

GENERAL DESCRIPTION

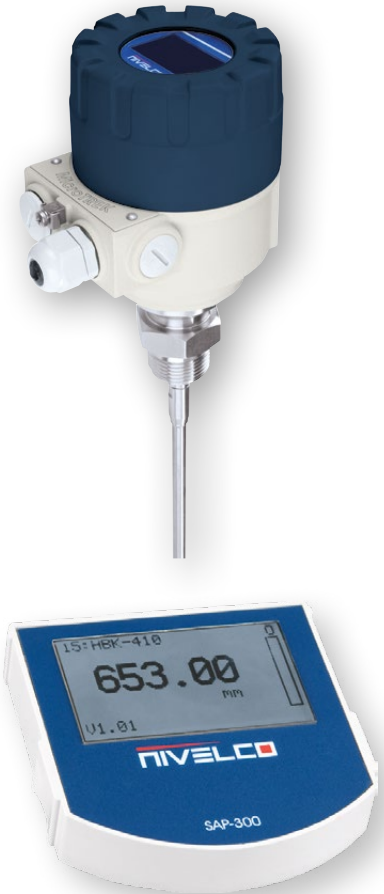
The **MicroTREK** Guided Wave Radar level transmitter is designed for continuous level measuring of conductive or non-conductive liquids, pulps and solids. **MicroTREK** level gauge operates based on the well-known TDR (Time Domain Reflectometry) principle. Micropulses are sent along a probe guide at the speed of light. As soon as the impulse reaches the surface of the medium, it is reflected back to the electronic module. Level distance is directly proportional to the flight time of the impulse. The reflected signal is dependent on the dielectric constant of the material, the feasibility of the measurement is $\epsilon_r \geq 1.4$. The TDR technology is unaffected by the properties of the medium as well as that of the space above it. Measurement is also unaffected by the change in the physical properties of the materials such as temperature, pressure, dielectric constant.

MAIN FEATURES

- Measuring range up to 80 feet
- Accuracy: ± 0.2 inch for liquids
- Measurement is independent of dielectric constant, temperature, pressure and density variations
- Rod, cable and coaxial probes
- Segmented rod probe version
- Minimum $\epsilon_r \geq 1.4$
- 2-wire version
- Graphic display
- 4-20 mA + HART output
- Medium temperature range: $-22^\circ\text{F} \dots +392^\circ\text{F}$
- Maximum process pressure: 580 psig
- IP67 protection

CERTIFICATIONS

- ATEX approved (Ex ia)
- ATEX approved (Ex iaD)
- ATEX approved (Dust Ex)
- IEC approved (Ex ia)
- IEC approved (Ex iaD)



SAP-300 display



HHA-400

HTK-400

APPLICATIONS

Mono cable / Mono rod Mono segmented rod	Twin cable	Twin rod	Coaxial Pipe
<ul style="list-style-type: none"> ■ Cement, limestone, fly ash, alumina, carbon black ■ All high-viscosity liquids ■ Mineral powders ■ Clean and contaminated liquids ■ For stilling wells (calibration required) ■ Aggressive mediums with plastic coated probes ■ Slightly conductive foams ■ High temperature applications ■ Bypass applications 	<ul style="list-style-type: none"> ■ Tank parks with solvents, oil or fuels ■ Water storage tanks ■ Plastic granules ■ For products with low dielectric constant ($\epsilon_r > 1.8$) ■ For any liquids, light granules ■ For narrow tanks ■ Where minimum dead-zone is needed ■ Mounting close to tank wall is possible 	<ul style="list-style-type: none"> ■ Plastic granule vessels ■ Coated tanks ■ Clean and contaminated liquids ■ Fine powders ■ Where minimum dead-zone is needed ■ For narrow tanks ■ For mediums with low dielectric constant and slightly moving products 	<ul style="list-style-type: none"> ■ Small vessels or tanks with max. 20 feet height ■ Solvents, liquefied gases ■ LPG, LNG ■ For clean liquids with low dielectric constant ■ Agitated or flowing liquids – the probe acts as a stilling well ■ Liquid or vapor spray near the probe ■ Can be heated ■ Contact possible with metallic object or tank wall ■ Where no dead-zone allowed

TECHNICAL DATA

Version		Plastic housing	Metal housing	High temperature version
Measured values		Distance, level; calculated values: volume, mass		
Measuring range		Depends on the probe type and dielectric constant (ϵ_r) of the measured medium		
Probe types		Mono cable, twin cable, mono rod, twin rod, coaxial pipe and segmented rod		
Accuracy	Linearity error ⁽¹⁾	For liquids: ± 0.2 inch, if probe length ≥ 32 feet: ± 0.05 % of the probe length For solids: ± 0.75 inch, if probe length ≥ 32 feet: ± 0.2 % of the probe length		
	Resolution	$\pm 3 \mu A$		
Minimum ϵ_r of the medium		1.4 (depending on the probe type)		
Power supply		18 V ... 35 V DC		
Output	Digital communication	4-20 mA + HART		
	Display	SAP-300 graphical display unit		
Medium temperature		-22 °F to +194 °F		-22 °F to +392 °F
Maximum medium pressure		580 psig; with plastic lined flange: max. 363 psig; with coaxial pipe probe: max. 232 psig		
Ambient temperature		-4 °F to +140 °F		-22 °F to +140 °F, with display: -4 °F to +140 °F
Process connection		Threaded, Flanged or Sanitary connections (as per order codes)		
Ingress protection		IP67		
Electrical connection		internal thread for 2x 1/2" NPT cable protective pipe + 2x M20 x1.5 cable glands cable outer diameter: $\varnothing 0.3... \varnothing 0.5$ inch, wire cross section: max. AWG15		
Electrical protection		Class III.		
Housing material		Plastic (PBT)		Paint coated aluminium or stainless steel
Sealing		FPM (Viton®), optional: FFKM (Kalrez®), EPDM		
Explosion protection		see: Special data for Ex certified models		
Mass (head unit)		3.3 lb	4.4 lb	5.5 lb

⁽¹⁾ Under reference conditions and stabilized temperature

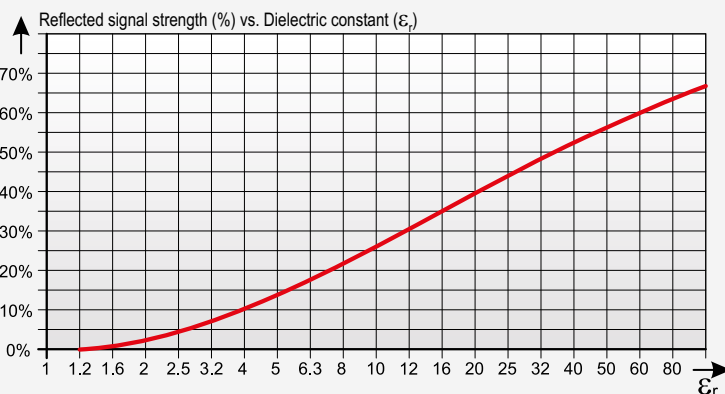
SPECIAL DATA FOR Ex CERTIFIED MODELS

Type	H00-400-8 Ex / H00-600-8 Ex		H00-400-5 Ex H00-600-5 Ex	H00-400-6 Ex H00-600-6 Ex
	Probe without coating	Coated probe		
Protection type	Intrinsically safe		Dust Ex	Intrinsically safe and Dust Ex
Ex marking	ATEX IEC Ex ⁽²⁾		See: www.nivelco.com	
Intrinsically safe data				
Power supply	18 V... 28 V DC			
Electrical connection	2x M20x1.5 metal cable glands, cable outer diameter: $\varnothing 0.3 ... \varnothing 0.5$ inch, wire cross section: max. AWG15			
Ambient temperature	-22 °F to +140 °F, with display: -4 °F to +140 °F			

⁽²⁾ Need of IEC Ex is to be specified with order

MEASURABILITY OF THE MEDIUM

The measurability of the medium and the reflected signal strength depends on the relative dielectric constant of the medium.



Informative ϵ_r values			
Butane	1.4	Grain	3-5
Cement	1.5-10	Edible oil	3.9
LPG	1.6-1.9	Limestone	6.1-9.1
Kerosene	1.8-2.1	Acetone	21
Crude oil	2.1	Ethanol	24
Diesel oil	2.1	Methanol	33.1
Benzene	2.3	Glycol	37
Asphalt	2.6	Nitrobenzene	40
Clinker	2.7	Water	80
Resin	2.4-3.6	Sulphuric acid (T=20 °C)	84

PROBE SELECTION

Reliable microwave measurement depends on the correct selection of probes taking into consideration the properties of the medium and other vessel conditions.

Probe type	Max. measuring range	Dead-zone ⁽¹⁾		Process connection	ϵ_r min.
		Upper (t) / lower (b) $\epsilon_r = 80$	Upper (t) / lower (b) $\epsilon_r = 2.4$		
Mono cable \varnothing 0.15 inch (4 mm)	80 feet (24 m)	12 / 0.75 inch	16 / 4 inch	1"; 1 1/2"	2.1
Mono cable \varnothing 0.3 inch (8 mm)				1 1/2"	
Mono rod \varnothing 0.3 inch (8 mm)	10 feet (3 m)	6 / 0.75 inch	12 / 4 inch	1"	
Mono / segmented rod \varnothing 0.55 inch (14 mm)	20 feet (6 m)			1 1/2"	
Twin cable 0.15 inch (4 mm)	80 feet (24 m)	0 / 0.4 inch	0 / 4 inch	1"; 1 1/2"	1.8
Twin rod \varnothing 0.3 inch (8 mm)	10 feet (3 m)				
Coaxial pipe \varnothing 1.1 inch (28 mm)	20 feet (6 m)	12 / 0.75 inch	16 / 4 inch	1"; 1 1/2" TriClamp; DN40 MILCH, DN50	2.4
Coated cable \varnothing 0.225 inch (6 mm)	80 feet (24 m)			DN50	
Coated rod \varnothing 0.45 / 0.65 inch (12 / 16 mm)	10 feet (3 m)				

⁽¹⁾ The unmeasurable upper and lower part of the tank, the lower dead-zone is extended with the length of the counterweight (cable versions only)

TECHNICAL DATA OF THE PROBES

Type	HOK, HOL HOV, HOW	HOR, HOP	HOS, HOZ	HON, HOJ	HOT, HOU	HOD, HOE	HOA, HOB HOC, HOH
Denomin.	Cable	Rod	Rod / segmented rod	Cable	Twin cable	Twin rod	Coaxial
Max. meas. dist.	80 feet	10 feet	20 feet	80 feet		10 feet	20 feet
Min. meas. dist. ($\epsilon_r=80 / \epsilon_r=2.4$)	1 feet / 1.3 feet			0.5 feet / 1 feet		0 feet	
Minimum ϵ_r of the medium	2.1			1.8		1.4	
Sensing space around the probe	\varnothing 2 feet			\varnothing 0.65 feet		0 feet	
Process connection	1"NPT; 1" BSP 1 1/2" NPT; 1 1/2" BSP	1"NPT 1" BSP		1 1/2" NPT 1 1/2" BSP		1"NPT; 1" BSP 1 1/2" NPT; 1 1/2" BSP	
Probe material	316 (1.4401)	316 Ti (1.4571)		316 (1.4401)		316 Ti (1.4571)	
Probe nominal \varnothing	0.15 inch	0.3 inch	0.55 inch	0.3 inch	0.15 inch	0.3 inch	1.1 inch
Mass	0.08 lb/ft	0.25 lb/ft	0.8 lb/ft	0.25 lb/ft	0.16 lb/ft	0.5 lb/ft	0.85 lb/ft
Separator material ⁽²⁾		-			PFA, welded on the cable	PTFE-GF25	PTFE
Weight dimensions	\varnothing 1x4 inch	-		\varnothing 1.5x10 inch	\varnothing 1.5x3 inch	-	
Weight material	316 Ti (1.4571)	-		316 Ti (1.4571)		-	

⁽²⁾ There is no separator below 5 feet probe length

TECHNICAL DATA OF THE COATED PROBES

Type	HOF, HOG	HOX	HOY	HOM	HQQ	HOO	HOI
Denomin.	FEP coated cable				PFA coated rod		PP coated rod
Max. meas. dist.	80 feet				10 feet		
Min. meas. dist. ($\epsilon_r=80 / \epsilon_r=2.4$)	1 feet / 1.3 feet						
Minimum ϵ_r of the medium	2.4						
Sensing space around the probe	\varnothing 2 feet						
Process connection	1"NPT; 1" BSP	1 1/2" TriClamp	DN 40 MILCH	DN 50 PN25 flange	1 1/2" TriClamp	DN 50 PN25	
Max. medium temp.	+302 °F				+140 °F		
Probe material	316 (1.4401)				316 Ti (1.4571)		
Probe coating material	FEP				PFA		PP
Probe nominal \varnothing	0.225 inch				0.45 inch		0.65 inch
Fillet coating material	-				PFA		PP
Weight material	316 Ti (1.4571)			316 Ti + PFA coating		-	
Mass	0.1 lb/ft			0.33 lb/ft		0.4 lb/ft	

MicroTREK H-400/H-500 with cable probe

2-wire compact TDR level transmitter for liquids and free-flowing solids with stainless steel mono or twin cable probe with or without plastic coating

Version / Temperature

H	Transmitter / Flange temperature max. 90°C
T	Transmitter / Flange temp. max. 200°C (with St. St. probe only)
H	Transmitter with local LCD indicator / Flange temperature max. 90°C
B	Transmitter with local LCD indicator / Flange temp. max. 200°C (with St. St. probe only)

Probe / Process connection

H	
K	Mono cable, Ø 4 mm, 1.4401 / 1" BSP / max. 24 m
L	Mono cable, Ø 4 mm, 1.4401 / 1" NPT / max. 24 m
V	Mono cable, Ø 4 mm, 1.4401 / 1 1/2" BSP / max. 24 m
W	Mono cable, Ø 4 mm, 1.4401 / 1 1/2" NPT / max. 24 m
N	Mono cable, Ø 8 mm, 1.4401 / 1 1/2" BSP / max. 24 m
J	Mono cable, Ø 8 mm, 1.4401 / 1 1/2" NPT / max. 24 m
T	Twin cable, 2x Ø 4 mm, 1.4401 / 1 1/2" BSP / max. 24 m
U	Twin cable, 2x Ø 4 mm, 1.4401 / 1 1/2" NPT / max. 24 m
F	Mono cable, Ø 4 mm, + FEP coated / 1" BSP / max. 24 m
G	Mono cable, Ø 4 mm, + FEP coated / 1" NPT / max. 24 m
X	Mono cable, Ø 4 mm, + FEP coated / Triclamp 1 1/2" / max. 24 m
Y	Mono cable, Ø 4 mm, + FEP coated / Sanitary DN40 / max. 24 m
M	Mono cable, Ø 4 mm, + PFA/FEP coated / DN50, PN25, 1.4571+PFA/FEP lining

Housing

H	
4	Aluminium (paint coated)
5	Plastic, PBT, glass fibre reinforced (Ex version not available; HT, HB only)
6	Stainless steel

Probe length

H	
n n	1.0-24.0 m (each 1 m), for mono cable, Ø 4 mm, 1.4401
n n	1.0-24.0 m (each 1 m), for mono cable, Ø 8 mm, 1.4401
n n	1.0-24.0 m (each 1 m), for twin cable, 1.4401
n n	1.0-24.0 m (each 1 m), for mono cable, Ø 4 mm, 1.4401 + FEP

nn = 01-24 : 1.0-24.0 m

Output / Approval

H	
4	4-20 mA + HART
5	4-20 mA + HART / Ex tD (only for HT, HB and probes without coating)
6	4-20 mA + HART / Ex iaD
8	4-20 mA + HART / Ex ia

Need of IEC is to be specified with order

Available on request (see relevant page for details)

S A P - 3 0 0 - 0	Graphic plug-in display module
S A T - 3 0 4 - 0	HART-USB modem
S A K - 3 0 5 - 2	HART-USB/RS485 modem
S A K - 3 0 5 - 6	HART-USB/RS485 modem / Ex ia

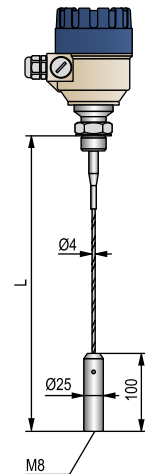
Various process connections (price information on request)

- DIN and ANSI flanges
- TriClamp
- DN 40 Pipe coupling (DIN 11851)

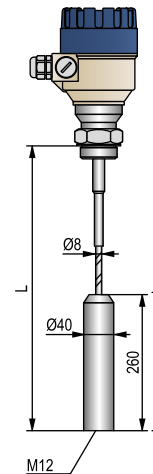
Special sealings

- EPDM
- FFKM 5 users

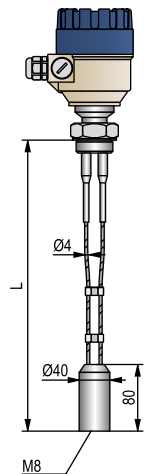
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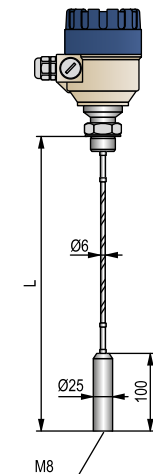
HOK / HOL / HOV / HOW-400/500



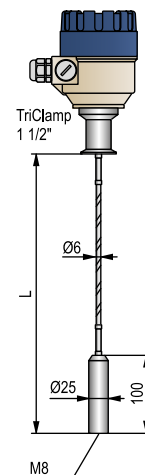
HON / HOJ-400/500



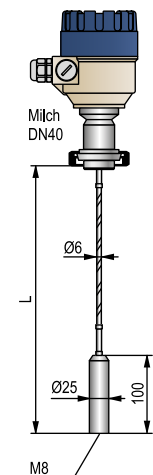
HOT / HOU-400/500



HOF / HOG-400/500



HOX-400 / 500



HOY 400 / 500

MicroTREK H-400/H-500 with rod probe

2-wire compact TDR level transmitter for liquids and free-flowing solids with stainless steel mono or twin rod probe with or without plastic coating

Version / Temperature

H	□ □ - □ □ □ □ - □
T	Transmitter / Flange temperature max. 90°C
H	Transmitter / Flange temp. max. 200°C (with St. St. probe only)
B	Transmitter with local LCD indicator / Flange temperature max. 90°C
P	Transmitter with local LCD indicator / Flange temp. max. 200°C (with St. St. probe only)

Probe / Process connection

H	□ □ - □ □ □ □ - □
R	Mono rod, 1.4571 / 1" BSP / max. 3 m
P	Mono rod, 1.4571 / 1" NPT / max. 3 m
D	Twin rod, 1.4571 / 1 1/2" BSP / max. 3 m
E	Twin rod, 1.4571 / 1 1/2" NPT / max. 3 m
Q	Mono rod + PFA coated / DN50, PN25, 1.4571+PFA lining
I	Mono rod + PP coated / DN50, PN25, 1.4571+PP lining
O	Mono rod + PFA coated / 1 1/2" Triclamp PFA coated

Housing

H	□ □ - □ □ □ □ - □
4	Aluminium (paint coated)
5	Plastic, PBT, glass fibre reinforced (Ex version not available; HT, HB only)
6	Stainless steel

Probe length

H	□ □ □ - □ □ □ □ - □
n n	1.0-3.0 m (each 0.1 m), for mono rod, 1.4571
n n	1.0-3.0 m (each 0.1 m), for mono rod, PP coated
n n	1.0-3.0 m (each 0.1 m), for mono rod, PFA coated
n n	1.0-3.0 m (each 0.1 m), for twin rod, 1.4571

nn = 10-30 : 1.0-3.0 m

Output / Approval

H	□ □ □ - □ □ □ □ - □
4	4-20 mA + HART
5	4-20 mA + HART / Ex tD (only for HT, HB and probes without coating)
6	4-20 mA + HART / Ex iaD
8	4-20 mA + HART / Ex ia

Need of IEC is to be specified with order

Available on request (see relevant page for details)

S A P - 3 0 0 - 0	Graphic plug-in display module
S A T - 3 0 4 - 0	HART-USB modem
S A K - 3 0 5 - 2	HART-USB/RS485 modem
S A K - 3 0 5 - 6	HART-USB/RS485 modem / Ex ia

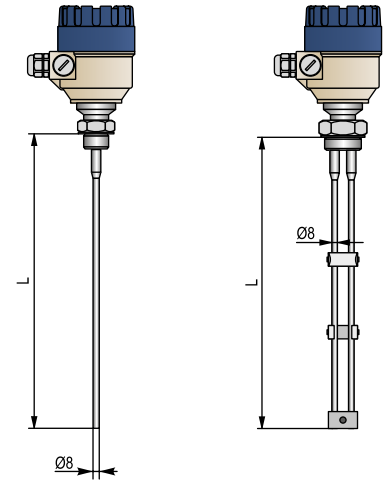
Various process connections (price information on request)

- DIN and ANSI flanges
- TriClamp
- DN 40 Pipe coupling (DIN 11851)

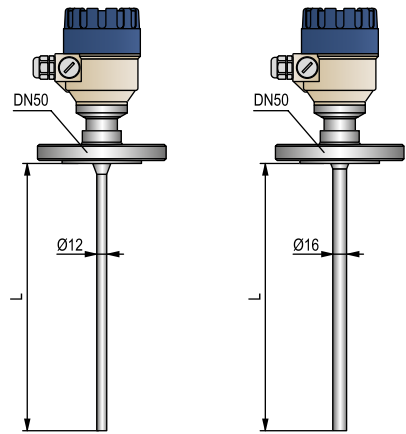
Special sealings

- EPDM
- FFKM 5 options

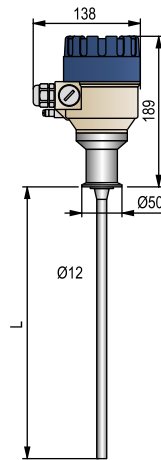
The above process connections and special sealings should be ordered separately and should be specified in the text part of the order



HOR / HOP-400 / 500 HOD / HOE-400 / 500



HQO-400 / 500 HQI-400 / 500



HQO-400 / 500

MicroTREK H-400/H-500 with rod or coaxial probe

2-wire compact TDR level transmitter for liquids and free-flowing solids with stainless steel Ø 0.55" (14 mm) rod or coaxial probe

Version / Temperature

H	□ - □ - □ - □ - □
T	Transmitter / Flange temperature max. 90°C
H	Transmitter / Flange temp. max. 200°C (with St. St. probe only)
B	Transmitter with local LCD indicator / Flange temperature max. 90°C
P	Transmitter with local LCD indicator / Flange temp. max. 200°C (with St. St. probe only)

Probe / Process connection

H	□ - □ - □ - □ - □
S	* Mono rod, 1.4571 / 1 1/2" BSP / max. 6 m
Z	* Mono rod, 1.4571 / 1 1/2" NPT / max. 6 m
A	Coaxial, 1.4571 / 1" BSP / max. 6 m
B	Coaxial, 1.4571 / 1" NPT / max. 6 m
C	Coaxial, 1.4571 / 1 1/2" BSP / max. 6 m
H	Coaxial, 1.4571 / 1 1/2" NPT / max. 6 m

* Can be ordered with sectionalized probe which should be given in the text of the order. The length of the probe section is 1 m.

Housing

H	□ - □ - □ - □ - □
4	Aluminium (paint coated)
5	Plastic, PBT, glass fibre reinforced (Ex version not available; HT, HB only)
6	Stainless steel

Probe length

H	□ - □ - □ - □ - □
nn	1.0-6.0 m (each 0.1 m), for mono rod, 1.4571
nn	1.0-6.0 m (each 0.1 m), for coaxial, 1.4571
nn	1.0-6.0 m (each 0.1 m), for sectionalized mono rod, 1.4571

nn = 10-60 : 1.0-6.0 m

Output / Approval

H	□ - □ - □ - □ - □
4	4-20 mA + HART
5	4-20 mA + HART / Ex tD (only for HT, HB and mono rod probes)
6	4-20 mA + HART / Ex iaD
8	4-20 mA + HART / Ex ia

Need of IEC is to be specified with order

Available on request (see relevant page for details)

S A P - 3 0 0 - 0	Graphic plug-in display module
S A T - 3 0 4 - 0	HART-USB modem
S A K - 3 0 5 - 2	HART-USB/RS485 modem
S A K - 3 0 5 - 6	HART-USB/RS485 modem / Ex ia

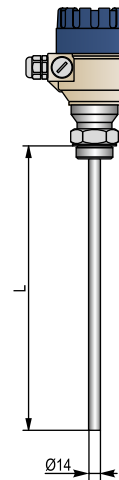
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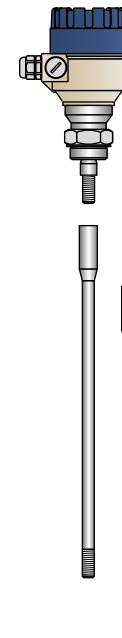
Special sealings

- EPDM
- FFKM **5** 5 options

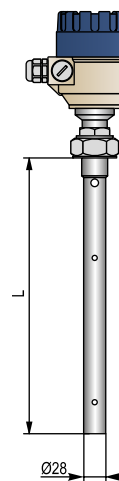
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H□S / H□Z-400 / 500



H□S / H□Z-400 / 500 with segmented probe



H□A / H□B / H□C / H□H-400 / 500