

# **ULTRASONIC**

## *Distance and Proximity Sensors*



### **UFP / UPA Series**

#### **Key-Features:**

- Available measurement ranges from 200 to 6000 mm
- Ultrasonic distance sensor or proximity switch
- Teachable measurement range
- M12/ M18/ M30 thread housings
- Linearity up to 0.3 %
- Working temperature -20 to +70 °C
- Measurement is independent of the targets material, surface, colour or transparency
- Protection class up to IP67

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## TECHNICAL DATA

Distance sensor		UFP-200	UFP-400	UFP-500	UFP-800	UFP-1600	UFP-2000	UFP-3500	UPA-6000
Detection range	[mm]	25...200	30...400	60...500	100...800	80...1600	200...2000	300...3500	600...6000
Repeatability *		±0.3 %	±0.2 % / ±1 mm			±0.2 % / ±2 mm			
Linearity error	[%]	< 0.3	< 0.5						
Resolution	[mm]	0.250	0.125	0.250		1.0		1.5	
Response time	[ms]	40	60	100	100	140	200	400	700
Signal output		0...10 V		0...10 V / 4...20 mA					
Teachable measurement range		Yes		Yes					
Current consumption (no load)	[mA]	< 25		< 30					
Operating voltage	[VDC]	12...30		15...30					
Inverted characteristic curve		No		Yes					
Control inputs		Yes		Yes					
Safety features		Protection against reverse polarity and short circuit							
Temperature range	[°C]	-20...+70		-20...+70					
Connection		M12 connector		M12 connector, cable output					M12 connector
Design		M12x1, 79 mm		M18x1, 100 mm				M30x1.5, 125 mm	Disk, 80x80x50 mm
Case material		steel		Plastics					
Protection class		IP65	IP65	IP67	IP67	IP65	IP67	IP67	IP65
Angle of the sound cone		8°							

Proximity switch		UFP-200	UFP-400	UFP-500	UFP-800	UFP-1600	UFP-2000	UFP-3500	UPA-6000
Switching points		1				2			
Detecting range	[mm]	25...200	30...400	60...500	100...800	80...1600	200...2000	300...3500	600...6000
Repeatability *		±0.3 %	±0.5 %	±0.2 % / ±1 mm		±0.2 % / ±2 mm			
Resolution	[mm]	0.250	0.125	0.250		1.0			
Hysteresis	[%]	2		1					
Sampling frequency	[Hz]	25	15	10	10	6	5	2.5	1
Signal		PNP / NPN		PNP / NPN					
Visualization of current state		LED green / yellow							
Adjustment of switching points		by Teach-in mode							
Max. output current	[mA]	100		500					
Current consumption (no load)	[mA]	< 25		< 60					
Operating voltage	[VDC]	10...30		12...30					
Switching mode		NO / NC		NO / NC					
Control inputs		Yes		Yes					
Safety features		Protection against reverse polarity and short circuit							
Temperature range	[°C]	-20...+70		-20...+70					
Connection		M12 connector		M12 connector, cable output					M12 connector
Design		M12x1, 79 mm		M18x1, 100 mm				M30x1.5, 125 mm	Disk, 80x80x50 mm
Case material		steel		Plastics					
System of protection		IP65	IP65	IP67	IP67	IP65	IP67	IP67	IP65
Angle of the sound cone		8°		8°					

\* in case two values are indicated, please choose the worse value

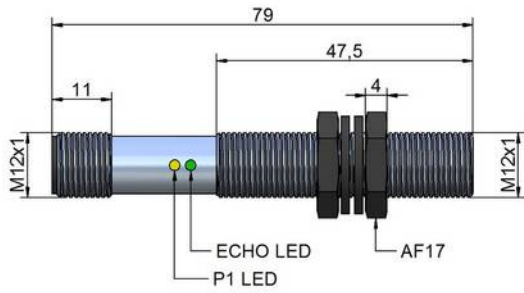
## !! WARNING – SAFETY INFORMATION !!

These devices are not designed for critical safety or emergency shut-down purposes. Therefore they should never be used in an application, where a malfunction of the device could cause personal injury.

## TECHNICAL DRAWINGS UFP SERIES

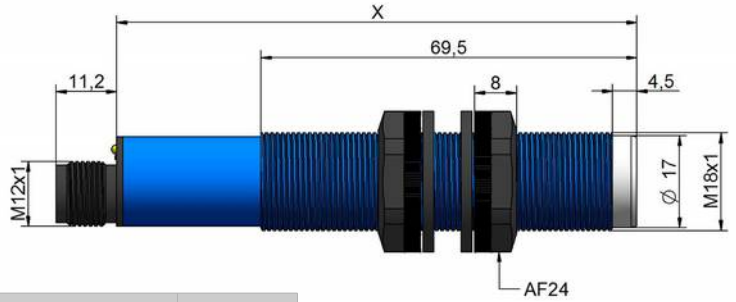
### UFP-200

Measuring range: 200 mm  
Output: 1 x Switching Output or 0...10 V



### UFP-400/ 500/ 800/ 1600/ 2000:

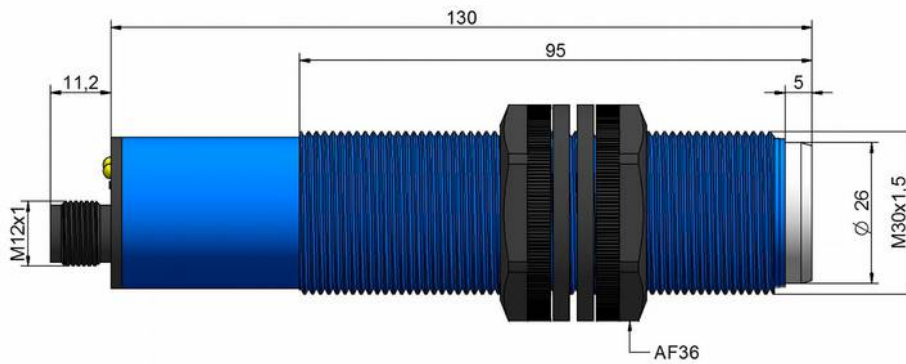
Measuring range: up to 2000 mm  
Output: 2 x Switching output or 0...10 V or 4...20 mA



Model	X
UFP-400	89
UFP-500/800/1600/2000	96

### UFP-3500:

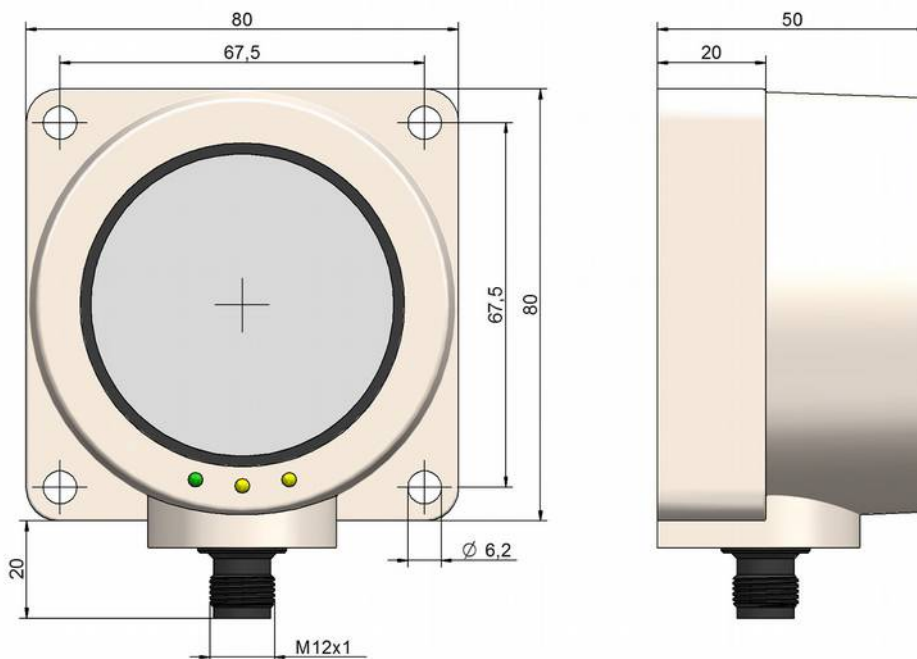
Measuring range: 3500 mm  
Output: 2 x Switching output or 0...10 V or 4...20 mA



## TECHNICAL DRAWINGS UPA SERIES

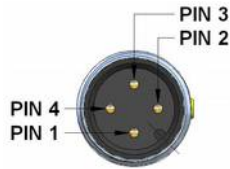
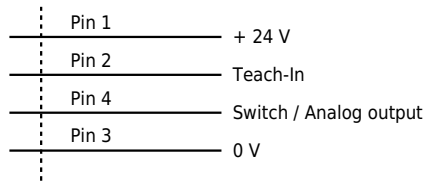
### UPA-6000:

Measuring range: 6000 mm  
Output: 2 x Switching output or 0...10 V or 4...20 mA



# ELECTRICAL CONNECTIONS

## UFP-200: PIN configuration

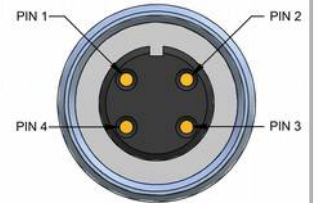


## UFP-200: connection cable, 4 pole

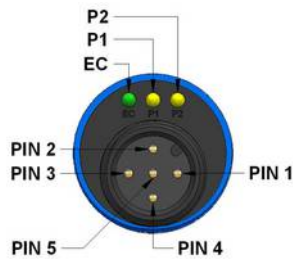
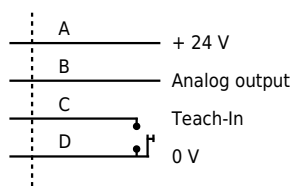
### Cable with M12 connector, 4-pole, IP67

K4P2M-S-M12	2 m, M12-connector straight
K4P5M-S-M12	5 m, M12-connector straight
K4P10M-S-M12	10 m, M12-connector straight
K4P2M-SW-M12	2 m, M12-connector angular
K4P5M-SW-M12	5 m, M12-connector angular
K4P10M-SW-M12	10 m, M12-connector angular

PIN No.	cable colour	PIN No.	cable colour
Pin 1	brown	Pin 3	blue
Pin 2	white	Pin 4	black

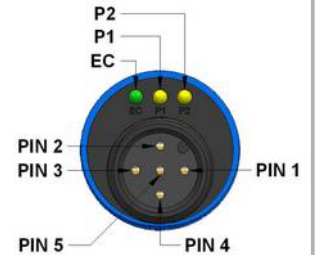
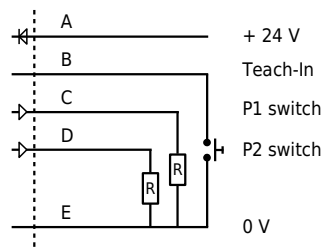


## UFP-400/ 500/ 800/ 1600/ 2000/ 3500 with analog output: output configuration



Pin No.	Cable output:	cable colour
A Pin 1	Brown	
B Pin 4	Black	
C Pin 5	Pink	
D Pin 3	Blue	

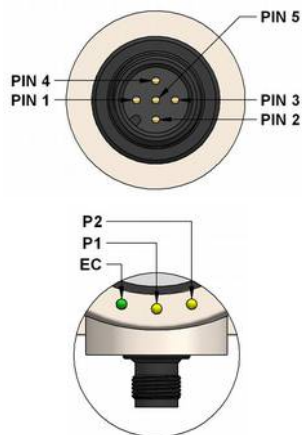
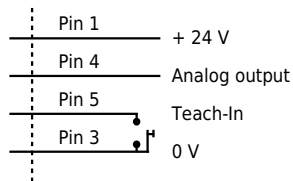
## UFP-400/ 500/ 800/ 1600/ 2000/ 3500 as proximity switch: output configuration



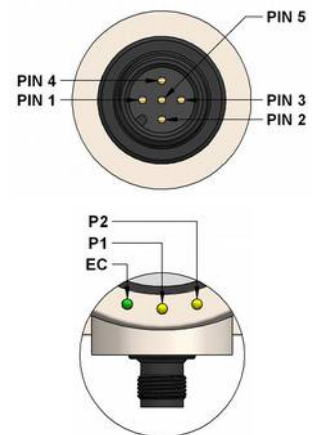
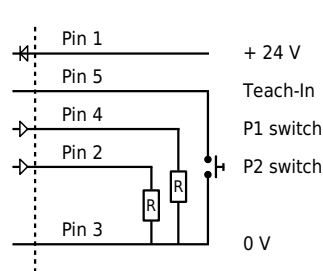
Pin No.	Cable output:	cable colour
A Pin 1	Brown	
B Pin 5	Pink	
C Pin 4	Black	
D Pin 2	Grey*	
E Pin 3	Blue	

\* UFP-3500: cable colour white

## UPA-6000 with analog output: PIN configuration



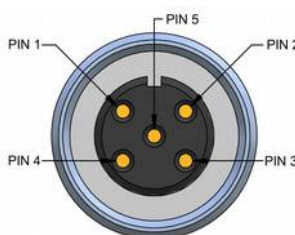
## UPA-6000 as proximity switch: PIN configuration



## UFP-400/ 500/ 800/ 1600/ 2000/ 3500 and UPA-6000: connection cable, 5 pole

### Cable with M12 connector, 5-pole, shielded, IP67

K5P2M-S-M12	2 m, M12-connector straight
K5P5M-S-M12	5 m, M12-connector straight
K5P10M-S-M12	10 m, M12-connector straight
K5P2M-SW-M12	2 m, M12-connector angular
K5P5M-SW-M12	5 m, M12-connector angular
K5P10M-SW-M12	10 m, M12-connector angular



PIN No.	Cable colour
Pin 1	brown
Pin 2	white
Pin 3	blue
Pin 4	black
Pin 5	grey

## TEACH-IN GUIDE

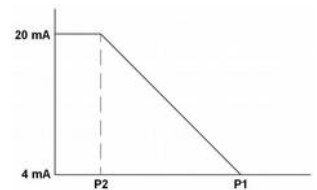
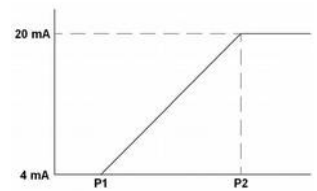
### Analog Output 0...10 V / 4...20 mA (Teach-In)

#### Normal operation:

EC (Echo LED) GREEN: Activates whenever echo is received (support for orientation).  
 P1 LED, P2 LED YELLOW: One of the lamps is lit whenever the target quits the zone between P1 and P2  
 Teach-In (Line): Connect activating line to GND (time required for teach-in: ca. 30 sec).

#### Characteristic curve ( $P1 < P2$ ): $P1 = 0\text{ V} / 4\text{ mA}$ und $P2 = 10\text{ V} / 20\text{ mA}$

- Teach-In must remain coupled to GND (ca. 6 - 8 sec.), until EC (Echo LED) and P1 start to flash (2 Hz) (UFP-200 only YELLOW).
- Now P1 starts to flash (1 Hz), and EC (Echo) is ready to operate, serving as an aid for orientation. For UFP-200 model however, only YELLOW flashes (frequency  $\frac{1}{2}$  Hz).  
The reference object has to be positioned in position 0 V / 4 mA. Acknowledge by interconnecting Teach-In and GND, just for a moment. From now on, the sensor works in normal operation with this selected P1 value.
- Connect Teach-In to GND one more time (for ca. 15 - 16 sec.), until EC (Echo LED) and P2 start to flash (2 Hz). For model UFP-200, only YELLOW, frequency 1 Hz).
- Procedure of step 2 is repeated for P2: As soon as the reference object has been installed in position 10 V / 20 mA (do not forget to confirm, as described above), the sensor accepts the new value for P2 and uses it for further operation.



#### Inverted characteristic curve ( $P2 < P1$ ): $P2 = 0\text{ V} / 4\text{ mA}$ und $P1 = 10\text{ V} / 20\text{ mA}$

### 2 point proximity switch (Teach-In)

#### Normal operation:

EC (Echo LED) GREEN: Is lit whenever echo is received (simplifies orientation).  
 P1 and P2 LED YELLOW: State of break-over point SP1 resp. SP2  
 Teach-In: Activating line (time required for teach-in: ca. 30 sec)

#### Set-up procedure for switching point SP1

- Teach-In line must be coupled to GND (ca. 6 - 8 sec.), until EC (Echo LED) and P1 start to flash (2 Hz). For UFP-200: Only YELLOW.
- P1 starts to flash at a frequency of 1 Hz, and EC LED is active (for orientation purpose). For UFP-200 however, YELLOW flashes (only  $\frac{1}{2}$  Hz). The reference object has to be positioned. Acknowledge by shortly interconnecting Teach-In and GND.
- During teach-in, LED P1 visualizes the behavior of switching point SP1. If the lamp is lit: NO for SP1. Lamp off: NC characteristics.

#### Set-up procedure for switching point SP2

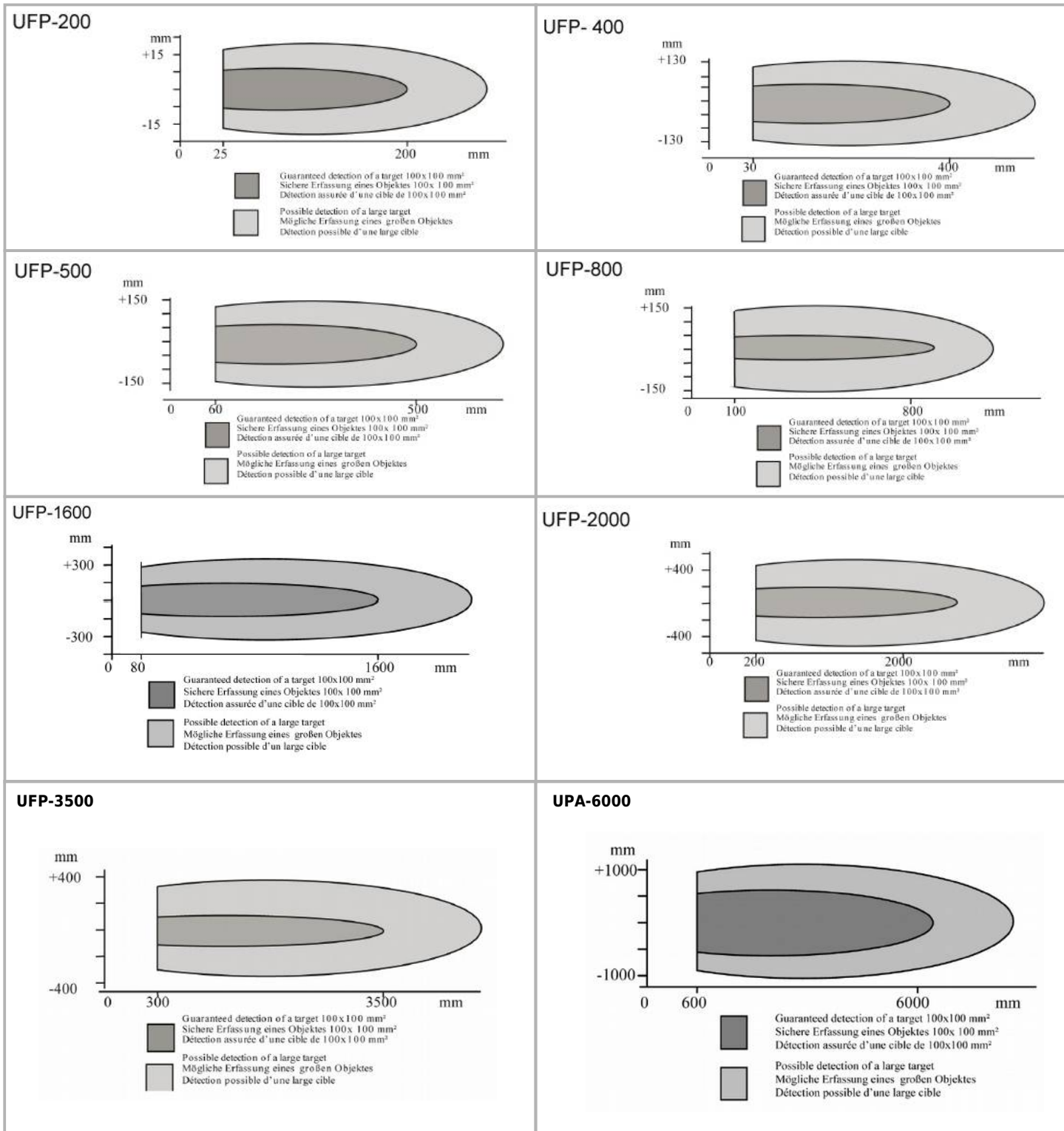
- Teach-In line must be coupled to GND (ca. 14 - 18 sec.), until EC (Echo LED) and P2 start to flash (2 Hz). For UFP-200 only yellow (1 Hz).
- P2 starts to flash at a frequency of 1 Hz, and EC LED is active (support for orientation). For UFP-200 however, only YELLOW flashes ( $\frac{1}{2}$  Hz). The reference object has to be positioned. Acknowledge by shortly interconnecting Teach-In and GND). For UFP-200, the hysteresis distance should not be confirmed, before the yellow LED is illuminated.
- During teach-in, LED P1 visualizes the behavior of switching point SP2. If the lamp is lit: NO for SP1. Lamp off: NC characteristics.

#### Window function / hysteresis function

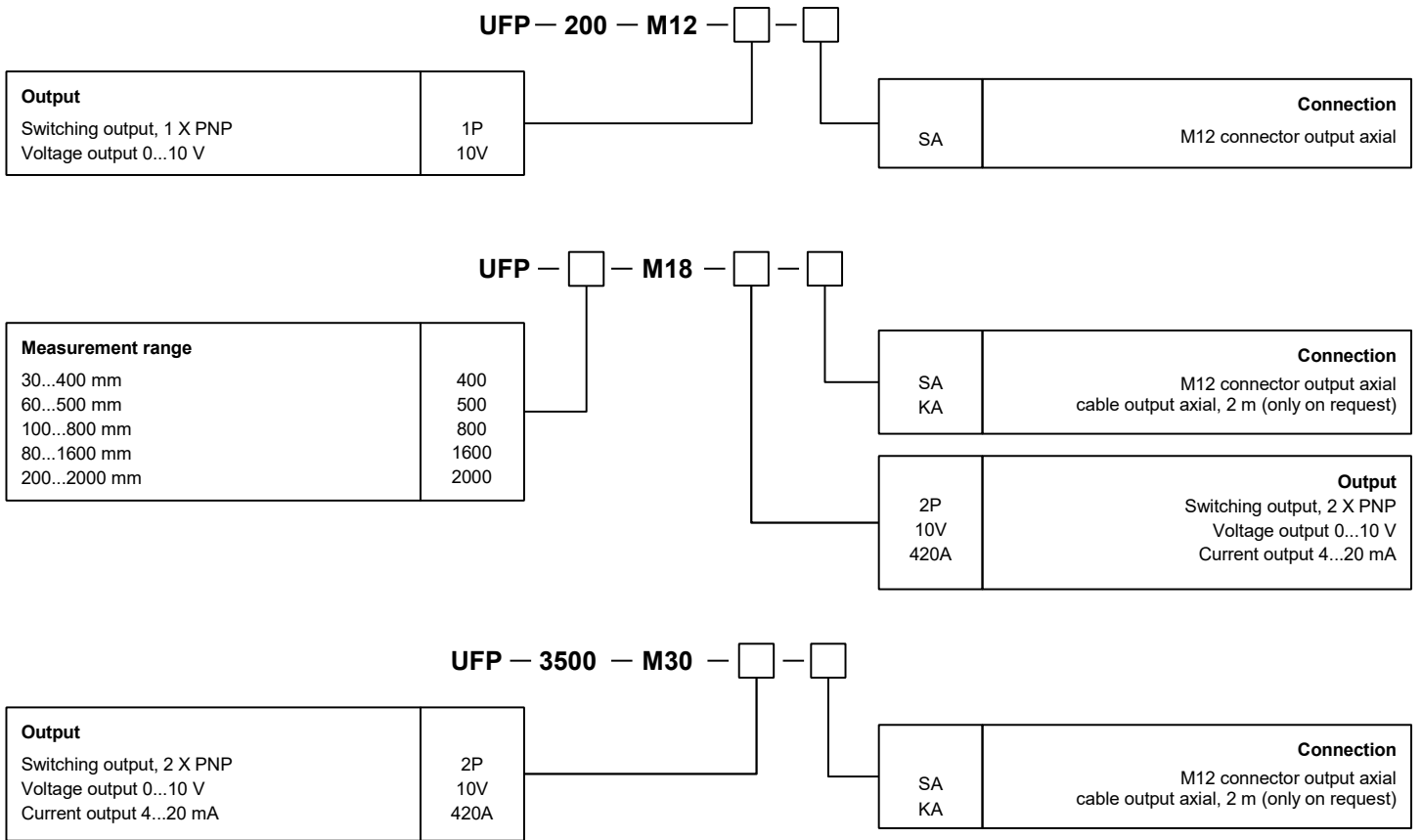
- If for UFP-200, teach-in procedure is carried out only for SP1, SP2 automatically is accepted for this distance + 1%.
- If both P1 and P2 LED's are OFF, the sensor reads the window function. If an object is between P1 and P2, then: SP1 ON, SP2 OFF
- If during Teach-In, both P1 and P2 LED's are lit, the sensor uses the hysteresis function. SP1 (normally open contact) and SP2 (normally closed contact) are at P1 and have the hysteresis of P1-P2.

# SOUND CONE GEOMETRY

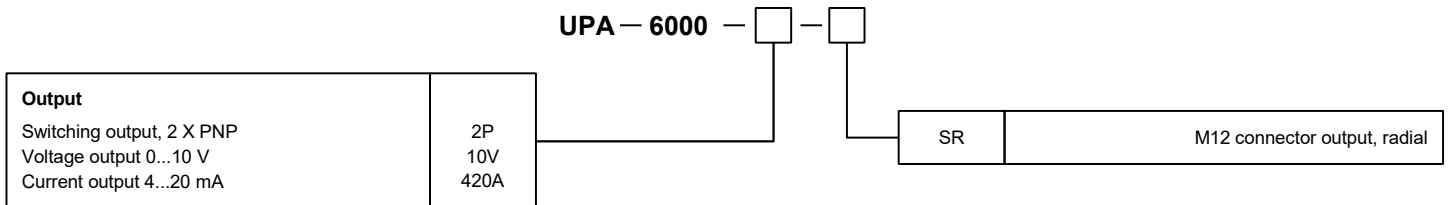
The exact geometry of the sound cone depends on the air-pressure, temperature, humidity and the size of the target.



## ORDER CODE UFP SERIES



## ORDER CODE UPA SERIES



## ACCESSORIES

### Cable with M12 connector, 5-pole, shielded

K5P2M-S-M12	2 m, straight, IP67
K5P5M-S-M12	5 m, straight, IP67
K5P10M-S-M12	10 m, straight, IP67
K5P2M-SW-M12	2 m, angular, IP67
K5P5M-SW-M12	5 m, angular, IP67
K5P10M-SW-M12	10 m, angular, IP67

### Cable with M12 connector, 4-pole (for UFP-200)

K4P2M-S-M12	2 m, straight, IP67, shielded
K4P5M-S-M12	5 m, straight, IP67, shielded
K4P10M-S-M12	10 m, straight, IP67, shielded
K4P2M-SW-M12	2 m, angular, IP67, shielded
K4P5M-SW-M12	5 m, angular, IP67, shielded
K4P10M-SW-M12	10 m, angular, IP67, shielded

### Connector M12, 5-pole, shielded

D5-G-M12-S	straight, IP67
D5-W-M12-S	angular, IP67

### Connector M12, 4-pole (for UFP-200)

D4-G-M12-S	straight, IP67, shielded
D4-W-M12-S	angular, IP67, shielded

Subject to change without prior notice.

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