

MAGNETOSTRICTIVE TRANSDUCER



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Series MSB

Key-Features:

- For hydraulic applications
- Measurement ranges from 50 to 4000 mm
- Small overall dimensions
- Plug-in flange or threaded flange
- Linearity up to $\pm 0.02\%$
- Output signal: analog or digital start/stop
- Protection class IP67
- Operating pressure up to 350 bar
- Operating temperature -30...+70 °C

TECHNICAL DATA

Measurement range MR	[mm]	50 / 100 / 130 / 150 / 200 / 225 / 300 / 400 / 450 / 500 / 600 / 700 / 750 / 800 / 900 / 1000 / 1250 / 1500 / 1750 / 2000 / 2250 / 2500 / 2750 / 3000 / 3250 / 3500 / 3750 / 4000
Linearity	[%]	<±0.02 (min. ±0.06 mm)
Repeatability	[mm]	<0.01
Resolution		theoretical infinite, depends on the signal quality of the reference (10 µm)
Hysteresis		<±0.005 % of the measurement range
Sampling time position		MR ≤1000: 1 ms / MR 1250...2000: 1.5 ms / MR ≥2250: 2 ms
Displacement speed	[m/s]	≤10
Acceleration max.	[m/s ²]	≤100
Output signal		0.1...10.1 V / 0.1...5.1 V ¹⁾ / 4...20 mA / RS422 (Start/Stop) ²⁾
Output load	[kΩ]	5
Supply	[VDC]	18...30 (12 for output signal 0.1...5.1 V)
Electrical isolation	[VDC]	100
Current consumption max.	[mA]	40 (load on output start/stop: 300 Ω)
Power ripple	[V _{pp}]	max. 1
Protection class		IP67
Operating temperature	[°C]	MB ≤2500: -30...+90 (bei ≤24 VDC) / MB ≥2750: -30...+70
Storage temperature		-40...+100
Temperature coefficient	[% FS/°C]	0,005
Operating pressure max.	[bar]	350 (peak max. 500)
Inverse polarity protection		yes
Over-voltage protection		yes
Shock resistance (DIN IEC68T2-27)		100 g, 11 ms, single shock
Vibration resistance (DIN IEC68T2-6)		20 g, 10...2000 Hz
Connection		MSB-...-F1: cable output / MSB-...-F2: connector output
Housing		stainless steel AISI 316
Mounting		MSB-...-F1: plug-in flange / MSB-...-F2: threaded flange

¹⁾ Measurement range max. 1250 mm

²⁾ RS422 (Start/Stop) only for version F1

DIGITAL OUTPUT RS422

Magnetostrictive transducers of the MSB-...-S-F1 series supply digital outputs in START/STOP format with RS422 differential serial transmission. The transducer requests an initialisation pulse that launches sampling.

The following pulses are transmitted on the outputs:

Start: the Initialisation pulse retransmitted

Stop: the pulse corresponding to the position of each magnet.

The time between the Start pulse and the subsequent Stop pulses is proportional to the position of each magnet according to the "Magnetostrictive wave propagation speed" constant, equal to about 2900 m/s.

$$P = \text{Time} * 2900 \text{ m/s}$$

The correct propagation speed for each product is shown on the product label.

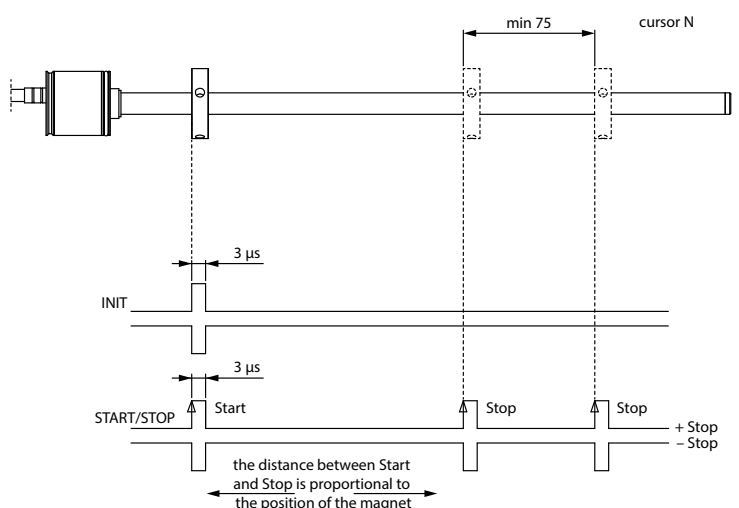
Resolution in terms of metres is linked to the resolution used to measure time

$$1 \mu\text{s} (1 \text{ MHz}) \Rightarrow 2.9 \text{ mm}$$

$$10 \text{ ns} (100 \text{ MHz}) \Rightarrow 29 \mu\text{m}$$

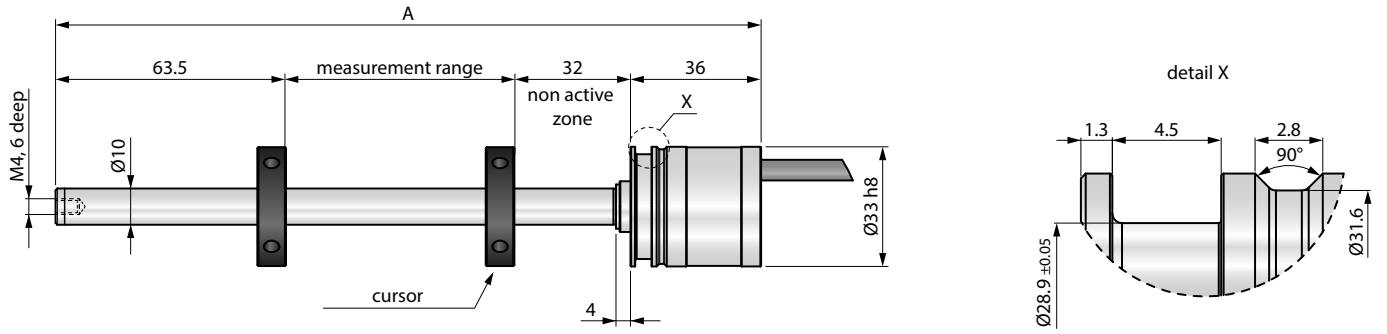
$$1 \text{ ns} (1 \text{ GHz}) \Rightarrow 2.9 \mu\text{m}$$

The measurement reference is the leading edge of the pulse. Optimum width of the interrogation pulse is 3 µs, but the transducer works correctly for times from 1.5 to 5 µs.

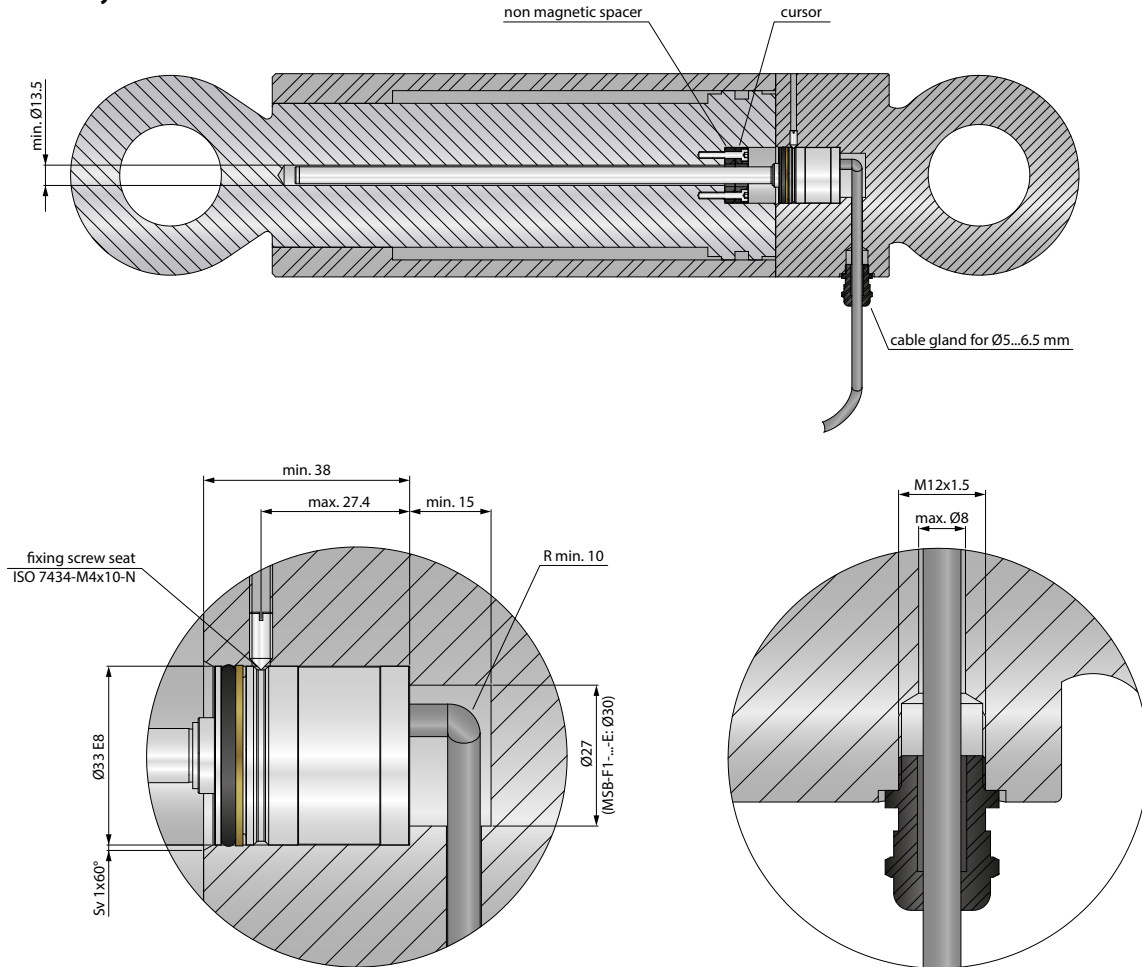


TECHNICAL DRAWING

Dimensions: MSB-...-F1

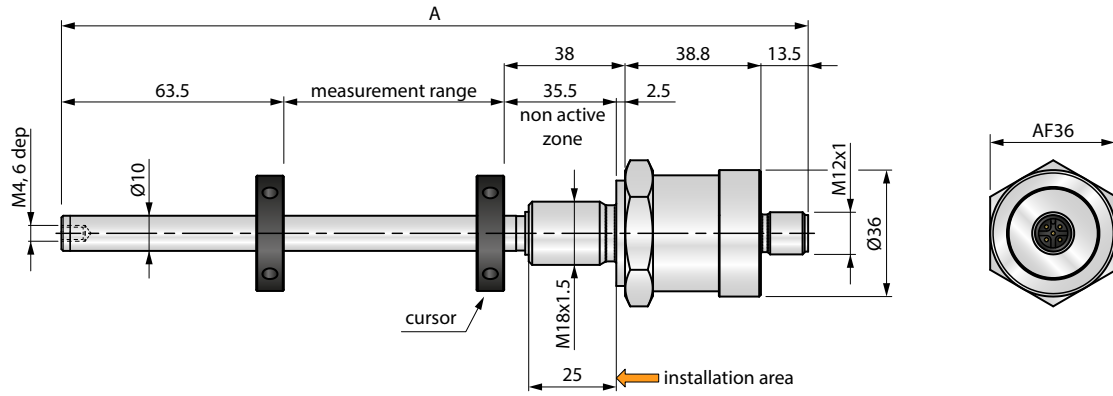


Installation inside a cylinder: MSB-...-F1

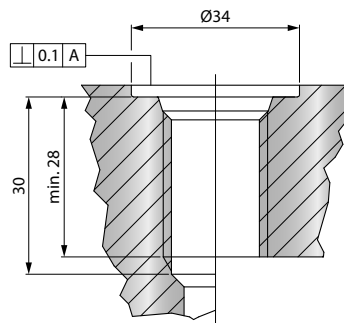
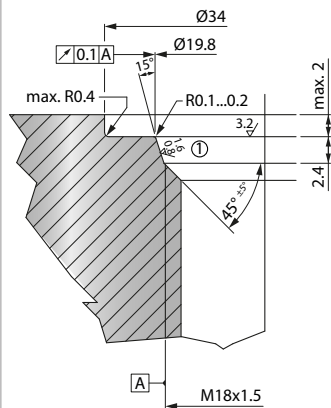
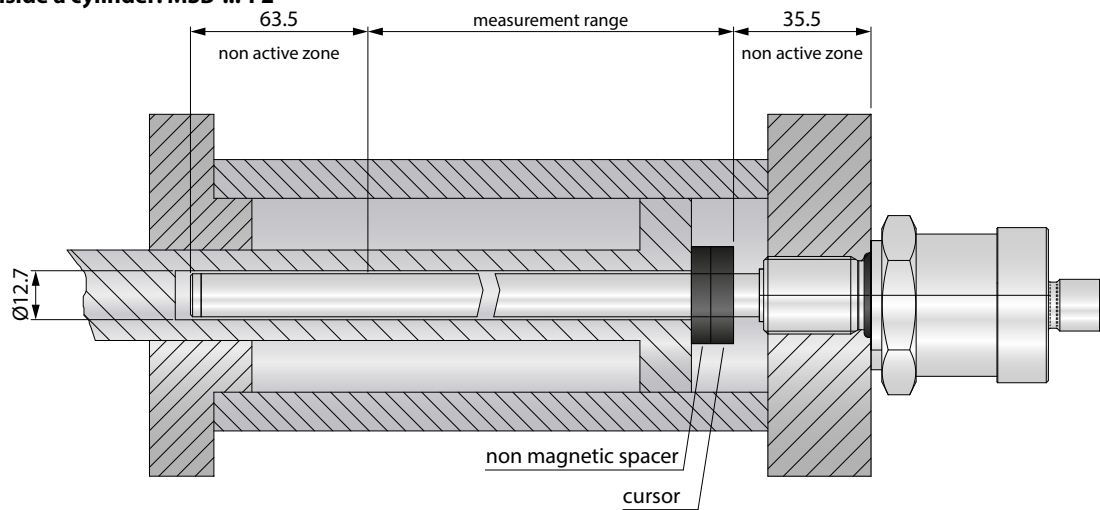


TECHNICAL DRAWING

Dimensions: MSB-...-F2



Installation inside a cylinder: MSB-...-F2



① The seal surface must be free from winding or longitudinal scratches.

Ro 1.6 μm for seals with NON pulsating pressure
 Ro 0.8 μm for seals with pulsating pressure

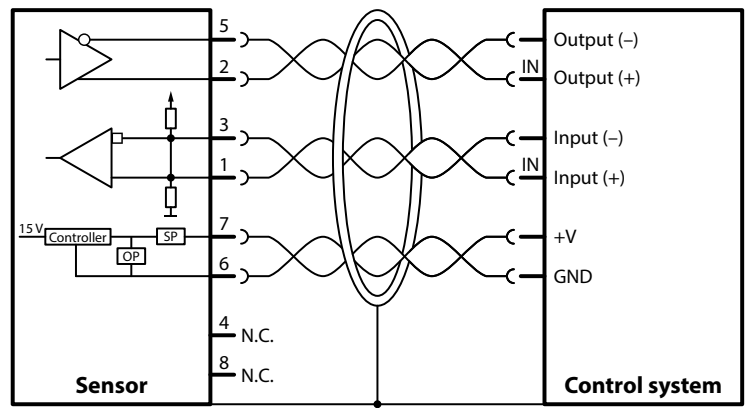
ELECTRICAL CONNECTION

MSB-...-F1: analog output

Function	Cable colour
Signal	YE
GND _{signal}	PK
+V	BN
GND _{supply}	BU

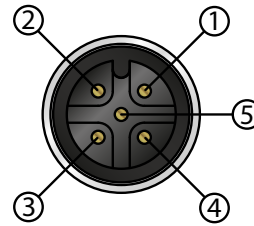
MSB-...-F1: digital output

Function	Cable colour
Output (+)	GY
Output (-)	GN
Input (+)	YE
Input (-)	PK
+V	BN
GND _{supply}	BU



MSB-...-F2

Pin	Function	Connection cable KSP Cable colour
1	Signal	BN
2	GND _{signal}	WH
3	Do not connect	BU
4	GND _{supply}	BK
5	+V	GY



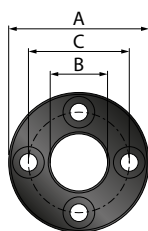
MAGNETIC CURSORS

Magnetic cursors	A [mm]	B [mm]	C [mm]	D [mm]	thickness [mm]
PCUR022	32.8	13.5	23.9	-	7.9
PCUR023	32.8	13.5	23.9	11	7.9
PCUR024	25.4	13.5	-	-	7.9
PCUR026 ¹⁾	52.4	12	44	-	-
PCUR027 ¹⁾	52.4	15	44	-	-

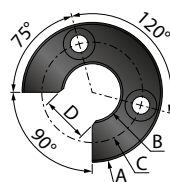
Magnetic cursor	Scope of delivery
PCUR022	<ul style="list-style-type: none"> N° 8 brass nuts M4 N° 8 brass washers D4 N° 4 brass screws M4x25
PCUR023	<ul style="list-style-type: none"> N° 4 brass nuts M4 N° 4 brass washers D4 N° 2 brass screws M4x25
PCUR026, PCUR027	<ul style="list-style-type: none"> stopper set (PKIT036)

¹⁾ Floating cursor for liquids, material: stainless steel AISI 316
Magnetic cursors for liquids need higher measurement range.

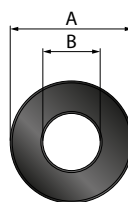
PCUR022



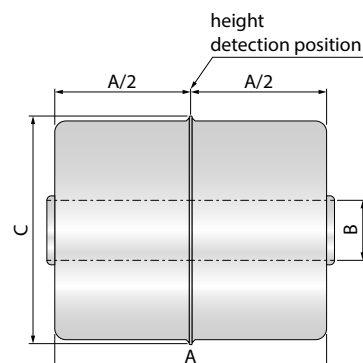
PCUR023



PCUR024



PCUR026/PCUR027



ORDER CODE

MSB - [] - [] - []

Measurement range [mm] See „Technical Data“	e. g. 50
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Output signal	
Analog output 0.1...10.1 V	N
Analog output 0.1...5.1 V ¹⁾	K
Analog output 4...20 mA	E
Digital output RS422 Start/Stop ²⁾	S

F1	Version Plug-in flange, cable output 1 m Threaded flange, connector M12 ³⁾
F2	

Note: Magnetic cursors must be ordered separately!

¹⁾ Measurement range max. 1250 mm

²⁾ Version F1 only

³⁾ Magnetic cursors for liquids need higher measurement range.

ACCESSORIES

Magnetic cursors (not included in sensor scope of delivery)

PCUR022	Magnetic cursor Ø32.8 mm
PCUR023	Magnetic cursor Ø32.8 mm with 90° slit
PCUR024	Magnetic cursor Ø25.4 mm
PCUR026	Floating cursor for liquids, hole Ø12 mm
PCUR027	Floating cursor for liquids, hole Ø15 mm
CUR022	Non-magnetic spacer for PCUR022

Digital displays for sensors with analog output, 2 channel

WAY-AX-S	touch screen, supply: 18...30 VDC
WAY-AX-S-AC	touch screen, supply: 115...230 VAC

Cable with mating connector M12 (female) for MSB-...-F2

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

Connector (female) for self assembly for MSB-...-F2

D5-G-M12-S	straight connector M12, 5 pins, IP67
D5-W-M12-S	angular connector M12, 5 pins, IP67