



# Magnetostrictive Level Transmitters

## Expert Line



measuring  
•  
monitoring  
•  
analysing

### NMB



NMB-TF/-BF

NMB-C

NMB-T

NMB-G



NRM-300P



- 0.1 mm (0.004") or 1 mm (0.04") resolution
- Insertion length up to 15 m (50 ft)
- Rigid or flexible guide tube
- Plastic-coated version for chemicals
- 4...20 mA and HART® output
- Graphic display
- 99 point linearisation table
- Volume measurement
- Interface measurement
- ATEX certified variants (in preparation)
- IP67 (IP68)

N2



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KOBOLD Messring GmbH  
Nordring 22-24  
D-65719 Hofheim/Ts.  
Head Office:  
+49(0)6192 299-0  
+49(0)6192 23398  
info.de@kobold.com  
www.kobold.com



**Description**

NMB magnetostrictive level transmitters are an ideal solution for accurately measuring clean liquids. Their accuracy makes them an excellent choice for custody transfer measurement of liquids such as fuels, solvents, and alcohol derivatives.

Flexible tube units allow accurate measurements in tanks as high as 15 meters (50 ft). Plastic-coated models can be used with aggressive materials. Integrating the transmitter into a process control system is easy with intelligent signal processing, communication software, and a wide range of accessories.

**Operating Principle**

A float containing a magnetic disc moves along a guide tube with the specific magnetostrictive wire in it. A pulse generated by the electronics travels along the magnetostrictive wire.

At the point the pulse reaches the float's magnetic field, a torsion develops. Reflected from the torsion point, the pulse creates an acoustic wave that travels back along the wire.

The 4...20 mA output of the transmitter is proportional to the elapsed time between the excitation and detection.

**Applications**

- Oil, gas and chemical industry
- Fuels and gasoline products
- Pharmaceutical industry
- Alcohols and beverages, food industry
- Installation in bypass tubes possible
- Supplementary level transmitter for NBK bypass level indicator

**Certificates (in preparation)**

- ATEX (Ex ia G)
- ATEX (Ex d G)
- ATEX (Ex d ia G)
- IEC Ex (Ex ia G)
- IEC Ex (Ex d G)
- IEC Ex (Ex d ia G)

**Technical Details**

	Rigid probe	Flexible probe	Plastic coated rigid probe	Mini version with rigid probe
Measured process value	Liquid level, distance, volume			
Nominal length (L)	0.5...4.5 m (1.5...14.5 ft)	2...15 m (6.5...50 ft)	0.5...3 m (1.5...10 ft)	0.5...1.5 m (1.5...4.5 ft)
Material of the tube	1.4571 (316Ti) stainless steel		PFA-coated stainless steel	1.4571 stainless steel
Highest process pressure <sup>1)</sup>	25 bar (2.5 MPa, 363 psi)	16 bar (1.6 MPa, 232 psi)	3 bar (0.3 MPa, 43.5 psi)	10 bar (1 MPa, 145 psi)
Process temperature	-40...+90°C (-40...+194°F), see temperature diagram			
Standard float diameter / material <sup>2)</sup>	Ø53.5x60 mm (Ø2x2.35") cylindrical / 1.4404 (316L)	Ø96 mm (Ø4") ball / 1.4435 (316L)	Ø76x87 mm (Ø3x3.45") cylindrical / PVDF / PP	Ø28x28 mm (Ø1x1.15") cylindrical 1.4404 (316L)
Medium density	See "Floats"			
Material of wetted parts	Titanium, Stainless Steel		PFA, PVDF, PP	Titanium, Stainless Steel
Ambient temperature	-40...+70°C (-40...+158°F), plastic housing: -25...+70°C (-13...+158°F), with display: -25...+70°C (-13...+158°F), Ex variant: see temperature diagram in the user's manual			
Output	Analogue	4...20 mA (limit values: 3.9...20.5 mA)		
	Digital	HART® (lowest loop resistance: 250 Ω)		
	Display	Graphic display NRM-300P		
Damping time	Adjustable 0...99 s			
Error indication	22 mA or 3.8 mA or holding			
Output load	$R_L = (U_s - 12.5 V) / 0.02 A$ , $U_s =$ supply voltage			
Supply voltage	12.5...36 V <sub>DC</sub>			
Electrical protection	Class III			
Ingress protection	IP67, IP68 for output code "9" (4 m water column for 4 hours)			
Process connection	As per order code			
Electric connection	2x M20x1.5 plastic cable glands for Ø6...Ø12 mm (Ø0.23...0.47") cable, + 2x internally threaded ½" NPT connection for protective pipes for 0.5...1.5 mm <sup>2</sup> (AWG20...15) wire cross section, IP68 protection: up to 20 m (65 ft), LiY-CY 6x0.5 mm (0.24x0.02"), fitted with 500 V cable			
Housing	Plastic (PBT) or painted aluminium or stainless steel			
Weight	1.7 kg (3.75 lb) + m. probe: 0.6 kg/m (0.4 lb/ft)	2.9 kg (6.4 lb) + m. probe: 0.3 kg/m (0.2 lb/ft) + counterweight 3.5 kg (7.7 lb)	1.7 kg (3.75 lb) + m. probe: 0.7 kg/m (0.45 lb/ft)	1.7 kg (3.75 lb) + m. probe: 0.6 kg/m (0.4 lb/ft)

<sup>1)</sup> Depends on selected float, with sliding sleeve connection the highest process pressure is 3 bar (0.3 MPa)

<sup>2)</sup> Requested float version must be specified in the order



**Measurement Details**

	1 mm resolution	0.1 mm resolution
Resolution <sup>3)</sup>	1 mm (0.04")	0.1 mm (0.004")
Nonlinearity <sup>3) 4)</sup> (up to 10 m [32.8 ft] order length)	±2 mm (±0.08") or ±0.02% F.S. whichever is greater	±1 mm (0.04") or ±0.01% F.S. whichever is greater
Nonlinearity <sup>3) 4)</sup> (above 10 m [32.8 ft] order length)	±3 mm (±0.12") or ±0.02% F.S. whichever is greater	
Hysteresis <sup>5)</sup>	±1 mm (±0.04")	±0.25 mm (±0.01") (up to 10 m [32.8 ft] length)
		±1 mm (±0.04") (above 10 m [32.8 ft] length)
Zero span (in LEVEL mode)	Anywhere within the active range	
Measuring Range (reducing)	Minimum distance: 200 mm (7.87"); maximum distance: as per probe length	
Temperature error	0.04 mm / 10 °C (0.0015" / 50 °F) between (-25...+50 °C [-13...+122 °F])	
Current Output Properties	Resolution: 2 µA, accuracy: 10 µA, temperature error: 200 ppm/°C	

<sup>3)</sup> For displayed and HART® transmitted values

<sup>4)</sup> Under reference conditions

<sup>5)</sup> In case of a different factory setting the accuracy data is not valid!

**Ex Information (in preparation)**

	ia (IP68) <sup>6)</sup>	ia	d	dia
Ex marking (ATEX)	Ⓔ Ex II 2Gx II 1 G Ex ia IIB T6...T5 Ga		Ⓔ Ex II 1/2 G Ex d ia IIB T6...T5 Ga/Gb	Ⓔ Ex II 2 G Ex d IIB T6...T5 Gb
Ex marking (IECEX)	Ex ia IIB T6...T5 Ga		Ex db ia IIB T6 Ga/Gb	Ex db IIB T6...T5 Gb
Nominal length (L)	0.5...15 m (1.64...49 ft)		0.5...10 m (1.64...32.8 ft)	
Cable entry	-	M20×1.5 cable gland	Metal M20×1.5 cable gland Ex d certification	
Cable outer diameter	-	∅7 ... ∅13 mm (∅0.27 ... ∅0.5")	∅9 ... ∅11 mm (∅0.35 ... ∅0.43")	
Stock cable	max. 20 m; LiY-CY 6x0.5 mm; 500 V C < 9 nF; L < 10 µH		-	
Ex supply voltage, Intrinsically safety data	U <sub>i</sub> = 30 V I <sub>i</sub> = 140 mA P <sub>i</sub> = 1 W		U <sub>s</sub> : 12.5...36 V <sub>DC</sub> I <sub>i</sub> = 140 mA	
	ATEX: C <sub>i</sub> < 25 nF, L <sub>i</sub> < 210 µH			
	IECEX: C <sub>i</sub> < 15 nF, L <sub>i</sub> < 200 µH			
	U <sub>i</sub> = 30 V I <sub>i</sub> = 140 mA P <sub>i</sub> = 1 W C <sub>i</sub> < 15 nF L <sub>i</sub> < 200 µH			

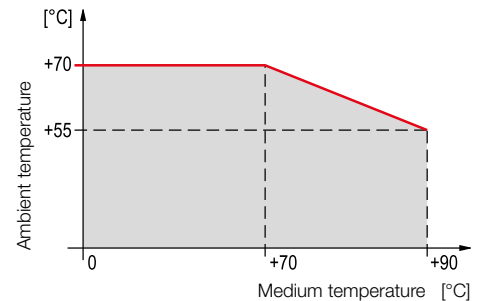
<sup>6)</sup> Caution! The NMB-xxxxxxx90 is rated IP68. The cover, the cable gland, the cable, and the cover plug are glued in place and cannot be opened!

**Temperature Parameters**

**Temperature limits for Ex version (in preparation)**

Type	Temperature class	Max. ambient temperature	Max. medium temperature
Rigid probe	T6	+70 °C (+158 °F)	+80 °C (+176 °F)
Rigid probe with plastic coating			
Flexible probe			+70 °C (+158 °F)
Rigid probe	T5	+55 °C (+131 °F)	+90 °C (+194 °F)
Rigid probe with plastic coating			

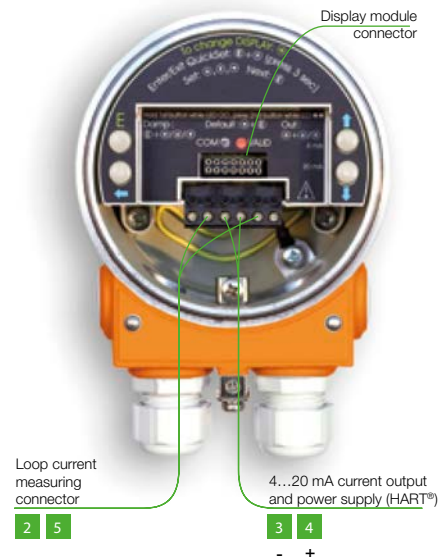
**Temperature Diagram**



**Lower Temperature Limit**

Type		Ex protection type		
		ia	d	dia
Transmitter		-40 °C (-40 °F)		
Transmitter with display	ATEX	-25 °C (-13 °F)	-20 °C (-4 °F)	
	IEC Ex	-25 °C (-13 °F)		

**Wiring**





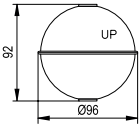
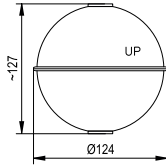
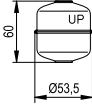
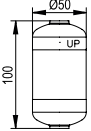
**Order Details NMB** (Example: NMB-TRR25A051S)

Model	Design	Probe Type / Process connection	Housing	Probe length
NMB-	<p>T = Transmitter                      B<sup>1)</sup> = Transmitter + Display                      E = Transmitter with PFA-coated probe                      G<sup>1)</sup> = Transmitter with PFA-coated probe + display                      M<sup>2)</sup> = Transmitter mini                      C<sup>2)</sup> = Transmitter mini + display</p>	<p><b>For NMB-T/-B</b>                      RR25 = rigid / G 1                      RR50 = rigid / G 2                      RN25 = rigid / 1" NPT                      RN50 = rigid / 2" NPT                      RT65 = rigid / 2½" TriClamp                      RT80 = rigid / 3" TriClamp                      RT1H = rigid / 4" TriClamp                      R00U<sup>3)</sup> = rigid / without (for sliding sleeve)                      FR50 = flexible / G 2                      FN50 = flexible / 2" NPT</p>	<p>A = Aluminium, housing position "A"                      L = Aluminium, housing position "B"                      P = Plastic, housing position "A" (not for Ex)                      F = Plastic, housing position "B" (not for Ex)                      E = St. Steel, housing position "A"                      G = St. Steel, housing position "B"</p>	<p>05 = 0.5 m                      06 = 0.6 m                      ...                      15 = 1.5 m (max. length with rigid probe, mini version)                      ...                      17 = 1.7 m                      ...                      21 = 2.1 m                      ...                      30 = 3.0 m (max. length with PFA-coated rigid probe)                      ...                      45 = 4.5 m (max. length with probe type "rigid")                      ...                      A0 = 10 m                      A1 = 10.1 m                      ...                      A9 = 10.9 m                      B0 = 11.0 m                      ...                      C0 = 12.0 m                      ...                      D0 = 13.0 m                      ...                      E0 = 14.0 m                      ...                      F0 = 15.0 m (max. length with probe type "flexible")</p>
		<p><b>For NMB-E/-G</b>                      R00U<sup>3)</sup> = rigid / without (for sliding sleeve)</p>		
		<p><b>For NMB-M/-C</b>                      RR25 = rigid / G 1                      RN25 = rigid / 1" NPT                      RT40 = rigid / 1½" TriClamp                      RT50 = rigid / 2" TriClamp                      RT65 = rigid / 2½" TriClamp                      RT80 = rigid / 3" TriClamp                      RT1H = rigid / 4" TriClamp</p>		

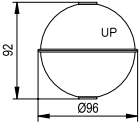
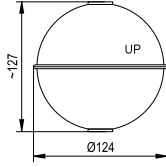
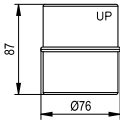

Electrical output/ Resolution	Float options
<p>1 = 4 ... 20 mA / 0.1 mm                      2 = 4 ... 20 mA / 1 mm                      3 = 4 ... 20 mA + HART®/ 0.1 mm                      4 = 4 ... 20 mA + HART®/ 1 mm                      5 = 4 ... 20 mA / 0.1 mm / Ex ia G (in preparation)                      6 = 4 ... 20 mA / 1 mm / Ex ia G (in preparation)                      7 = 4 ... 20 mA + HART®/0.1 mm / Ex ia G (in preparation)                      8 = 4 ... 20 mA + HART®/1 mm/ Ex ia G (in preparation)                      A<sup>4)</sup> = 4 ... 20 mA / 0.1 mm / Exd G (≤10 m)                      B<sup>4)</sup> = 4 ... 20 mA + HART®/0.1 mm / Exd G (≤10 m)                      C<sup>4)</sup> = 4 ... 20 mA / 0.1 mm / Exd ia G (≤10 m)                      D<sup>4)</sup> = 4 ... 20 mA + HART®/0.1 mm / Exd ia G (≤10 m)</p>	<p>S = Standard float (see table for "floats")  <b>For NMB-TR/BR</b>                      2 = Float Ø124 mm stainless steel (1.4401) ball float (for min. 0.4 kg/dm<sup>3</sup> liquids)                      3 = Float Ø53.5 mm titanium float (for min. 0.55 kg/dm<sup>3</sup> liquids)                      4 = Float Ø50x100 mm titanium float (min. 0.45 kg/dm<sup>3</sup>)                      6 = Float Ø53.5 mm st. st. 1.4404, min. 0.8 kg/dm<sup>3</sup>  <b>For NMB-TF/BF</b>                      2 = Float Ø124 mm stainless steel (1.4401) ball float (for min. 0.4 kg/dm<sup>3</sup> liquids)  <b>For NMB-E/G</b>                      5 = Float made of PP</p>

<sup>1)</sup> Standard display in Position "A"  
<sup>2)</sup> Insertion length max. 1500 mm  
<sup>3)</sup> Threaded sliding sleeve should be ordered separately  
<sup>4)</sup> Insertion length max. 10 000 mm (in preparation)

**Schwimmer-Auswahl**

Type	for NMB-TR/BR				
	Standard	Code "2"	Code "3" <sup>1)</sup>	Code "6" <sup>1)</sup>	Code "4" <sup>1)</sup>
Dimensions [mm]					
Medium Density (min.)	0.55 kg/dm <sup>3</sup>	0.4 kg/dm <sup>3</sup>	0.55 kg/dm <sup>3</sup>	0.8 kg/dm <sup>3</sup>	0.45 kg/dm <sup>3</sup>
Material	1.4435	1.4401	Titan	1.4404	Titan
Medium pressure	16 bar	25 bar			16 bar

<sup>1)</sup> Designed for min. 2" process connection.

Type	for NMB-TF/BF		for NMB-E/G		for NMB-M
	Standard	Code "2"	Standard	Code "5"	Standard
Dimensions [mm]					
Medium Density (min.)	0.55 kg/dm <sup>3</sup>	0.4 kg/dm <sup>3</sup>	0.7 kg/dm <sup>3</sup>	0.4 kg/dm <sup>3</sup>	0.8 kg/dm <sup>3</sup>
Material	1.4435	1.4401	PVDF	PP	1.4404
Medium pressure	16 bar	25 bar	3 bar		10 bar



**Order Details Connections NMS/NMB** (Example: ZUB-NMS/B CER25)

Model	Connection/ Material/ Size
ZUB-NMS/B	<p><b>For NMS-S/NMB-TR/BR</b>  <b>CER25</b> = Sliding sleeve, 1.4571, 1" BSP  <b>CER50</b> = Sliding sleeve, 1.4571, 2" BSP  <b>CEN25</b> = Sliding sleeve, 1.4571, 1" NPT  <b>CEN50</b> = Sliding sleeve, 1.4571, 2" NPT</p> <p><b>For NMS-K/NMB-E/G</b>  <b>CPR25</b> = Sliding sleeve, PVDF, 1" BSP  <b>CPN25</b> = Sliding sleeve, PVDF, 1" NPT  <b>F6F80</b> = PP flange FF DN80, PN16 + 1" BSP sliding sleeve model CPR25 must be ordered  <b>F6F1H</b> = PP flange FF DN100, PN16 + 1" BSP sliding sleeve model CPR25 must be ordered</p>

**Accessories**

Code	Description	Image
HARTCOMM	HART® modem (Download of configuration software NUS-NTB-NRM-SW at <a href="http://www.kobold.com">www.kobold.com</a> )	
NRM-300P	Plug-in graphical display module	
NUS-NTB-NRM-SW	Configuration software for remote programming with PC (FREE download)	

**Process Connections\***

Code	Description	Image
ZUB-NMS/B...	Sliding sleeve 1.4571 (316Ti) or PVDF: 1", 2" BSP/ NPT process connection	

\* The process connections and special seals are ordered separately and must be specified in the text part of the order



Magnetostrictive Level Transmitters Model NMB

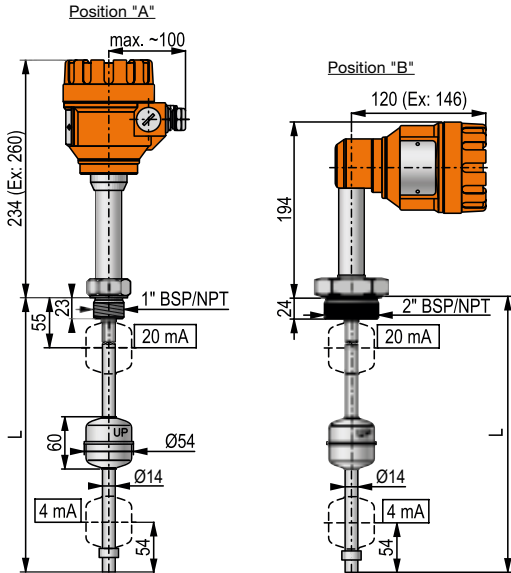
Order Details ZGF (Example: ZGF-A1 D51)

Model	Version	Standard / Flange Material/ Form
ZGF= Flange as accessory e.g. for NRE	A = Flat Face (A) T = Raised Face (B1) C = Tongue (C) D = Groove (D)	<b>1</b> = DIN / Carbon steel / EN 1092 B1 <b>2</b> = DIN / Stainless steel / EN 1092 B1 <b>3</b> = DIN / Polypropylene / EN 1092 A <b>5</b> = ANSI / Carbon Steel / ASME B16.5 RF <b>6</b> = ANSI / Stainless steel / ASME B16.5 RF <b>7</b> = ANSI / PP / ASME B16.5 FF <b>A</b> = JIS / Carbon steel / B 2220 RF <b>B</b> = JIS / Stainless steel / B 2220 RF <b>C</b> = JIS / PP / B 2220 FF
Process connection DIN / ANSI / JIS	Nominal pressure DIN / ANSI / JIS	Instrument side connection
<b>D</b> = DN15 / ½" / 15A <b>A</b> = DN20 / ¾" / 20A <b>B</b> = DN25 / 1" / 25A <b>C</b> = DN32 / 1¼" / 32A <b>7</b> = DN40 / 1½" / 40A <b>0</b> = DN50 / 2" / 50A <b>1</b> = DN65 / 2½" / 65A <b>2</b> = DN80 / 3" / 80A <b>3</b> = DN100 / 4" / 100A <b>4</b> = DN125 / 5" / 125A <b>5</b> = DN150 / 6" / 150A <b>6</b> = DN200 / 8" / 200A <b>8</b> = DN250 / 10" / 250A <b>9</b> = DN300 / 12" / 300A	<b>5</b> = PN6 / - / 5K <b>6</b> = PN10 / - / 10K <b>1</b> = PN16 / 150 psi / 16K <b>2</b> = PN25 / 300 psi / 30K <b>3</b> = PN40 / 600 psi / 40K <b>4</b> = PN63 / 900 psi / 63K	<b>1</b> = ¼" BSP <b>C</b> = ½" BSP <b>D</b> = ½" NPT <b>E</b> = ¾" BSP <b>4</b> = ¾" NPT <b>2</b> = 1" BSP <b>5</b> = 1" NPT <b>7</b> = 1½" BSP <b>8</b> = 1½" NPT <b>3</b> = 2" BSP <b>6</b> = 2" NPT <b>9</b> = M20x1.5 <b>J</b> = Weldable to NGS (stainless steel only) <b>L</b> = Weldable to NRM-4/ NRE-4 (stainless steel only)

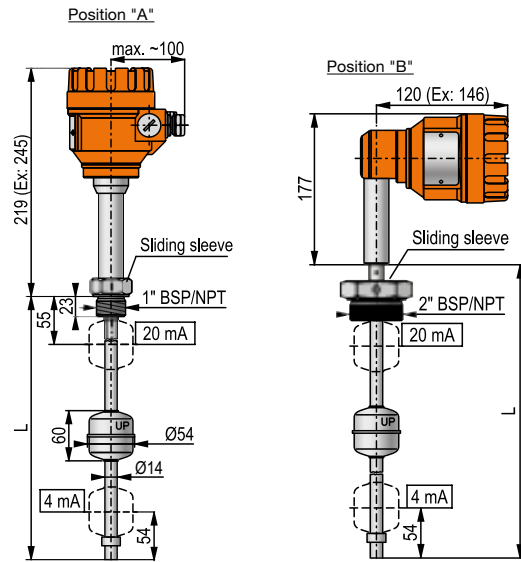


**Dimensions [mm]**

**Rigid probe with threaded process connection**



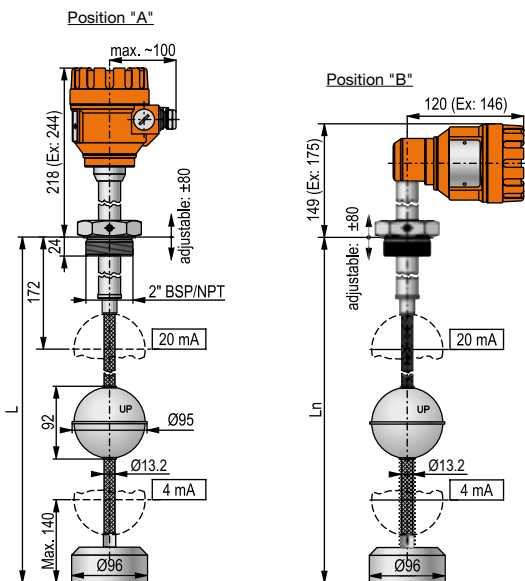
**Rigid probe without process connection <sup>1)2)</sup>**



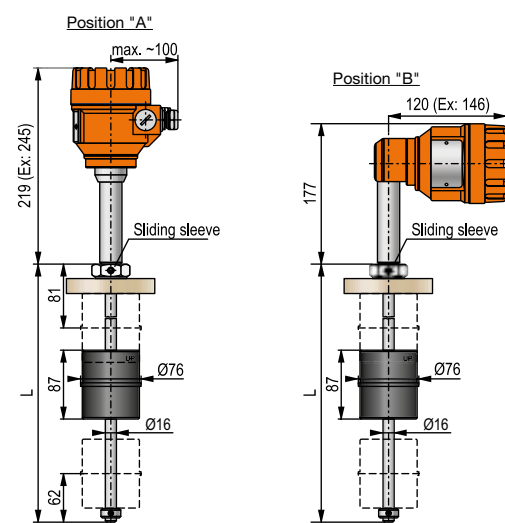
<sup>1)</sup> Sliding sleeve and flange to be ordered separately

<sup>2)</sup> NMB-T(B)ROOL is without float and without process connection for NBK

**Flexible probe with sliding sleeve and counterweight**



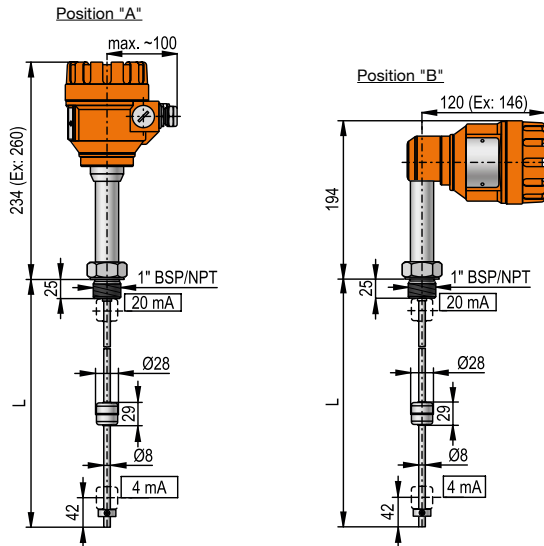
**Rigid probe with plastic coating without process connection <sup>1)</sup>**



<sup>1)</sup> Sliding sleeve and flange to be ordered separately

Dimensions [mm] (cont'd)

Mini type rigid probe transmitter with threaded process connection

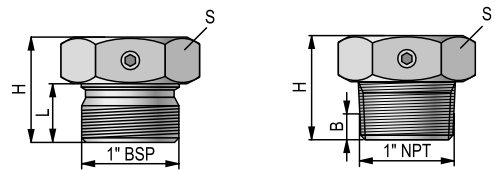


Accessories

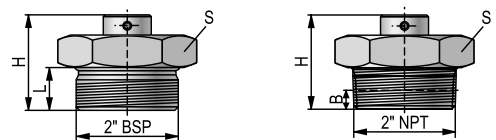
Sliding Sleeve

	Material	Proc. conn.	Dimensions			
			S	H	L	B
ZUB-NMB/S-CER25	1.4571 (316Ti)	1" BSP	41 mm (1.61")	36 mm (1.42")	20 mm (0.79")	-
ZUB-NMB/S-CER50		2" BSP	60 mm (2.36")	55 mm (2.17")	24 mm (0.94")	-
ZUB-NMB/S-CEN25		1" NPT	41 mm (1.61")	37 mm (1.46")	-	10 mm (0.39")
ZUB-NMB/S-CEN50		2" NPT	60 mm (2.36")	44.5 mm (1.75")	-	11 mm (0.43")
ZUB-NMB/S-CPR25	PVDF	1" BSP	46 mm (1.81")	42 mm (1.65")	22 mm (0.87")	-
ZUB-NMB/S-CPN25		1" NPT	46 mm (1.81")	42 mm (1.65")	25 mm (0.98")	-

ZUB-NMB/S-CER25/-CEN25



ZUB-NMB/S-CER50/-CEN50



ZUB-NMB/S-CPR25

