

NIVOSWITCH

VIBRATING FORK LEVEL SWITCHES
FOR LIQUIDS AND SOLIDS

3 YEARS WARRANTY



NIVELCO

LEVEL SWITCHES

MAIN FEATURES

- Compact and mini compact type
- Rod extension up to 3 meters (10 feet)
- Chemical resistance plastic (PFA) coated version
- Polished vibrating part
- Hygienic versions with various process connections and 0.5 micron fine polishing
- Adjustable sensitivity
- Relay or electronic output
- Switching performance does not depend on the change of liquid conductivity, dielectric constant, pressure and temperature
- Medium temperature max. +130 °C (266 °F)
- Output test with optional test magnet
- Ex, FM, CSA and DNV GL versions
- IP67, IP65 / IP68 protection

GENERAL DESCRIPTION

NIVOSWITCH vibrating fork level switches are suitable for level detection of liquids or granular, powdered solids. Units with parallel vibrating fork are suitable for liquids, units with non-parallel vibrating fork are suitable for solids. Mounted on pipes, silos, tanks or hopper bins filling / emptying can be controlled using these devices just as well they can generate fail-safe alarms providing overflow- or dry run protection. The operation principle is based on the electronic circuit exciting the fork probe making it vibrate. As the medium reaches and covers the fork its vibration changes, or stops. The fork will start vibrating again as the medium sets it free. The electronics senses the change of vibration and gives output signal after a selected delay. Plastic coated version is recommended in aggressive mediums, highly polished version is recommended for abrasive mediums. The PNP / NPN transistor output versions can be connected directly to PLC, or relay unit. The NIVOSWITCH vibrating forks are able to solve switching tasks of highcurrent loads with the help of UNICONT PPK switching amplifiers. The UNICONT PPK-312-8 Ex intrinsically safe switching unit is designed to serve Ex rated vibrating forks.

INDUSTRY SEGMENTS

- Water- and wastewater industry
- Food and beverage industry
- Chemical industry
- Oil industry
- Construction material industry
- Paper industry
- Marine applications

APPLICATIONS

- For liquids: minimum 0.7 kg/dm³ (700 oz/ft³) density and maximum 10⁴ mm²/s (0.1 ft²/s) viscosity, for solids: minimum 0.01 kg/dm³ (10 oz/ft³) density
- For liquids / free-flowing, powdered solids, granules
- For normal or hazardous, aggressive (acids, solvents) liquids or high viscosity liquids
- Covers a large variety of level detection applications such as high/low fail-safe limit switch or dry run protection, pump controls



TYPE SELECTION

Type selection is aided by this table for choosing the proper version to a given level switching task. Most essential aspect is the consistency (liquid or solid) of the measurement medium.

Application	For liquids		For solids	
Features	Mini compact	Compact	Mini compact	Compact
Metal housing	■	■	■	■
Plastic housing		■		■
Extension	■	■	■	■
Highly polished version	■	■		
Plastic coated fork	■	■		
1", 1½" process connection	■	■	■	■
2" process connection	■	■		
Relay output		■		■
Electronic output	■		■	
Electrical connection	Terminal	■		■
	DIN connector	■	■	
	M12 connector	■		
	Cable	■		■
Intrinsically safe version (Ex ia)	■			
Flameproof enclosure (Ex d)		■		
Dust explosion proof version (Ex ta/tb IIIC)				■
DNV GL		■		
Fail-safe setting (low-high level)	■ ⁽¹⁾	■	■ ⁽¹⁾	■
Function indication	■	■	■	■
Density selection			■	■
Output test magnet	■		■	

⁽¹⁾ Only for 3-wire DC versions.

TECHNICAL DATA

Type	Mini compact		Compact	
	For liquids	For solids	For liquids	For solids
Insertion length	69 – 3000 mm (2.7 in – 10 ft)	137 – 3000 mm (5.4 in – 10 ft)	69 – 3000 mm (2.7 in – 10 ft)	137 – 3000 mm (5.4 in – 10 ft)
Material of wetted parts	1.4571 (316Ti) or PFA coating	Stainless steel 1.4571 (316Ti)	1.4571 (316Ti) or PFA coating	Stainless steel 1.4571 (316Ti)
Process connection	As per order codes			
Medium temperature	-40 °C ... +130 °C (-40 °F ... +266 °F) (see: temperature diagrams)			
Ambient temperature	-40 °C ... +70 °C (-40 °F ... +158 °F) M12 connector: -25 °C ... +70 °C (-13 °F ... +158 °F)	-40 °C ... +70 °C (-40 °F ... +158 °F) (see: temperature diagrams)	-30 °C ... +70 °C (-22 °F ... +158 °F)	-40 °C ... +70 °C (-40 °F ... +158 °F)
Medium pressure	max. 4 MPa (40 bar g / 580 psi g) (see: pressure diagrams)			
Medium density	> 0.7 kg/dm ³ (700 oz/ft ³)	≥ 0.01 kg/dm ³ (10 oz/ft ³)	> 0.7 kg/dm ³ (700 oz/ft ³)	≥ 0.01 kg/dm ³ (10 oz/ft ³)
Medium viscosity	≤ 10 000 mm ² /s (cSt) (0.1 ft ² /s)	–	≤ 10 000 mm ² /s (cSt) (0.1 ft ² /s)	–
Power supply	2-wire DC: 15 – 29 V DC 2-wire AC: 20 – 255 V AC; 3-wire DC: 12 – 55 V DC	2-wire DC: 15 – 27 V DC	20 – 255 V AC or 20 – 60 V DC	
Power consumption	AC: depending on load; DC: < 0.6 W		DC: < 3 W	
Housing material	Stainless steel 1.4571 (316Ti)		Paint coated aluminium or plastic (PBT)	
Electrical connection	Connector, or 3 m (10 ft) cable ⁽¹⁾ 2x 0.5mm ² (AWG 20) / 4x 0.75mm ² (AWG 18) / 5x 0.5mm ² (AWG 20)		2x M20x1.5 cable gland, for Ø6 – 12 mm (0.25 – 0.5 in) cable, terminal, for 0.5 – 1.5 mm ² (AWG 20 – 15) wire cross section	
Electrical protection	AC version: Class I; DC version: Class III		Class I	
Ingress protection	DIN connector type: IP65; M12 connector type: IP67, cable type: IP68		IP67	
Mass	≈0.5 kg + 1.2 kg/m (1.1 lb + 0.8 lb/ft) extension		≈1.3 kg + 1.2 kg/m (2.85 lb + 0.8 lb/ft) extension	

⁽¹⁾ Available cable length: maximum 30 m.

SPECIAL DATA FOR EX CERTIFIED MODELS

Type	For liquids		For solids
	Mini compact type with metal housing, 2-wire DC version ⁽²⁾⁽⁴⁾ RA□-4□□-□ Ex, RC□-4□□-□ Ex RG□-4□□-□ Ex	Compact type with metal housing ⁽³⁾ RN□-4□□-□ Ex RM□-4□□-□ Ex	Compact type with metal housing RF□-3□□-B Ex RR□-3□□-B Ex
Ex proof marking	IEC Ex	–	–
	ATEX	⊕ II 1G Ex ia IIB T6...T4 Ga ⊕ II 1G Ex ia IIC T6...T4 Ga	⊕ II 1/2 G Ex d IIB T6...T4 Ga/Gb
Intrinsically safe permissible limiting datas	U _i = 29 V; I _i = 100 mA; P _i = 1,4 W; C _i = 7 nF; L _i = 0 mH	–	–
Supply voltage	15 – 29 V DC	20 – 250 V AC (50/60 Hz) or 20 – 36 V DC	20 – 250 V AC or 20 – 50 V DC
Ambient temperature	T6...T4	-40 °C ... +70 °C	
Electrical connection	Connector or max. 3 m integrated cable	2 pcs. metal M20x1.5 cable glands	
		Ex d IIC protection	Ex ta IIIC protection

⁽²⁾ Intrinsically safe vibrating forks should be powered by [Ex ia] certified and approved devices, for example by UNICONT PKK-312-8 Ex.

⁽³⁾ Devices with the following codes have got IEC EX and ATEX certificate: M, P, H, N, G, B, K.

⁽⁴⁾ The 7th (last) character can be only "8", "9" and "L".

SPECIAL DATA FOR FM AND CSA CERTIFIED MODELS

Type	RN□-4□□-N, RN□-4□□-P, RM□-4□□-N, RM□-4□□-P	
Ex proof marking	USA	Class I, Division 1, Groups C, D; T6...T4, -40 °C ≤ Ta ≤ +70 °C; IP67
	Canada	Class I, Division 1, Groups C, D; T6...T4, -40 °C ≤ Ta ≤ +70 °C; IP67
Applicable location	Class I, Division 1, Groups C, D Class I, Division 2, Groups C, D	
Electrical connection	NPT ½" conduit entry or M20x1.5 certified cable gland (not included), plug-in type terminal blocks for 0.75 – 1.5 mm ² (AWG 16 – 18) wire cross section	
Supply voltage	20 – 250 V AC or 20 – 36 V DC	

rc45s18a0608b

ORDER CODES (NOT ALL CODE VARIATION AVAILABLE)

Vibrating fork level switches for liquids

NIVOSWITCH R ■■■-■■■-■■■⁽¹⁾

Type	Code	Process connection	Code	Insertion length	Code	Output / Ex	Code					
Mini compact	PFA coated fork	A ⁽⁶⁾	BSP	1"	M	Mini compact	DIN conn.	2-wire AC	1 ⁽³⁾			
	1.4571 fork	C		1½"	H			3-wire DC	3 ⁽³⁾			
	1.4571 fork, highly polished	G		2"	C			2-wire DC	6 ⁽³⁾			
Compact	PFA coated fork	D ^(6,8)	NPT	1"	P	Cable	M12 conn.	2-wire DC / Ex ia	8 ⁽³⁾			
	1.4571 fork	F ⁽⁸⁾		1½"	N			2-wire DC	K ⁽³⁾			
	1.4571 fork, highly polished	J ⁽⁸⁾		2"	L			2-wire DC / Ex ia	L ⁽³⁾			
	2-wire DC	1 ⁽³⁾										
	2-wire DC / Ex ia	M ⁽³⁾										
	2-wire AC	2 ^(3,5)										
Housing	Code	Dairy pipe DN40, DIN 11851	D ⁽¹³⁾	900 mm (3 feet)	0	Compact	Cable	3-wire DC	4 ^(3,5)			
		Dairy pipe DN50, DIN 11851	E ⁽¹³⁾	1 m (3.3 feet)	1			2-wire DC	7 ^(3,5)			
		1½" TriClamp	T ⁽¹³⁾	3 m (10 feet)	3			0	2-wire DC / Ex ia	9 ^(3,14)		
		2" TriClamp	R ⁽¹³⁾						1 relay	0 ⁽²⁾		
		DN50 PN40, 1.4571	G						2 relays	A ⁽²⁾		
		2" ANSI RF600, 1.4571	B	JIS 40K 50A, 1.4571	K			3 m (10 feet)	3	0	1 relay / Ex d	N ⁽⁴⁾
		DN50 PN16, PP	F ⁽⁷⁾	JIS 10K 50A, PP	J ⁽⁷⁾						2 relays / Ex d	p ⁽⁴⁾
2" ANSI FF150, PP	A ⁽⁷⁾											

⁽¹⁾ The order code of an Ex version product should end in "Ex"
⁽²⁾ Not available for the codes that starting with RA, RC, RG
⁽³⁾ Only available for the codes that starting with RA, RC, RG
⁽⁴⁾ Only available for the codes that starting with RN and RM
⁽⁵⁾ Cable length maximum 30 m
⁽⁶⁾ Only available with 1" BSP process connection
⁽⁷⁾ Max. 6 bar (87 psi), -20 °C ... +90 °C (-4°F ... +194°F)
⁽⁸⁾ Ex type not available

Vibrating fork level switches for solids

NIVOSWITCH R ■■■-■■■-■■■⁽¹⁾

Type	Code	Process connection	Code	Insertion length	Code	Output / Ex	Code				
Compact / casted fork	F	BSP	1"	M ⁽¹²⁾	125 / 137 mm (4.9" / 5.4")	0	1	Mini compact	Conn.	2-wire AC	1 ⁽¹¹⁾
Compact / welded fork	R		1½"	H	200 / 175 mm (7.9" / 6.9")	0	2			3-wire DC	3 ⁽¹¹⁾
Mini compact / casted fork	C	NPT	1"	p ⁽¹²⁾	300 mm (1 feet)	0	3	Cable	Mini compact	2-wire DC	6 ⁽¹¹⁾
Mini compact / welded fork	L		1½"	N	900 mm (3 feet)	0	9			2-wire AC	2 ^(5,11)
Housing	Code	DN50 PN16, PP DIN	F	900 mm (3 feet)	0	9	0	9	0	3-wire DC	4 ^(5,11)
		DN50 PN40, 1.4571 DIN	G							2-wire DC	7 ^(5,11)
		2" ANSI FF150 PP	A							1 m (3.3 feet)	1
		2" ANSI RF600 1.4571	B	3 m (10 feet)	3	0	0	0	2 relays	A ⁽¹⁰⁾	
		JIS 10K 50A PP	J						1 relay / Dust Ex ta/tb IIIC	B ⁽¹⁰⁾	
		JIS 40K 50A 1.4571	K								
		1½" TriClamp	T ⁽⁹⁾								
2" TriClamp	R ⁽⁹⁾										
Dairy pipe DN40, DIN 11851	D ⁽⁹⁾										
Dairy pipe DN50, DIN 11851	E ⁽⁹⁾										

⁽⁹⁾ Only available according to the following code: RC□-3□□□□ and RL□3□□□□
⁽¹⁰⁾ Only available for the codes that starting with RF and RR
⁽¹¹⁾ Only available for the codes that starting with RC and RL
⁽¹²⁾ Not available for the codes that starting with RR and RL
⁽¹³⁾ Only available for the codes that starting with RA, RC, RG, RF and RJ
⁽¹⁴⁾ Cable length up to 3 m

ACCESSORIES TO ORDER

DIN rail mountable current controlled switch module recommended for NIVOSWITCH vibrating forks

UNICONT PKK-312-■⁽¹⁾

Power supply	Code	Power supply	Code
230 V AC	1	24 V AC/DC	4
110 V AC	2	24 V AC/DC / Ex	8
24 V AC	3		



UNICONT PKK-312-8 Ex
 Intrinsically safe remote switching unit dedicated to the Ex ia versions of the NIVOSWITCH vibrating forks.

Specifications in metric & US units. NIVELCO reserves the right to change technical data without notice!



OPERATION

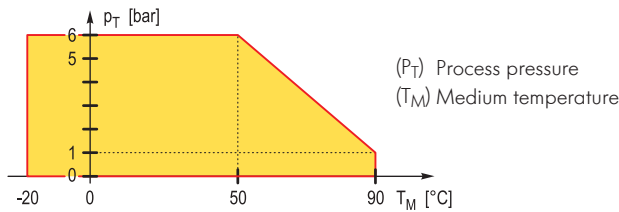
Compact and mini compact type					
Power supply	Switching	Fail-safe setting ⁽¹⁾	Status LED	Output	
				Relay	Electronic
ON	High level				
	High level				
	Low level				
	Low level				
OFF	-	high or low			

Mini compact, 2-wire DC version			
Power supply	Switching	Status LED	Output
ON			14 ± 1 mA
			9 ± 1 mA
OFF	Fork immersed, or fork is free		-

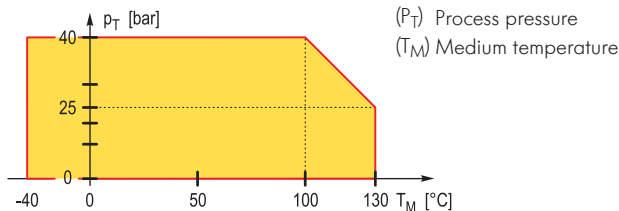
⁽¹⁾ Can be done with appropriate wiring in case of mini compact type with integrated cable.

TEMPERATURE DATA

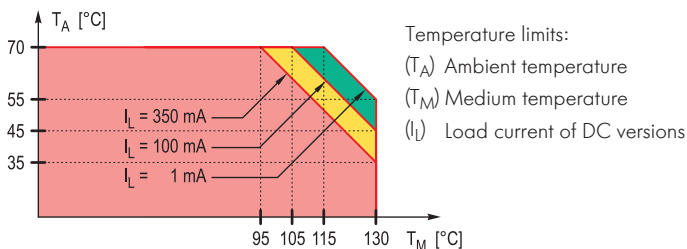
Process pressure – medium temperature PP flange version



Process pressure – medium temperature



Mini compact version



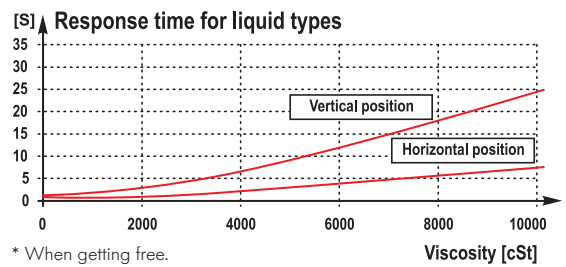
OPERATION MODE SWITCHES

Compact	Compact
Fail-safe	Density
Fail-safe alarm is indicated with de-energised relay or open state of the output	Medium density ≥ 0.5 kg/dm ³
	Medium density < 0.5 kg/dm ³

OUTPUT DATA

Compact type				
Output		For liquids	For solids	
Relay		1 or 2 pcs. (SPDT) relays 250 V AC, 8 A, AC1 / 250 V AC, 6 A, AC1		
Response time	when immersed	≤ 0.5 sec		
	when free	≤ 1 sec ⁽¹⁾	≤ 1 sec - H density	3 sec - L density

RESPONSE TIME DIAGRAM*



Mini compact type					
Type	Output	For liquids	For solids		
2-wire DC	DC current change	when immersed: 14 mA ± 1 mA			
		when free: 9 mA ± 1 mA			
2-wire AC	AC output for serial connection	Voltage drop (in switched-on state): < 10.5 V			
		Residual current (in switched-off state): < 6 mA			
	Current load	max. continuous	350 mA, AC 13	350 mA, AC 13; Ex version: 140 mA	
		min. continuous	10 mA / 255 V; 25 mA / 24 V		
	max. impulse	1.5 A / 40 msec			
3-wire DC	Transistor switch	NPN or PNP output can be realized with appropriate wiring			
	Voltage drop (in switched-on state)	< 4.5 V	< 1.8 V		
	Current load (maximum continuous)	350 mA / U _{max} = 55 V	350 mA / U _{max} = 55 V; Ex version: 200 mA		
	Residual current (in switched-off state)	< 100 µA	< 10 µA		
	Response time	when immersed	0.5 sec		
when free		< 1 sec ⁽¹⁾	≤ 1 sec - H density	< 3 sec - L density	

⁽¹⁾ See viscosity diagram.

APPROVALS

	FM Canada, Certificate No.: FM16CA0122X		BKI IECEx, Certificate No.: IECEx BKI 16.0002 issue No.: 0
	FM US, Certificate No.: FM16US0224X		Ex Russia, Certificate No.: RU C-HU.MIO62.B.04397
	BKI ATEX, Certificate No.: BKI10ATEX0012X/1 BKI ATEX, Certificate No.: BKI16ATEX0031 BKI ATEX, Certificate No.: BKI16ATEX0011		Marine Approval Certificate No.: TAA000018W

WIRING

Mini compact (connector version)

Compact

Operation mode LED

Power supply connector

Density switch⁽³⁾

Fail-safe switch

Relay output

Operation mode LED

Fail-safe switch⁽²⁾

Density switch⁽³⁾

⁽²⁾ Only for 3-wire DC versions.

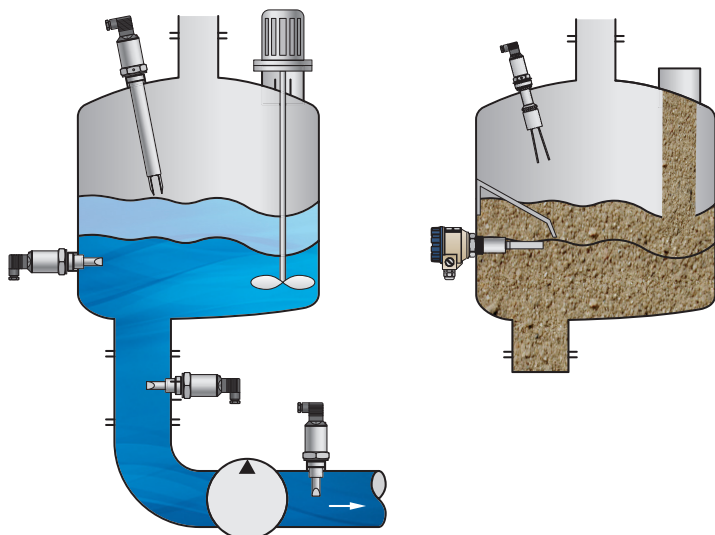
⁽³⁾ Only for vibrating forks for solids.

RFM-500

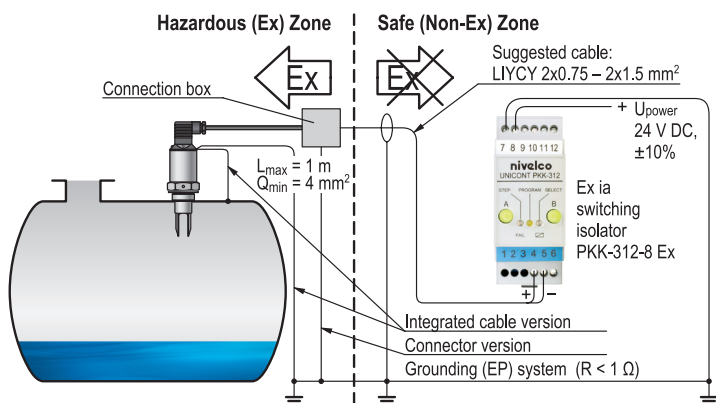
RNM-402

RFM-504

INSTALLATION



RECOMMENDED SET-UP VARIATION



- Applied in low viscosity medium (no risk of subsidence remaining on the fork-tines) any of the mounting varieties shown is possible.
- Applied in higher viscosity medium (risk of subsidence remaining on the fork-tines) only vertical (top) mounting can be suggested.
- If applied as side mount, take care of the positioning mark (mark "O").

RPS-101
- test magnet



RCM-401



ACCESSORIES TO ORDER

Name	For liquids	
	for vibrating forks	for liquids with plastic coating
Weld-in socket (1" BSP)	RPG-101-0	-
Sliding sleeve for extended versions ⁽¹⁾	1½" BSP	RPH-112-0
	1½" NPT	RPN-112-0
		RPH-122-0
		RPN-122-0

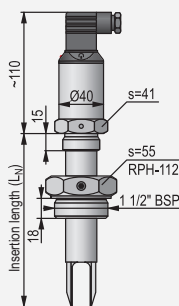
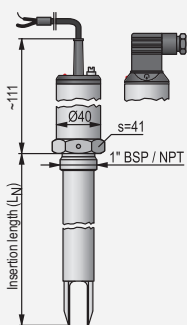
⁽¹⁾ For minimum 300 mm insertion length and maximum 6 bar medium pressure.

RPS-101-0 test magnet for mini compact versions

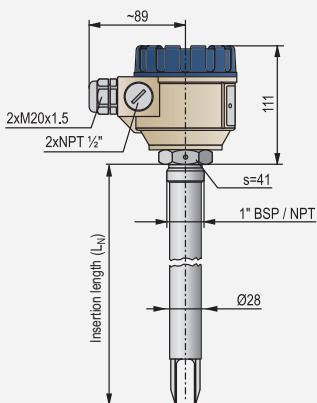
DIMENSIONS

For liquids

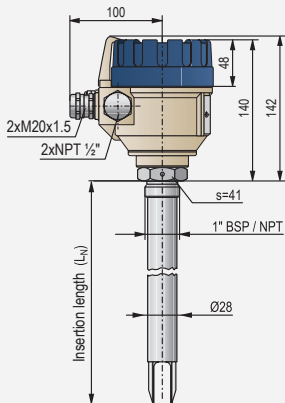
Mini compact



Compact

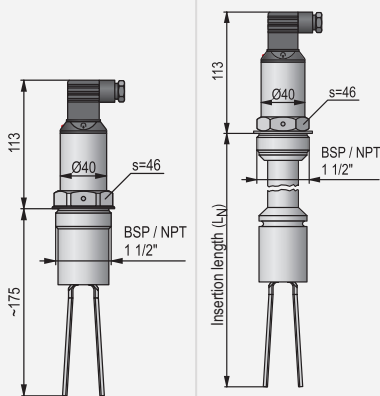


Compact - FM

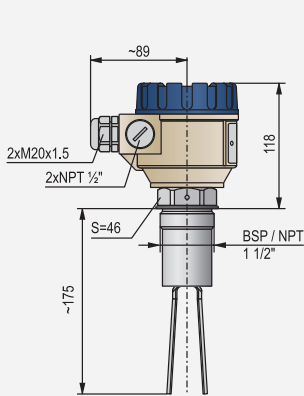


For solids

Mini compact



Compact



Other process connections

- DIN, ANSI and JIS flanges stainless steel, PP or plastic (PFA) coated stainless steel
- DN40 and DN50 pipe-coupling process connections (DIN 11851)
- 1 1/2" and 2" TriClamp process connections (ISO 2852)
- Other hygienic (food-industry) process connections

Accessories

