

# Ultrasonic Sensors

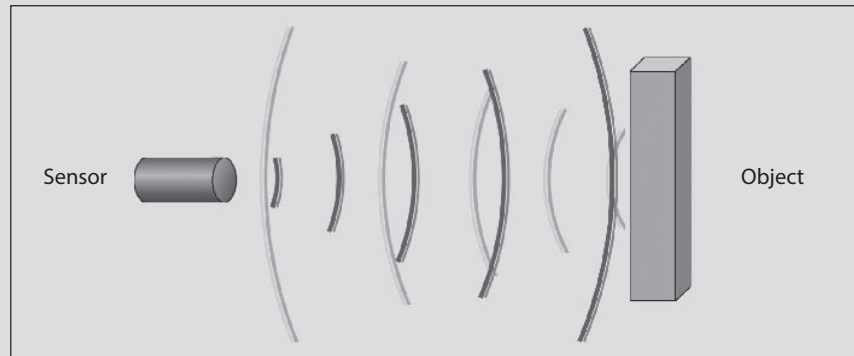
Ultrasonic sensors are used to precisely detect the position of objects of any material and colour, irrespective of external light levels even in harsh industrial environments. The sensors are characterised by high sound intensity that makes it possible to detect even the smallest of objects.

In addition to their high precision, outstanding repeatability and high degree of linearity their strengths also include their suitability for use in universal applications, irrespective of light conditions, as well as colour and material of the objects and substances to be detected.

Ultrasonic sensors produce accurate results even in connection with highly transparent objects such as film or glass surfaces and are completely unaffected by normal levels of soiling on the sensor surface. High performance under the most difficult operating conditions, even in suspended particle or water vapour environments, is a characteristic feature as is their ruggedness under harsh operating conditions.

Thanks to their outstanding properties ultrasonic sensors are used in a diverse range of applications and sectors of industry.

## Measuring principle



The sensor emits a sound pulse that is reflected from the object to be detected. The sensor reads in the reflected pulse and the distance to the object is determined by means of a runtime measurement routine.

## Advantages

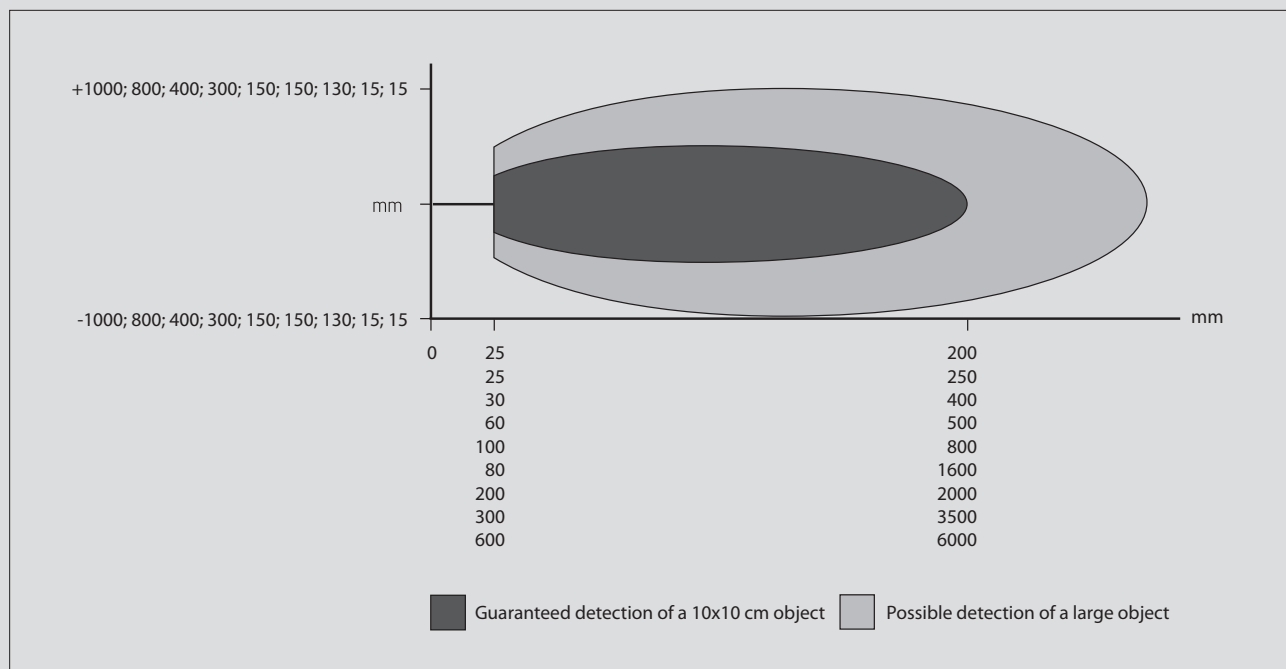
- Protection class IP 67
- Large detection range of up to 6000 mm (depending on type)
- High linearity
- High repeat accuracy
- Narrow sound beam of 8°
- Adaptive 0–10 V voltage or 4–20 mA current output (analogue sensors)
- Two adaptive switching outputs, can be used individually or combined in connection with switching sensors (depending on type)

## Technical data\*

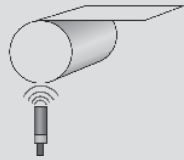
- One analogue 0 ...10 V/4 ...20 mA output or two switching outputs.
- Rated operating voltage range 12 V – 30 V DC
- Enclosure: PBT/ GF30
- Ambient temperature –15 °C...70 °C
- Repeat accuracy  $\pm 0.2\% \pm 2\text{ mm}$
- Hysteresis 1 %

\* Please refer to the following catalogue pages and the corresponding datasheets for technical information on the individual products

## Detection range:



### Application examples:



#### Wind-on and wind-off control

Detection of the diameter of coils in the paper, plastics and textile as well as metal working industries.



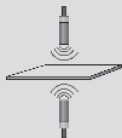
#### Sag control

Detection of sag loop for controlling material tension or controlling quantity of material for the downstream production process.



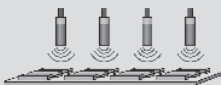
#### Level measurement

Level measurement of liquids of bulk materials in containers and silos.



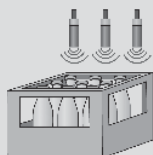
#### Thickness measurement

Thickness measurement of objects.



#### Completeness check

For checking completeness of objects in containers.



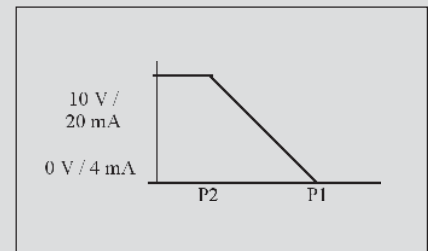
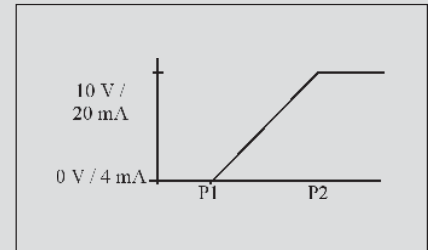
#### Completeness check of bottles in crates

For checking the presence and height of bottles in crates.

### Teach-in procedure

#### Analogue sensors

Any interval within the measuring range can be selected for the analogue output by means of TeleTeach. The slope of the characteristic curve – positive or negative – can, of course, be set to any value.



The points P1 and P2 determine the position of the analogue characteristic curve: P1 defines the point at which the characteristic curve assumes the value 0 V/4 mA, P2 defines the 10 V/20 mA point. In the case of a “positive characteristic curve”, the sensor is programmed in such a way that the sensor-P1 distance is smaller than the sensor-P2 distance. Correspondingly, sensor-P2 distance is smaller than sensor-P1 distance for a “negative characteristic curve”.

#### Switching sensors

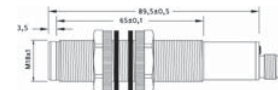
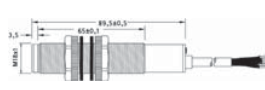
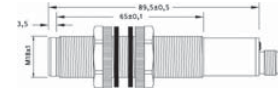
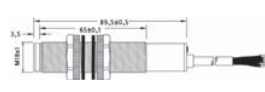
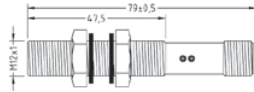
The two switching outputs are taught-in accurate to the millimetre via a teach-in input. Independent of each other, they can be optionally adapted with 1 % hysteresis as complementary windows (NO / NC) or as complementary switching outputs (NO / NC) with hysteresis adjustable to any value. P1 and P2 define the position of the switching points. The switching point has NO characteristic if the corresponding LED is on while teaching in the switching point and conversely, it has NC characteristic when the LED is off. Two LEDs indicate the switching status of the sensor.

#### Standards and approvals:

EN 60947-5-2

# Ultrasonic Sensors (Type M12, M18)

Type	M12	M18		M18	
Detection range	25–200 mm	30–400 mm	30–400 mm	30–400 mm	30–400 mm
Output	1 x NO/NC	2 x NO/NC	Analogue	2 x NO/NC	Analogue
Type of connection	Connector M12	Cable 2 m	Cable 2 m	Connector M12	Connector M12
Special feature					



<b>PNP</b>	DC	NO/NC Type	<b>6712101001</b> UN12I-DPE0-0200-S30	<b>6711102005</b> UT18I-DPE0-0400-C30	<b>6712102005</b> UT18I-DPE0-0400-S30
<b>NPN</b>	DC	NO/NC Type	<b>6712201001</b> UN12I-DNE0-0200-S30	<b>6711202005</b> UT18I-DNE0-0400-C30	<b>6712202005</b> UT18I-DNE0-0400-S30
<b>Analogue</b>	DC	0–10 V Type 4–20 mA Type		<b>6711402005</b> UT18I-D00U-0400-C30 <b>6711302005</b> UT18I-D00I-0400-C30	<b>6712402005</b> UT18I-D00U-0400-S30 <b>6712302005</b> UT18I-D00I-0400-S30

## Technical data

Rated operating voltage	$U_B$	12–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC
Rated operating current	$I_B$	100 mA	500 mA	–	500 mA	–
Switching frequency (max)	F	20 Hz	15 Hz	–	15 Hz	–
Resolution		–	–	0.125 mm	–	0.125 mm
Linearity error		–	–	< 0.5 %	–	< 0.5 %
Response times		–	–	60 ms	–	60 ms
Repeatability		±0.3 %	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm
Sound beam		12°	8°	8°	8°	8°
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED	LED/LED

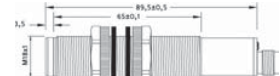
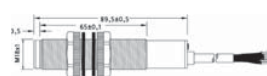
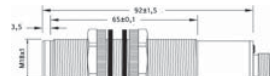
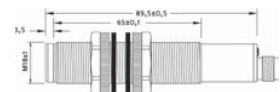
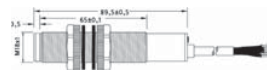
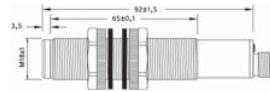
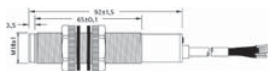
## Mechanical data

Ambient temperature (min/max)		–20°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67
Enclosure material		Stainless steel	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
Connection		M12 x 1	5 x 0.14 mm <sup>2</sup>	4 x 0.14 mm <sup>2</sup>	M12 x 1	M12 x 1

Please refer to Accessories for cable couplers and sensor tester.



M18		M18		M18		M18	
60–500 mm	60–500 mm	60–500 mm	60–500 mm	80–1600 mm	80–1600 mm	80–1600 mm	80–1600 mm
2 x NO/NC	Analogue	2 x NO/NC	Analogue	2 x NO/NC	Analogue	2 x NO/NC	Analogue
Cable 2 m	Cable 2 m	Connector M12	Connector M12	Cable 2 m	Cable 2 m	Connector M12	Connector M12



<b>6711102004</b> UT181-DPE0-0500-C30		<b>6712102004</b> UT181-DPE0-0500-S30		<b>6711102002</b> UT181-DPE0-01.6-C30		<b>6712102002</b> UT181-DPE0-01.6-S30	
<b>6711202004</b> UT181-DNE0-0500-C30		<b>6712202004</b> UT181-DNE0-0500-S30		<b>6711202002</b> UT181-DNE0-01.6-C30		<b>6712202002</b> UT181-DNE0-01.6-S30	
	<b>6711402004</b> UT181-D00U-0500-C30 <b>6711302004</b> UT181-D00I-0500-C30		<b>6712402004</b> UT181-D00U-0500-S30 <b>6712302004</b> UT181-D00I-0500-S30		<b>6711402002</b> UT181-D00U-01.6-C30 <b>6711302002</b> UT181-D00I-01.6-C30		<b>6712402002</b> UT181-D00U-01.6-S30 <b>6712302002</b> UT181-D00I-01.6-S30

12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC
500 mA	–	500 mA	–	500 mA	–	500 mA	–
10 Hz	–	10 Hz	–	6 Hz	–	6 Hz	–
–	0.25 mm	–	0.25 mm	–	1 mm	–	1 mm
–	< 0.5 %	–	< 0.5 %	–	< 0.5 %	–	< 0.5 %
–	100 ms	–	100 ms	–	140 ms	–	140 ms
±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm
8°	8°	8°	8°	8°	8°	8°	8°
Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED

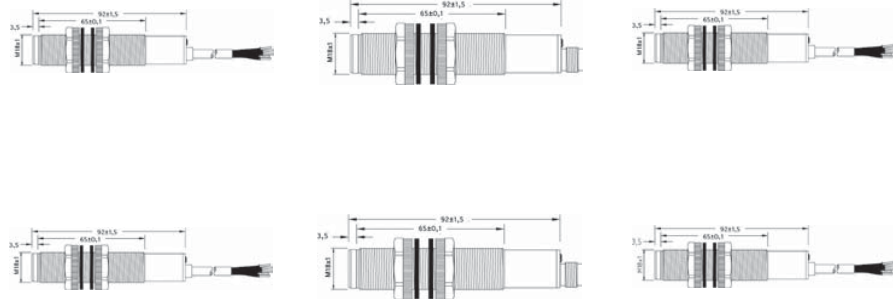
–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C
IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67
PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
5 x 0.14 mm <sup>2</sup>	4 x 0.14 mm <sup>2</sup>	M12 x 1	M12 x 1	5 x 0.14 mm <sup>2</sup>	4 x 0.14 mm <sup>2</sup>	M12 x 1	M12 x 1

You will find detailed data sheets to the products under [www.bernstein.eu](http://www.bernstein.eu)



# Ultrasonic Sensors (Type M18, M30)

Type	M18		M18		M18	
<b>Detection range</b>	100–800 mm	100–800 mm	100–800 mm	100–800 mm	200–2000 mm	200–2000 mm
<b>Output</b>	2 x NO/NC	Analogue	2 x NO/NC	Analogue	2 x NO/NC	Analogue
<b>Type of connection</b>	Cable 2 m	Cable 2 m	Connector M12	Connector M12	Cable 2 m	Cable 2 m
<b>Special feature</b>						



<b>PNP</b>	DC	NO/NC Type	<b>6711102003</b> UT18I-DPE0-0800-C30	<b>6712102003</b> UT18I-DPE0-0800-S30	<b>6711102001</b> UT18I-DPE0-02.0-C30	
<b>NPN</b>	DC	NO/NC Type	<b>6711202003</b> UT18I-DNE0-0800-C30	<b>6712202003</b> UT18I-DNE0-0800-S30	<b>6711202001</b> UT18I-DNE0-02.0-C30	
<b>Analogue</b>	DC	0–10 V Type 4–20 mA Type	<b>6711402003</b> UT18I-D00U-0800-C30 <b>6711302003</b> UT18I-D00I-0800-C30	<b>6712402003</b> UT18I-D00U-0800-S30 <b>6712302003</b> UT18I-D00I-0800-S30	<b>6711402001</b> UT18I-D00U-02.0-C30 <b>6711302001</b> UT18I-D00I-02.0-C30	

## Technical data

Rated operating voltage	$U_B$	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC
Rated operating current	$I_B$	500 mA	–	500 mA	–	500 mA	–
Switching frequency (max)	F	10 Hz	–	10 Hz	–	5 Hz	–
Resolution		–	0.25 mm	–	0.25 mm	–	1 mm
Linearity error		–	< 0.5 %	–	< 0.5 %	–	< 0.5 %
Response times		–	100 ms	–	100 ms	–	200 ms
Repeatability		$\pm 0.2 \% \pm 1 \text{ mm}$	$\pm 0.2 \% \pm 1 \text{ mm}$	$\pm 0.2 \% \pm 1 \text{ mm}$	$\pm 0.2 \% \pm 1 \text{ mm}$	$\pm 0.2 \% \pm 2 \text{ mm}$	$\pm 0.2 \% \pm 2 \text{ mm}$
Sound beam		8°	8°	8°	8°	8°	8°
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED

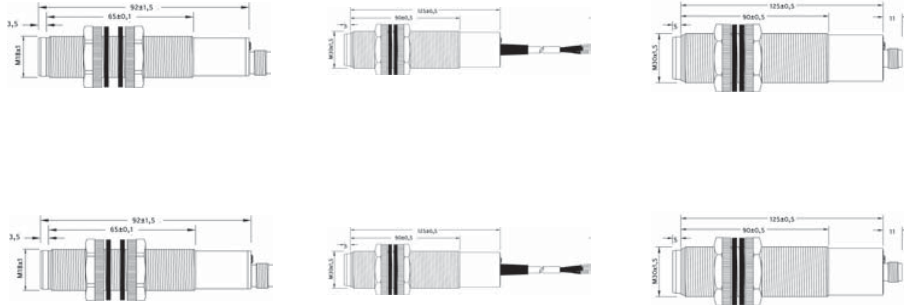
## Mechanical data

Ambient temperature (min/max)		–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67	IP67
Enclosure material		PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
Connection		5 x 0.14 mm <sup>2</sup>	4 x 0.14 mm <sup>2</sup>	M12 x 1	M12 x 1	5 x 0.14 mm <sup>2</sup>	4 x 0.14 mm <sup>2</sup>

Please refer to Accessories for cable couplers and sensor tester.



M18		M30		M30	
200–2000 mm	200–2000 mm	300–3500 mm	300–3500 mm	300–3500 mm	300–3500 mm
2 x NO/NC	Analogue	2 x NO/NC	Analogue	2 x NO/NC	Analogue
Connector M12	Connector M12	Cable 2 m	Cable 2 m	Connector M12	Connector M12



<b>6712102001</b> UT18I-DPE0-02.0-S30		<b>6711103001</b> UT30I-DPE0-03.5-C30		<b>6712103001</b> UT30I-DPE0-03.5-S30	
<b>6712202001</b> UT18I-DNE0-02.0-S30		<b>6711203001</b> UT30I-DNE0-03.5-C30		<b>6712203001</b> UT30I-DNE0-03.5-S30	
	<b>6712402001</b> UT18I-D00U-02.0-S30 <b>6712302001</b> UT18I-D00I-02.0-S30		<b>6711403001</b> UT30I-D00U-03.5-C30 <b>6711303001</b> UT30I-D00I-03.5-C30		<b>6712403001</b> UT30I-D00U-03.5-S30 <b>6712303001</b> UT30I-D00I-03.5-S30

12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC
500 mA	–	500 mA	–	500 mA	–
5 Hz	–	2.5 Hz	–	2.5 Hz	–
–	1 mm	–	1 mm	–	1 mm
–	< 0.5 %	–	< 0.5 %	–	< 0.5 %
–	200 ms	–	400 ms	–	400 ms
±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm
8°	8°	8°	8°	8°	8°
Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED

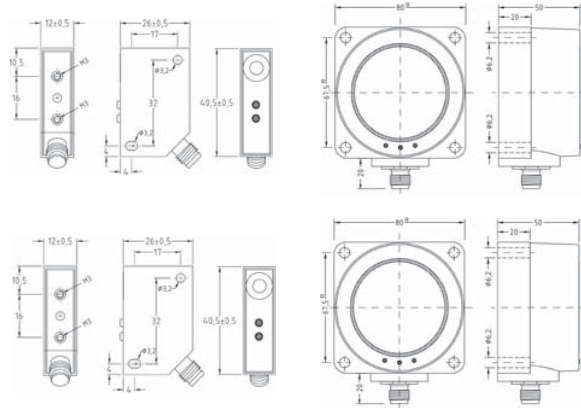
–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C
IP67	IP67	IP67	IP67	IP67	IP67
PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
M12 x 1	M12 x 1	5 x 0.14 mm <sup>2</sup>	4 x 0.14 mm <sup>2</sup>	M12 x 1	M12 x 1

You will find detailed data sheets to the products under [www.bernstein.eu](http://www.bernstein.eu)



# Ultrasonic Sensors (Type 40.5 x 26 x 12 mm, 80 x 80 x 50 mm)

<b>Type</b>	<b>40.5 x 26 x 12 mm</b>		<b>80 x 80 x 50 mm</b>	
<b>Detection range</b>	25–250 mm	25–250 mm	600–6000 mm	600–6000 mm
<b>Output</b>	1 x NO/NC	Analogue	2 x NO/NC	Analogue
<b>Type of connection</b>	Connector M8	Connector M8	Connector M12	Connector M12
<b>Special feature</b>				



<b>PNP</b>	DC	NO/NC Type	<b>6713111001</b> UT25I-DPE0-0250-V30	<b>6712112001</b> UT80I-DPE0-06.0-S30		
<b>NPN</b>	DC	NO/NC Type	<b>6713211001</b> UT25I-DNE0-0250-V30	<b>6712212001</b> UT80I-DNE0-06.0-S30		
<b>Analogue</b>	DC	0–10 V Type 4–20 mA Type	<b>6713411001</b> UT25I-D00U-0250-V30	<b>6712412001</b> UT80I-D00U-06.0-S30 <b>6712312001</b> UT80I-D00I-06.0-S30		

<b>Technical data</b>					
Rated operating voltage	U <sub>B</sub>	10–30 VDC	12–30 VDC	12–30 VDC	15–30 VDC
Rated operating current	I <sub>B</sub>	100 mA	–	500 mA	–
Switching frequency (max)	F	20 Hz	–	1 Hz	–
Resolution		–	0.125 mm	–	1.5 mm
Linearity error		–	< 0.3 %	–	< 0.5 %
Response times		–	40 ms	–	700 ms
Repeatability		±0.2 % ±0.2 mm	±0.2 % ±0.2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm
Sound beam		8°	8°	8°	8°
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED

<b>Mechanical data</b>					
Ambient temperature (min/max)		–10°C/+70°C	–10°C/+70°C	–15°C/+70°C	–15°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP65	IP65
Enclosure material		PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
Connection		M8 x 1	M8 x 1	M12 x 1	M12 x 1

Please refer to Accessories for cable couplers and sensor tester.

