

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 it can control filling / emptying, also can generate fail-safe alarms providing overflow- or dry run protection. The operation principle is based on that the electronic circuit excites a vibration in the fork probe. When 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. The plastic coated version is recommended to use for aggressive mediums, the highly polished version is recommended to use for abrasive mediums. The PNP/NPN transistor output versions can be connected directly to PLC, or relay unit. NIVOSWITCH vibrating forks are able to solve switching tasks of high-current loads with the help of UNICONT PKK switching amplifiers. UNICONT PKK-312-8 Ex is a recommended intrinsically safe switching unit designed for Ex rated vibrating forks.

MAIN FEATURES

- Compact and mini compact type
- Rod extension up to 3 meters
- Plastic PFA coated version
- Polished vibrating part
- Hygienic versions with various process connections and 0.5 micron fine polishing
- Selectable 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
- Output test with optional test magnet
- Ex version
- IP67, IP65/IP68 protection

APPLICATIONS





- For liquids: min. 0.7 kg/dm³ density and max. 10⁴ mm²/s viscosity, for solids: min. 0.01 kg/dm³ density
- Level switch of liquids, powders, granules
- Food & beverages industry, animal feed, chemical industry, oil industry
- For normal or hazardous, aggressive (acids, solvents) liquids
- For free-flowing, powdered solids, granules
- Covers a large variety of level detection, applications such as high/low fail safe limit switch, overflow or dry run protection, pump controls

CERTIFICATIONS

- ATEX approved (Ex ia)
- ATEX approved (Ex d)
- ATEX approved (Dust Ex)
- IEC approved (Ex d)
- Germanischer Lloyd (only for RF-400 compact types for liquids)
- FM
- CSA

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		Liquids		Solids	
Features					
		Mini compact	Compact	Mini compact	Compact
Metal housing		■	■	■	■
Plastic housing			■		■
Extension		■	■	■	■
Highly polished version		■	■		
Plastic coated fork		■	■		
1" process connection		■	■		
1 1/2" process connection				■	■
Relay output			■		■
Electronic output		■		■	
Electronic connection	Terminal		■		■
	DIN connector	■		■	
	M12 connector	■			
	Cable	■		■	
Intrinsically safe version		■			
Flameproof enclosure			■		
Dust Ex version					■
Germanischer Lloyd			■		
Function 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	137-3000 mm	69-3000 mm	137-3000 mm
Material of wetted parts	1.4571 or PFA coating	1.4571 stainless steel	1.4571 or PFA coating	1.4571 stainless steel
Process connection	As per order code			
Medium temperature	- 40°C ... +130°C (see: temperature diagrams), for PFA coated types: -40 °C ... +120 °C			
Ambient temperature	- 40°C ... +70°C (see: temperature diagrams) with M12 connector: - 25 °C ... +70 °C		- 30°C ... +70°C	- 40°C ... +70°C
Medium pressure	max. 4 MPa (40bar) (see: pressure diagrams)			
Medium density	> 0.7 kg/dm ³	≥ 0.01 kg/dm ³	> 0.7 kg/dm ³	≥ 0.01 kg/dm ³
Medium viscosity	≤ 10000 mm ² /s (cSt)	-	≤ 10000 mm ² /s (cSt)	-
Power supply	2-wire DC: 15-29 V DC	2-wire DC: 15-27 V DC	20-255V AC, 20-60V DC	
Power consumption	AC: depending on load; DC: < 0.6 W		AC: 1.2-17 VA; DC: < 3 W	
Housing material	1.4571 stainless steel		Paint coated aluminium or plastic (PBT)	
Electrical connection	Connector, or 3 m integrated cable ⁽¹⁾ 2x0.5 mm ² / 4x0.75 mm ² / 5x0.5 mm ²		2xM20x1.5 cable gland, for Ø 6-12 mm cable, terminal for 0.5 – 1.5 mm ² wire cross section	
Electrical protection	AC version: Class I.; DC version: Class III.		Class I.	
Ingress protection	DIN connector type: IP65, M12 con. type: IP67, cable type: IP68		IP67	
Mass	≈ 0.5 kg + 1.2 kg/m extension		≈ 1.3 kg + 1.2 kg/m extension	

⁽¹⁾ available cable length: max. 30 m

SPECIAL DATA FOR Ex CERTIFIED MODELS

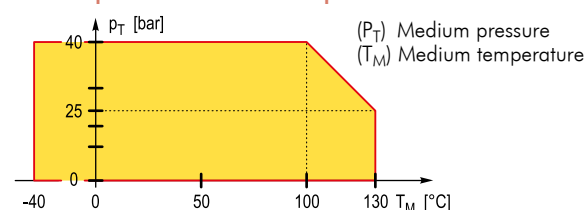
Type	NIVOSWITCH liquids		NIVOSWITCH solids	
	Mini compact type with 2-wire DC output ⁽²⁾	Compact type with metal housing		
Protection type	Intrinsically safe	Flameproof enclosure	Dust Ex	
Ex marking	ATEX	ATEX & IEC Ex FM & CSA	ATEX	
	see: www.nivelco.com			
Medium temperature	See: Temperature data tables		-40 °C ... +130 °C	
Ambient temperature			-40 °C ... +70 °C	
Electrical connection	Connector or max. 3 m integrated cable	2 pcs. metal M20x1.5 cable glands for Ø 8 ... 13 mm cable		

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

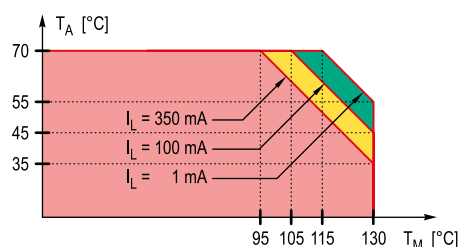
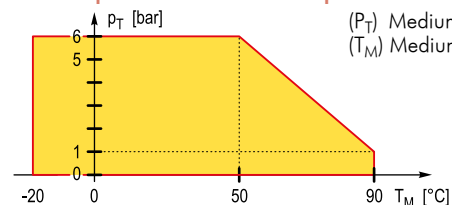
Temperature classes	T6	T5	T4	
Mini compact type for liquids (Ex ia)				
Max. ambient temperature	+70°C	+60°C	+60°C	
Min. ambient temperature	with DIN connector or integrated cable: -40°C with M12 connector: -25°C			
Max. medium temperature	+70°C	+75°C	+95°C +130°C	
Compact types with flameproof enclosure (Ex d)				
Medium temperature min.: -40 °C; Max:	+70 °C	+80 °C	+95 °C	+130 °C
Ambient temperature min.: -40 °C; Max:	+65 °C	+50 °C	+65 °C	+70 °C
Max. surface temperature of the process connection	+70 °C	+80 °C	+95 °C	+125 °C
Max. surface temperature	+75 °C	+80 °C	+95 °C	+130 °C

TEMPERATURE DATA

Medium pressure - Medium temperature



Medium pressure - Medium temperature PP flange version



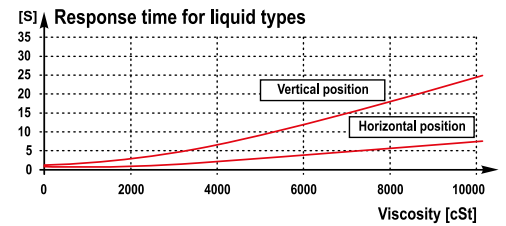
Mini – Compact version

Temperature limits:
(T_A) Ambient temperature
(T_M) Medium temperature
(I_L) Load current of DC versions

OUTPUT DATA

RESPONSE TIME DIAGRAM

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	≤ 1sec ⁽¹⁾	≤ 1 sec – H density 3 sec – L density



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 (max. 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		< 1sec ⁽¹⁾	≤ 1 sec – H density < 3 sec – L density		

⁽¹⁾ see: viscosity diagram

OPERATION

Compact and Mini compact type						
Power supply	Switching	Fail-Safe setting ⁽²⁾	Status LED	Output		
				Relay	Electronic	
ON	High level	high				
		high				
	Low level	low				
		low	low			
OFF	–	High or Low				

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

⁽²⁾ Can be done with appropriate wiring in case of mini compact type with integrated cable

OPERATION MODE SWITCHES

Compact Fail-Safe		Compact 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

NIVOSWITCH RN/RM-400 with standard or rod extended probe

Compact vibrating fork level switch for liquids, standard probe length: 125 mm or with stainless steel rod extended probe up to 3 m

Fork material / Approval

R - 4 -

N	Stainless steel with tumble polishing / Ex d
M	Highly polished stainless steel / Ex d

Process connection

R - 4 -

M	1" BSP
P	1" NPT
H	1 1/2" BSP
N	1 1/2" NPT
C	2" BSP
L	2" NPT

Stainless steel flanges; not welded unless specifically ordered so
Flanges conform to: EN 1092-1 / ANSI B 16.5

G	DN 50 PN 40/25
B	ANSI 2" RF 600/300 psi
K	JIS 40K 50A

Housing

R - -

4	Aluminium (paint coated)
---	--------------------------

Probe length

R - 4 -

For standard polished forks (RN)

0 1	Standard probe: 125 mm
n n	0.2-3 m; each started 0.1 m

For highly polished forks (RM)

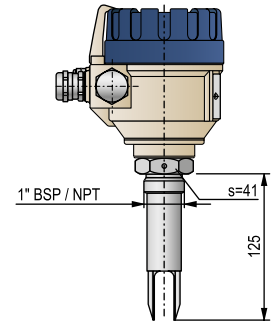
0 1	Standard probe: 125 mm
n n	0.2-3 m; each started 0.1 m

nn = 02-30 : 0.2-3 m

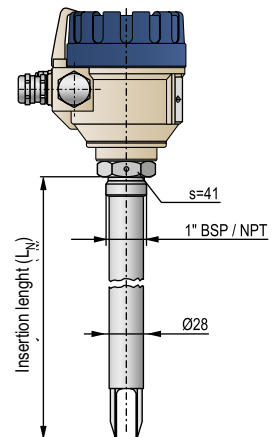
Output

R - 4 -

N	1 SPDT relay, 250 V AC, 8 A
P	2 SPDT relay, 1 x 250 V AC, 8 A and 1 x 250 V AC, 6 A



RNM / RNP-401



RNM / RNP-402 - 430