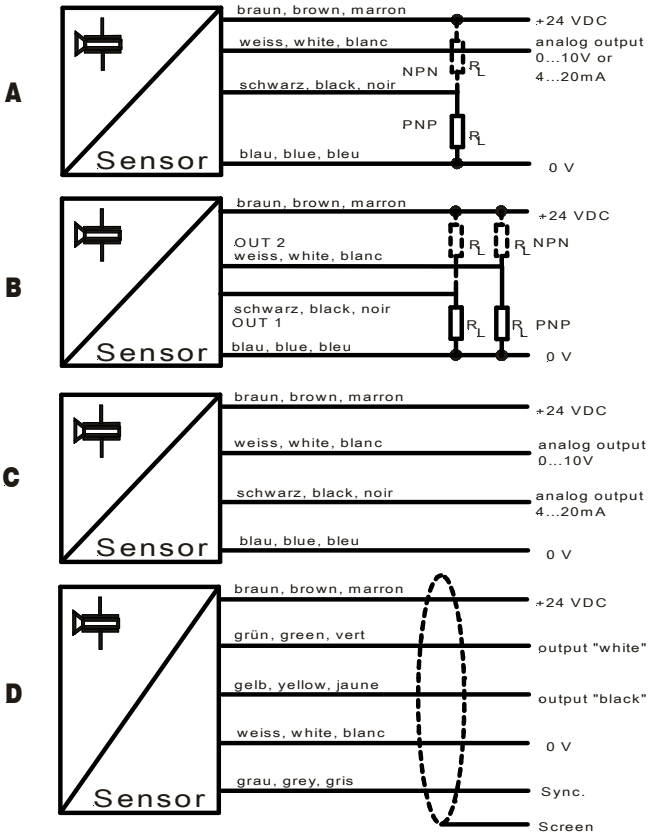
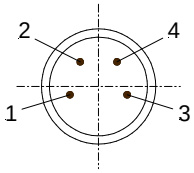
Diagrams of connections



All versions with integrated cable instead of connector have cable colours according to scheme “D”.

4-pin connector

1 brown	3 blue
2 white	4 black



View on the sensor

Scope of delivery

- Sensor
- 4 screws M4x20mm for mounting
- UPK 5000: damping rubber for mounting
- Miniature screw driver for potentiometer

Some typical ultrasound applications

Level measurement
- Measuring level in small containers
- Water gauge measurement
- Monitoring liquid levels in bottling plants
- Checking for tailbacks on conveyor belts
- Monitoring contents of granulate hoppers on injection moulding machines
- Distance monitoring on combine harvesters, beet lifters etc.
- Monitoring ground clearance and distance on agriculture and construction vehicles

Process control
- Controlling belt tension or sag
- Sensing and signalling valve positions
- Measuring roll diameter on reeling machines
- Monitoring the height of stacks (charges, storehouse, assembling machines)
- Detecting material feed
- Detecting the feed of strip stock to blanking machines and presses
- Detecting on plastic blow-moulding machines

Counting / Detection
- Counting onlookers at freestanding sales displays or show cases
- Access supervision at rotating doors, counters etc.
- Door automation
- Detecting transparent objects, foils, flat glass, bottles etc.
- Sensing objects in robot grippers
- Recognizing full or empty pallets
- Count and detect objects with 'difficult' surface
- Detect wrong parts on conveyors
- Collision protection on vehicles

Scanning of dimensions
- Determining the dimensions of packages
- Sensing the height of plants in automated green houses
- Measuring the volume of tree-trunks

Accessories (see also data sheet ‚ACC’)

Cables 4-pin with M8 screw connector, PUR:

With straight connector:	l=2m	Type KAB 2K4VGPUR
	l=5m	Type KAB 5K4VGPUR
with 90° connector:	l=2m	Type KAB 2K4VWPUR
	l=5m	Type KAB 5K4VWPUR

Mounting bracket made of reinforced polyamide:
Type UPM

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SONARANGE

UPR 05.05 e

SNT SENSORTECHNIK AG

Ultrasonic distance and proximity sensors
UPR Series

- Measuring range up to 1000mm
- Slow and fast versions
- Version with 90° (radial) transducer
- Versions with synchronisation input
- Small size M18 x 1
- Measurement independent of material, surface, colour and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects
- Protection class IP 67, fully watertight, robust
- Plastic or stainless steel housing
- Customized versions available!
- Swiss made

Technical specifications		**UPR 702**	**UPR 1002**	**UPR 1003**	**UPR 1004**
Detection range	mm	0...700	0...1000	0...1000	0...1000
Blind range (no reasonable analogue output signal)	mm	0...160	0...160	0...180	0...180
Adjustment range of binary output (with potentiometer)	mm	160...700	160...1000	180...1000	180...1000
Hysteresis of binary output, axial	mm	40...30	40...30	60...30	70...30
Linearity of analogue output	%FS	<1%			
Over all accuracy in whole temperature range	%FS	~±2			
Operating frequency	kHz	~180			
Status indicator	-	LED red			
Binary output, short circuit proof, max. 0.1A	-	by choice PNP, NPN, NO, NC			
Switching speed max.	Hz	~25	~16	~7	~0.25
t_{on} / t_{off} binary output (depending on potentiometer setting)	ms	<50	<70	<100	<240
Analogue output in detection range (versions)	V	-	(0)...10	(0)...10	(0)...10
R_L min. 10kΩ with V output	V	-	(10)...0V	(10)...0V	(10)...0V
R_L max. 500Ω with mA output	mA	-	(4)...20mA	(4)...20mA	(4)...20mA
Ripple of analogue output	mV	-	~±120	~±100	~±40
Tracking speed of analogue output	s/95%FS	-	<0.1	<0.4	<1.5
Power supply voltage (reversal polarity protection)	VDC	18...33			
Ripple of supply voltage	%	<10			
Mean consumption, switched wo. load	mA	~45	~45	~35	~35
		version with mA output +20mA			
Peak current, switched wo. Load	mA	300mA/0.1ms			
Temperature coefficient of sensor	mV/°K	typ. +4			
Temperature coefficient of air path	%/°K	-0.17 (increasing temperature → output decreases)			
Ambient temperature during operation	°C	-20...+50			
Sensor temperature during operation	°C	-20...+70			
Pressure range	$mbar_{abs}$	~900...1100			
Mass wo. Cable	g	~45	~45	~45	~65
Protection class	-	IP67			
Housing material	-	Polyamide	Polyamide	Polyamide	V2A stainless
Electrical connection	-	M8 connector or integrated cable			

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Description

Outstanding features of the UPR series are the compact M18 size and the 'W' version with 90° (radial) ***SONARANGE*** transducer for confine mounting conditions. The sensors are available as pure proximity switches and as distance sensors with V or mA analogue output as well. Typical applications are detection of objects and distance and level measurement.

Model selection

The main difference between the UPR versions is their very different switching speed (measuring speed). Thus the sensor should be selected according to the application as follows.

UPR 702 ...
Very fast, for fast counting and detection of objects up to 700mm distance, binary output only, due to the high speed not to be used in tanks (echo) or applications with a near background wall (secondary echoes)!

UPR 1002 ...
Fast, for fast distance measurement up to 1m, with analogue and binary output, due to the high speed not to be used in tanks (echo) or applications with a near background wall (secondary echoes)!

UPR 1003 ...
Reasonably slow, for general distance and level measurement up to 1m, with analogue and binary output.

UPR 1004 ...
Very slow, for reliable level measurement up to 1m, with analogue and binary output, high sensitivity, in stainless steel housing, transducer surface PTFE coated.

For general applications use model UPR 1003…!

Blind range

The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range no distance measurement is possible! However the pure function as proximity switch (binary output) is possible in the blind range with certain restrictions (only bigger objects).

Binary output

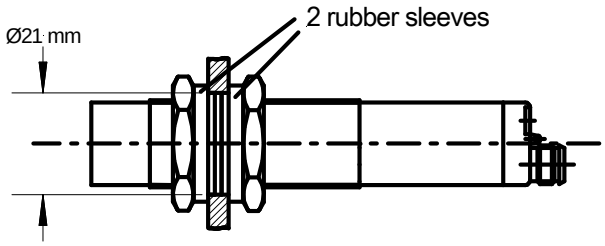
The binary output becomes active, i.e. it switches on or off, when a scanned object falls below the set distance or if it exceeds it. Each switch point has a hysteresis (see technical specifications). This is the difference between switch on and switch off point during approach or departure. Hysteresis is necessary for an appropriate switching behaviour.
The switching distance is set with a 3-turn potentiometer. An object with reasonable size and perpendicularly to the sensor axis is placed at the desired distance from the sensor. First the potentiometer is turned min. 3x counterclockwise to zero (no stop). Then the potentiometer is slowly turned clockwise until the LED illuminates (NO) or expires (NO). Thus the switching distance for the binary output is set.

Synchronisation input (Y versions)

The ultrasonic signals can disturb each other when several sensors are focused on he same target or when sensors are mounted close together. This can be avoided by synchronizing the sending pulses. The synchronisation leads of all sensors are connected to each other by shielded cables as short as possible. Since all sensors send then simultaneously, the current consumption increases heavily. Not used synchronisation leads shall be isolated.

Mounting

Ultrasonic sensors shall be mounted as soft as possible in order keep acoustic disturbances away from the mounting spot. Thus two M18 nuts, washers and rubber sleeves for mounting are scope of delivery. The rubber sleeves for a hole of Ø21mm shall be used!



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Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

Cable

The sensors have a 3- or 4-pin M8 connector for screw or snap-on connection or an integrated cable. The cable should be kept as short as possible. Maximum cable length is approx. 100m, if cross section area is appropriate (peak current of 300mA!, use 470µF/35V backup capacitor close to sensor). The cable should not be mounted parallel or close to high current cables.
Cables for connection to the M8 connector have to be ordered separately.

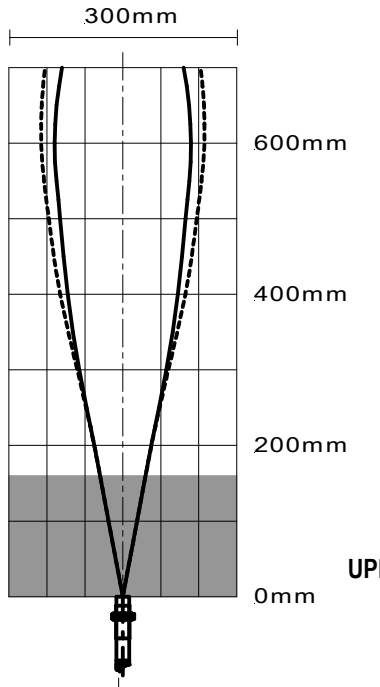
Power supply

Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 300mA for each sensor. In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

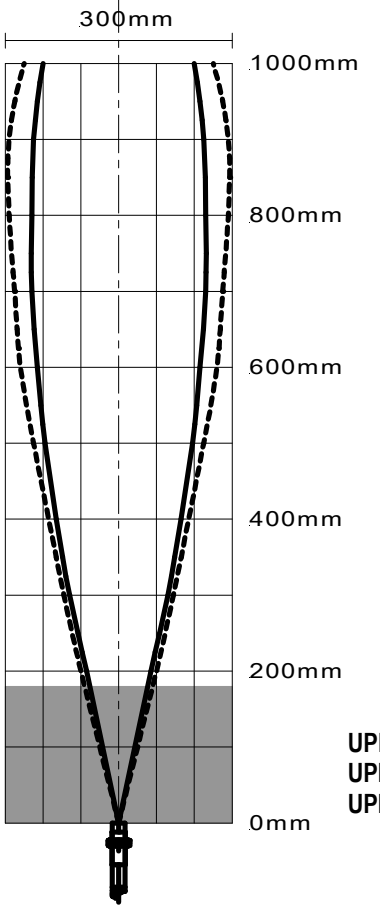
Detection beam

The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. Below the typical cone shapes for the UPR sensors are shown. The bold line shows the range, where the sensor detects objects which are perpendicular to the sensor axis. In the dotted range the sensor detects round objects (Ø10mm). Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

No other ultrasonic sensor working at the same frequency shall be within the cone or close to it or opposite to it. This is only allowed when using the synchronisation option (Y-version).



UPR 702



UPR 1002
UPR 1003
UPR 1004

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Standard versions

Type	Description	Scheme
UPR 702 PS 24	axial transducer, PNP NO, 2m integrated cable	A
UPR 702 PS 24 W	radial transducer, PNP NO, 2m integrated cable	A

UPR 100X PS 24	axial transducer, PNP NO, 2m integrated cable	A
UPR 100X PS 24 W	radial transducer, PNP NO, 2m integrated cable	A
UPR 100X PS 24 A	axial transducer, PNP NO, analogue output 0...10V, 4-Pin connector	B
UPR 100X PS 24 WA	axial transducer, PNP NO, analogue output 0...10V, 4-Pin connector	B
UPR 100X PS 24 VA	axial transducer, PNP NO, inverted analogue output 10...0V, 4-Pin connector	B
UPR 100X PS 24 VWA	radial transducer, PNP NO, inverted analogue output 10...0V, 4-Pin connector	B
UPR 100X PS 24 I	axial transducer, PNP NO, analogue output 4...20mA, 4-Pin connector	B
UPR 100X PS 24 WI	radial transducer, PNP NO, analogue output 4...20mA, 4-Pin connector	B
UPR 100X PS 24 Y	axial transducer, PNP NO, Synchronisation input, 4-Pin connector	C
UPR 100X PS 24 WY	radial transducer, PNP NO, Synchronisation input, 4-Pin connector	C
UPR 100X PS 24 C	axial transducer, PNP NO, 3-Pin connector	A
UPR 100X PS 24 CW	radial transducer, PNP NO, 3-Pin connector	A
UPR 100X	UPR 1002 … = switching speed 16Hz **UPR 1003 … = switching speed 7Hz (this version shall be used for standard applications!)**	
UPR 1004 PS 24 RA	stainless steel housing, axial transducer, PNP NO, analogue output 0...10V, 4-Pin connector	B
UPR 1004 PS 24 RVA	stainless steel housing, axial transducer, PNP NO, analogue output 10...0V, 4-Pin connector	B
UPR 1004 PS 24 RI	stainless steel housing, axial transducer, PNP NO, analogue output 4...20mA, 4-Pin connector	B

Option	NPN instead of PNP	
Option	NC instead of NO	

Basically almost all possible versions are available according to the following product key:

Product key

UPR XXXX □ □ 24 □ □ □ □

Synchronisation input	Y
Analogue output 10V	A
Analogue output 20mA	I
90° radial transducer	W
Inverted analogue output	V
3-Pin connector (only binary output)	C
Integr. cable (only binary output)	-
Binary output (NO)	S
Binary output (NC)	O
Binary output PNP	P
Binary output NPN	N

Accessories (see also data sheet ‚ACC')

Cables 4-pin with M8 screw connector, PUR:

with straight connector:	l=2m	Type KAB 2K4VGPUR
	l=5m	Type KAB 5K4VGPUR
with 90° connector:	l=2m	Type KAB 2K4VWPUR
	l=5m	Type KAB 5K4VWPUR

Cables 3-pin with M8 screw connector, PUR:

with straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
with 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR

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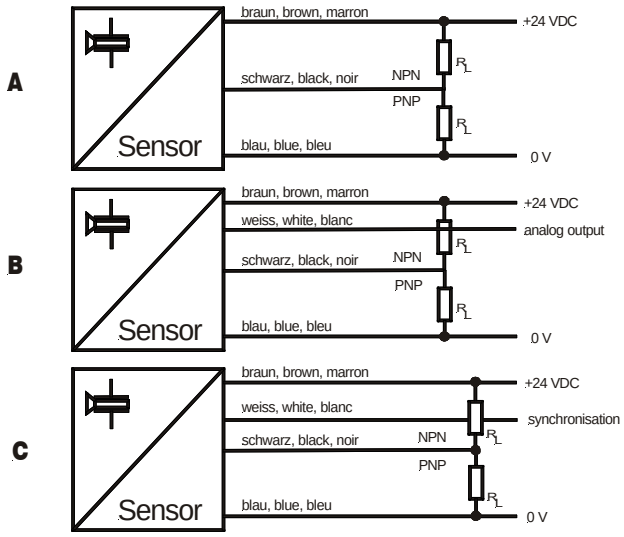
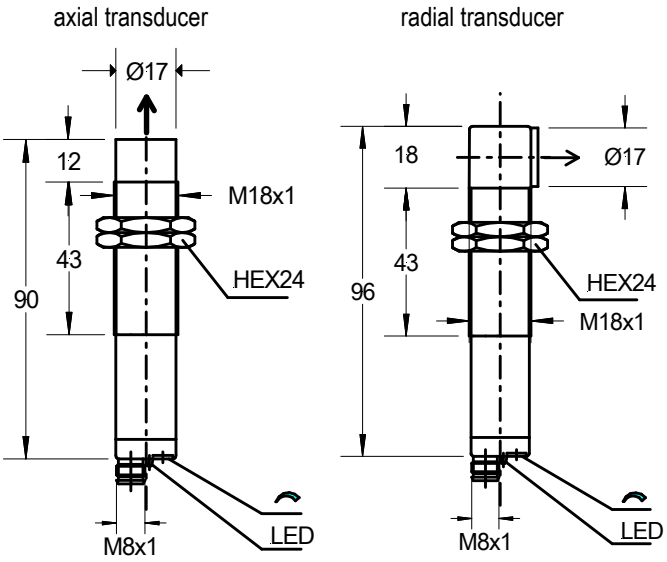
Diagrams of connections



Dimensions



Use an appropriate miniature screw driver max. size 2.5mm for adjustment of the potentiometer for switching distance!

Scope of delivery

- Sensor
- 2 of each M18 nuts, washers and rubber sleeves for mounting

Some typical ultrasound applications

Level measurement
- Measuring level in small containers
- Water gauge measurement
- Monitoring liquid levels in bottling plants
- Checking for tailbacks on conveyor belts
- Monitoring contents of granulate hoppers on injection molding machines
- Distance monitoring on combine harvesters, beet lifters etc.
- Monitoring ground clearance and distance on agriculture and construction vehicles

Process control
- Controlling belt tension or sag
- Sensing and signaling valve positions
- Measuring roll diameter on reeling machines
- Monitoring the height of stacks (charges, storehouse, assembling machines)
- Detecting material feed
- Detecting the feed of strip stock to blanking machines and presses
- Detecting on plastic blow-molding machines

Counting / Detection
- Counting onlookers at freestanding sales displays or show cases
- Access supervision at rotating doors, counters etc.
- Door automation
- Detecting transparent objects, foils, flat glass, bottles etc.
- Sensing objects in robot grippers
- Recognizing full or empty pallets
- Count and detect objects with 'difficult' surface
- Detect wrong parts on conveyors
- Collision protection on vehicles

Scanning of dimensions
- Determining the dimensions of packages
- Sensing the height of plants in automated green houses
- Measuring the volume of tree-trunks

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SONARANGE

SNT SENSORTECHNIK AG

Ultrasonic distance sensor
UPR 1503 R 24

- Measuring range up to 1500mm
- Adjustable full scale (500...1500mm)
- Version with 90° (radial) transducer
- Small size M18 x 1
- Measurement independent of material, surface, colour and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects
- Protection class IP 67, fully watertight, robust
- Swiss made

Technical specifications		**UPR 1503 R 24 C(W)A**	**UPR 1503 R 24 C(W)I**
Detection range	mm	180...1500	
Blind range (no reasonable analogue signal)	mm	0...180	
Adjustable full scale (mit Potentiometer)	mm	500...1500	
Linearity	%FS	<0.5	
Over all accuracy	%FS	~±1	
Operating frequency	kHz	~180	
Status indicator (when object detected)	-	LED red	
Switching speed max.	Hz	~7	
Analogue output in detection range		(0)...10 V R_L min. 10kΩ	(4)...20mA R_L max. 500Ω
Ripple of analogue output	mV	~±100	
Tracking speed of analogue output	s/95%FS	<0.4	
Power supply voltage (reversal polarity protection)	VDC	18...33	
Ripple of supply voltage	%	<10	
Mean consumption	mA	~35	~55
Peak current	mA	300mA/0.1ms	
Temperature coefficient of sensor	mV/°K	typ. +4	
Temperature coefficient of air path	%/°K	-0.17	
Ambient temperature during operation	°C	-20...+50	
Sensor temperature during operation	°C	-20...+70	
Pressure range	$mbar_{abs}$	~900...1100	
Mass wo. cable	g	~45	
Protection class	-	IP67	
Housing material	-	Polyamide	
Electrical connection	-	M8 connector 3-pin	

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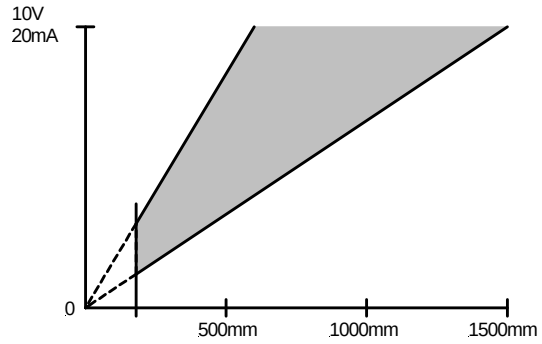
Description

The UPR 1503 sensors are based on the well established UPR series. Outstanding features are the compact M18 size and the 'W' version with 90° (radial) ***SONARANGE*** transducer for confine mounting conditions. The sensors have an extended measuring range of 1500mm with analogue output in V or mA. Ideal applications are distance and level measurement. The full scale (10V or 20mA) can be set with a multi turn potentiometer.

Setting of full scale

The full scale (FS), i.e. the distance where analogue output shall be 10V or 20mA, can be adjusted between 500…1500m. In order to set the FS, an object with reasonable size is placed at the desired distance. First the potentiometer is turned min. 4x counterclockwise to zero (no stop). Then the potentiometer is slowly turned clockwise until the desired reading is measured with a multimeter in V or mA. The analogue output always goes through (theoretical) zero, although it can never reach zero due to the blind range.



Blind range

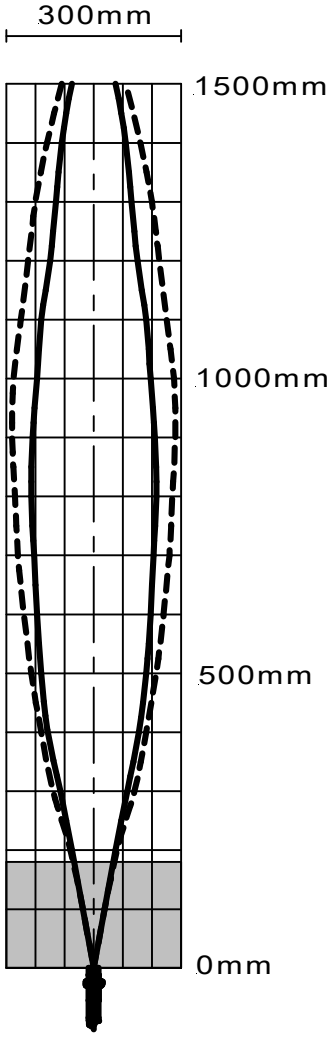
The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range the analogue output signal can have any reading. Thus no distance measurement is possible there!

Detection beam

The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. Below the typical cone shape of UPR 1503 is shown.

The bold line shows the range, where the sensor detects objects which are perpendicular to the sensor axis. In the dotted range the sensor detects round objects (Ø10mm). Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

No other ultrasonic sensor working at the same frequency shall be within the cone or close to it or opposite to it.



Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

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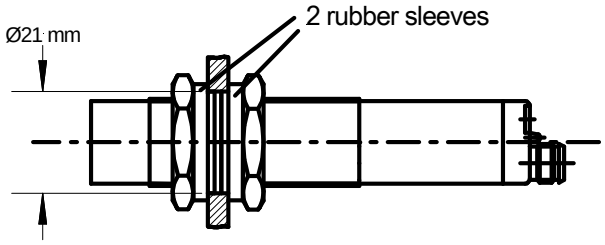
Mounting

Ultrasonic sensors shall be mounted as soft as possible in order keep acoustic disturbances away from the mounting spot. Thus two M18 nuts, washers and rubber sleeves for mounting are scope of delivery. The rubber sleeves for a hole of Ø21mm shall be used!



Cable

The sensors have a 3-pin M8 connector for screw or snap-on connection. The cable should be kept as short as possible. Maximum cable length is approx. 100m, if cross section area is appropriate (peak current of 300mA!, use 470µF/35V backup capacitor close to sensor). The cable should not be mounted parallel or close to high current cables.
Cables for connection to the M8 connector have to be ordered separately.

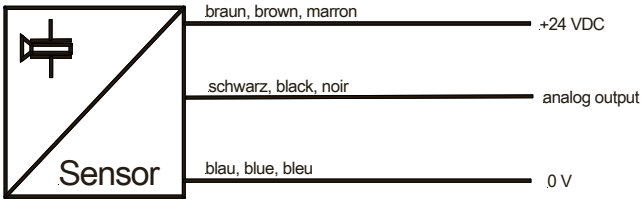
Power supply

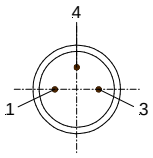
Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 300mA for each sensor. In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

Versions

Type	Description
UPR 1503 R 24 CA	axial transducer, analogue output 0...10V, 3-pin connector
UPR 1503 R 24 CI	axial transducer, analogue output 4…20mA, 3-pin connector
UPR 1503 R 24 CWA	radial transducer, analogue output 0...10V, 3-pin connector
UPR 1503 R 24 CWI	radial transducer, analogue output 4…20mA, 3-pin connector

Diagram of connections



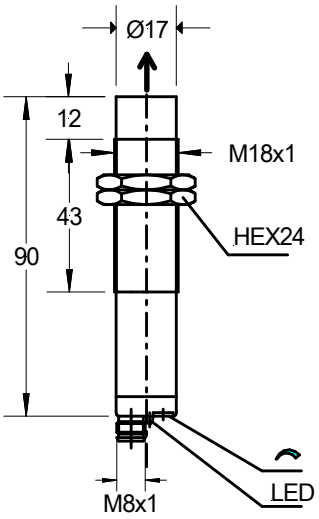


3-pin connector (view on the sensor):
1 brown
3 blue
4 black

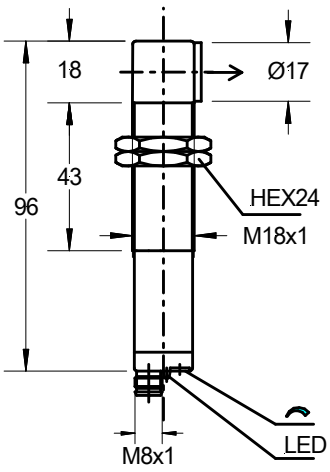
Use an appropriate miniature screw driver max. size 2.5mm for adjustment of the potentiometer!

Dimensions

axial transducer



radial transducer



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Scope of delivery

- Sensor
- 2 of each M18 nuts, washers and rubber sleeves for mounting

Accessories (see also data sheet ‚ACC')

Cables 3-pin with M8 screw connector, PUR:

With straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
With 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR

Some typical ultrasound applications

Level measurement

- Measuring level in small containers
- Water gauge measurement
- Monitoring liquid levels in bottling plants
- Checking for tailbacks on conveyor belts
- Monitoring contents of granulate hoppers on injection molding machines
- Distance monitoring on combine harvesters, beet lifters etc.
- Monitoring ground clearance and distance on agriculture and construction vehicles

Process control

- Controlling belt tension or sag
- Sensing and signaling valve positions
- Measuring roll diameter on reeling machines
- Monitoring the height of stacks (charges, storehouse, assembling machines)
- Detecting material feed
- Detecting the feed of strip stock to blanking machines and presses
- Detecting on plastic blow-molding machines

Counting / Detection

- Counting onlookers at freestanding sales displays or show cases
- Access supervision at rotating doors, counters etc.
- Door automation
- Detecting transparent objects, foils, flat glass, bottles etc.
- Sensing objects in robot grippers
- Recognizing full or empty pallets
- Count and detect objects with 'difficult' surface
- Detect wrong parts on conveyors
- Collision protection on vehicles

Scanning of dimensions

- Determining the dimensions of packages
- Sensing the height of plants in automated green houses
- Measuring the volume of tree-trunks

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Ultrasonic distance and proximity sensors resistant against chemicals
UPR CP Series (PVDF/PTFE housing)

- Measuring range up to 1000mm
- Highly resistant against most chemicals such as acids and lyes
- Housing made of PVDF or PTFE
- Small size
- Measurement independent of material, surface, color and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects
- Protection class IP 67, fully watertight, robust
- Customized versions available!
- Swiss made

Technical specifications

		UPR 1003 PSCP ...
Detection range	mm	0...1000
Blind range (no reasonable analog signal)	mm	0...180
Adjustment range of switch output (with potentiometer)	mm	180...1000
Hysteresis of switch output, axial	mm	60...30
Over all accuracy in whole temperature range	%FS	~±2
Operating frequency	kHz	~180
Status indicator	-	LED red
Switch output, short circuit proof, max. 0.1A	-	by choice PNP, NPN, NO, NC
Switching speed	Hz	~7
t_{on} / t_{off} switch output (depending on potentiometer setting)	ms	<100
Analog output in detection range (Versions)	V	(0)...10
R_L min. 10kΩ with V output	V	(10)...0V
R_L max. 500Ω with mA output	mA	(4)...20mA
Ripple of analog output	mV	~±100
Tracking speed of analog output	s/95%FS	<0.4
Power supply voltage (polarity reversal protection)	VDC	18...33
Ripple of supply voltage	%	<10
Mean consumption, switched wo. load	mA	~35
		version with mA output +20mA
Peak current, switched wo. load	mA	300mA/0.1ms
Temperature coefficient of sensor	mV/°K	typ. +4
Temperature coefficient of air path	%/°K	-0.17
Ambient temperature during operation	°C	-20...+50
Sensor temperature during operation	°C	-20...+70
Detection beam angle	°	~20 (d.h. ±10)
Pressure range	$mbar_{abs}$	~900...1100
Mass wo. cable	g	~120
Protection class	-	IP67
Housing material front part	-	PVDF or PTFE
Housing material rear part	-	Polyamide
Electrical connection	-	M8 connector

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Description

The UPR CP series sensors are specially designed for use in a chemically harsh environment. The high resistance is based on PVDF resp. PTFE material. A detailed list of durability is available upon request. A typical application is the level measurement of acids and lyes in smaller containers. The basic sensor is a model UPR 1003 … However any UPR series sensor can be built in CP version (see data sheet UPR series). The front part exposed to the medium is made of PVDF (upon request also of PTFE). Both are extremely robust and resistant materials. PTFE is even little more resistant, but softer than PVDF. The outstanding feature is the ultrasonic transducer which is PTFE foil covered, too. The rear part of the sensor with cable and potentiometer is made of stainless steel resp. polyamide (not resistant against acids).

For OEM applications the shape of the housing can be ordered customized. Actually the following two designs are available as standard products:

- UPR 1003 PSCP 24 ...
- UPR 1003 PSCP 24 … DAE

Blind range

The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range no distance measurement is possible! However the pure function as proximity switch (switching output) is possible in the blind range with certain restrictions (only bigger objects).

Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of 10°. However rough and structured (granular) surfaces can be detected up to an angle of 60°.

Cable

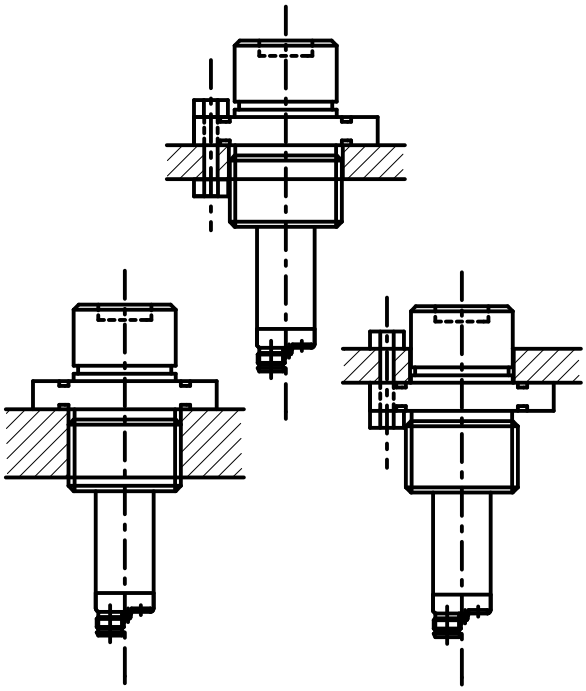
The sensors have a 3- or 4-pin M8 connector for screw or snap-on connection. The cable should be kept as short as possible. Maximum cable length is approx. 100m, if cross section area is appropriate (peak current of 300mA!, use 470µF/35V backup capacitor close to sensor). The cable should not be mounted parallel or close to high current cables.
Cables for connection to the M8 connector have to be ordered separately.

Mounting

Ultrasonic sensors shall be mounted as soft as possible in order to keep acoustic disturbances away from the mounting spot.

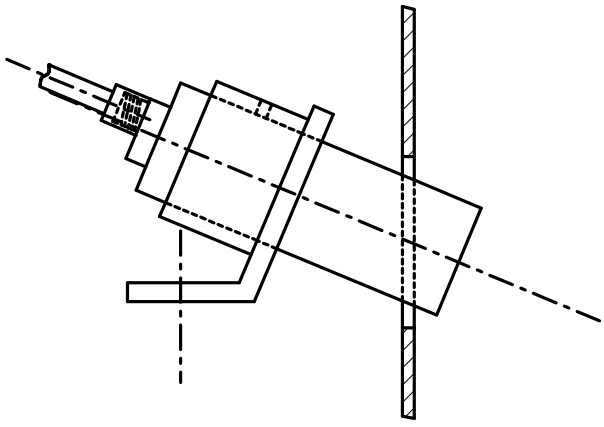
UPR 1003 PSCP 24 ...

Mounting on the flange with 6 M4 screws or mounting on the G1" thread. Sealing with Viton O-rings which are scope of delivery.



UPR 1003 PSCP 24 …DAE

Mounting e.g. with a clip.



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Standard versions

Type	Description
UPR 1003 PSCP 24 A	Shape type UPR 1003 PSCP 24 ..., PNP NO, analog output 0...10V, 4 pin connector
UPR 1003 PSCP 24 VA	Shape type UPR 1003 PSCP 24 ..., PNP NO, analog output 10…0V, 4 pin connector
UPR 1003 PSCP 24 I	Shape type UPR 1003 PSCP 24 ..., PNP NO, analog output 4…20mA, 4 pin connector

UPR 1003 PSCP 24 A DAE	Shape type UPR 1003 PSCP 24 … DAE, PNP NO, analog output 0...10V, 4 pin connector

Basically nearly all possible versions are available according to the following key (see also data sheet UPR Series):

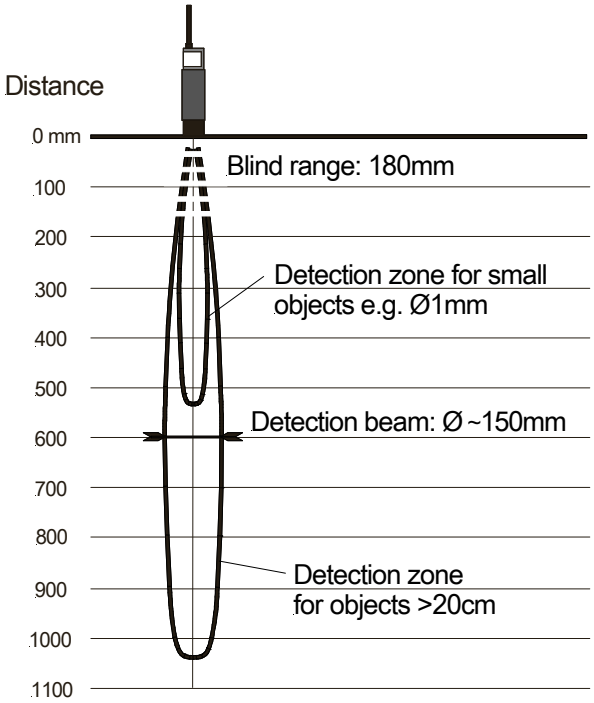
UPR 1003 _ _ CP 24 _ _

P=PNP
N=NPN

S=NO
O=NC

empty: switching output only, integrated cable
C: Switching output only, 3 pin connector
A: Analog output U, 4 pin connector
I: Analog output I, 4 pin connector
V: Inverted analog output

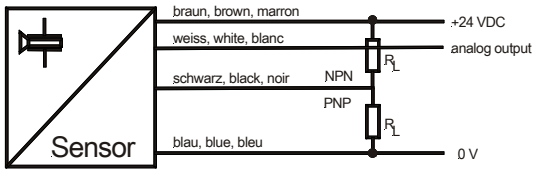
Detection beam



Power supply

Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 300mA for each sensor. In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

Diagram of connections



Use appropriate miniature screw driver max. size 2.5mm for adjustment of the potentiometer for switching distance!

Accessories (see also data sheet ‚ACC')

Cables 4-pin with M8 screw connector, PUR:

with straight connector:	l=2m	Type KAB 2K4VGPUR
	l=5m	Type KAB 5K4VGPUR
with 90° connector:	l=2m	Type KAB 2K4VWPUR
	l=5m	Type KAB 5K4VWPUR

Cables 3-pin with M8 screw connector, PUR:

with straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
with 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR

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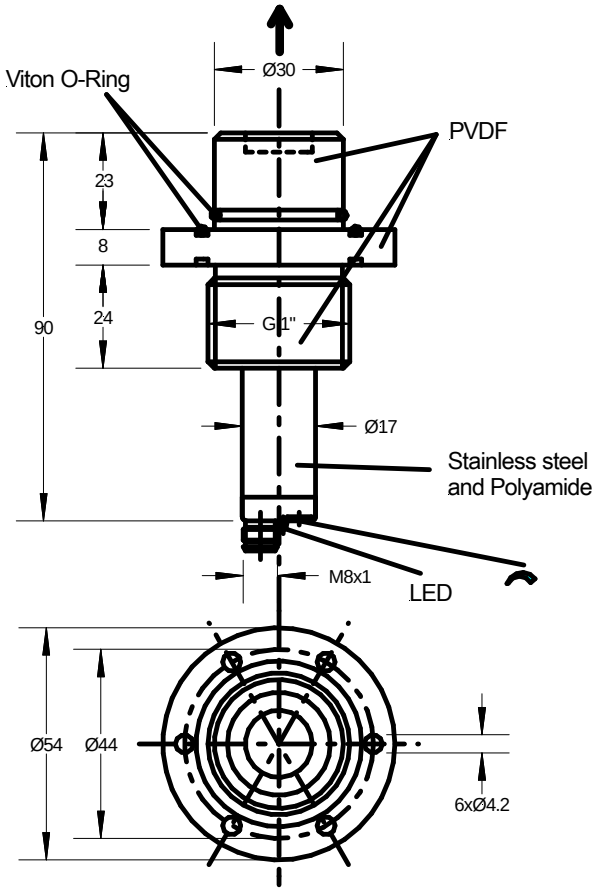
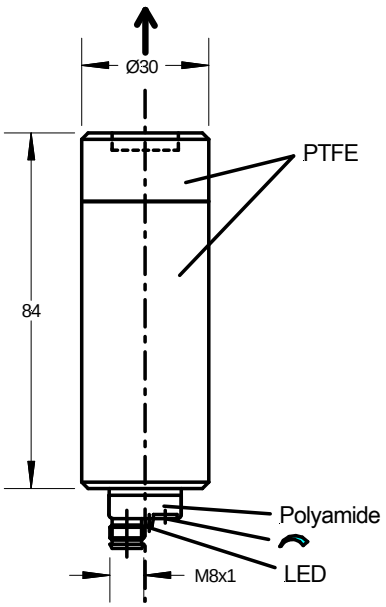
Dimensions

UPR 1003 PSCP 24 A:



UPR 1003 PSCP 24 A DAE:



Some typical ultrasound applications

Level measurement

- Measuring level in small containers
- Water gauge measurement
- Monitoring liquid levels in bottling plants
- Checking for tailbacks on conveyor belts
- Monitoring contents of granulate hoppers on injection molding machines
- Distance monitoring on combine harvesters, beet lifters etc.
- Monitoring ground clearance and distance on agriculture and construction vehicles

Process control

- Controlling belt tension or sag
- Sensing and signaling valve positions
- Measuring roll diameter on reeling machines
- Monitoring the height of stacks (charges, storehouse, assembling machines)
- Detecting material feed
- Detecting the feed of strip stock to blanking machines and presses
- Detecting on plastic blow-molding machines

Counting / Detection

- Counting onlookers at freestanding sales displays or show cases
- Access supervision at rotating doors, counters etc.
- Door automation
- Detecting transparent objects, foils, flat glass, bottles etc.
- Sensing objects in robot grippers
- Recognizing full or empty pallets
- Count and detect objects with 'difficult' surface
- Detect wrong parts on conveyors
- Collision protection on vehicles

Scanning of dimensions

- Determining the dimensions of packages
- Sensing the height of plants in automated green houses
- Measuring the volume of tree-trunks

Scope of delivery

- Sensor
- 2 Viton O-rings with type UPR 1003 PSCP 24 A

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SONARANGE

SNT SENSORTECHNIK AG

Ultrasonic proximity sensors
UPX Series

- Detection range up to 500mm
- Small size in popular ‚R-Shape'
- Versions with synchronisation input
- Measurement independent of material, surface, color and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects
- Protection class IP 67, fully watertight, robust
- Customized versions available!
- Swiss made

Technical specifications		**UPX 150**	**UPX 500**
Detection range	mm	0...170	0...500
Adjustment range of binary output (with potentiometer)	mm	60...170	120...500
Hysteresis of binary output, axial	%	~10...40 adjustable with potentiometer	~10
Reproducability	%FS	<1	
Operating frequency	kHz	~350	~175
Status indicator	-	LED red	
Binary output, short circuit proof, max. 0.1A	-	by choice PNP, NPN, NO, NC	
Switching frequency	Hz	~15	~2
t_{on} binary output	ms	<5	<10
t_{off} binary output	ms	<40	~400...8000 adjustable with potentiometer
Power supply voltage (reversal polarity protection)	VDC	12...28	
Ripple of supply voltage	%	<10	
Mean consumption, switched wo. load	mA	~45	~55
Peak current, switched wo. load	mA	100/0.05ms	250/0.1ms
Temperature coefficient of sensor	%/°K	typ. –0.1	
Temperature coefficient of air path	%/°K	-0.17	
Ambient temperature during operation	°C	-20...+50	
Sensor temperature during operation	°C	-20...+70	
Pressure range	$mbar_{abs}$	~900...1100	
Mass wo. cable	g	~50	
Protection class	-	IP67	
Housing material	-	Polyamide and stainless steel	
Electrical connection	-	M8 connector or integrated cable	

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Model selection

The main difference between the two UPX models is their different detection range (reach and shape). Also switching speed is different.

UPX 150 ...
Very narrow detection zone. Useful for looking into small orifices. Fast reaction time t_{on}. For fast counting/detecting up to 170mm distance and for level control as well. Binary output only. Axial hysteresis can be adjusted with potentiometer from approx. 5…50mm, depending on switching distance. This enables e.g. also a min./max. level control.

UPX 500 ...
General purpose proximity switch with fast reaction time t_{on} and slower t_{off} delay. The delay can be adjusted with potentiometer between 0.4...8s. Detection zone with Ø ~90mm. Binary output only.

Blind range

The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range no distance measurement is possible! However the pure function as proximity switch (binary output), as used on the UPX series, is possible in the blind range with certain restrictions (only bigger objects).

Binary output

The binary output becomes active, i.e. it switches on or off, when a scanned object falls below the set distance or if it exceeds it. Each switch point has a hysteresis (see technical specifications). This is the difference between switch on and switch off point during approach or departure. Hysteresis is necessary for an appropriate switching behaviour.
The switching distance is set with the potentiometer. An object with reasonable size and perpendicularly to the sensor axis is placed at the desired distance from the sensor. The potentiometer is now turned from left slowly clockwise until the LED illuminates (NO) or expires (NO). Thus the switching distance for the binary output is set.

Synchronisation input (Y versions)

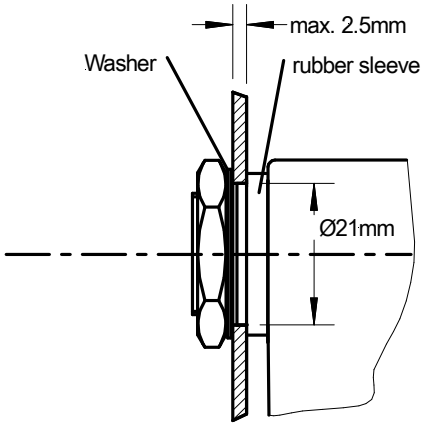
The ultrasonic signals can disturb each other when several sensors are focused on he same target or when sensors are mounted close together. This can be avoided by synchronizing the sending pulses. The synchronisation leads of all sensors are connected to each other by shielded cables as short as possible. Since all sensors send then simultaneously, the current consumption increases heavily. Not used synchronisation leads shall be isolated.

Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of 7° (UPX 150) and 10° (UPX 500). However rough and structured (granular) surfaces can be detected up to much higher angles.

Mounting

Ultrasonic sensors should be mounted softly in order to keep external acoustic noise away from the sensor. The UPX sensors can be mounted in two ways, with two M4 screws through the two holes in the housing or on the M18 thread of the transducer as well. Anyway a rubber gasket should be used between the sensor and the mounting spot. Thus scope of delivery are a M18 nut, a washer and a rubber sleeve for mounting on the M18 transducer. The rubber sleeve fits for a mounting hole of Ø21mm.



Cable

The sensors have a 3- or 4-pin M8 connector for screw or snap-on connection or an integrated cable. The cable should be kept as short as possible. Maximum cable length is approx. 100m, if cross section area is appropriate (peak current of 100 or 250mA!, use 470µF/35V backup capacitor close to sensor). The cable should not be mounted parallel or close to high current cables.
Cables for connection to the M8 connector have to be ordered separately.

Power supply

Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 100mA (UPX 150) or 250mA (UPX 500). In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

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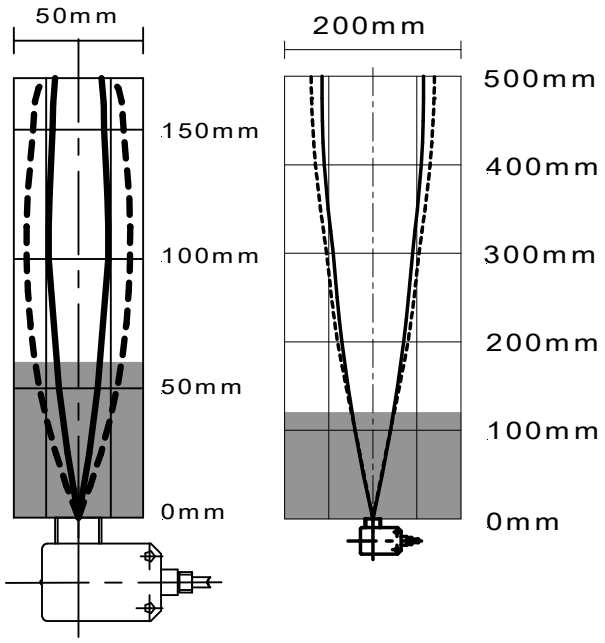
Detection beam

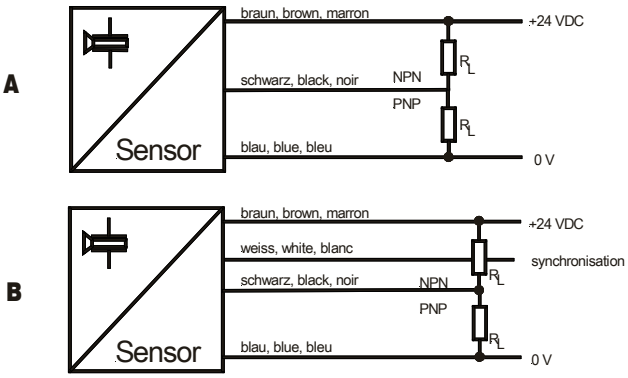
The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. Below the typical cone shapes for the UPX sensors are shown. The difference between bold and dotted line represents the variation due to different targets. Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

No other ultrasonic sensor working at the same frequency shall be within the cone or close to it or opposite to it. This is only allowed when using the synchronisation option (Y-version).



UPX 150 **UPX 500**

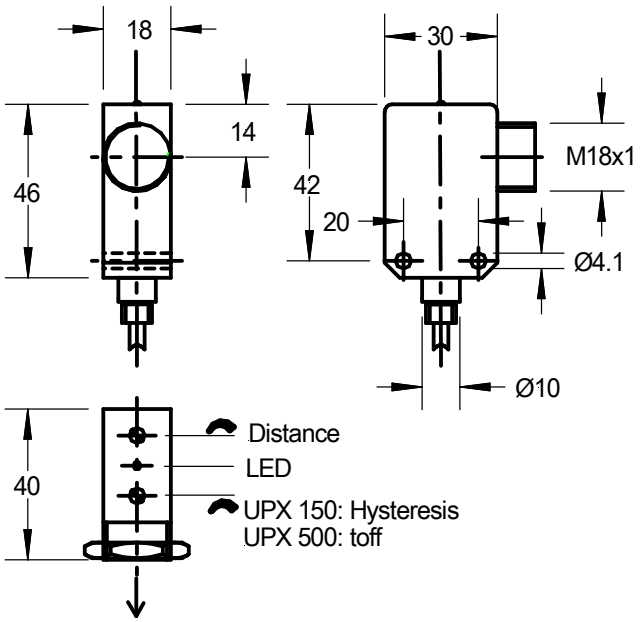
Diagram of connections



Scope of delivery

- Sensor
- M18 nut, washer and rubber sleeve for mounting
- Miniature screw driver for potentiometer

Dimensions



Use the miniature screw driver which is scope of delivery for adjustment of the two potentiometers!

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Standard versions

Type	Detection range	Description	Scheme
UPX 150 PVPS 24	150mm	PNP NO, 2m integrated cable	A
UPX 150 PVPS 24 C	150mm	PNP NO, 3-Pin connector	A
UPX 500 PVPS 24	500mm	PNP NO, 2m integrated cable	A
UPX 500 PVPS 24 Y	500mm	PNP NO, synchronisation input, 4-Pin connector	B
UPX 500 PVPS 24 C	500mm	PNP NO, 3-Pin connector	A
Option		NPN instead of PNP	
Option		NC instead of NO	

Basically all possible versions are available according to the following key:
Detection range: XXX: 150 = 170mm, XXX: 500 = 500mm

Product key

UPX XXX PV □ □ 24 □ □

synchronisation input (4-pin connector)	Y
connector integr. Cable	C -
binary output NO binary output NC	S O
binary output PNP binary output NPN	P N

Accessories (see also data sheet ‚ACC')

Cables 4-pin with M8 screw connector, PUR:

with straight connector:	l=2m	Type KAB 2K4VGPUR
	l=5m	Type KAB 5K4VGPUR
with 90° connector:	l=2m	Type KAB 2K4VWPUR
	l=5m	Type KAB 5K4VWPUR

Cables 3-pin with M8 screw connector, PUR:

with straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
with 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR

Some typical ultrasound applications

Level measurement
- Measuring level in small containers
- Water gauge measurement
- Monitoring liquid levels in bottling plants
- Checking for tailbacks on conveyor belts
- Monitoring contents of granulate hoppers

Process control
- Controlling belt tension or sag
- Sensing and signaling valve positions
- Measuring roll diameter on reeling machines
- Monitoring the height of stacks (charges, storehouse)
- Detecting material feed
- Detecting the feed of strip stock to blanking machines

Counting / Detection
- Counting onlookers at freestanding sales displays
- Access supervision at rotating doors, counters etc.
- Door automation
- Detecting transparent objects, foils, flat glass, bottles etc.
- Sensing objects in robot grippers
- Recognizing full or empty pallets
- Count and detect objects with 'difficult' surface
- Detect wrong parts on conveyors
- Collision protection on vehicles

Scanning of dimensions
- Determining the dimensions of packages
- Sensing the height of plants in automated green houses

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Ultrasonic proximity sensor
UPL 200

- Detection range up to 200mm
- Short M30 housing with M12 connector
- No blind range for most materials
- Measurement independent of material, surface, colour and size of target
- Works under dust, dirt, fog, light
- Detects transparent and bright objects
- Protection class IP 67, fully watertight, robust
- Good value
- Swiss made

Technical specifications		**UPL 200**
Detection range	mm	0...200
Fixed switching distance	mm	~200
Hysteresis of switch output, axial, @200mm	mm	~16
Reproducability	%FS	<1
Operating frequency	kHz	~350
Status indicator	-	LED red
Switch output, short circuit proof, max. 0.1A	-	by choice PNP, NPN, NO, NC
Switching frequency	Hz	~15
t_{on} switch output	ms	<5
t_{off} switch output	ms	<40
Power supply voltage (reversal polarity protection)	VDC	12...28
Ripple of supply voltage	%	<10
Mean consumption, switched wo. load	mA	~45
Peak current, switched wo. load	mA	100/0.05ms
Ambient temperature during operation	°C	-20...+50
Sensor temperature during operation	°C	-20...+70
Pressure range	$mbar_{abs}$	~900...1100
Mass wo. cable	g	~100
Protection class	-	IP67
Housing material	-	nickel plated brass
Electrical connection	-	M12 connector

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Properties

Ultrasonic sensors are best suited for detection of objects with very different surfaces and materials, as well as under difficult environmental conditions such as dust, dirt, fog, bright light. There they have clear advantages compared to inductive, capacitive and optical sensors.
The ultrasonic proximity switch UPL 200 is designed for detection in the rather close range up to 200mm. It has a fixed switching distance and no setting elements (only an LED). Thus it is most suited for lateral approximation of objects, e.g. on conveyors. In order to detect targets in the whole range between 0…200m, the object should have a minimum size of approx. 15mm and it should not be made of sound absorbing material. In the range 80…200mm the sensor detects also much smaller and sound absorbing objects.

Blind range

The typical zone close to the ultrasonic sensor is called blind zone. Conventional sensors cannot detect in the blind range. However the UPL type detects most objects also in the blind range due to its high power ***SONARANGE*** transmitter and the M30 surface, i.e. in the whole range from 0…200mm. Only very bad reflecting (e.g. some textiles) or very small objects (<15mm) can be detected only above 80mm distance. Thus for most objects the sensor works without blind zone.

Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of approx. 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

Cable

The sensor has an electrical connector in M12 size. A cable with connector is not scope of delivery. The cable should be kept as short as possible. Maximum cable length is approx. 100m, if cross section area is appropriate (peak current of 100mA!, use 470µF/35V backup capacitor close to sensor). The cable should not be mounted parallel or close to high current cables. Cables for connection to the M12 connector have to be ordered separately.

Power supply

Ideally a power supply is used exclusively for the sensor. The power supply must be able supply the short peak current of approx. 100mA. In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

Monting

The sensor can be mounted with the two M30 hex nuts (scope of delivery) in a mounting bore.

Detection zone UPL 200

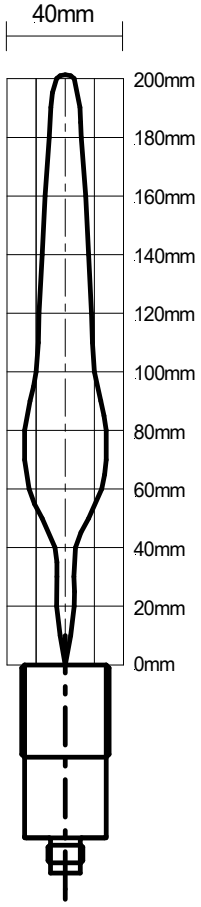
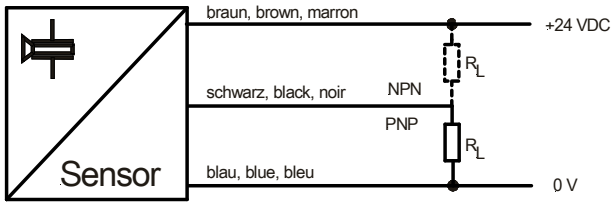
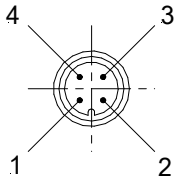


Diagram of connections





1 +24VDC (brown)
2 nc.
3 0V (blue)
4 OUT PNP NO (black)

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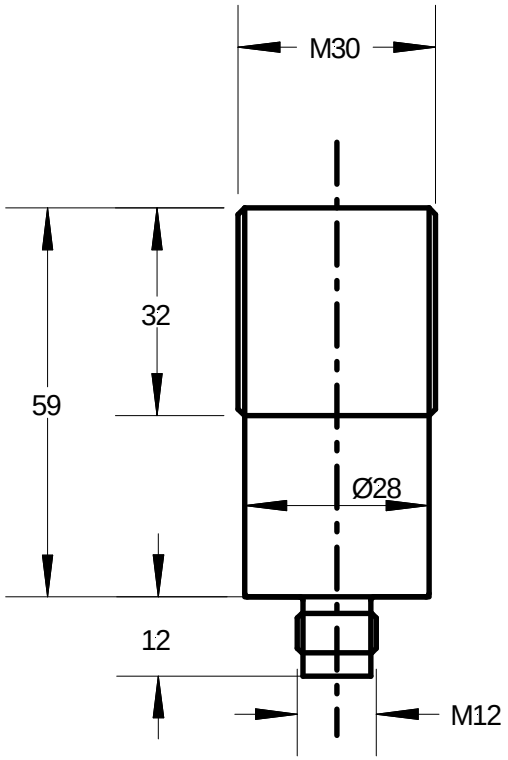
Standard versions

Type	Detection range	Description
UPL 200 FIPS 24 C	200mm	switch output PNP, NO
UPL 200 FINS 24 C	200mm	switch output NPN, NO
UPL 200 FIPO 24 C	200mm	switch output PNP, NC
UPL 200 FINO 24 C	200mm	switch output NPN, NC

Dimensions



Scope of delivery

- Sensor
- 2 M30 hex nuts

Accessories (see also data sheet ‚ACC')

PVC cable 3-pin with M12 screw connector
with straight connector: l=2m Type KAB 2L3VGPVC

Some typical ultrasound applications

Level measurement
- Measuring level in small containers
- Water gauge measurement
- Monitoring liquid levels in bottling plants
- Checking for tailbacks on conveyor belts
- Monitoring contents of granulate hoppers on injection molding machines
- Distance monitoring on combine harvesters, beet lifters etc.
- Monitoring ground clearance and distance on agriculture and construction vehicles

Process control
- Controlling belt tension or sag
- Sensing and signaling valve positions
- Measuring roll diameter on reeling machines
- Monitoring the height of stacks (charges, storehouse, assembling machines)
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- Detecting on plastic blow-molding machines

Counting / Detection
- Counting onlookers at freestanding sales displays or show cases
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- Detecting transparent objects, foils, flat glass, bottles etc.
- Sensing objects in robot grippers
- Recognizing full or empty pallets
- Count and detect objects with 'difficult' surface
- Detect wrong parts on conveyors
- Collision protection on vehicles

Scanning of dimensions
- Determining the dimensions of packages
- Sensing the height of plants in automated green houses
- Measuring the volume of tree-trunks

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SONARANGE

UPS 04.08 e

SNT SENSORTECHNIK AG

Miniature ultrasonic distance and proximity sensors
UPS Series

- Measuring range up to 200mm
- Very small blind range
- Narrow detection beam
- Small size M12x1
- Teach-In
- Binary or analogue outputs
- Measurement independent of material, surface, colour and size of target
- Work under dust, dirt, fog, light
- Detect transparent and bright objects

Technical specifications		UPS 200 TVPA 24 C	UPS 200 TOR 24 CA	UPS 200 TOR 24 CI
Detection range	mm		20...200	
Blind range (no reasonable analogue output signal)	mm		20	
Adjustment range	mm		20...200	
Hysteresis	%	≤1	-	-
Linearity of analogue output	%FS	-	<1	<1
Reproducability	%FS	<0.5	<0.5	<0.5
Temperature error	%FS	≤1.5	≤1.5	≤1.5
Operating frequency	kHz		~400	
Status indicator	-		LED yellow/red	
Binary output, reversal polarity protection,	-	PNP NO/NC max. 0.1A	-	-
Switching speed max.	Hz	13	-	-
t_{on} binary output	ms	~30	-	-
Analogue output in detection range		-		
R_L min. 1kΩ with V output	V		0...10	
R_L max. 300Ω with mA output	mA			4...20
Power supply (reversal polarity protection)	VDC	10...30	15…30	10…30
Power supply ripple	%		10	
Mean consumption, switched wo. load	mA		~30	
Ambient temperature during operation	°C		-25...+70	
Mass	g		25	
Protection class	-		IP65	
Housing material	-		nickel plated brass	
Electrical connection	-		connector M12, 4-pin	

Description

The ultrasonic sensors of the UPS series are specially small, and they have a narrow detection beam. Thus they are well suited to detect objects in the near range up to 200mm and under confined conditions. The sensors are available as well as pure proximity switches as also as distance sensors with analogue mA or V output. The switch or measuring distances can be learned by a teach-in procedure. An optional Teach-In box is available. Typical applications are detection of objects and distance and level measurement.

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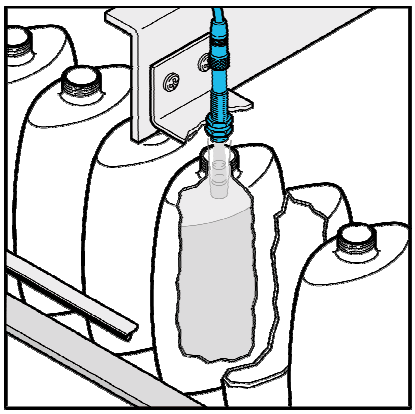


Model selection

The UPS versions have different outputs.

UPS 200 TVPA 24 C
Ultrasonic sensor with a binary output with 2 teachable switching points (NO, NC or window function).

UPS 200 TOR 24 CA
Ultrasonic sensor for distance measurement with an analogue output 0...10V. The lower and upper limits are teachable.

UPS 200 TOR 24 CI
Ultrasonic sensor for distance measurement with an analogue output 4...20mA. The lower and upper limits are teachable.

Blind range

The lower detection range is called blind range. It is typical for ultrasonic sensors. In the blind range no distance measurement is possible! However the pure function as proximity switch (binary output) is possible in the blind range with certain restrictions (only bigger objects).

Setting of the switching points (UPS 200 TVPA 24 C)

The switching points are set by connecting the teach wire with either the power supply $-U_B$ (0V) or $+U_B$ (+24VDC). The voltage must be active for min. 1s on the teach wire. The LED shows during teaching if the sensor has detected the object.

Window operation NO
- Place the object to the near switching point
- Teach switching point with $-U_B$
- Place the object to the far switching point
- Teach switching point with $+U_B$

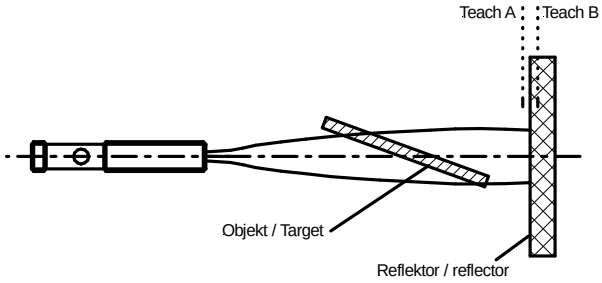
Window operation NC
- Place the object to the near switching point
- Teach switching point with $+U_B$
- Place the object to the far switching point
- Teach switching point with $-U_B$

Switching point NO
- Place the object to the switching point
- Teach switching point with $+U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $-U_B$

Switching point NC
- Place the object to the switching point
- Teach switching point with $-U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $+U_B$

Application hint window operation (UPS 200 TVPA 24 C)

In window operation the sensor detects only targets which are within the window limits. The same function can also be used to simulate a kind of retro-reflective sensor. The reflector is mounted in the small window between Teach A and Teach B (see drawing below). In such setup the sensor detects also targets which pass the sensor beam in a very flat angle. The sensor would not detect such targets in normal scan operation mode.



Setting the measuring limits (UPS 200 TOR 24 CA/I)

The two measuring limits are set by connecting the teach wire with either the power supply $-U_B$ (0V) or $+U_B$ (+24VDC). The voltage must be active for min. 1s on the teach wire. The LED shows during teaching if the sensor has detected the object. With $-U_B$ the lower measuring limit (0V or 4mA) and with $+U_B$ the upper measuring limit (10V or 20mA) is teached. Thus it is possible to teach a rising or a falling ramp.

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- Place the object to the lower measuring limit (i.e. where 0V or 4mA is expected)
- Teach lower measuring limit with $-U_B$
- Place the object to the upper measuring limit (i.e. where 10V or 20mA is expected)
- Teach upper measuring limit with $+U_B$

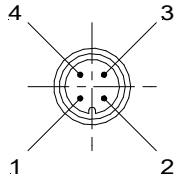
Lower and upper measuring limits can also later be programmed individually. The teach wire must not be connected during normal operation. The sensor can e.g. be operated after teaching with a 3 wire cable.

LED indicator

	LED red	LED yellow
During teach-in:		
- object detected	off	blinking
- no object detected	blinking	off
- object not reliably detected	on	off
Normal operation PNP	off	switching status
Normal operation analogue	off	on
Error	on	last status

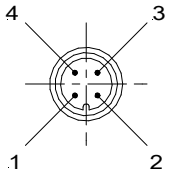
Electrical connections (view to the sensor)

UPS 200 TVPA 24 C



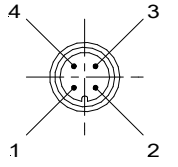
1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT PNP (schwarz/black)

UPS 200 TOR 24 CA

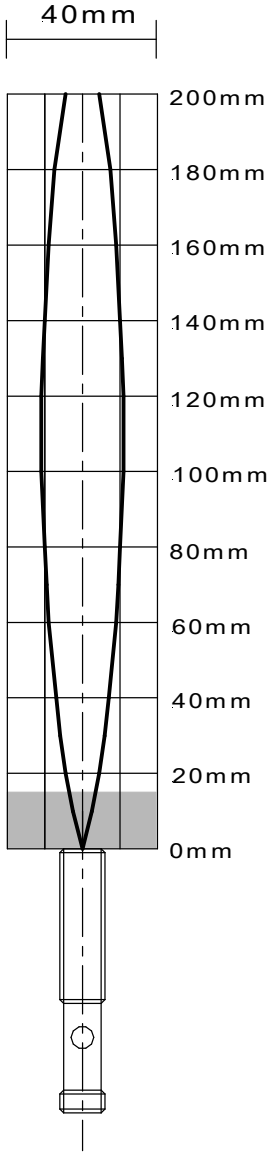


1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT 0...10V (schwarz/black)

UPS 200 TOR 24 CI



1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT 4...20mA (schwarz/black)



Detection beam

The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. On the left the typical cone shape for the UPS sensors is shown. Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

Mounting

The sensor can be mounted with the two M12 nuts (HEX 17) which are scope of delivery.

Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of approx. 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

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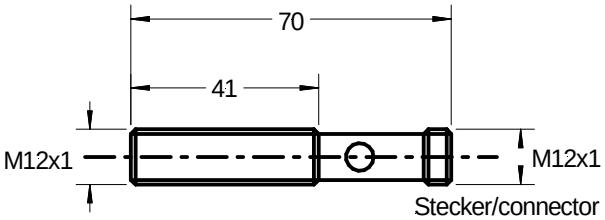
Cable

The sensors have an M12 4-pin connector for screw mounting. The cable should not be mounted parallel or close to high current cables. Cables have to be ordered separately.

Dimensions



Scope of delivery

- Sensor
- 2 M12 nuts

Accessories (see also data sheet ‚ACC')

PUR cable 3-wire with M12 connector:
l=2m Type KAB 2L3VGPUR

PUR cable 4-wire with M12 connector:
l=2m Type KAB 2L4VGPUR

Teach-In box: see separate data sheet

UPS special versions

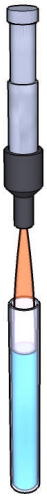
Special versions of UPS sensors are available for measurements in narrow cavities and for aggressive media.

UPS 150 FOCUS Beam

- Very narrow detection beam
- Particularly for level measurement in narrow cavities (off approx. Ø10mm)
- No blind range

UPS 150 Chemical Protection

- Chemically resistant version (PVDF)
- Diaphragm PTFE coated
- Front resistant to most chemicals



Level measurement in small tubes with UPS FOCUS Beam sensor:

With little distance between sensor and tube and, depending on the measuring height, levels can be measured in tubes which are only few mm wide.

For details about the UPS special sensors see separate data sheet „UPS SPEZ".

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Special miniature ultrasonic distance and proximity sensors UPS FB und UPS CP Series

UPS 150 FB ...

- Very narrow detection beam (FOCUS Beam)
- Particularly for level measurement in narrow cavities (off approx. Ø10mm)
- No blind range
- Measuring range up to 150mm
- Teach-In
- Binary or analogue outputs

UPS 150 CP ...

- Chemically resistant version (PVDF)
- Diaphragm PTFE coated
- Front resistant to most chemicals
- Measuring range up to 150mm
- Teach-In
- Binary or analogue outputs

Technical data		**UPS 150 ... TVPA 24 C**	**UPS 150 ... TOR 24 CA**	**UPS 150 ... TOR 24 CI**
Detection range	mm		0 or 20...150	
Hysteresis of switching point	%	≤1	-	-
Linearity of analogue output	%FS	-	<1	<1
Reproducability	%FS	<0.5	<0.5	<0.5
Temperature error	%FS	≤1.5	≤1.5	≤1.5
Operating frequency	kHz		~400	
Status indicator	-		LED yellow/red	
Binary output, short circuit protection	-	PNP NO/NC max. 0.1A	-	-
Switching speed max.	Hz	13	-	-
t_{on} binary output	ms	~30	-	-
Analogue output in detection range		-		
R_L min. 1kΩ with V output	V		0...10	
R_L max. 300Ω with mA output	mA			4...20
Power supply (reversal polarity protection)	VDC	10...30	15...30	10...30
Power supply ripple	%		10	
Mean consumption, switched wo. load	mA		~30	
Ambient temperature during operation	°C		-25...+70	
Mass	g		25	
Protection class	-		IP65	
Housing material	-		nickel plated brass, PVDF or PP	
Electrical connection	-		connector M12, 4-pin	

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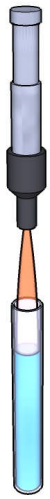
Description

UPS 150 FB ...

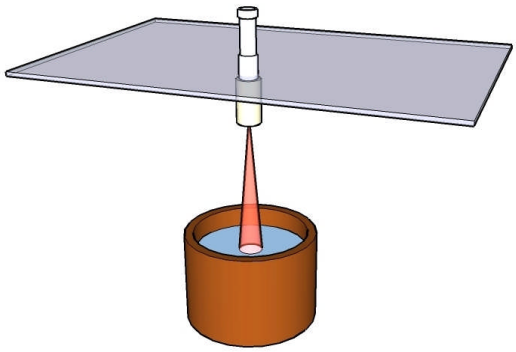
The ultrasonic sensors series UPS FB (FOCUS Beam) are equipped with a focusing device made of glass-fiber reinforced polypropylene, which makes the sound beam particularly narrow. Therefore they are suitable in the near range up to 150mm to watch into narrow cavities. A typical application is measuring of liquid level in small tubes or containers.



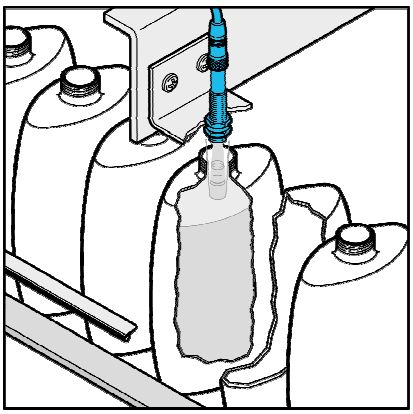
With little distance between sensor and tube and, depending on the measuring height, levels can be measured in tubes which are considerably narrower than the beam shown on the drawing.
In very narrow setups, only a test can verify the feasibility of measurement.

UPS 150 CP ...

The diaphragm of the series UPS 150 CP (Chemical Protection) is coated with a thin PTFE foil. The head made of chemically resistant PVDF serves as mechanical fixation for the foil and protection of the sensor front part. Thus the front part of the ultrasonic sensor becomes resistant to most chemicals.



All UPS sensors are available as pure proximity switches and distance sensors with analogue outputs in V or mA as well. The switching and/or measuring distances are trained by means of Teach-in. Optionally a Teach-in box is available



Model selection

The UPS versions have different outputs.

UPS 150 ... TVPA 24 C
Ultrasonic sensor with a binary output with 2 teachable switching points (NO, NC or window function).

UPS 150 ... TOR 24 CA
Ultrasonic sensor for distance measurement with an analogue output 0...10V. The lower and upper limits are teachable.

UPS 150 ... TOR 24 CI
Ultrasonic sensor for distance measurement with an analogue output 4...20mA. The lower and upper limits are teachable.

Setting of the switching points (UPS 150 ... TVPA 24 C)

The switching points are set by connecting the teach wire with either the power supply $-U_B$ (0V) or $+U_B$ (+24VDC). The voltage must be active for min. 1s on the teach wire. The LED shows during teaching if the sensor has detected the object.

Window operation NO

- Place the object to the near switching point
- Teach switching point with $-U_B$
- Place the object to the far switching point
- Teach switching point with $+U_B$

Window operation NC

- Place the object to the near switching point
- Teach switching point with $+U_B$
- Place the object to the far switching point
- Teach switching point with $-U_B$

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Switching point NO

- Place the object to the switching point
- Teach switching point with $+U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $-U_B$

Switching point NC

- Place the object to the switching point
- Teach switching point with $-U_B$
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach with $+U_B$

Setting the measuring limits (UPS 150 … TOR 24 CA/I)

The two measuring limits are set by connecting the teach wire with either the power supply $-U_B$ (0V) or $+U_B$ (+24VDC). The voltage must be active for min. 1s on the teach wire. The LED shows during teaching if the sensor has detected the object. With $-U_B$ the lower measuring limit (0V or 4mA) and with $+U_B$ the upper measuring limit (10V or 20mA) is teached. Thus it is possible to teach a rising or a falling ramp.

- Place the object to the lower measuring limit (i.e. where 0V or 4mA is expected)
- Teach lower measuring limit with $-U_B$
- Place the object to the upper measuring limit (i.e. where 10V or 20mA is expected)
- Teach upper measuring limit with $+U_B$

Lower and upper measuring limits can also later be programmed individually. The teach wire must not be connected during normal operation. The sensor can e.g. be operated after teaching with a 3 wire cable.

LED indicator

	LED red	LED yellow
During teach-in: - object detected - no object detected - object not reliably detected	 off blinking on	 blinking off off
Normal operation PNP Normal operation analogue	off off	switching status on
Error	on	last status

Mounting

The sensor can be mounted with the two M12 nuts (HEX 17) which are scope of delivery.

Inclination angle of object

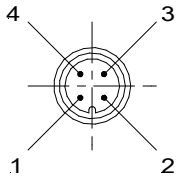
Smooth surfaces can be detected up to an inclination angle of approx. 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.

Cable

The sensors have an M12 4-pin connector for screw mounting. The cable should not be mounted parallel or close to high current cables. Cables have to be ordered separately.

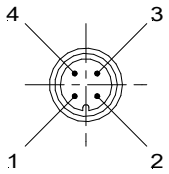
Electrical connections (view to the sensor)

UPS 150 ... TVPA 24 C



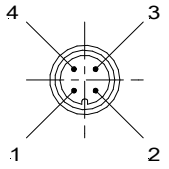
1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT PNP (schwarz/black)

UPS 150 ... TOR 24 CA



1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT 0...10V (schwarz/black)

UPS 150 ... TOR 24 CI



1 +24VDC (braun/brown)
2 Teach (weiss/white)
3 0V (blau/blue)
4 OUT 4...20mA (schwarz/black)

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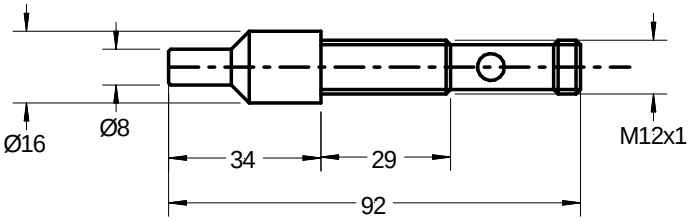
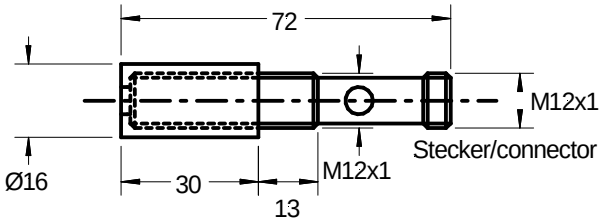
Dimensions



UPS 150 FB ...

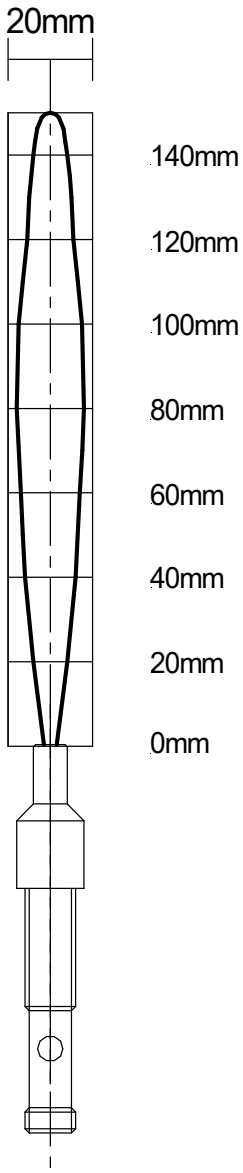


UPS 150 CP ...

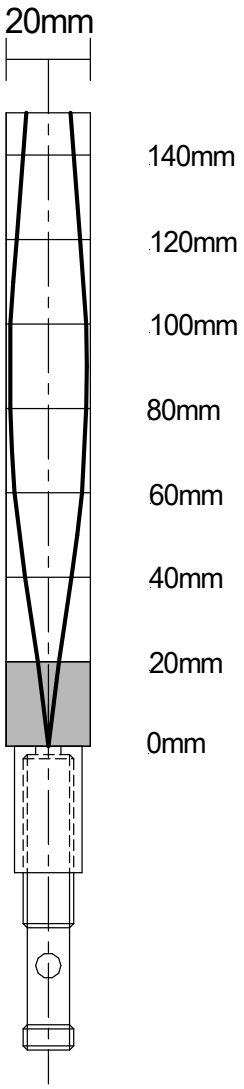
Detection beams

The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and more badly reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

The typical detection beams for the sensors UPS FB und UPS CP are shown on the right side.



UPS 150 FB ...



UPS 150 CP ...

Accessories (see also data sheet ‚ACC')

PUR cable 3-wire with M12 connector:
l=2m Type KAB 2L3VGPUR

PUR cable 4-wire with M12 connector:
l=2m Type KAB 2L4VGPUR

Teach-In box: see separate data sheet

Scope of delivery

- Sensor
- 2 M12 nuts

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Teach-In Box for Ultrasonic Proximity Sensors Series UPS

Description

The ultrasonic sensors of the UPS series are set with a teach-in procedure. This can happen either manually by connecting the teach wire to 0V or +24VDC, or with the help of the Teach-In Box. The Teach-In Box has two 2m long cables for connection between sensor (M12, f) and sensor cable (M12, m). Thus it is put into the actual sensor cabling, and it can be removed after the teach-in procedure. The teach-in happens by a quick touch of the switch either to the left or right.

Setting of the switching points (UPS 200 TVPA 24 C)

The switching points are set by a quick touch (min. 1s) of the switch. The LED shows during teaching if the sensor has detected the object.

Window operation NO

- Place the object to the near switching point
- Teach switching point by pushing switch to the left ($-U_B$)
- Place the object to the far switching point
- Teach switching point by pushing switch to the right ($+U_B$)

Window operation NC

- Place the object to the near switching point
- Teach switching point by pushing switch to the right ($+U_B$)
- Place the object to the far switching point
- Teach switching point by pushing switch to the left ($-U_B$)

Switching point NO

- Place the object to the switching point
- Teach switching point by pushing switch to the right ($+U_B$)
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach by pushing switch to the left ($-U_B$)

Switching point NC

- Place the object to the switching point
- Teach switching point by pushing switch to the left ($-U_B$)
- Cover the sensor diaphragm by hand or let the sensor look into the void
- Teach by pushing switch to the right ($+U_B$)

Setting the measuring limits (UPS 200 TOR 24 CA/I)

The two measuring limits are set by a quick touch (min. 2s) of the switch. The LED shows during teaching if the sensor has detected the object. By pushing the switch to the left ($-U_B$) the lower measuring limit (0V or 4mA) and by pushing the switch to the right ($+U_B$) the upper measuring limit (10V or 20mA) is teached. Thus it is possible to teach a rising or a falling ramp.

- Place the object to the lower measuring limit (i.e. where 0V or 4mA is expected)
- Teach lower measuring limit by pushing switch to the left ($-U_B$)
- Place the object to the upper measuring limit (i.e. where 10V or 20mA is expected)
- Teach upper measuring limit by pushing switch to the right ($+U_B$)

Lower and upper measuring limits can also later be programmed individually.

LED indicator on sensor

	LED red	LED yellow
During teach-in:		
- object detected	off	blinking
- no object detected	blinking	off
- object not reliably detected	on	off
Normal operation PNP	off	switching status
Normal operation analogue	off	on
Error	on	last status

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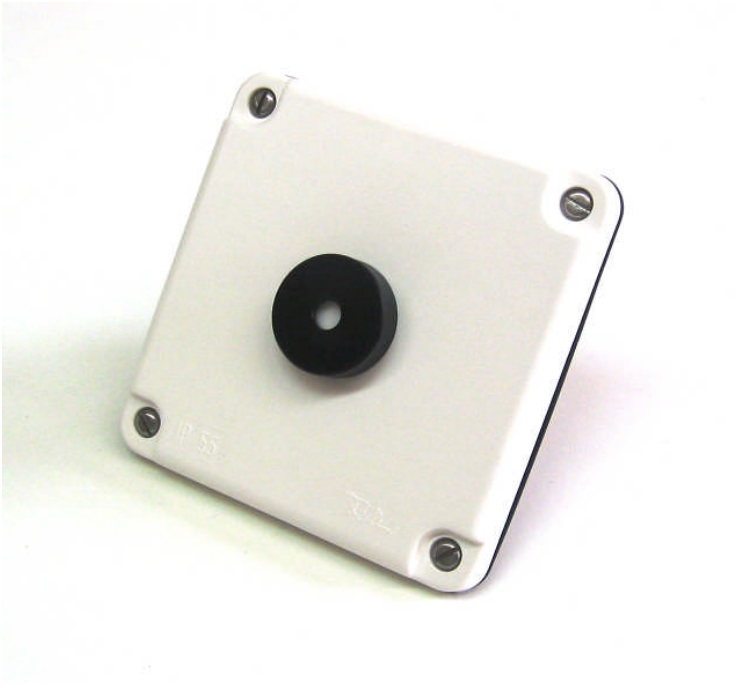
SONARANGE

UPY 03.08 e

SNT SENSORTECHNIK AG

Non-contact ultrasonic switch for door automation
UPY Series

- Built-in the cover of electric switch box (surface mount or in-wall mount)
- For use where contact by hand is not allowed (e.g. food processing, clean rooms, hospitals)
- Works under dirt, dust, fog, bright light
- Switches independently of material, surface, colour and size of target
- Water tight, protection class IP 67, robust
- Reach 30cm (independent of target!)
- With relay output for connection of a door control unit
- 24VDC operation
- Customized versions available!
- Swiss made



Technical data

		UPY 300 RA 24
Detection range	mm	300
Operating frequency	kHz	180
Switch output	-	Relay (1 change switch N/O, N/C)
t_{on} Relay	s	~0.1
t_{off} Relay	s	~3
Switch voltage relay	VAC/DC	max. 30
Switch current relay	A	max. 6
Power supply voltage (reversal polarity protection)	VDC	12...26
Mean consumption	mA	~60
Ambient temperature	°C	-20...+50
Protection class sensor	-	IP67
Electrical connection	-	screw-terminal
Color of box cover	-	white

Description

The ultrasonic switch UPY 300 RA 24 is used instead of a conventional electric wall mounted switch when a non contact operation is necessary (e.g. sliding doors, lights etc.). This complies with certain hygienic demands (food processing industry, hospitals, clean rooms).
The advantage of ultrasonic sensors compared to optical switches is that they are least susceptible to dirt and fully water resistant. The sensor diaphragm is protected against mechanical wear by an orifice. The orifice can be dismounted for cleaning purpose. The sensor reacts only to presence and not to movements. As soon as an object (e.g. a hand) is within the 30cm detection zone, the built-in relay switches. Since the sensor does sense the time of flight and not an intensity (as usual with optical sensors), it has a 100% background suppression. Loads of up to 30VAC/DC and 6A can be switched with the mono stable relay.

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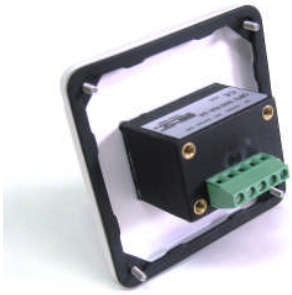
Electrical connection

A 4 or 5 wire cable can be connected to the sensors screw terminal. Connection (from left to right, see also type label):

- 0V (sensor power supply)
- +24VDC (sensor power supply)
- NC relay out (max. 30V!)
- Common relay contact (max. 30V!)
- NO relay out (max. 30V!)

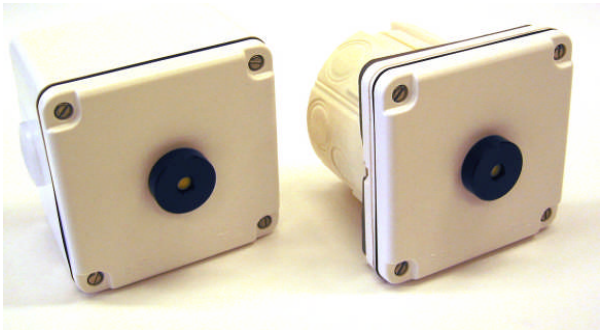
The relay works as a pulse switch. It switches as long as an object is within the detection range. After that it switches back to its original status after a time delay of approx. 3s. With the relay pulse a control unit can be operated.



Rear view

Mounting

The UPY switch is offered as one unit together with the box cover (incl. sealing and 4 M3 screws). The box cover fits to a surface mount housing (APG) or to an in-wall mount housing (ELK) as well. For mounting into a wall one needs additionally a mounting plate (MPL).



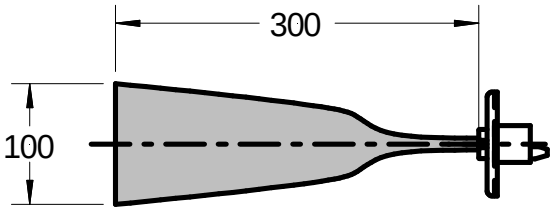
surface mount in-wall mount

Distances

Ultrasonic sensors can mutually influence themselves when they look at each other. They are supposed to be mounted therefore not fully opposite to each other. If not possible, at least the following rule must be followed:

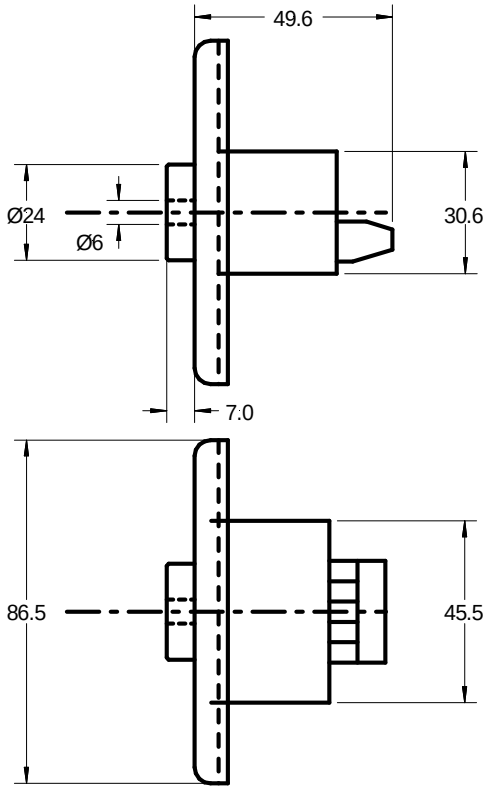
- mutual distance min. 3m
- or mounted min. 30cm out of axis

Detection range



The detection range can be set shorter or longer on customer demand.

Dimensions



Accessories

For surface mounting:

- Surface mount housing, white 87x87x54mm (WxLxH) — Type APG

For in-wall mounting:

- In-wall mount housing 78x78x57mm (WxLxH) — Type ELK
- Mounting plate incl. sealing for in-wall mount housing 87x87x7mm (WxLxH) — Type MPL

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SONARANGE

UPB 05.05 e

SNT SENSORTECHNIK AG

Ultrasonic Barrier
UPB Series

- Large detection range up to 1500mm
- Small size in popular ‚R-Shape'
- Microprozessor controlled
- No blind range
- Very high switching frequency (200Hz)
- For detection of fast objects and objects with small distance to each other
- For detection of non right-angled surfaces
- Adjustable transmitter power
- Adjustable switching delay
- Works under dust, dirt, fog, bright light
- Detects transparent and bright objects
- Protection class IP 67, fully watertight, robust
- Customized versions available!
- Swiss made

Technical specifications		**UPB 1500**
Detection range	mm	0...1500
Operating frequency	kHz	~180
Status indicator transmitter	-	LED green
Status indicator receiver	-	LED yellow
Switch output, short circuit proof, max. 0.1A	-	by choice PNP, NPN, NO, NC
Switching frequency	Hz	200
Sampling frequency	Hz	800
t_{on} switch output (adjustable on receiver with potentiometer)	ms	3…~400
t_{off} switch output	ms	<3
Transmitting power (adjustable on transmitter with potentiometer)	%	~0.5...100
Power supply voltage (polarity reversal protection)	VDC	18...30
Ripple of supply voltage	%	10
Mean consumption transmitter		
@ max. transmitter power	mA	35
@ min. transmitter power	mA	10
Peak consumption transmitter		
@ max. transmitter power	mA	55
@ min. transmitter power	mA	15
Mean consumption receiver, switched wo. load	mA	17
Ambient temperature during operation	°C	-20...+50
Sensor temperature during operation	°C	-20...+70
Pressure range	$mbar_{abs}$	~900...1100
Mass without cable (transmitter and receiver)	g	45 each
Protection class	-	IP67
Housing material	-	Polyamide and stainless steel
Electrical connection	-	3-pin connector 8mm

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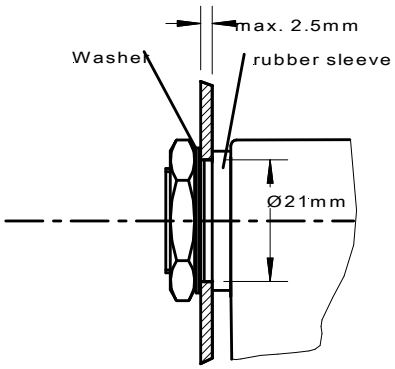
Properties

Ultrasonic sensors are perfectly suited for detection of objects with very different surfaces and under bad environmental conditions (dust, dirt, fog, bright light). A disadvantage is their relatively low measuring speed, caused by the slow speed of sound compared e.g. to the speed of light. Moreover the so called blind range of ultrasonic scanner type sensors (transmitter and receiver in the same sensor) might be sometimes a disadvantage, too.
Those disadvantages are eliminated with the ultrasonic barrier UPB. In the same way as with a light barrier, the full range between transmitter and receiver can be used. There is no blind range. The measuring speed of 200Hz is very high as well. The microprocessor controlled UPB series combines high acoustic power with small size. This is achieved with new optimized acoustic ***SONARANGE*** transducers working at high electrical voltages.
The high measuring speed combined with the large measuring range of 1500mm are the outstanding characteristics of the UPB ultrasonic barrier.

Mounting

Ultrasonic sensors should be mounted softly in order to keep external acoustic noise away from the sensor. The UPB sensors can be mounted in two ways, with two M4 screws through the two holes in the housing or on the M18 thread of the transducer as well. Anyway a rubber gasket should be used between the sensor and the mounting spot. Thus scope of delivery are a M18 nut, a washer and a rubber sleeve for mounting on the M18 transducer. The rubber sleeve fits for a mounting hole of Ø21mm.



Cable

Transmitter and receiver have both a 3-pin M8 connector. The cable should be kept as short as possible. The cable should not be mounted parallel or close to high current cables. Cables for connection to the M8 connector have to be ordered separately.

Power supply

Ideally a power supply is used exclusively for the sensor. In order to avoid disturbances the part where the sensor is mounted must be correctly earthed.

Settings

A further outstanding characteristic of the UPB series are the adjustable transmitter and receiver.

Transmitter (green LED):
The acoustic power can be adjusted with the potentiometer. The max. power (turn clockwise) should be used for big and slow objects and when operating with a large barrier distance. A reduced power (turn counter clockwise) is favourable when the objects are so small, so acoustically transparent or so fast that the sound would go around or penetrate the object with a high power setting. In particular for small or fast objects the appropriate transmitter power must be experimentally evaluated.

The speed and the width of the object are in the following direct relationship:

$$v \leq \frac{b}{x}$$

v speed of object [m/s]
b width of object resp. width of the gap between objects [mm] (the smaller is true)

The value x depends on the distance between transmitter and receiver and also on the transmitter power. The min. value of x is 3. With higher distance and higher transmitter power approaches 30.

Example:
A 50mm wide object can be safely detected up to a speed of approx. 1.7m/s (x=30). With small barrier distance even up to higher speed (x=3).

Receiver (yellow LED):
The switching-on delay can be adjusted on the receiver with a potentiometer. The barrier has max. speed without delay (counter clockwise). This should be he normal operation mode. An increased switching-on delay (clockwise) might make sense when small objects (or disturbances) should not make the sensor to switch.

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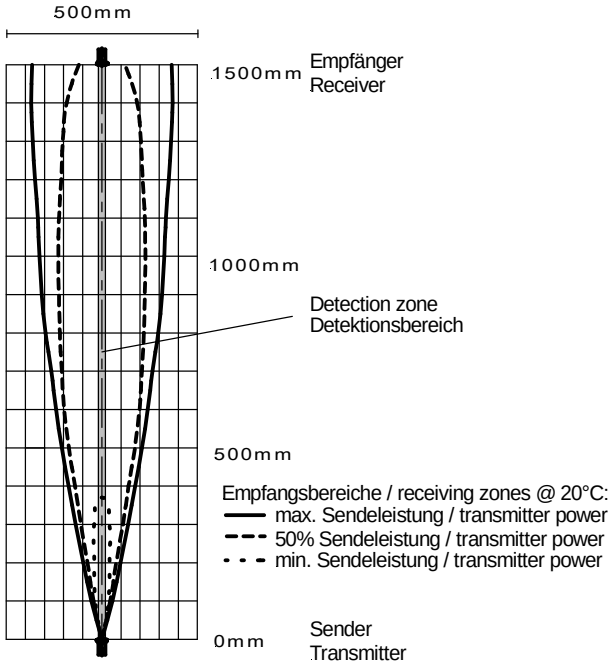
Standard versions

Type	Description
UPB 1500 P 24 CT	Transmitter, 3-pin connector
UPB 1500 PVPS 24 CR	Receiver, PNP, NO, 3-pin connector
UPB 1500 PVNS 24 CR	Receiver, NPN, NO, 3-pin connector
UPB 1500 PVPO 24 CR	Receiver, PNP, NC, 3-pin connector
UPB 1500 PVNO 24 CR	Receiver, NPN, NC, 3-pin connector

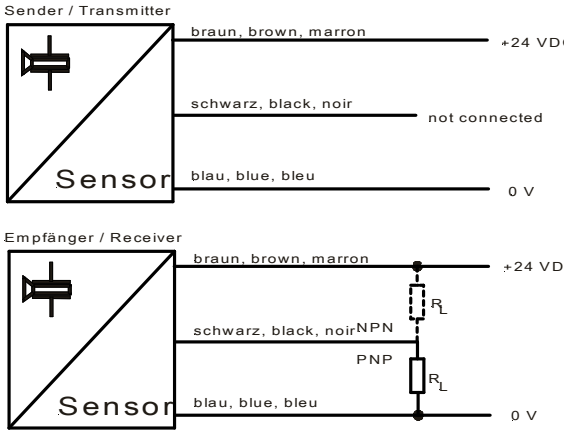
Transmitter and receiver don't have to be paired. For an ultrasonic barrier both, a transmitter and a receiver are ordered separately.

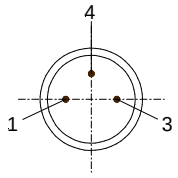
Detection area

An ultrasonic barrier works according to the principle of shading. As soon as the receiver is sufficiently covered by the object, it switches. The necessary shading for switching can be adjusted with the transmitter power and thus adapted to the object. When several ultrasonic barriers are to be positioned next to each other, each receiver must be outside of the reception range of his neighbour.



Diagrams of connections





1 brown
3 blue
4 black

3-pin connector (view on the sensor):

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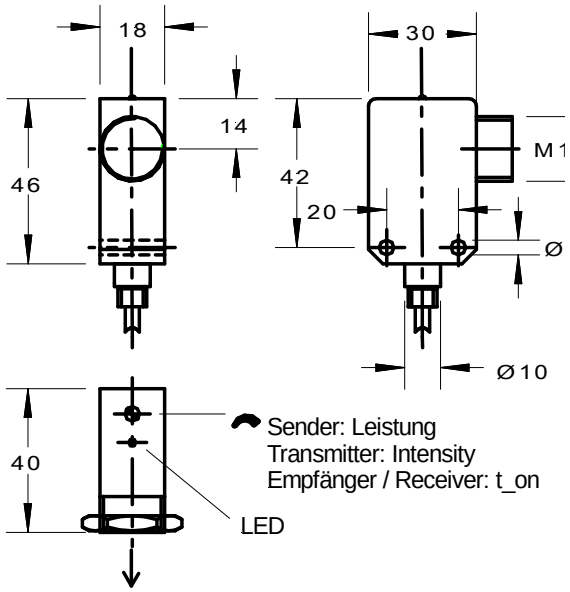
Dimensions



Use appropriate miniature screw driver max. size 2.5mm for adjustment of the two potentiometers!

Scope of delivery

- 1 transmitter or 1 receiver
- M18 nuts, washer and rubber sleeve for mounting

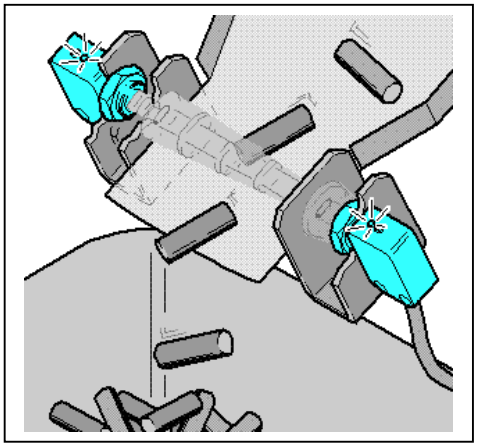
Accessories (see also data sheet (‚ACC')

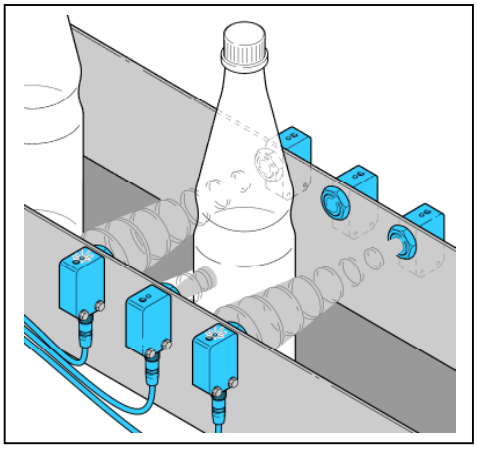
PUR cable 3-pin with M8 screw connector

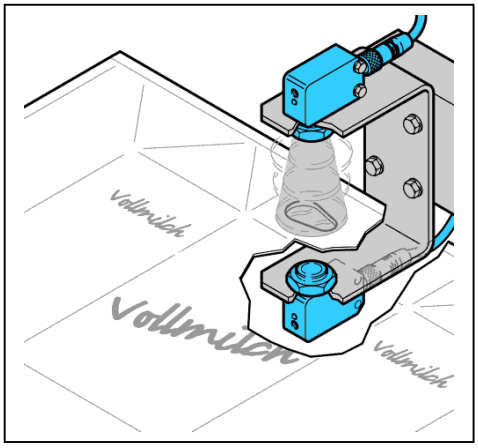
with straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
with 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR

Some applications for ultrasonic barriers

- Detection of fast objects and those with small mutual distance
- Detection of transparent objects
- Detection of non right-angled surfaces
- Detection of foils, paper etc.
- Detection of double sheets







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Ultrasonic fork barrier for edge control
UPF Series

- Ultrasonic fork barrier with analogue output 0...10V
- The analogue signal is a function of lateral covering
- For edge control and web guidance systems
- For transparent foils
- For contaminated air
- Fork width 30mm
- 500Hz sampling rate
- 8mm measuring width
- Swiss made

Technical Data

		UPF 30 FI 24 CA
Fork width	mm	30
Detection width	mm	approx. 8
Noise of output signal	mm	approx. 0.2
Reproduciblity at 50% covering	mm	approx. 0.5
Sampling frequency	Hz	500
Output signal	V	0...10
Power supply voltage (polarity reversal protection)	VDC	18...36
Ripple of supply voltage	%	10
Ambient temperature during operation	°C	0...+45
Protection class	-	IP64 (on request IP67)
Electrical connection	-	M8 connector, 4-pin

Properties

The edge sensor Type UPF 30 is an ultrasonic barrier with separated transmitter and receiver. It is suited for edge detection on web guiding systems. In contrast to conventional barriers it does not offer a simple on/off output signal, but it measures the degree of covering of the ultrasonic receiver as an analogue output signal. If the receiver is fully covered, the output is 0V and if not covered at all 10V. The result is a considerably higher accuracy of positioning of <1mm. The ultrasonic barrier is much less sensitive to dust and dirt compared to optical systems. Furthermore transparent webs (e.g. foils) can be perfectly detected with ultrasound.

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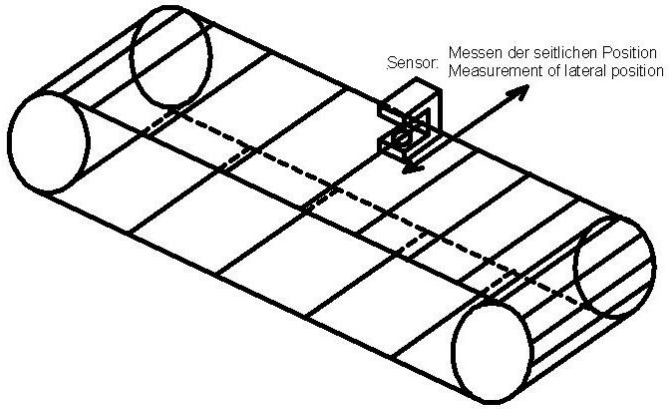
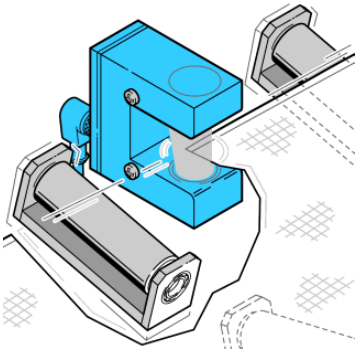
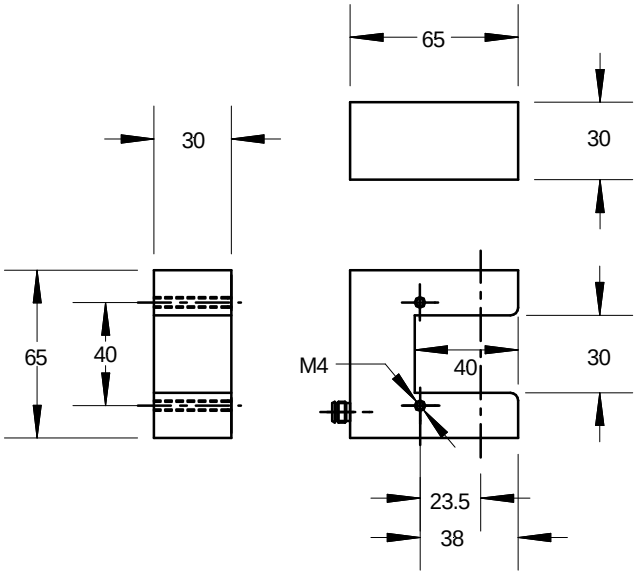
Application

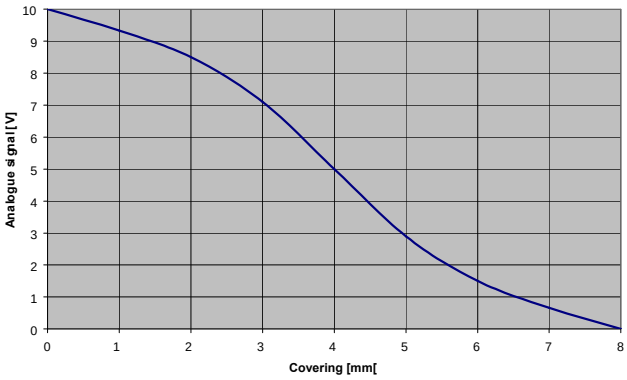




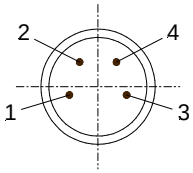
Dimensions



Output signal 0...10V as function of lateral covering (qualitatively, scatter of approx. 0.5V)

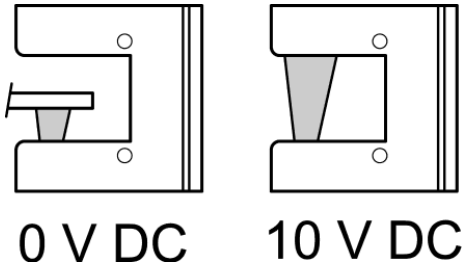


Electrical connection



View on the sensor

1 brown:	+24VDC
2 white:	analogue output signal 0...10V
3 blue:	0V
4 black:	n.c.



Accessories (see also data sheet ‚ACC')

Cables 4-pin with M8 screw connector, PUR:

With straight connector:	l=2m	Type KAB 2K4VGPUR
	l=5m	Type KAB 5K4VGPUR
with 90° connector:	l=2m	Type KAB 2K4VWPUR
	l=5m	Type KAB 5K4VWPUR

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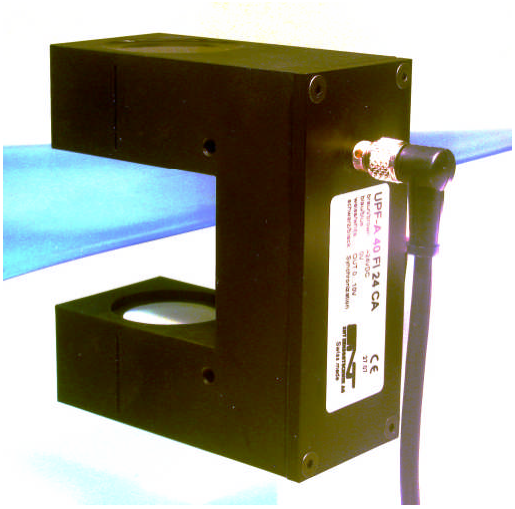
Ultrasonic fork sensor for web guide and edge control
UPF-A Series

- Ultrasonic fork barrier with analogue output 0...10V
- The analogue signal is a function of lateral covering (13mm detection width)
- For edge control and web guidance systems
- For transparent foils
- For contaminated air
- High accuracy and temperature stability
- High measurement range
- Very small plane change influence
- 285Hz sampling rate
- Swiss made

New generation!
with the 5 advantages



Technical Data		**UPF-A 40 FI 24 CA**
Fork width	mm	40
Detection width	mm	~13 (±6.5)
Resolution (noise):		
- @ 20...80% covered	mm	~0.1
- @ 0...100% covered	mm	~0.15
Plane change (influence of position between transm. and receiver):		
- ±13mm from center	mm	≤ ±0.1
- out of ±13mm from center	mm	≤ ±0.5
Linearity @ 10...90% covered (typical)	%FS	≤ 5%
Ultrasonic frequency	kHz	~130
Sampling frequency (in non synchronized mode)	Hz	285
Tracking speed of analogue output (5...95%FS)	ms	7
Output signal	V	0...10
Temperature stability 0...60°C (typical)	%	±5
Power supply voltage (polarity reversal protection)	VDC	8...30
Ripple of supply voltage	%	10
Current consumption @ 24VDC	mA	35
Power consumption	W	0.9
Power indicator	-	yellow LED in connector
Ambient temperature during operation	°C	0...+60
Storage temperature	°C	-10...+70
Synchronization input (connector pin 4)		
- square wave signal (on rising edge)	V	3.5 ... 30
- min. signal duration	ms	0.02
- max. sampling frequency (for proper signal)	Hz	285
Max. cable length	m	20
Protection class	-	IP67
Housing material	-	black anodized aluminum
Electrical connection	-	M8 connector, 4-pin
Mass	g	370

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Properties

The edge sensor type UPF-A 40 is based on the experience of SNT Sensortechnik AG with ultrasonic through beam sensors. New software algorithms and a unique ***SONARANGE*** ultrasonic transducer material allow an accuracy and temperature stability so far only realized with optical systems. But the ultrasonic fork barrier is much less sensitive to dirt and dust compared to optical sensors. Further more transparent materials such as foils can be perfectly handled.

The 5 advantages of SNT ultrasonic fork sensors

1. The SNT ultrasonic transducers have a large diameter.
   Result: large measurement range combined with high linearity and resolution.

2. The all new ***SONARANGE*** material of the ultrasonic transducers has a Young's modulus which is constant up to higher temperatures compared to the past.
   Result: high temperature stability.

3. The signals are compensated with computed data as well as with a temperature sensor.
   Result: precise operation up to 60°C.

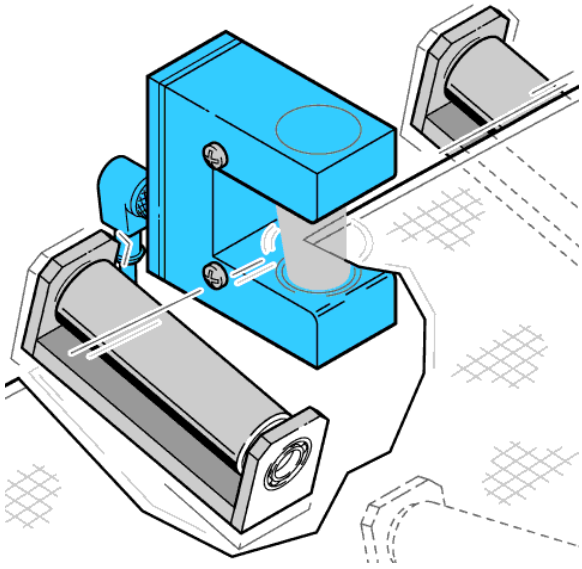
4. Each sensor is individually trimmed.
   Result: The sensors are reproducible, and the influence of air humidity and pressure is considerably reduced.

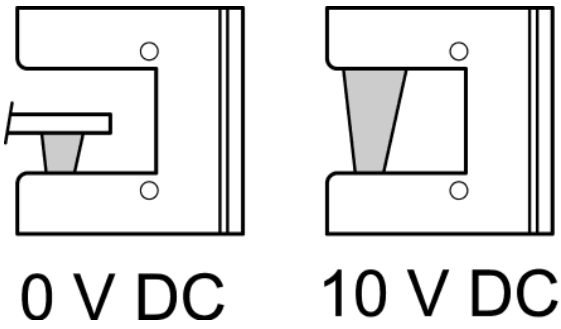
5. Software and transducers are designed to eliminate the influence of multiple echoes.
   Result: Very small influence of plane change and high measuring speed.

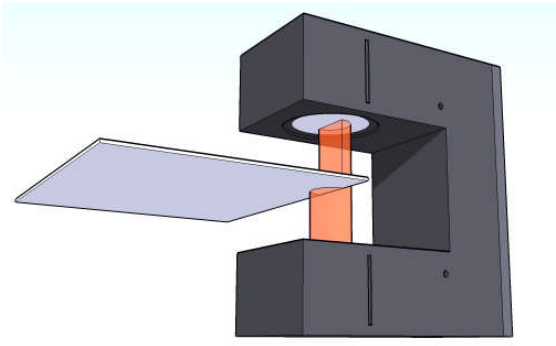
The UPF-A is an ultrasonic barrier with separated transmitter and receiver. It is suited for edge detection on web guiding systems. In contrast to conventional barriers it does not offer a simple on/off output signal, but it measures the degree of covering of the ultrasonic receiver as an analogue output signal. If the receiver is fully covered, the output is 0V and if not covered at all 10V.

The relative humidity of air and the air pressure as well (sea level) have an influence on the output signal due to physical laws (attenuation of sound). Higher air humidity or decreasing air pressure do reduce the output signal at a given edge position.

Application







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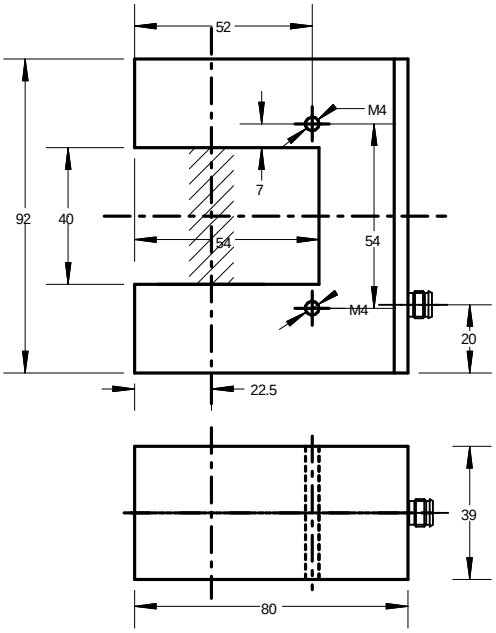
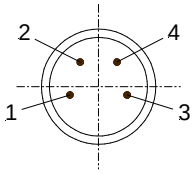
Dimensions



Synchronization

The internal sampling clock of the sensor can be overcome with an external repeating signal (max. 285Hz). This can be helpful if several sensors are measuring along a fast moving web.

Electrical connection



View on the sensor

1 brown:	+24VDC
2 white:	analogue output 0...10V
3 blue:	0V
4 black:	synchronization input

Accessories (see also data sheet ‚ACC')

Cables 4-pin with M8 screw connector, PUR:

With straight connector:	l=2m	Type KAB 2K4VGPUR
	l=5m	Type KAB 5K4VGPUR
with 90° connector:	l=2m	Type KAB 2K4VWPUR
	l=5m	Type KAB 5K4VWPUR

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OPTORANGE

OPF 09.05 e

SNT SENSORTECHNIK AG

Fork light barriers
OPF / OPFL Series

- Simple and quick mounting
- Detection of smallest parts
- Fork widths 30...120mm
- High switching frequency up to 4kHz
- Water proof, IP 67, robust
- Versions with red light and laser light as well
- Customized versions available

NEW:
available with
teach-in

Technical data		**OPF 30**	**OPF 50**	**OPF 80**	**OPF 120**	**OPFL ...**
Fork width	mm	30	50	180	120	30…120
Power supply voltage	VDC			10...35		
Emitted light	-		Red light 660nm, clocked			Red light laser class 2
Output	-			PNP, NO/NC switchable		
Status indicator	-			LED yellow		
Output current	mA			max. 200, kurzschlussfest		
Mean consumption	mA			<30		
Voltage drop	V			<2.8		
Switching speed	kHz	4	4	4	2	3
Resolution, smallest object	mm	0.5	0.5	0.5	0.8	0.05
Sensitivity	-	adjustable with pot. or with teach-in on object			adjustable with pot.	
Hysteresis	mm			0.25		0.02
Reproducability	mm	0.02	0.04	0.06	0.06	0.01
Ambient temperature	°C			-10...+60		+5...+45
Ambient light immunity	Lx	80'000	80'000	80'000	50'000	100'000
Insulation voltage indurance	V			500		250
Protection class	-			IP67		
Housing material	-		Zinc die-cast, black lacquered			Alu, black elox.
Electrical connection	-			M8 connector 3-pin		

Standard versions

Fork width	**Type red light with pot.**	**Type red light with teach-in**	**Type laser light with pot.**
30mm	OPF 30 PA 24 C	OPF 30 TA 24 C	OPFL 30 PA 24 C
50mm	OPF 50 PA 24 C	OPF 50 TA 24 C	OPFL 50 PA 24 C
80mm	OPF 80 PA 24 C	OPF 80 TA 24 C	OPFL 80 PA 24 C
120mm	OPF 120 PA 24 C		OPFL 120 PA 24 C

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Description

Fork light barriers have several advantages compared to standard barriers. Transmitter and receiver are perfectly aligned. Mounting is therefore very easy. There is no mechanical misalignment possible after mounting. Furthermore each version of fork width is optimized in light intensity, sensitivity and measuring frequency. Thus fork light barriers have a high resolution and reproducibility. They are ideally suited for detection of small parts and for precise edge detection.
The versions with laser instead of red light are even approx. 10 times more precise.

Model selection

Various fork widths are available from 30…120mm. Smaller or larger widths are available on demand. Each fork width is available with red light (OPF) or with laser light (OPFL).

Function

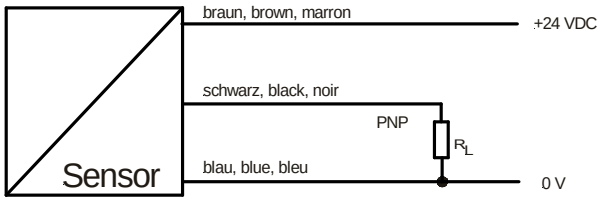
Fork light barriers have a transmitter and a receiver, each mounted in one side of the fork housing. The transmitter beam is focused to the receiver. If the receiver detects the light beam, the output of the receiver becomes active. If the light beam is interrupted, the receiver output gets disabled. The output signal can be set for NO (switching on dark) or NC (switching on bright) function. The status of the output signal is shown with the LED integrated in the M8 connector. The LED lights up when the output is active.

Mounting

Mounting happens with M4 screws. Parasitic light focussed directly into the receiver should be avoided.

Electrical connection

The electrical connection is done with a 3-pin cable with M8 connector.



Control elements

Detection sensitivity (versions with potentiometer):
The detection sensitivity is adjusted with the potentiometer more far from the connector. At the left stop the sensitivity is maximum. Thus the smallest possible parts are detected. The radiated light power is lowest.
At right stop the sensitivity is smallest. Only bigger objects are detected. The radiated light power is highest. In this setting the fork barrier has its highest pollution margin.

Teach-In:
When using teach-in versions, the yellow teach button has to be pressed for min. 2s, until the teach LED is flashing. Then the object to be detected is being guided several times (min. 2x) through the barrier. When the object is teached, the LED stops flashing, and the connector LED flashes twice.

Output function:
The output function (NO or NC) can be selected with the rotational switch which is closest to the connector. This switch shall always be either at the left or the right stop:

- Left stop = NO
- Right stop = NC

The fork light barriers are configured as standard with NO output. The potentiometer for output function is covered with a rubber cap. For switching the function the cap has to be removed with a small screw driver.

Cable

The fork barriers have a 3-pin M8 connector for screw mounting. Cables have to be ordered separately.

Scope of delivery

- Fork light barrier

Accessories (see also data sheet ‚ACC')

PUR cable 3-pin with M8 screw connector

with straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
with 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR

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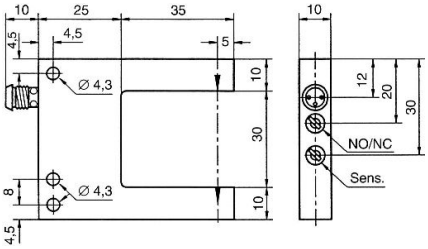
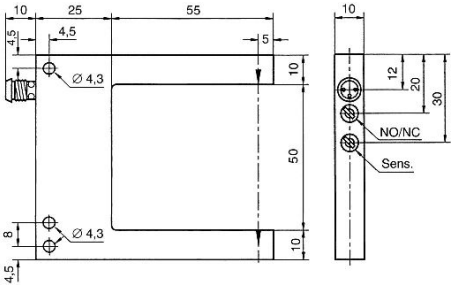
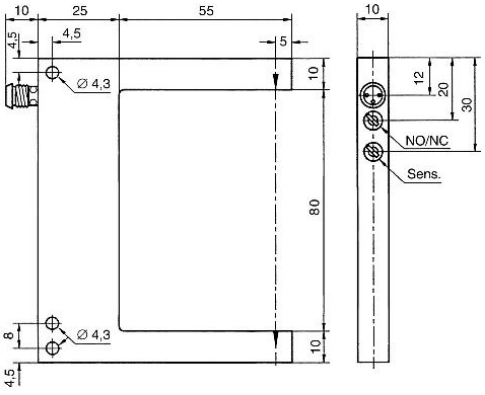
Dimensions red light fork barrier OPF



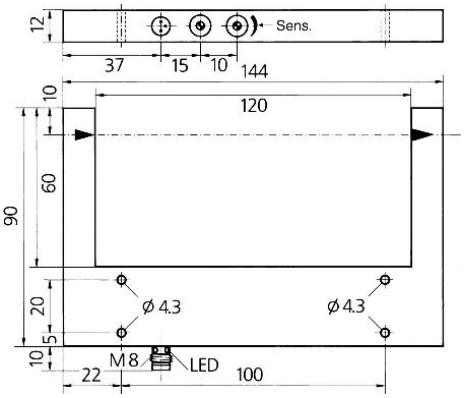
OPF 30 P/TA 24 C: fork width 30mm



OPF 50 P/TA 24 C: Gabelweite 50mm

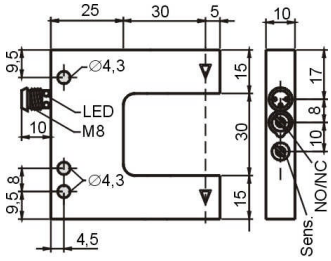


OPF 80 P/TA 24 C: fork width 80mm

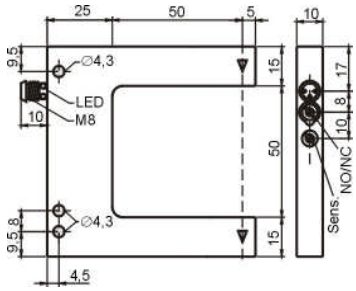


OPF 120 PA 24 C: fork width 120mm

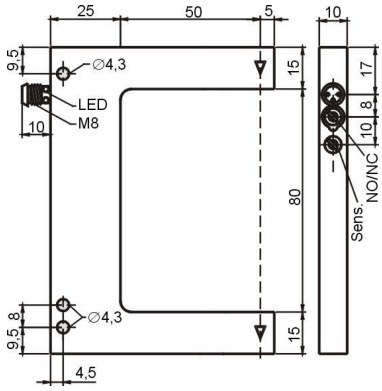
Dimensions laser fork barrier OPFL



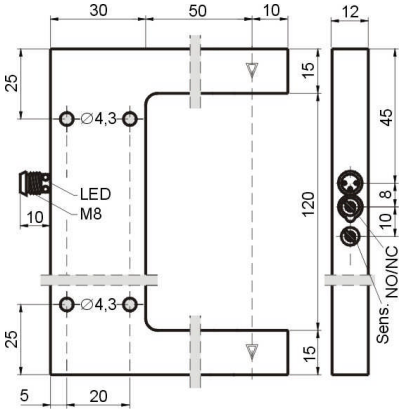
OPFL 30 PA 24 C: fork width 30mm



OPFL 50 PA 24 C: fork width 50mm



OPFL 80 PA 24 C: fork width 80mm



OPFL 120 PA 24 C: fork width 120mm

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OPTORANGE

OPF label 09.05 e

SNT SENSORTECHNIK AG

Fork light barriers for label sensing
OPF Label Series

- Simple and quick installation
- Teach-In
- Detection of labels with infrared light
- Fork widths 2mm and 5mm
- High switching frequency 3kHz
- Water proof, IP 67, robust

Technical data		**OPF 02 TA 24 C**	**OPF 05 TA 24 C**
Fork width	mm	2	5
Power supply voltage	VDC	10...35	
Emitted light	-	Infrared	
Output	-	PNP, NO/NC switchable	
Status indicator	-	LED yellow	
Output current	mA	max. 200, short circuit proof	
Mean consumption	mA	<35	
Voltage drop	V	<2.0	
Switching speed	kHz	3	
Resolution, smallest object	mm	0.5	
Sensitivity	-	fully automatic Teach-In	
Hysteresis	mm	0.1	
Reproducability	mm	0.1	
Ambient temperature	°C	-10...+60	
Ambient light immunity	Lx	100'000	
Insulation voltage indurance	V	500	
Protection class	-	IP67	
Housing material	-	Zinc die-cast, black lacquered	
Electrical connection	-	M8 connector 3-pin	

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Description

The OPF label fork light barriers with teach-in function allow quick and easy installation in label processing systems. The sensor detects the gap between labels. Thanks to infrared light the barrier has high penetration power.

Output function

The output function (NO or NC) can be selected with the rotational switch which is closest to the connector. This switch shall always be either at the left or the right stop:

- Left stop = NO
- Right stop = NC

The fork light barriers are configured as standard with NO output. The potentiometer for output function is covered with a rubber cap. For switching the function the cap has to be removed with a small screw driver.

Teach-In

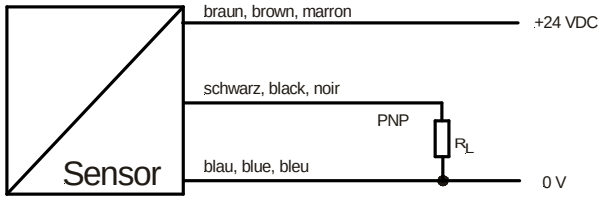
The yellow teach button has to be pressed for min. 2s, until the teach LED is flashing. Then several labels (min. 2) are being guided through the barrier. When the gaps and labels are teached, the LED stops flashing, and the connector LED flashes twice.

Mounting

Mounting happens with M5 screws. Parasitic light focussed directly into the receiver should be avoided.

Electrical connection

The electrical connection is done with a 3-pin cable with M8 connector.



Cable

The fork barriers have a 3-pin M8 connector for screw mounting. Cables have to be ordered separately.

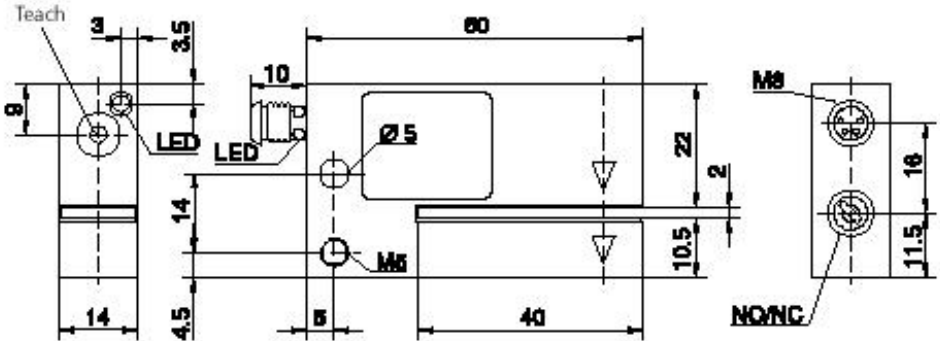
Scope of delivery

- Fork light barrier

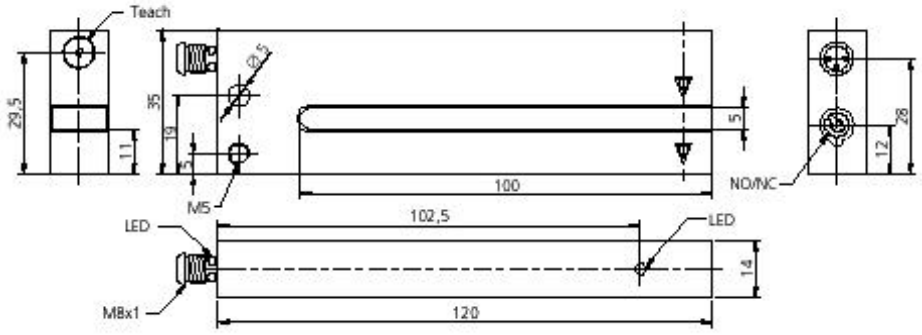
Accessories (see also data sheet ‚ACC')

PUR cable 3-pin with M8 screw connector

with straight connector:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
with 90° connector:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR



OPF 02 TA 24 C



OPF 05 TA 24 C

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OPTORANGE

OPF 05.06 e

SNT SENSORTECHNIK AG

Optical proximity switch for glass fiber wave guides
OPD Series

- For all glass fiber wave guides of SNT Sensortechnik AG (scanners and barriers)
- Detection of smallest objects
- Teach-In with button or externally
- Very robust die cast housing
- High light power
- High speed 1.5kHz
- Water tight, IP 65, robust

Technical specifications		**OPD 1500 TA 24 C**
Emitted light	nm	880nm (infrared light, clocked)
Detection range	mm	min. 1500, against white surface, without wave guide
Power supply voltage	VDC	10...35
Mean consumption	mA	<45
External teach input	-	active: teach 2s → U_B, inactive: teach → GND
Status indicator	-	LED yellow
Operating indicator	-	LED green
Teach and error indicator	-	LED red
Switch output	-	PNP, NO/NC selectable
Switching frequency	Hz	1500
Current capacity of output	mA	max. 200, reversal polarity protection
Voltage drop	V	<2.8
Hysteresis of switch output	%	<12
Reproducability	%	<2
Ambient temperature	°C	-10...+60
Ambient light immunity	Lx	50'000
Protection class	-	IP65
Mass	g	~330
Housing material	-	Zinc die-cast
Electrical connection	-	M12 connector, 4-pin

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Properties

The optical proximity switch for glass fiber wave guides type OPD is the basic electronics for all fiber-optic cables of the types FOY (scanner) and FOI (barriers) of SNT Sensortechnik AG. It can also be operated stand alone as an optical proximity switch. It reaches very high detection distances and is suited therefore also for long and thin wave guides. Thanks to clocked infrared light, it is non sensitive to ambient light.
The electronics is built in a very robust metal housing. The OPD together with the SNT glass fiber wave guides is a very robust detection device for smallest parts under difficult conditions. The switching distance can be teached by teach-in keys or by an external signal. Moreover it can be readjusted manually by the same keys if necessary. The setting as NO or NC is done by keys as well.

Function

Optical wave guide sensors are ideally suited when objects have to be detected in confine conditions. The (bigger) sensor is separated from the small scanner head. Glass-fiber wave guides are more robust and have longer service life compared to plastic guides. The proximity switch OPD is a sensor which fits to the glass fiber wave guides of SNT Sensortechnik AG. The guide is mounted with an appropriate nut on the thread of the sensor. The O-ring seal makes it a fully tight connection.

Scanner:
Together with an FOY glass fiber wave guide a reflection scanner can be realized. When an object enters the invisible light beam within the preselected distance, the sensor switches.

Barrier:
The sensor works as light barrier together with an FOI glass fiber wave guide. When the unvisible light beam is interrupted by an object, the sensor switches.

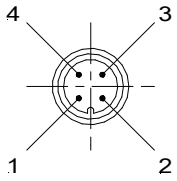
The output function can be selected between NO or NC. The output status is indicated by the yellow LED in the front panel of the sensor. The LED is on when the output is active.

Mounting

The sensor can be mounted with 2 M4 screws through 2 long holes in the metal housing.

Electrical connection

The electrical connection is done with a 3-wire cable (without external teach-in function) or with a 4-wire cable (with external teach-in function). The connector is an M12 sensor type connector.



1 +24VDC (braun/brown)
2 ext. Teach (weiss/white)
3 0V (blau/blue)
4 OUT PNP (schwarz/black

View to the connector on the sensor

When a 4-wire cable is used, the teach-in wire has always to be connected to ground. An open wire can cause interference.

Teach-In

External teach input
The teaching can be controlled e.g. by a PLC with the external teach input .

Teach input	Teach mode
>2s → U_B (+24VDC)	Active
GND	Inactive

The procedure is the same as with manual teach-in with the **Teach** key.

Teaching of operating distance:
Teaching has to be done under original application conditions in the following sequence:

Scanner:	**Barrier:**
1. Background (no object)	1. interrupted (object)
2. Teach the object	2. open (no object)

After switching the power on, the sensor works in normal mode (detection mode). The green LED **Run** is on.

- Teach the background or the closed barrier
- Remove the object from the detection zone (scanner) or place object in the barrier
- Press the **Teach** key for min. 2s

After pressing the **Teach** key, the green LED switches off and the sensor goes after 2s into the teach mode. The red LED **Teach/Error** lights on. The background value has been stored.

- Teach the object (scanner) or the open barrier
- Place the object in the detection zone (scanner) or remove it from the barrier
- Press again the **Teach** key for a short moment

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After a successful teach-in the red LED **Teach/Error** lights up twice, and the sensor goes back into normal operating mode (green LED **Run** is on). The object value has been stored.
If the teach-in has not been properly done, the red LED **Teach/Error** is quickly blinking for approx. 5 s.

Manual setting of switching distance:
The manual setting can be used for adjustment of switching distance or for varying the functional reserve. It is available only after a teach-in on an object.
The adjustment happens in steps.

- Push the keys **Man+** or **Man-** for min. 2s.

After pushing the key, the green LED **Run** switches off and the sensor goes into teach mode after 2s. The red LED **Teach/Error** is on.

- The switching distance can now be adjusted to the application by repeated pushing of the keys **Man-** or **Man+**.

If the programmed value is accepted, the red LED **Teach/Error** flashes twice after each push on the keys **Man+** or **Man-**.
If the sensor is already on the lower or upper limit, the red LED **Teach/Error** flashes quickly after each key push for approx. 5s.
If no key is pushed anymore, the sensor returns automatically to normal mode after 10s (green LED **Run** lights up).

Reverse output function

The switch output can be reversed by simultaneous pushing on the keys **Man+** and **Man-** for min. 2s:

- NO
- NC

After releasing the keys the red LED **Teach/Error** flashes twice. The output function has been reversed.

Cable

The OPD sensor has a 4-pin M12 connector. However 3- or 4-wire M12 cables can be connected on the same connector. Cables have to be ordered separately.

Scope of delivery

- Optical proximity switch for glass fiber wave guides

Accessories (see also data sheet ‚ACC')

PUR cable 3-wire with M12 connector:
l=2m Type KAB 2L3VGPUR

PUR cable 4-wire with M12 connector:
l=2m Type KAB 2L4VGPUR

Keyboard

Man-
Switching distance -
Programming output function

Man+
Switching distance +
Programming output function

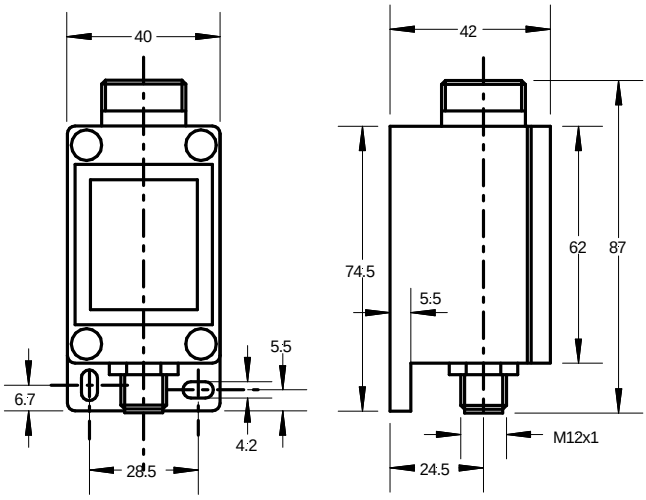
LED **Run**
Green, normal operation

LED **Output**
Yellow, output status

LED **Teach/Error**
Red, teach mode,
teach acknoledgement,
error indication

Teach
Store object and background

Dimensions



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OPTORANGE

OPE 06.07 e

SNT SENSORTECHNIK AG

Optical proximity switches for glass fiber wave guides
OPE Series

- For all glass fiber wave guides of SNT Sensortechnik AG (scanners and barriers)
- Infrared light source
- Detection of smallest objects
- Low cost versions with potentiometer setting
- Robust housing
- Versions with 110/230VAC and relay output

Properties

The optical proximity switches for glass fiber wave guides type OPE are the basic electronics for all fiber-optic cables of the types FOY (scanner) and FOI (barriers) of SNT Sensortechnik AG. They can also be operated stand alone as an optical proximity switch. Thanks to clocked infrared light, they are non sensitive to ambient light. The electronics is built in a robust housing. The OPE together with the SNT glass fiber wave guides are a robust detection device for smallest parts under difficult conditions. The switching distance can be set by 1- or 10-turn potentiometers. The various versions have different sensitivity, speed, outputs and housings (see table on page 2).

Function

Optical wave guide sensors are ideally suited when objects have to be detected in confine conditions. The (bigger) sensor is separated from the small scanner head. Glass-fiber wave guides are more robust and have longer service life compared to plastic guides. The proximity switches type OPE are sensors which fit to the glass fiber wave guides of SNT Sensortechnik AG. The guide is mounted with an appropriate nut on the thread of the sensor. The O-ring seal makes it a fully tight connection (see drawing besides).

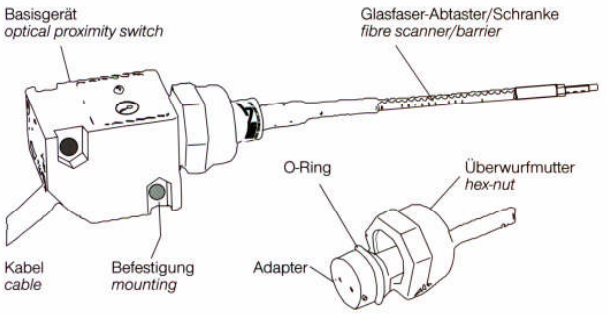
Scanner:
Together with an FOY glass fiber wave guide a reflection scanner can be realized. When an object enters the invisible light beam within the pre selected distance, the sensor switches.

Barrier:
The sensor works as light barrier together with an FOI glass fiber wave guide. When the invisible light beam is interrupted by an object, the sensor switches.

Depending on the sensor version the output is either NO or NC. The output status is indicated by the red LED. The LED is on when the output is active.

Mounting

The OPE sensors can be mounted with 2 M4 screws and a mounting bracket (scope of delivery).



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Type	Art. #	Spezial properties	Switch distance [mm] *	Hysteresis [%]	Max. switching speed [Hz]	Switch on/off time [ms]	PNP	NPN	Relay	NO	NC	Supply voltage	Housing (page 3)	Electr. connection (page 3)
OPE 300 LEPS 24	23000	1-turn potentiometer	300	15	40	12	•			•		24VDC	V	A
OPE 300 LENS 24	23100	1-turn potentiometer	300	15	40	12		•		•		24VDC	V	B
OPE 500 LZPS 24	24000	10-turn potentiometer	500	15	40	12	•			•		24VDC	V	A
OPE 500 LZNS 24	24100	10-turn potentiometer	500	15	40	12		•		•		24VDC	V	B
OPE 750 LZPS 24	24050	10-turn potentiometer	750	15	40	12	•			•		24VDC	V	A
OPE 750 LZNS 24	24060	10-turn potentiometer	750	15	40	12		•		•		24VDC	V	B
OPE 300 MEPS 24	24500	1-turn potentiometer	300	15	200	2	•			•		24VDC	V	A
OPE 300 MENS 24	24510	1-turn potentiometer	300	15	200	2		•		•		24VDC	V	B
OPE 300 HEPS 24	25000	1-turn potentiometer	300	15	1000	0.4	•			•		24VDC	V	I
OPE 300 HENS 24	24520	1-turn potentiometer	300	15	1000	0.4		•		•		24VDC	V	I
OPE 300 MEPA 24	24630	1-turn potentiometer	300	15	200	2	•			•	•	24VDC	V	C
OPE 300 MENA 24	24640	1-turn potentiometer	300	15	200	2		•		•	•	24VDC	V	D
OPE 300 MEQA 24	24400	Switch for NC/NO	300	15	200	2	•	•		•	•	24VDC	V	G
OPE 300 MEPA 24 TO	24600	Switch for NC/NO	300	15	200	2	•			•	•	24VDC	Y	A
OPE 300 MEPS 24 AA	24200	Adjustable times $t_{on/off}$ Separate switch for NC/NO	300	15	40	0.05 -5s	•			•	•	24VDC	V	A
OPE 300 MENS 24 AA	24300	Adjustable times $t_{on/off}$ Separate switch for NC/NO	300	15	40	0.05 -5s		•		•	•	24VDC	V	B
OPE 300 LERA 24	21000	Relay	300	15	20	25			•	•	•	24VD/AC	V	H
OPE 300 LERA 110	21200	Relay	300	15	20	25			•	•	•	110VAC	V	H
OPE 300 LERA 220	21300	Relay	300	15	20	25			•	•	•	230VAC	V	H
OPE 500 LZRA 24	22000	Relay	500	15	20	25			•	•	•	24VD/AC	V	H
OPE 500 LZRA 110	22200	Relay	500	15	20	25			•	•	•	110VAC	V	H
OPE 500 LZRA 220	22300	Relay	500	15	20	25			•	•	•	230VAC	V	H
OPE 750 LZRA 24	22350	Relay	750	15	20	25			•	•	•	24VD/AC	V	H
OPE 750 LZRA 220	22360	Relay	750	15	20	25			•	•	•	230VAC	V	H

* nominal switching distance for target paper 200g/m², size DIN A4 (without glass fiber wave guide)

Outputs

- PNP/NPN: short circuit proof, max. 35VDC, 100mA
- Relay: max. 250V, 2A

Scope of delivery

- Optical proximity switch
- 1 mounting bracket and 2 M4 screws/nuts

Hint

The new type OPD 1500 TA 24 C is an alternative to the OPE and OPR types which are described on this data sheet. The OPD offers higher distance and speed and it is more precise due to teach-in programming (see separate data sheet OPD).

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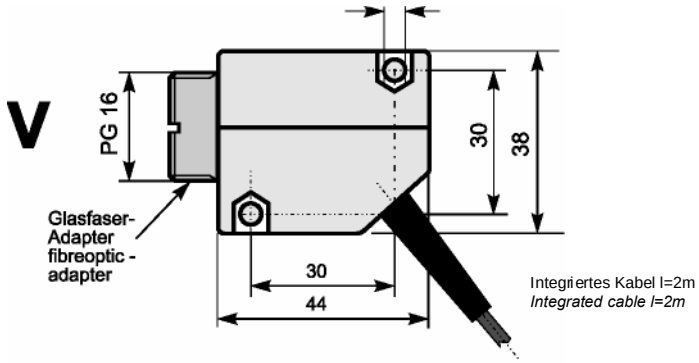
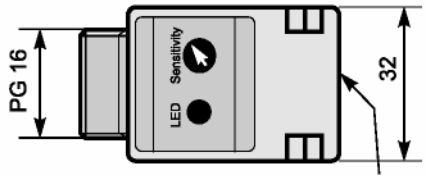
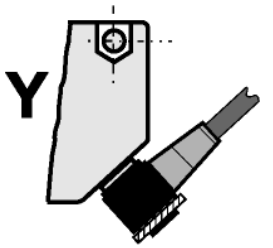
Housings



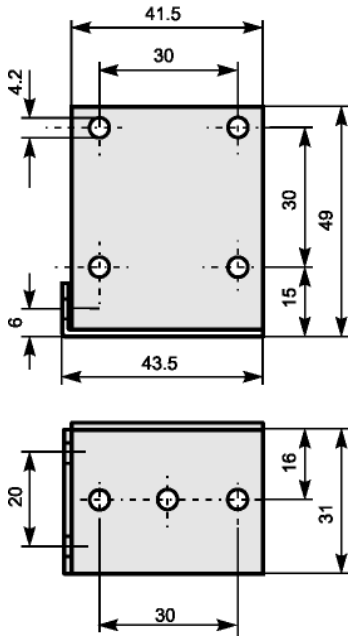
Integriertes Kabel l=2m
Integrated cable l=2m



Versionen mit Verzögerung:
Schalter hell/dunkel, Potentiometer
Verzögerungszeit
Delayed versions: Switch NO/NC
Potentiometer delay time

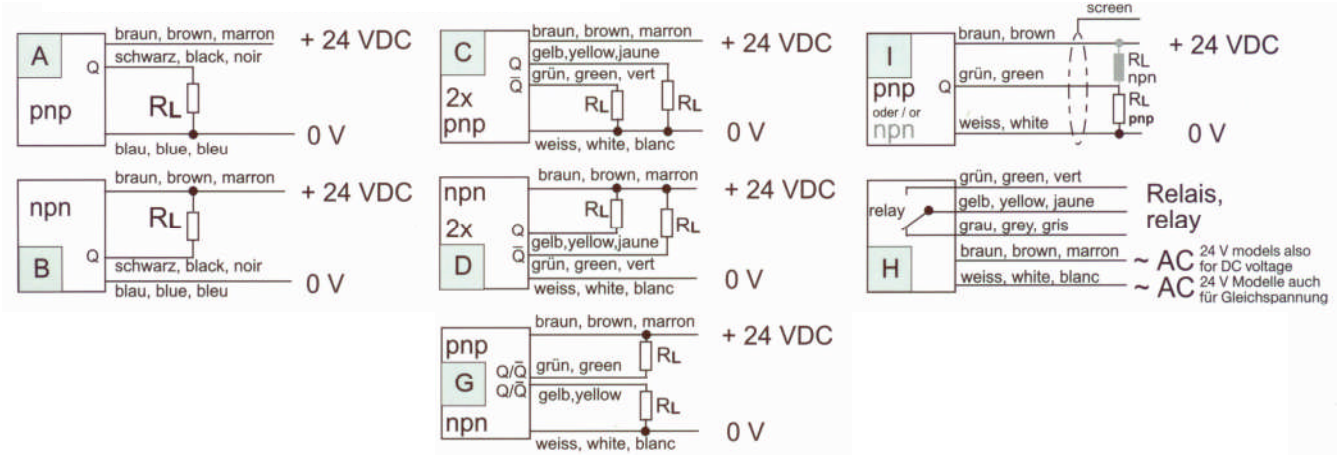


Stecker Typ TORSON
Connector Type TORSON



Befestigungswinkel OPM06 für Geräte der Serie OPE
Mounting bracket OPM06 for OPE series

Electrical connection



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OPTORANGE

FO 04.06 e

SNT SENSORTECHNIK AG

Glass-fiber wave guides
FO Series

- Non contact detection, positioning, counting, supervision
- Glass instead of plastic!
- Very robust, no aging thanks to glass
- Fiber cross sections 0.5...4mm^2
- Lengths 250...5000mm
- Various small scanner heads
- For high temperatures and ATEX
- Customized versions available
- Swiss made

Properties

Glass fiber wave guides are used for detection of smallest objects in confined space. Thus the miniature scanner head is separated from the real (bigger) sensor. The proximity switches types OPE or OPD are infrared sensors suitable for glass fiber wave guides of SNT Sensortechnik AG (see data sheets OPE/D). The wave guide is mounted with a nut on the sensor thread. The O-ring sealing makes the connection absolutely tight. The compact design of the scanner heads permits scanning in very small spaces, at extreme ambient temperatures, in explosive areas and in strong electromagnetic fields. It is possible to detect very small parts.

Function

FOY scanner:
The FOY glass fiber scanners perform as reflection scanner sensors. Transmitter and receiver are accommodated in the same wave guide. The pulsed infrared light is fully or partially reflected by the target and received by the sensor through the receiver glass fiber. As soon as the received light exceeds the value which was selected in the sensor, the sensor activates its binary output. The amount of reflected signal depends on target material, distance, surface, size, color and detection angle. Further more the reflected light must sufficiently differ in intensity from the reflection of the background.

FOI barrier:
With an FOI glass fiber wave guide the sensor works as light barrier. Transmitter and receiver are accommodated in separate guides. When the (invisible) light beam between transmitter and receiver head is interrupted, the sensor activates its binary output.
With glass fiber barriers all targets can be detected which reduce the received signal by at least the hysteresis of the sensor. Taking into account a certain power reserve, it is therefore necessary to choose the fiber optic barrier whose light beam is obscured to the greatest possible extent by the target object. Taking into account the working distance, the fiber optic barrier with the smallest possible glass cross-section should always be used. In general, fiber optic barriers having larger glass cross-sections also have larger effective distances.

Selection

The appropriate glass fiber wave guide can be selected with the help of the tables on pages 2 and 3. When the wave guide length is preselected, then the maximum detection distance is given as a function of sensor model (OPE/D) and glass cross section.
Further moiré wave guides with plastic (PU) or metal hoses (HT) are available.

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FOY scanners

Type	Art. #	Short description	Detection distance [mm]				Hose		Head
			OPE 300	OPE 500	OPE 750	OPD 1500	PUR	Metal	
FOY 500-0.5G	50100	mini, straight, M4	10	15	25		•		C
FOY 1000-0.5G	50200	mini, straight, M4	8	13	20		•		C
FOY 500-0.5GHT	50900	mini, straight, HT, M4	10	15	25			•	D
FOY 1000-0.5GHT	51000	mini, straight, HT, M4	8	13	20			•	D
FOY 2000-0.5GHT	51100	mini, straight, HT, M4	7	11	17			•	D
FOY 500-0.5GBHT 100	52650	mini, bendable, HT, M4	10	15	25			•	E
FOY 500-0.5GW	51200	mini, angle 90°, M4	7	12	17		•		F
FOY 1000-0.5GW	51300	mini, angle 90°, M4	6	10	15		•		F
FOY 500-0.5GWHT	52000	mini, angle 90°, HT, M4	7	12	17			•	G
FOY 1000-0.5GWHT	52100	mini, angle 90°, HT, M4	6	10	15			•	G
FOY 500-0.5GWR	53950	mini, thread 90°, M3	7	11	17			•	I
FOY 500-1G	52900	standard, straight, M4	18	30	45		•		K
FOY 1000-1G	53000	standard, straight, M4	17	28	42		•		K
FOY 500-1GHT	53700	standard, straight, HT, M4	18	30	45			•	L
FOY 1000-1GHT	53800	standard, straight, HT, M4	17	28	42			•	L
FOY 2000-1GHT	53900	standard, straight, HT, M4	15	25	37			•	L
FOY 500-1GW	54000	standard, 90°	17	28	42		•		M
FOY 1000-1GW	54100	standard, 90°	16	26	40		•		M
FOY 500-1GWHT	54600	standard, angle 90°, HT	17	28	42			•	N
FOY 1000-1GWHT	54700	standard, angle 90°, HT	16	26	40			•	N
FOY 2000-1GWHT	54800	standard, angle 90°, HT	14	23	35			•	N
FOY 500-1GWR	53960	standard, thread 90° M4	16	26	40			•	O
FOY 1000-1GWR	53965	standard, thread 90° M4	15	25	37			•	O
FOY 500-2GWR	55650	medium, thread 90° M4	35	58	87			•	O
FOY 1000-2GWR	55655	medium, thread 90° M4	30	50	75			•	O
FOY 500-4G	57300	big, rugged, straight, M6	70	120	170		•		P
FOY 1000-4G	57400	big, rugged, straight, M6	60	100	150		•		P
FOY 2000-4G	57500	big, rugged, straight, M6	50	85	120		•		P
FOY 3000-4G	57600	big, rugged, straight, M6	40	65	100		•		P
FOY 500-4GHT	58300	big, rugged/, HT, M6	70	120	170			•	R
FOY 1000-4GHT	58400	big, rugged, HT, M6	60	100	150			•	R
FOY 2000-4GHT	58500	big, rugged, HT, M6	50	85	120			•	R
FOY 3000-4GHT	58520	big, rugged, HT, M6	40	65	100			•	R
FOY 4000-4GHT	58530	big, rugged, HT, M6	30	50	75			•	R
FOY 5000-4GHT	58540	big, rugged, HT, M6	25	42	65			•	R
FOY 500-4GW	58600	big, rugged, 90°	70	120	170		•		S
FOY 1000-4GW	58700	big, rugged, 90°	60	100	150		•		S
FOY 500-4GWHT	59200	big, rugged, 90°, HT	70	120	170			•	T
FOY 1000-4GWHT	59300	big, rugged, 90°, HT	60	100	150			•	T
FOY 2000-4GWHT	59400	big, rugged, 90°, HT	50	85	120			•	T

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FOI barriers

Type	Art. #	Short description	Barrier with [mm]				Hose		Head
			OPE 300	OPE 500	OPE 750	OPD 1500	PUR	Metal	
FOI 500-0.5BP 50	59705	mini, bendable	50	85	120	250	•		B
FOI 500-0.5PU	97900	mini, straight, thread M4	50	85	120	250	•		K
FOI 500-1PU	59800	mini, straight, thread M4	130	210	300	500	•		K
FOI 1000-1PU	59900	mini, straight, thread M4	100	160	250	450	•		K
FOI 500-1HT	60600	mini, straight, thread M3, HT	130	210	300	500		•	E1
FOI 1000-1HT	60700	mini, straight, thread M3, HT	100	160	250	450		•	E1
FOI 2000-1HT	60800	mini, straight, thread M3, HT	80	130	200	420		•	E1
FOI 500-1WPU	60900	mini, 90°, thread M4	120	200	300	500	•		F
FOI 1000-1WPU	61000	mini, 90°, thread M4	80	130	200	450	•		F
FOI 500-1WHT	62000	mini, 90°, thread M4, HT	120	200	300	500		•	G
FOI 1000-1WHT	62100	mini, 90°, thread M4, HT	80	130	200	450		•	G
FOI 2000-1WHT	62200	mini, 90°, thread M4, HT	60	100	150	420		•	G
FOI 500-1WHTL	62050	mini, 90°, long, thread M4, HT	120	200	300	500		•	H1
FOI 1000-1WHTL	62150	mini, 90°, long, thread M4, HT	80	130	200	450		•	H1
FOI 500-1WR	62510	mini, thread 90° M3	130	210	300	500		•	I
FOI 1000-1WR	62520	mini, thread 90° M3	90	150	220	450		•	I
FOI 500-2WR	62550	medium, thread 90° M4	250	400	600	700*		•	O
FOI 1000-2WR	62560	medium, thread 90° M4	150	250	370	600		•	O
FOI 500-4PU	62900	big, straight, thread M4	700	700*	700*	700*	•		K
FOI 1000-4PU	63000	big, straight, thread M4	600	900	1500	1500*	•		K
FOI 2000-4PU	63100	big, straight, thread M4	400	600	1000	1800	•		K
FOI 500-4HT	64000	big, straight, thread M4, HT	700	700*	700*	700*		•	L
FOI 1000-4HT	64100	big, straight, thread M4, HT	600	900	1500	1500*		•	L
FOI 2000-4HT	64200	big, straight, thread M4, HT	400	600	1000	1800		•	L
FOI 3000-4HT	64250	big, straight, thread M4, HT	300	500	700	1700		•	L
FOI 5000-4HT	64270	big, straight, thread M4, HT	150	250	400	1600		•	L
FOI 500-4WPU	64300	big, 90°, without thread	600	600*	600*	600*	•		L1
FOI 1000-4WPU	64400	big, 90°, without thread	500	800	1200	1500*	•		L1
FOI 500-4WHT	65500	big, 90°, high temp., HT	600	600*	600*	600*		•	M1
FOI 1000-4WHT	65600	big, 90°, high temp., HT	500	800	1200	1500*		•	M1
FOI 2000-4WHT	65700	big, 90°, high temp., HT	400	600	1000	1800		•	M1
FOI 500-4WPUL	64600	big, 90°, long	600	600*	600*	600*	•		N1
FOI 1000-4WPUL	64700	big, 90°, long	500	800	1200	1500*	•		N1
FOI 500-4WHTL	65520	big, 90°, long, HT	600	600*	600*	600*		•	O1
FOI 1000-4WHTL	65550	big, 90°, long, HT	500	800	1200	1500*		•	O1

*) limited by the physical wave guide length

Type key „FOY XXX-Z....“

FOY = scanner, FOI = barrier
XXX = lenght [mm]
Z = fibre area [mm^2]

HT = metal hose (200°C)
PU = Polyurethan hose (80°C)
W = 90° bended
WR = angle with thread

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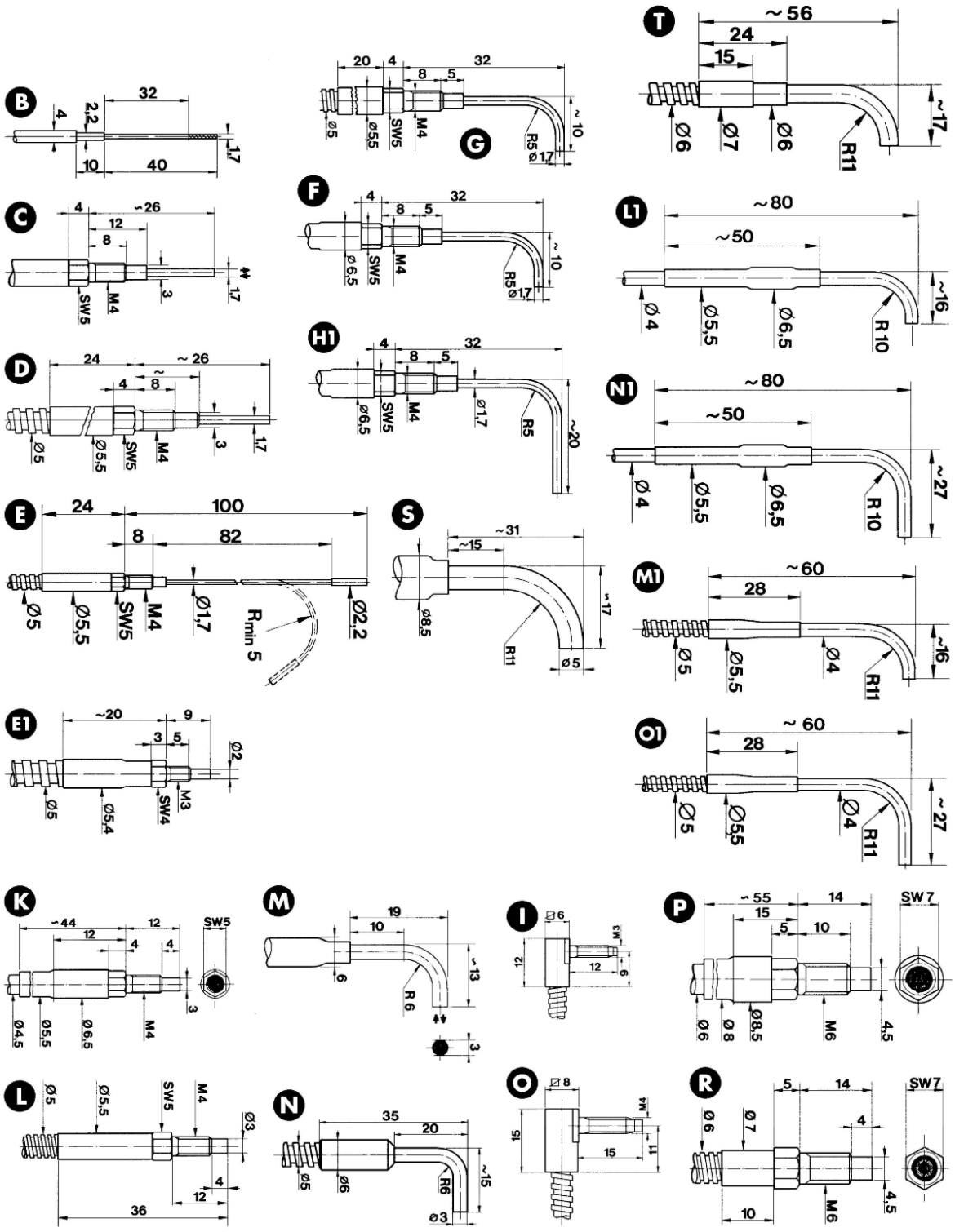
Scanner heads



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Accessories

PUR cable with straight screw type M8 connector

3-pin:	l=2m	Type KAB 2K3VGPUR
	l=5m	Type KAB 5K3VGPUR
4-pin:	l=2m	Type KAB 2K4VGPUR
	l=5m	Type KAB 5K4VGPUR

PUR cable with 90° screw type M8 connector

3-pin:	l=2m	Type KAB 2K3VWPUR
	l=5m	Type KAB 5K3VWPUR
4-pin:	l=2m	Type KAB 2K4VWPUR
	l=5m	Type KAB 5K4VWPUR

PVC cable with straight screw type M12 connector

4-pin/3-wire:	l=2m	Type KAB 2L3VGPVC

PUR cable with straight screw type M12 connector

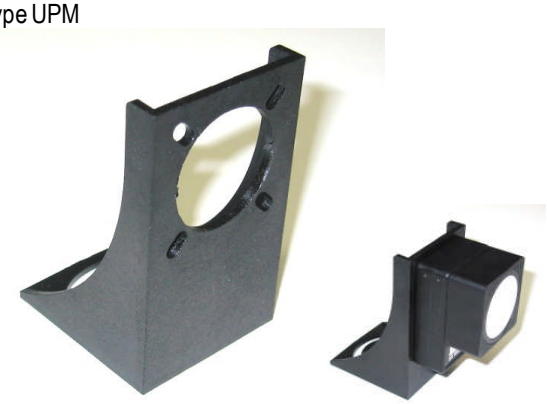
4-pin/3-wire	l=2m	Typ KAB 2L3VGPUR
4-pin/4-wire	l=2m	Typ KAB 2L4VGPUR

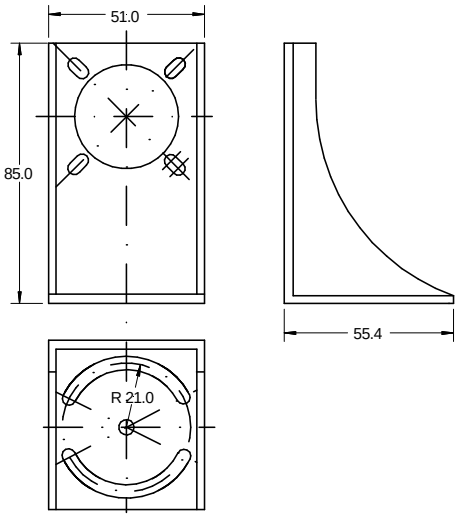
Teach-In box for UPS series

The Teach-In Box has two 2m long cables for connection between sensor (M12, f) and sensor cable (M12, m). Thus it is put into the actual sensor cabling, and it can be removed after the teach-in procedure. The teach-in happens by a quick touch of the switch either to the left or right.

Mounting braket made of glassfibre reinforced Polyamide

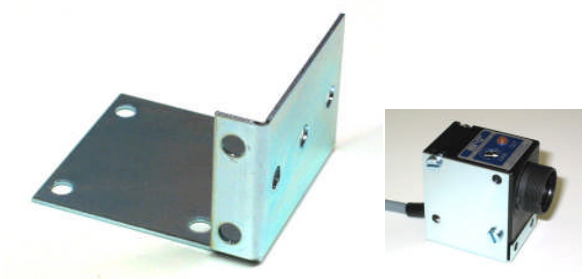
For mounting of ultrasonic sensors UP and UPK series.
Type UPM





Metal mounting braket

For mounting of optical sensors OPE series.
Type OPM06, incl. 2 screws



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