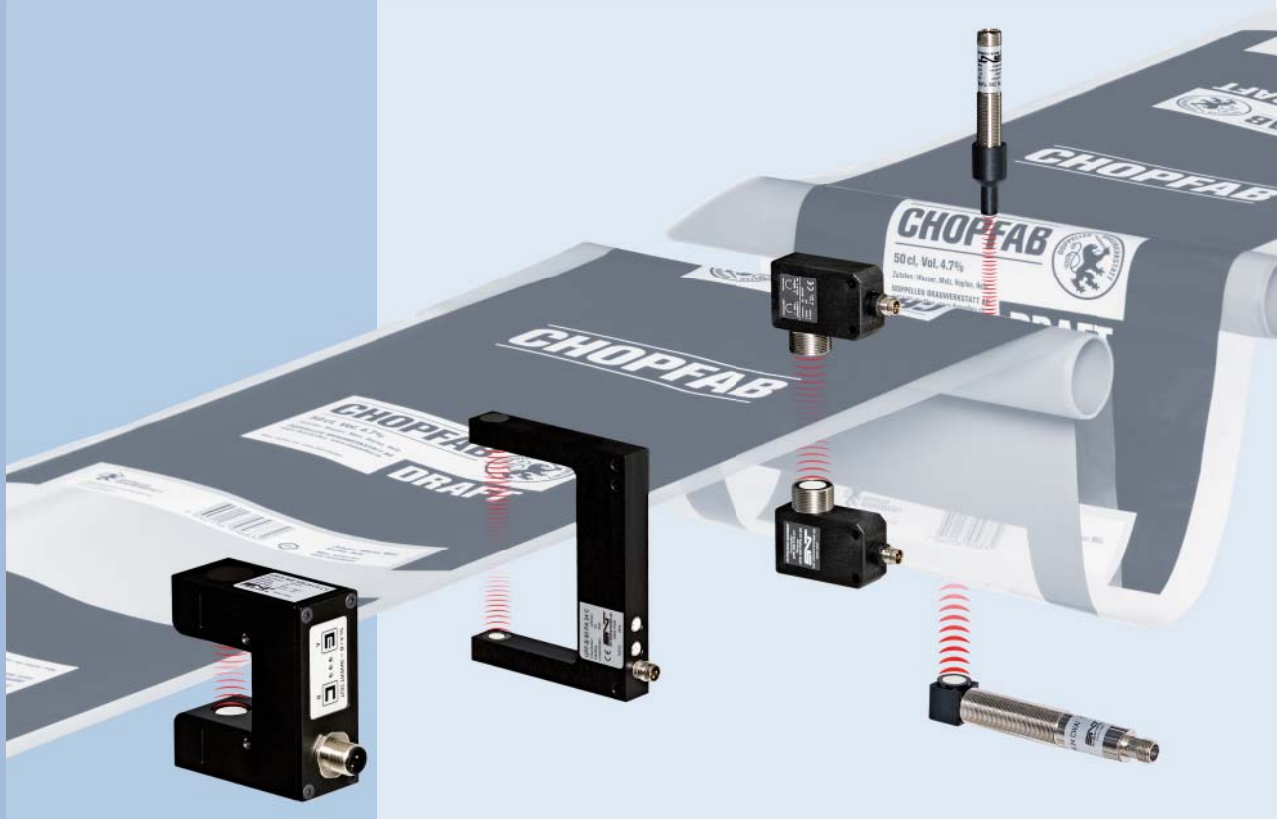


SONARANGE®

Ultrasonic Sensors



- Proximity / distance sensor
- Through beam sensor
- Fork sensor
- Retroreflective barrier

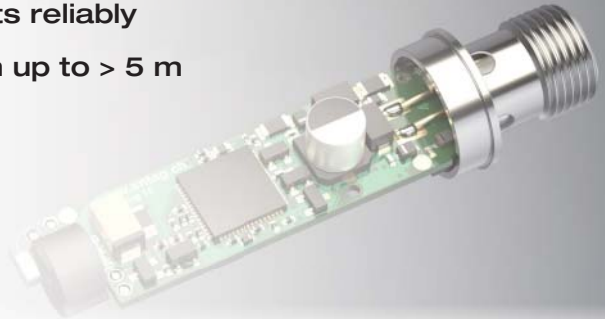
When other sensors give up!



Ultrasonic Sensors

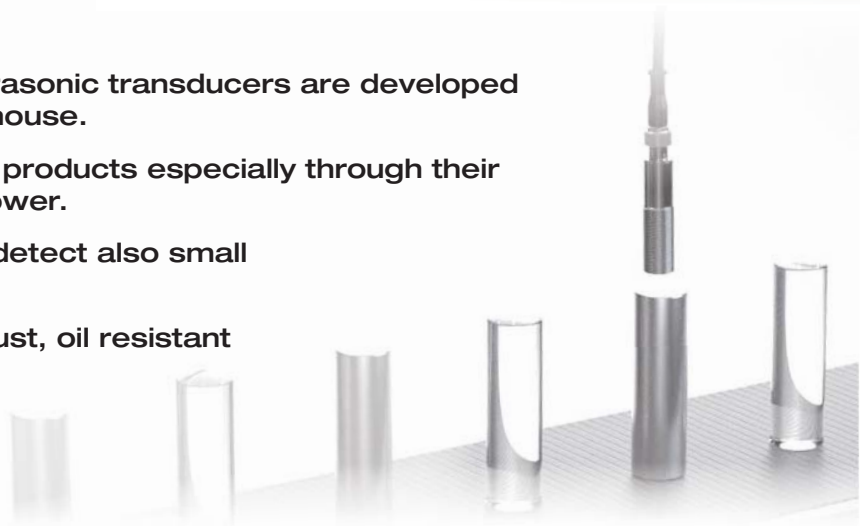
Why ultrasonic sensors?

- Independent of material, surface, color and size of target
- Work under dust, dirt, fog, bright light
- Detect transparent and shining objects reliably
- Wide measuring ranges from few mm up to > 5 m
- Safe background suppression
- No correction factors



Particularities

- 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.
- Waterproof, IP67, robust, oil resistant



Applications

Level Control

- Level measurement in containers and processes
- Monitoring of feed hoppers
- Checking for tailbacks on conveyors

Process Control

- Controlling belt tension or sag
- Web guide control
- Detecting material feed

Counting / Detection

- Counting and detection of parts, vehicles, persons and animals
- Detection of objects with "difficult" surface
- Detection of full and empty containers and pallets

Scanning of Dimensions

- Height sensing
- Volume measurement
- Roll diameter measurement



Ultrasonic Sensors

General

Ultrasonic sensors are mainly used in machine manufacturing and process control for distance measurement, as proximity switch and 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. 6 ms per meter. The innovative ultrasonic edge sensors however are working based on analysis of sound intensity.

Ultrasound is very robust compared to other measuring principles. It passes dirty environment as well. Furthermore, it is reflected by almost all surfaces. Thus it makes independent of material, color and surface structure of the target to be detected.

Terms / Definitions

- The binary switching output (PNP or NPN transistor) of the sensor is activated when a scanned object falls below a preset distance value or exceeds it (NO or NC).
- Sensors with analog output (0 ... 10 V or 4 ... 20 mA) measure the distance to the object.
- The detection beam of an ultrasonic sensor generally has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and less reflective objects result in a smaller cone (narrower and shorter). Larger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The beams shown on pages 14/15 are typical shapes. 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.
- The near range corresponds to the so called blind range, which is typical for ultrasonic sensors. In the blind range no measurement is possible.

Limits of ultrasonic sensors



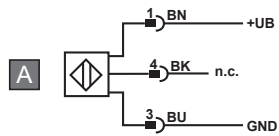
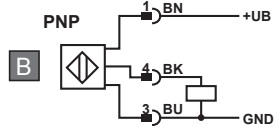
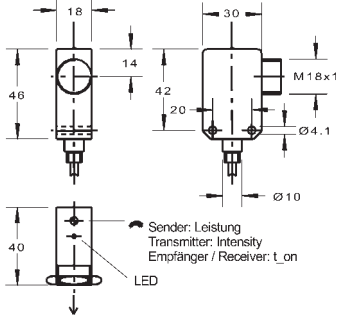
- Relatively slow, switching speed approx. 1 ... 25 Hz
- Exception: Ultrasonic through beam > 200 Hz
- Resolution approx. 0.5 ... 2 mm, due to wave length of sound
- Works only in air
- Problems in case of very hot or very cold targets

Sensor selection table

Distance	1 binary OUT	2 binary OUT	0...10 V analogue OUT	4...20 mA analogue OUT
< 200 mm	UPS UPX		UPS	UPS
< 500 mm	UPX	UPK	UPK	UPK
< 1000 mm	UPR-B	UPK	UPK	UPK
< 1500 mm	UPR-A		UPR-A	UPR-A
< 2500 mm		UPK	UPK	UPK
< 5000 mm		UPK	UPK	UPK
through beam	UPB			
fork	UPF-B		UPF-A	

Ultrasonic Through Beam

up to 2500 mm

Through beam	up to 2500 mm
Output function	
Connections	
  <p>BN = Brown BU = Blue BK = Black WH = White</p>	 <p>Sender: Leistung Transmitter: Intensity Empfänger / Receiver: L_on LED</p>

Technical Specs (at +20 °C; 24 VDC)	Transmitter: UPB 1500 (2500) P 24 CT	Receiver: UPB 1500 (2500) ...
Detection range	0 ... 1500 mm (2500)	
Setting	Potentiometer	
Transmitting power	0,5 ... 100 % adjustable	-
Switching frequency	200 Hz	
Response time	-	3 ... 400 ms adjustable
Release time	-	< 3 ms
Operating frequency	180 kHz	
Power supply voltage	18 ... 30 VDC	
Ripple of supply voltage	< 10 %	
Current consumption	max. 55 mA	max. 20 mA
Binary output	-	PNP (NO o. NC); max. 100 mA
Temperature range	0 °C to +50 °C	
Pressure range	~900 ... 1100mbar _{abs}	
Protection class	IP67	
Housing material	Polyamid; V2A	
Electrical connection	Connector: M8x1; 3-pin	
Specification	CE	

Ordering Code			
Version	Distance 0 ... 1500 mm / 0 ... 2500 mm	Connection	Article No.
Transmitter: 1,5 m	UPB 1500 P 24 CT	A	36004
Transmitter: 2,5 m	UPB 2500 P 24 CT	A	36010
Receiver: PNP (NO) 1,5 m	UPB 1500 PVPS 24 CR	B	36000
Receiver: PNP (NC) 1,5 m	UPB 1500 PVPO 24 CR	B	36002
Receiver: PNP (NO) 2,5 m	UPB 2500 PVPS 24 CR	B	36005
Receiver: PNP (NC) 2,5 m	UPB 2500 PVPO 24 CR	B	36011

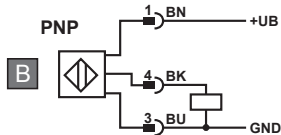
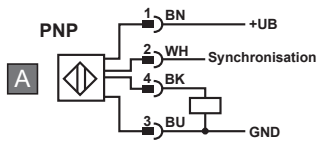
Ultrasonic Proximity Switch

compact

Proximity switch

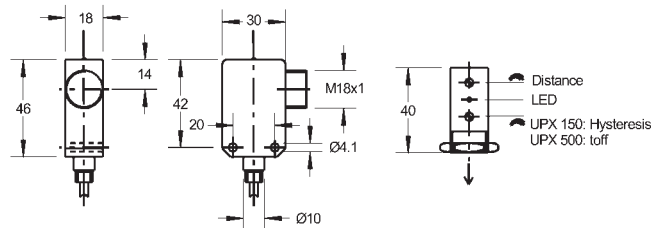
Output function

Connections



BN = Brown
BK = Black

BU = Blue
WH = White







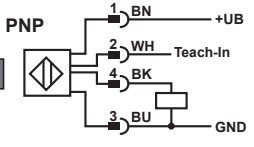
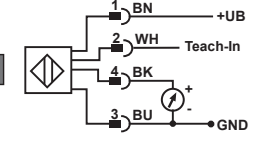
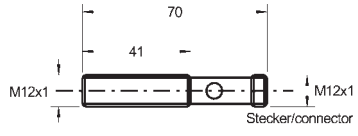
Technical Specs (at +20 °C; 24 VDC)	UPX 150 ...	UPX 500 ...
Detection range	60 ... 150 mm	120 ... 500 mm
Setting	Potentiometer	
Switching frequency	~ 12 Hz	~ 2 Hz
Response time	< 5 ms	< 10 ms
Release time	< 40 ms	0,4 ... 8 sec. adjustable
Operating frequency	350 kHz	180 kHz
Power supply voltage	12 ... 28 VDC	
Ripple of supply voltage	< 10 %	
Current consumption	~ 45 mA	~ 55 mA
Binary output	PNP (NO); max. 100 mA	(NC) on request
Hysteresis	10 ... 40 % adjustable	~ 10 %
Temperature range	0 °C to +50 °C	
Pressure range	~ 900 ... 1100 mbar _{abs}	
Protection class	IP67	
Housing material	Polyamid; V2A	
Electrical connection	cable: 2 m / connector: M8x1; 3-/4-pin	
Specification	CE	

Ordering Code

Version	Distance 60 ... 150 mm	Connection	Article No.
PNP (NO); cable: 2 m; PVC; 3-wire	UPX 150 PVPS 24	B	33150
PNP (NO); connector: M8x1; 3-pin	UPX 150 PVPS 24 C	B	33170
Version	Distance 120 ... 500 mm	Connection	Article No.
PNP (NO); cable: 2 m; PVC; 3-wire	UPX 500 PVPS 24	B	33000
PNP (NO); connector: M8x1; 3-pin	UPX 500 PVPS 24 C	B	33040
PNP (NO); Syncr.; connector: M8x1, 4-pin	UPX 500 PVPS 24 Y	A	33020

Ultrasonic Distance Sensors

miniature

Distance sensors			
Output function			
Connections			
<p>A</p>  <p>B</p>  <p>BN = Brown BU = Blue BK = Black WH = White</p>			




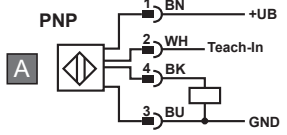
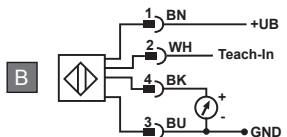
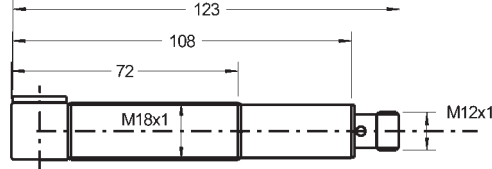
Technical Specs	UPS...C (PNP)	UPS...CA (0-10V)	UPS...CI (4-20mA)
Detection range	20 ... 200 mm (standard) 0 ... 150 mm (focus device) 20 ... 150 mm (resistant against chemicals)		
Setting	Teach-In with Pin 2		
Sampling frequency	13 Hz	-	-
Response time	~ 30 ms	-	-
Power supply voltage	10 ... 30 VDC	15 ... 30 VDC	10 ... 30 VDC
Ripple of supply voltage	< 10 %		
Operating frequency	400 kHz		
Current consumption	~ 30 mA		
Binary output	PNP (NO or NC); max. 100 mA	-	-
Analog output	-	0 ... 10 V	4 ... 20 mA
Linearity	-	< 1 % / Sn max.	
Load resistance	-	> 1 kΩ	< 300 Ω
Hysteresis, axial	< 1 %	-	
Reproducibility	< 0,5 % / Sn max.		
Temperature range	0 °C to +70 °C		
Protection class	IP 67		
Housing material	nickel plated brass; PVDF or PA		
Electrical connection	connector: M12x1; 4-pin		
Specification	CE		

Ordering Code			
Version: PNP	Distance 200 mm	Connection	Article No.
PNP (NO or NC)	UPS 200 TVPA 24 C	A	38200
Analog version 0 ... 10 VDC	UPS 200 TOR 24 CA	B	38201
Analog version 4 ... 20 mA	UPS 200 TOR 24 CI	B	38202
Version focus device	Distance 150 mm	Connection	Article No.
PNP (NO or NC)	UPS 150 FB TVPA 24 C	A	38220
Analog version 0 ... 10 VDC	UPS 150 FB TOR 24 CA	B	38221
Analog version 4 ... 20 mA	UPS 150 FB TOR 24 CI	B	38222
Version chem. resistant	Distance 150 mm	Connection	Article No.
PNP (NO or NC)	UPS 150 CP TVPA 24 C	A	38240
Analog version 0 ... 10 VDC	UPS 150 CP TOR 24 CA	B	38241
Analog version 4 ... 20 mA	UPS 150 CP TOR 24 CI	B	38242

Ultrasonic Distance Sensors - Retroreflective barrier

programmable

Distance sensors, Retroreflective barrier, proximity switch

Output function		
Connections		
<p>A</p>  <p>B</p>  <p>BN = Brown BK = Black BU = Blue WH = White</p>		

Technical Specs	UPR-A 1500 TVPA 24 CW	UPR-A 1500 TOR 24 CWAI
Detection range	120 ... 1500 mm	
Setting	Teach-In with Pin 2	
Speed	~ 5 Hz	~ 30 Hz
Power supply voltage	11 ... 30 VDC	
Ripple of supply voltage	10 %	
Ultrasonic frequency	180 kHz	
Current consumption	~ 45 mA	~ 65 mA
Binary output	PNP (NO or NC); max. 100 mA	-
Analog output	-	0 ... 10 V / 4 ... 20 mA (auto detection)
Linearity	-	< 1 % / Sn max.
Load resistance	-	> 10 kΩ at U-out < 400 Ω at I-out
Hysteresis, axial	4 mm	-
Resolution	0,5 mm	
Temperature range	0 °C to +60 °C	
Pressure range	~ 900 ... 1100 mbar _{abs}	
Protection class	IP67	
Housing material	nickel plated brass; PA	
Electrical connection	Connector: M12x1; 4-pin	
Specification	CE	

UPR-A Ultrasonic Sensors

with selectable beam size




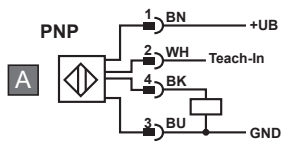
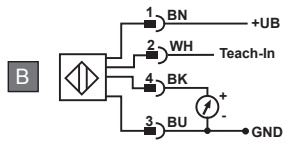
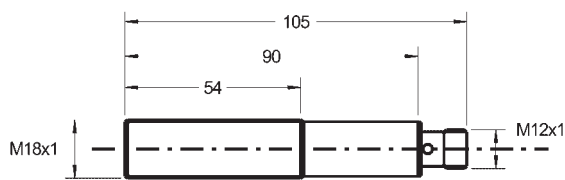
Ordering Code

Version: Standard	Distance 1500 mm	Connection	Article No.
PNP (NO o. NC)	UPR-A 1500 TVPA 24 CW	A	37201
Analog out 0 ... 10 VDC / 4 ... 20 mA	UPR-A 1500 TOR 24 CWAI	B	37203

Ultrasonic Distance Sensors - Retroreflective barrier

programmable


Distance sensors, Retroreflective barrier, proximity switch

Output function		
Connections		
<p>A</p>  <p>B</p>  <p>BN = Brown BU = Blue BK = Black WH = White</p>		

Technical Specs	UPR-A 1500 TVPA 24 C	UPR-A 1500 TOR 24 CAI
Detection range	120 ... 1500 mm	
Setting	Teach-In with Pin 2	
Speed	~ 5 Hz	~ 30 Hz
Power supply voltage	11 ... 30 VDC	
Ripple of supply voltage	10 %	
Ultrasonic frequency	180 Hz	
Current consumption	~ 45 mA	~ 65 mA
Binary output	PNP (NO or NC); max. 100 mA	-
Analog output	-	0 ... 10 V; 4 ... 20 mA (auto detection)
Linearity	-	< 1 % / Sn max.
Load resistance	-	> 10 kΩ (U), < 400 Ω (I)-load
Hysteresis, axial	4 mm	-
Resolution	0,5 mm	
Temperature range	0 °C bis +60 °C	
Pressure range	~ 900 ... 1100 mbar _{abs}	
Protection class	IP67	
Housing material	nickel plated brass	
Option: for ATEX zone 2+22 :	Ex tc IIIC T60°C Dc 0°C ≤ Ta ≤ +60°C Ex nA IIC T6 Gc 0°C ≤ Ta ≤ +60°C	
Further options	stainless steel housing 1.4571 (V4A), Version resistant against chemicals	
Electrical connection	Connector: M12x1; 4-pin	
Specification	CE	

UPR-A Ultrasonic Sensors

with selectable beam size



Ordering Code

Version: Standard / V4A	Distance 1500 mm	Connection	Article No.
PNP (NO o. NC)	UPR-A 1500 TVPA 24 C SC	A	37200 37330
Analog out 0 ... 10 VDC / 4 ... 20 mA	UPR-A 1500 TOR 24 CAI SCAI	B	37202 37331
Version: ATEX 2/22			
PNP (NO o. NC)	UPR-A 1500 TVPA 24 C Ex	A	37320
Analog out 0 ... 10 VDC / 4 ... 20 mA	UPR-A 1500 TOR 24 CAI Ex	B	37321

Ultrasonic Distance Sensors

multiple outputs

Distance Sensors

Output function

Connections

BN = Brown
BK = Black
BU = Blue
WH = White

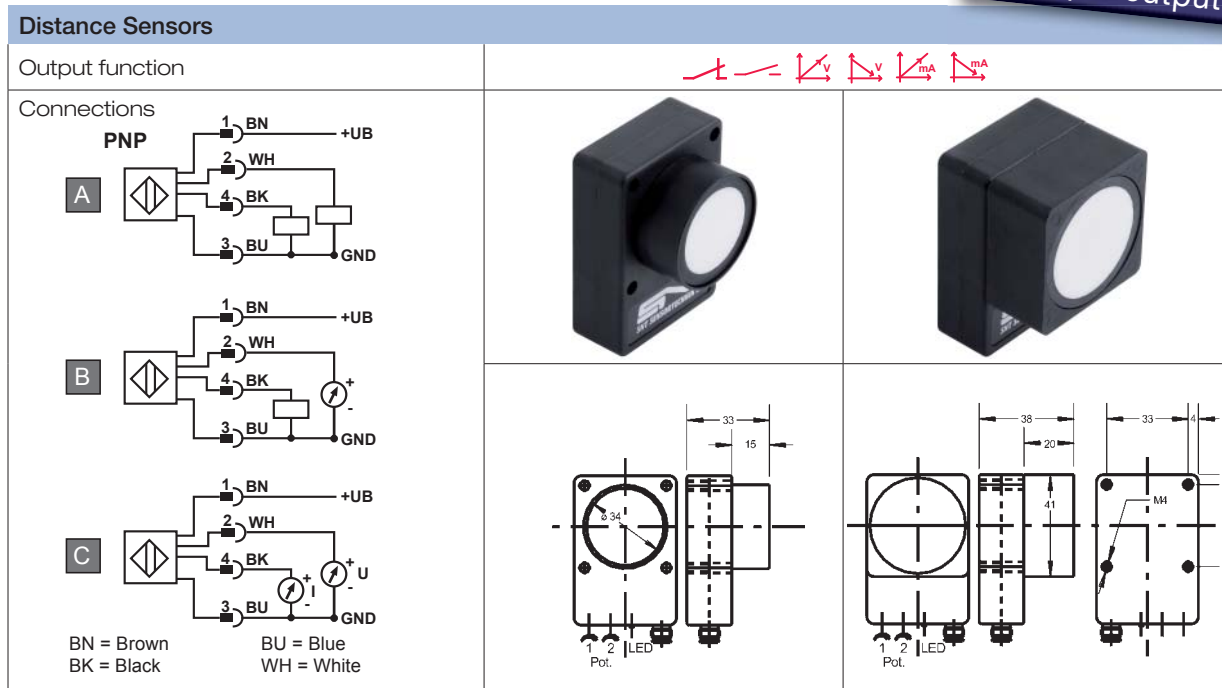
Technical Specs (at +20 °C; 24 VDC)	UPK 500 ...	UPK 1000 ...
Detection range	80 ... 500 mm	135 ... 1000 mm
Setting	Potentiometer	
Sampling frequency	~ 8 Hz	~ 5 Hz
Ultrasonic frequency	180 kHz	
Power supply voltage	15 ... 30 VDC	
Ripple of supply voltage	< 10 %	
Current consumption	~ 60 mA	
Binary output	PNP; max. 100 mA	
Analog output	0 ... 10 V / 10 ... 0 V; 4 ... 20 mA / 20 ... 4 mA	
Linearity analog output	<± 0,5 % / Sn max.	
Load resistance	> 10 kΩ-U-load / < 400 Ω -I-load	
Tracking speed of analogue output	< 60 ms / 95 % Sn max.	< 250 ms / 95 % Sn max.
Hysteresis, axial	~ 15 mm	~ 25 mm
Accuracy	<± 1% / Sn max.	
Temperature range	0 °C to +50 °C	
Pressure range	~ 900 ... 1100 mbar _{abs}	
Protection class	IP67	
Option	Synchronization input (on request) UPK.....Y	
Housing material	glass fiber reinforced Polyamid	
Electrical connection	Connector: M8x1; 4-pin	
Specification	CE	

Ordering Code

Version	Distance 80 ... 500 mm	Connection	Art. Nr.	Distance 135 ... 1000 mm	Connection	Art. Nr.
1 x PNP (NO), 1x PNP (NC)	UPK 500 PDPA 24 C	A	35050	UPK 1000 PDPA 24 C	A	35150
2 x PNP (NO)	UPK 500 PDPS 24 C	A	35040	UPK 1000 PDPS 24 C	A	35140
PNP (NO), 0 ... 10 VDC	UPK 500 PVPS 24 CA	B	35000	UPK 1000 PVPS 24 CA	B	35100
PNP (NO), 10 ... 0 VDC	UPK 500 PVPS 24 CVA	B	35020	UPK 1000 PVPS 24 CVA	B	35120
1 x PNP (NO), 4 ... 20 mA	UPK 500 PVPS 24 CI	B	35010	UPK 1000 PVPS 24 CI	B	35110
1 x PNP (NO), 20 ... 4 mA	UPK 500 PVPS 24 CVI	B	35030	UPK 1000 PVPS 24 CVI	B	35130
1x 0 ... 10 VDC, 1x 4 ... 20 mA	UPK 500 POR 24 CAI	C	35060	UPK 1000 POR 24 CAI	C	35160
1x 10 ... 0 VDC, 1x 20 ... 4 mA	UPK 500 POR 24 CVAI	C	35070	UPK 1000 POR 24 CVAI	C	35170

Ultrasonic Distance Sensors

multiple outputs



Technical Specs (at +20 °C; 24 VDC)	UPK 2500...	UPK 5000...
Detection range	250 ... 2500 mm	400 ... 5000 mm
Setting	Potentiometer	
Sampling frequency	~ 3 Hz	~ 2 Hz
Ultrasonic frequency	130 kHz	80 kHz
Power supply voltage	15 ... 30 VDC	
Ripple of supply voltage	< 10 %	
Current consumption	~ 60 mA	~ 65 mA
Binary output	PNP; max. 100 mA	
Analog output	0 ... 10 V / 10 ... 0 V; 4 ... 20 mA / 20 ... 4 mA	
Linearity analog output	<± 0,5 % / Sn max.	
Load resistance	> 10 kΩ-U-load / < 400 Ω -I-load	
Tracking speed of analogue output	< 400 ms / 95 % Sn max.	< 2 Sec. / 95 % Sn max.
Hysteresis, axial	~ 40 mm	~ 80 mm
Accuracy	<± 1 % / Sn max.	
Temperature range	0 °C to +50 °C	
Pressure range	~ 900 ... 1100 mbar _{abs}	
Protection class	IP67	
Option	Synchronization input (on request) UPK.....Y	
Housing material	glass fiber reinforced Polyamid	
Electrical connection	Connector: M8x1; 4-pin	
Specification	CE	


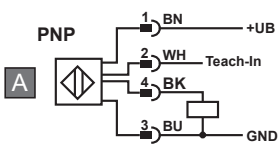
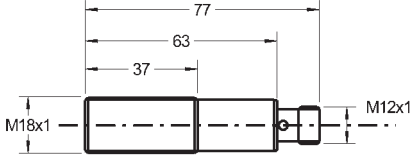
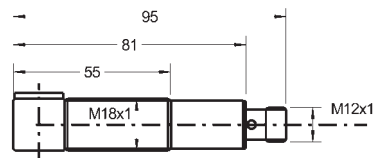
Ordering Code

Version	Distance 250 ... 2500 mm	Connection	Art. Nr.	Distance 400 ... 5000 mm	Connection	Art. Nr.
1 x PNP (NO), 1x PNP (NC)	UPK 2500 PDPA 24 C	A	35250	UPK 5000 PDPA 24 C	A	35350
2 x PNP (NO)	UPK 2500 PDPS 24 C	A	35240	UPK 5000 PDPS 24 C	A	35340
PNP (NO), 0 ... 10 VDC	UPK 2500 PVPS 24 CA	B	35200	UPK 5000 PVPS 24 CA	B	35300
PNP (NO), 10 ... 0 VDC	UPK 2500 PVPS 24 CVA	B	35220	UPK 5000 PVPS 24 CVA	B	35320
1 x PNP (NO), 4 ... 20 mA	UPK 2500 PVPS 24 CI	B	35210	UPK 5000 PVPS 24 CI	B	35310
1 x PNP (NO), 20 ... 4 mA	UPK 2500 PVPS 24 CVI	B	35230	UPK 5000 PVPS 24 CVI	B	35330
1x 0 ... 10 VDC, 1x 4 ... 20 mA	UPK 2500 POR 24 CAI	C	35260	UPK 5000 POR 24 CAI	C	35360
1x 10 ... 0 VDC, 1x 20 ... 4 mA	UPK 2500 POR 24 CVAI	C	35270	UPK 5000 POR 24 CVAI	C	35370



Ultrasonic proximity switch

low cost

Proximity switch	
Output function	— / —
Connections	
 <p>PNP</p> <p>1 BN — +UB</p> <p>2 WH — Teach-In</p> <p>4 BK —</p> <p>3 BU — GND</p> <p>Legend: BN = Brown BU = Blue BK = Black WH = White</p>	 

Technical Specs	UPR-B 1000 TVPA 24 C	UPR-B 1000 TVPA 24 CW
Detection range	100 ... 1000 mm	
Setting	Teach-In with Pin 2	
Sampling frequency	~ 5 Hz	
Ultrasonic frequency	180 kHz	
Power supply voltage	11 ... 30 VDC	
Ripple of supply voltage	10 %	
Current consumption	~ 30 mA	
Binary output	PNP (NO o. NC); max. 100 mA	
Hysteresis, axial	4 mm	
Temperature range	0 °C to +60 °C	
Pressure range	~ 900 ... 1100 mbar _{abs}	
Options	Synchronization, potentiometer, integrated cable	
Protection class	IP67	
Housing material	nickel plated brass; PA	
Electrical connection	Connector: M12x1; 4-pin	
Specification	CE	



Ordering Code			
Version: Axial	Distance 100 ... 1000	Connection	Article No.
PNP (NO o. NC)	UPR-B 1000 TVPA 24 C	A	37400
Version: angled	Distance 100 ... 1000		
PNP (NO o. NC)	UPR-B 1000 TVPA 24 CW	A	37401

Mounting instructions - Accessories

Mounting instructions





- Two sensors must not stand directly opposite each other. Even at multiple operating distances problems can arise.
- When multiple sensors scan the same object or if there is a shared distant background, versions with synchronization must be used (option).
- Installation in narrow pipes can be problematic. The inner tube diameter should be sufficiently larger than the sound beam diameter. And no protruding parts, side bores or deposits shall exist. Otherwise they will be detected instead of the target (e.g. level) in the pipe.
- Smooth surfaces are to be scanned up to a tilt angle of approx. 10°. Rough and highly textured surfaces are however detectable up to far larger angles.
- Ultrasonic sensors should be mounted as softly as possible in order to prevent acoustic disturbances. The scope of delivery therefore includes rubber parts for the mounting. This is especially true when installing in thin sheets or mounting brackets.



Electrical connection

- Normally a power supply is used to which no further loads operate.
- The cable length should be kept as short as possible. With very long cables use a 470µF/35V supporting capacitor close to the sensor.
- The cables should not be laid parallel to power cables.
- To prevent interference, make sure that the part where the sensor is mounted is electrically well grounded.



Accessories

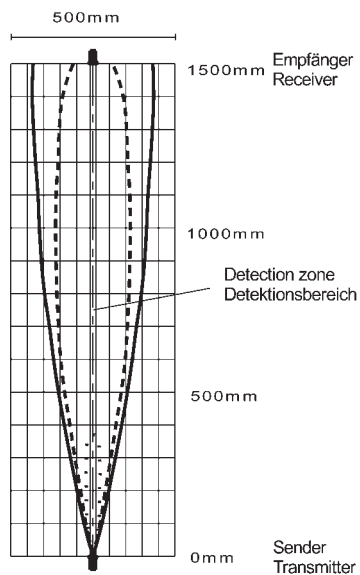
Connection cables PUR		- Miniature screw connector - Outer shielding made of PUR				
M8x1 connection	Pins / Colors	Length	straight	angled	Ordering Code	Article No.
	3-pin  1 = brown 3 = blue 4 = black	2 m	X		KAB 2K3VGPUR	10010
		5 m	X		KAB 5K3VGPUR	10012
		2 m		X	KAB 2K3VWPUR	10011
		5 m		X	KAB 5K3VWPUR	10013
	4-pin  1 = brown 2 = white 3 = blue 4 = black	2 m	X		KAB 2K4VGPUR	10004
		5 m	X		KAB 5K4VGPUR	10008
		10 m	X		KAB 10K4VGPUR	10006
		2 m		X	KAB 2K4VWPUR	10005
		5 m		X	KAB 5K4VWPUR	10009

Connection cables PUR		- Miniature screw connector - Outer shielding made of PUR				
M12x1 connection	Pins / Colors	Length	3 wire	4 wire	Ordering Code	Article No.
	4-pin  1 = brown 2 = white 3 = blue 4 = black	2 m	X		KAB 2L3VGPUR	10017
		2 m		X	KAB 2L4VGPUR	10018
		5 m		X	KAB 5L4VGPUR	10021
		10 m		X	KAB 10L4VGPUR	10023

Current data sheets for all SNT products are for download on our website www.sntag.ch.

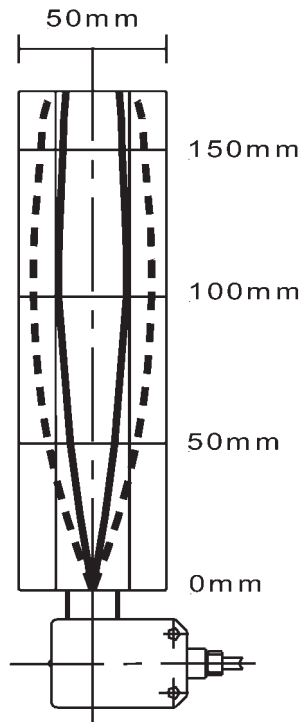
Scanning fields

UPB 1500

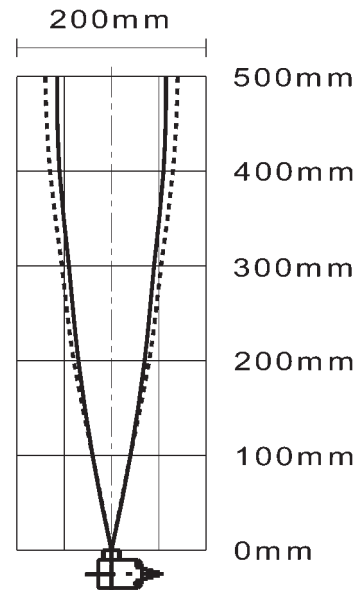


Empfangsbereiche / receiving zones @ 20°C:
 — max. Sendeleistung / transmitter power
 - - - 50% Sendeleistung / transmitter power
 · · · min. Sendeleistung / transmitter power

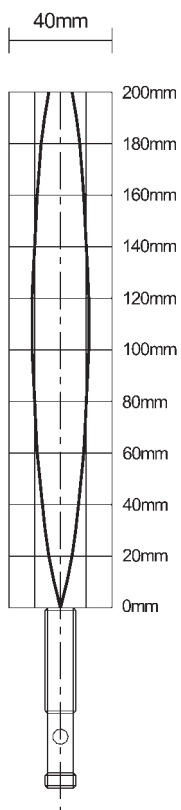
UPX 150



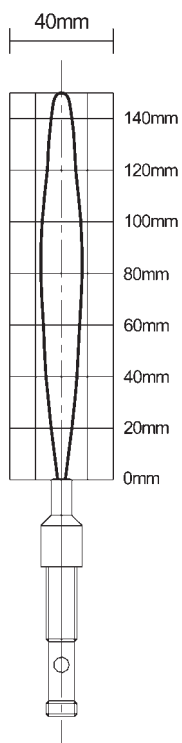
UPX 500



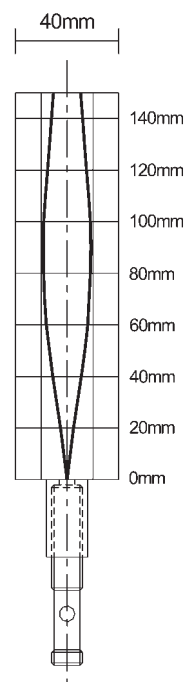
UPS 200



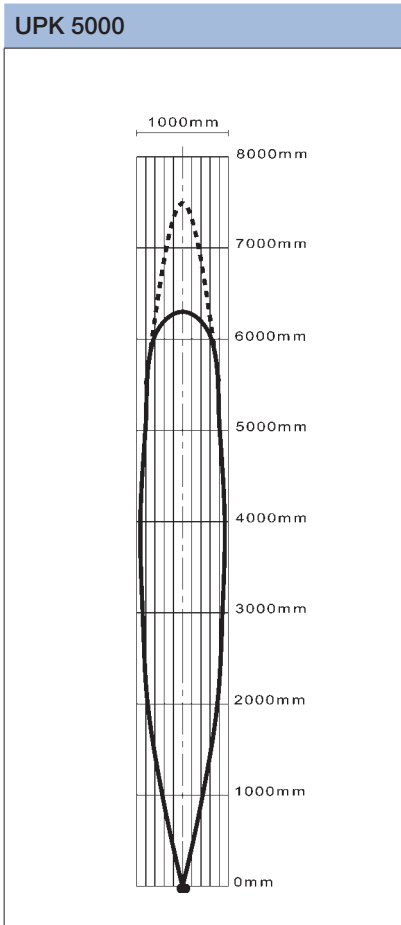
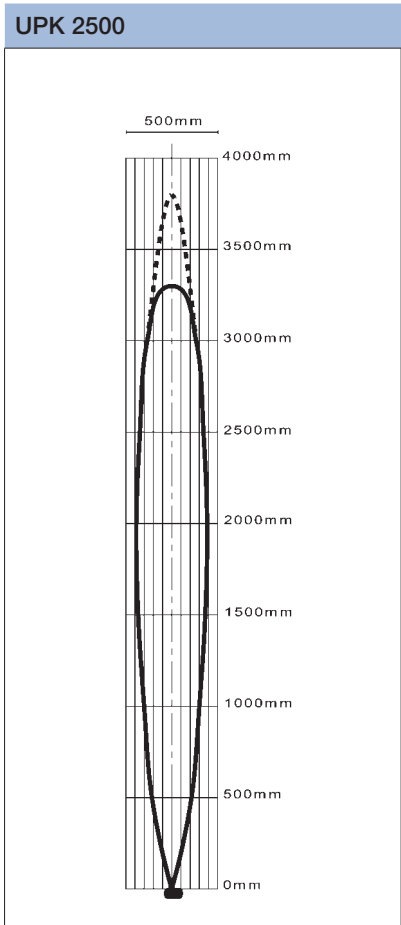
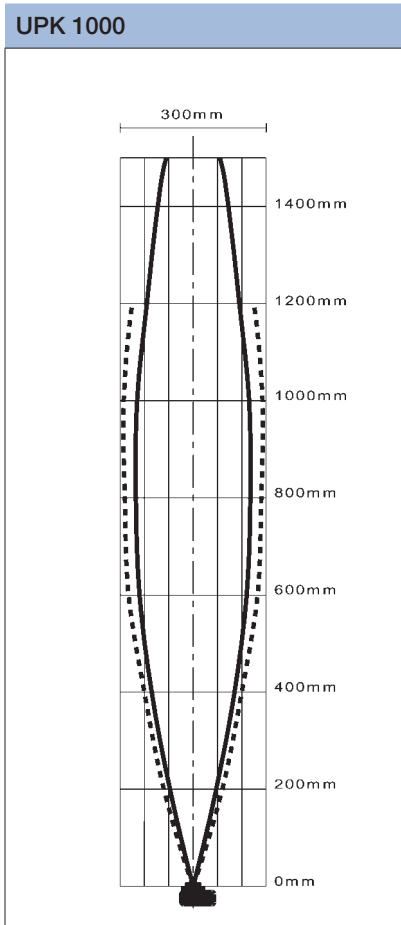
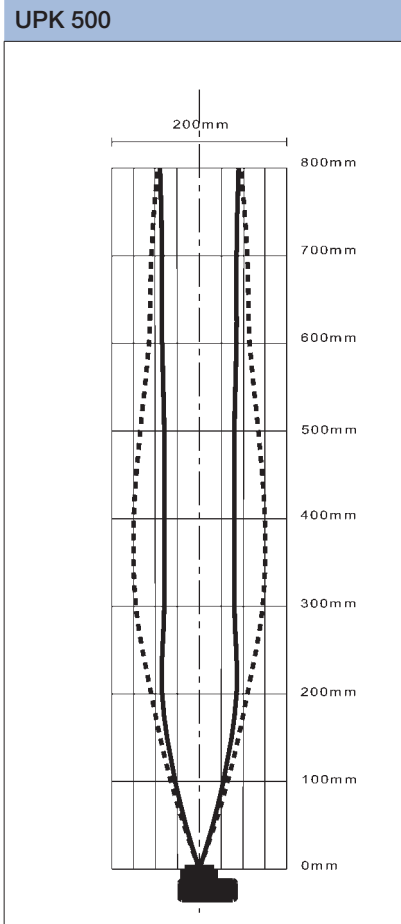
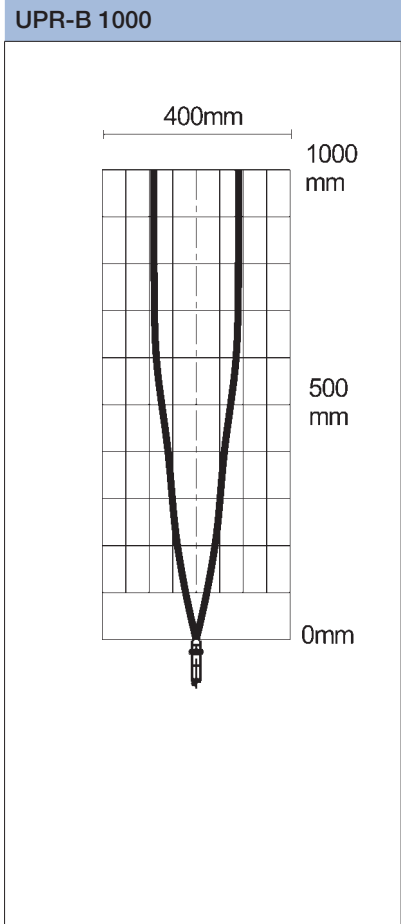
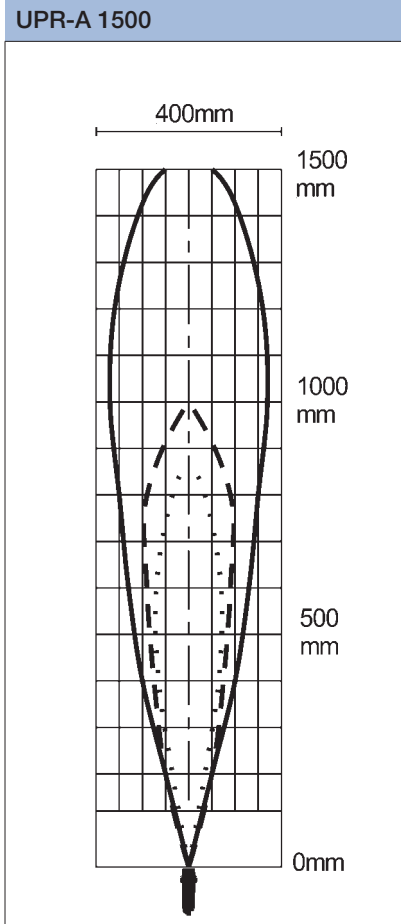
UPS 150 FB



UPS 150 CP



Scanning fields



Our main markets

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

Our strenghts

- Lean, flexible, efficient organization
- Rugged sensors with high sensitivity
- Know-how – in-house production of ultrasonic transducers
- Well established Swiss quality worldwide for over 20 years
- Standard product range as well as customized solutions
- short delivery time



www.ultraschallsensoren.com



SNT Sensortechnik AG
Hammerstrasse 6
CH-8180 Bülach
Switzerland

Phone: +41 (0)44 817 29 22
Fax: +41 (0)44 817 10 83

E-Mail: sales@sntag.ch
Web: www.sntag.ch

Distributors worldwide