LEVEL SWITCHES

NIVOSWITCH

VIBRATING FORK LEVEL SWITCHES FOR LIQUIDS



NIVOSWITCH R-400/500 vibrating fork level switches with parallel vibrating fork are suitable for detecting the level of liquids. Mounted on pipes, tanks it can control filling/emptying, can also generate fail-safe alarms providing overfill- or dry run protection. The operating 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. The fork will start vibrating freely 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 for use in aggressive media, the highly polished version is recommended for use in abrasive media. The PNP/NPN transistor output versions can be connected directly to a PLC, or relay unit.

Certain types of 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 intrinsic safety switching unit designed for Ex rated vibrating forks.

FEATURES

- Compact and mini compact version
- Rod length up to 3 meters (10 ft)
- ECTFE/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
- Process temperature max. +130 °C (+266 °F)
- Output can be toggled by test magnet
- Ex, DNV variants
- IP67, IP65/IP68

APPLICATIONS

- Min. 0.7 kg/dm³ density (specific gravity) and max. 10^4 mm²/s (0.1 ft²/s) viscosity
- Food & beverages industry, water industry, chemical industry, oil industry
- For normal or hazardous, aggressive (acids, solvents) liquids
- Covers a large variety of level detection, applications such as high/low fail-safe limit switch, overfill or dry-run protection, pump controls

VARIANTS

This chart will help you select the correct version for a given level switching application. The most important consideration is the consistency of the medium.

		Liquids				
F .		Mini compact	Com	pact		
reatures		RC□-400	RF□-400/500	RN□-400 Ex		
Metal housing						
Plastic housi	ng	-		-		
Extension						
High-polishe	ed version					
Plastic-coate	ed fork			-		
2" process c	connection					
1", 1½" proc	ess connection					
Relay output		-				
Electronic ou	Electronic output		-	-		
	Terminal	-				
Electrical	DIN connector		-	-		
connection	M12 connector		-	-		
	Cable		-	-		
Intrinsic safe	ty version		-	-		
Flameproof e	enclosure	-	-			
DNV		-		-		
Function setting (low-high level)		(1)	1.1			
Function indi	ication					
	magnet		-	-		

CERTIFICATES

- ATEX (Ex ia G)
- ATEX (Ex d G)
- IEC Ex (Ex d G)
- UKCA Ex (Ex ia G)
- DNV (only for RF-400 compact types for liquids)



PKK-312-8Ex Ex ia power supply for Ex ia vibrating forks



RFM-500

RNM-402

RPS-101-0 test magnet







RBM-401-3





connector



RCM-400 with DIN connector

TECHNICAL DATA

	Mini compact	Compact					
	RC□-400	RF□-400/500	RN🗆 – 400 Ex				
Insertion length		693000 mm (2.72"10 ft)					
Material of wetted parts	1.4571 stainless ste	el or ECTFE/PFA-coating	1.4571				
Process connection		As per order code					
Process temperature	-40+130 °C [-40+266 °F] (see "Thermo	al properties"), for ECTFE-coated versions: -40+120 °C	C (−40+248 °F)				
Ambient temperature	-40+70 °C [-40+158 °F] (see temperature diagrams)	−30+70 °C (−22+158 °F)					
	With M12 connector: -25+70 °C (-13+158 °F)	∫ °F)					
Medium pressure	Up to 40 bar [580 psi] (4 MPa) (see pressure diagrams)						
Medium density	> 0.7 kg/dm³ (>0.7 S.G.)						
Medium viscosity	≤ 10 000 mm ² /s (cSt)						
	2-wire DC: 1529 V DC	20255 V AC / 2060 V DC					
Supply voltage	2-wire AC: 20255 V AC; 3-wire DC: 1255 V DC						
Power consumption	AC: depending on load; DC: < 0.6 W	< 3 W					
Housing material	1.4571 stainless steel	Painted aluminum or plastic (PBT)	Painted aluminum				
Electrical connection	DIN / M12 connector, or 3 m (10 ft) integrated cable ⁽¹⁾ 2× 0.5 mm ² (AWG20) / 4× 0.75 mm ² (AWG19) / 5× 0.5 mm ² (AWG20)	e ⁽¹⁾ 2× M20×1.5 plastic cable glands for Ø6Ø12 mm (0.236"0.472") cable 2× terminal blocks for max. 2.5 mm ² (AWG14) wire cross section, 2× internally threaded ½" NPT connection for protective pipes					
Electrical protection	AC version: Class I, DC version: Class III	Class I					
Ingress protection	DIN connector: IP65; M12 connector: IP67; cable: IP68	IP67					
Weight	~0.5 kg + 1.2 kg/m extension (~1.1 lb + 1 lb/ft extension)	~1.3 kg + 1.2 kg/m extension (~2.85 lb + 0.8 lb/ft extension)	~2.1 kg + 1.2 kg/m extension (~4.63 lb + 0.8 lb/ft extension)				

 $^{\scriptscriptstyle (1)}$ Available cable length: up to 30 m (100 ft).

Ex INFORMATION

		Mini co	ompact version	Compact version (metal housing)		
		RC□−400−8 Ex / L Ex (connector type)	RC□-400-9 Ex (cable type)	RN□-400-N Ex, RN□-400-P Ex, RM□-400-N Ex, RM□-400-P Ex		
Explosion pro	otection	Intrir	nsically safe ⁽²⁾	Flame-proof housing		
Ex marking	IEC Ex		-	Ex d IIB T6T4 Ga/Gb, $-40 \text{ °C} \leq T_{amb} \leq +70 \text{ °C}$ (-40 °F $\leq T_{amb} \leq +158 \text{ °F}$)		
_	ATEX	ⓑ II 1G Ex ia IIB T6T4 C	Ga 🛛 😡 II 1G Ex ia IIC T6T4 Ga			
Intrinsic safety limits		$ \begin{array}{ll} U_i = 29 \; V; \; I_i = 100 \; \text{mA}; \; P_i = 1.4 \\ W; \; C_i = 7 \; \text{nF}; \; L_i = 0 \; \text{mH} \end{array} \begin{array}{ll} U_i = 29 \; V; \; I_i = 100 \; \text{mA}; \\ P_i = 1.4 \; W; \; C_i = 15 \; \text{nF}; \; L_i = 0 \; \text{mH} \end{array} $		-		
Supply voltag	ge	15	29 V DC	20250 V AC (50/60 Hz) / 2036 V DC		
Electrical connection				2× M20×1.5 cable glands for Ø7Ø12 mm (0.275"0.472") cable		
		DIN connector or M12	3 m (10 ft) integrated cable(1)	with Ex d IIC protection		
		connector		2× terminal blocks for max. 1.5 mm² (AWG16) wire cross section, 2× ½" NPT internal threads for cable protective pipes.		

⁽¹⁾ Available cable length: up to 30 m (100 ft). ⁽²⁾ Intrinsically safe vibrating forks must be powered by [Ex ia] certified devices, for example by UNICONT PKK-312-8 Ex.

Temperature classes	Т	6	T5	T4
Mini compact version for liquids (Ex ia)				
Highest ambient temperature	+70 °C (+158 °F)		+60 °C (+140 °F)	
Highest process temperature	+70 °C (+158 °F)	+75 °C (+167 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)
Compact version with flameproof enclosure (Ex d)				
Process temperature minimum: -40 °C (-40 °F); Maximum:	+70 °C (+158 °F)	+80 °C (+176 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)
Ambient temperature minimum: -40 °C (-40 °F); Maximum:	+65 °C (+149 °F)	+50 °C (+122 °F)	+65 °C (+149 °F)	+70 °C (+158 °F)
Highest surface temperature of the process connection	+70 °C (+158 °F)	+80 °C	1 O.5 °C (1902 °E)	+125 °C (+257 °F)
Highest surface temperature	urface temperature +75 °C (+167 °F) (+176 °F)		± 75 ℃ (+203 F)	+130 °C (+266 °F)

THERMAL PROPERTIES

Medium pressure – Process temperature



Medium pressure - Process temperature PP flange version





OUTPUT PROPERTIES

		Compact type	
Output		RF□, RV□, RJ□-400/500	
Relay		1 or 2 (SPDT) relays 250 V AC, 8 A, AC1 / 250 V AC, 6 A, AC1	
Response	when immersed	≤ 0.5 s	
time	when free	$\leq 1 s^{(1)}$	

			Mini compact type
Туре	Output		RC□, RG□, RB□, RE□-400/500
2-wire			When immersed: 14 mA \pm 1 mA
DC	DC conem chang	Je	When free: 9 mA ±1 mA
	AC output for serial connection		Voltage drop (in switched-on state): < 10.5 V
			Residual current (in switched-off state): < 6 mA
2-wire	Current load	max. continuous	350 mA, AC 13
		min. continuous	10 mA / 255 V; 25 mA / 24 V
		max. impulse	1.5 A / 40 ms
	Transistor switch		NPN or PNP output can be realized with appropriate wiring
	Voltage drop (in switched-on state)		< 4.5 V
3-wire DC	Current load (max. continuous)		$350 \text{ mA} / \text{U}_{max} = 55 \text{ V}$
	Residual current (in switched-off state)		< 100 μA
	Response	when immersed	0.5 s
	time	when free	<] s ⁽¹⁾

⁽¹⁾ See viscosity diagram

RESPONSE TIME DIAGRAM





OPERATION

Compact and Mini compact version								
Power supply	Switching		Fail-Safe		Output			
		Switching	setting ⁽²⁾		Relay	Electronic		
ON	level		HIGH	0	1. 4 5 6 8 6 7 7 7 7 7 7 7 8 9 7 7 7 7 7 7 7 7 7 7 7	$I_N \bigvee_{L}^{I} \bigoplus_{ON}^{R} U_{power}$		
	Low level High		HIGH	0	1 4 2 7 5 6 De-energised			
				0	1. 4 5 6 8 6 8 9 Energised			
			LOW	0	1. 4 2. 7 5 8 0-6 9 De-energised			
OFF	-	-	High / Low	0	1.	OFF		

Power supply	2-wire DC version Switching	Status LED	Output
01		0]4±1 mA
ON		0	9±1 mA
OFF	Fork immersed, or fork is free	\bigcirc	-

 $^{(\!2\!)}$ In the case of the mini-compact version with integrated cable, it is determined by the appropriate wiring.

OPERATING MODE SWITCH



WIRING



DIMENSIONS

connections



ALW/AYS ON BOARD.

NIVOMAG | NIVOSWITCH | NIVOPOINT | PiloTREK | MicroTREK





SIL

5 YEARS WARRANTY

NIVELCO.COM



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.
- In case of a horizontal installation or a mounting into a tube, the position marking ("O") should be taken into account.







ORDER CODES (NOT ALL CODE VARIATION AVAILABLE)

_____(1)

Vibrating fork level switches for liquids

1	IVOSWITCH		┍┛━╘┰╝╘┰╝└┑									
For	k material	Code	Process co	onnection	Code	Probe length	Ca	de	0ι	utput	/ Ex	Code
	1.4571 fork	С		1"	М	69 mm (2.7")	0	0			2-wire AC	1 ⁽⁷⁾
pact	1.4571 fork,	G	BSP	11⁄2"	Н	125 mm (4.9")	0	1		Ë	3-wire DC	3(7)
i com	FCTFF-coated fork	B ⁽²⁾		2"	С	200 mm (7.9")	0	2		NIC	2-wire DC	6(7)
Min	1.4571, without	- - (3)		1"	Р	200 mm (7.7)	•	2			2-wire DC / Ex ia	8(8)
	reed sensor	E	NPT	11/2"	N		÷		ŧ		2-wire DC	K ⁽⁷⁾
	1.4571 fork	F ⁽³⁾	114/II T.:CL	2"	L T(4)	000	0	0	dmo	Com.	2-wire DC / Ex ig	(8)
	ECIFE coated tork	V ⁽²⁾⁰⁾	2" TriClan	qmr	R ⁽⁴⁾	900 mm (55.4)	0	9	Vini o	M12	3-wire DC	- M ⁽⁷⁾
act	highly polished	J ⁽³⁾	Dairy pipe	•P e DN40,	D (4)	I m (39.4")	1	0			2-wire AC	2(7, 13)
le mil	1.4571 fork	Ν	DIN 11851	1	D(4/	•	:	:			2-wire DC	Z A(7, 13
	/ Ex d housing Staiplass stool	м	Dairy pipe	e DN50, 1	E ⁽⁴⁾	•	•	·		Cable	3-wile DC	-7(7, 13
	highly polished		DN40 PN	0/25 S		3 m (118")	3	0			2-wire DC	0(8.9)
	/ Ex d housing		DN50 PN	40, 1.4571	G						2-wire DC 7 Ex id	9(0,17)
			2" ANSI R	, F600, 1.4571	В						1 relay	0(10)
Ho	using	Code	JIS 40K 50	A, 1.4571	К						2 relays	A ⁽¹⁰⁾
Pair	nted aluminum	4	DN50 PN	16, PP	F ⁽⁴⁾						1 relay / Ex d	N ⁽¹¹⁾
Plas	stic	5	2" ANSI F	F150, PP	A(5)					5	2 relays / Ex d	P ⁽¹¹⁾
			JIS 10K 50)A, PP	(5)						1 relay / GL	G ⁽¹²⁾
		Stainless st welded	eel flanges;	U(6)						2 relays / GL	H ⁽¹²⁾	

(1) The order code of an Ex version product should end in "Ex". (2) Only 1" BSP (PVDF) or flange (PP or ECTFE-coated) process connection. (3) Ex version not available.
(4) Only available for the codes that starting with RB, RC, RG, RF and RL. (5) Max. 6 bar (87 psi), -20...+90 °C (-4...+194°F). (6) MFT-_____-H type flanges (available form size DN40) should be ordered separately. (7) Only available for the codes that starting with RB, RC, RG. (8) Only available for the codes that starting with RB, RC, and RG. (9) Cable length up to 3 m (9.84 ft). (10) Not available for the codes that starting with RB, RC, RG. (11) Only available for the codes that starting with RN and RM.
(12) RF version only, 1" BSP / 1" NPT and stainless steel flanged version only, with GL certification

ACCESSORIES

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



		For vibrating forks	For coated vibrating forks		
Weld-in socket (1" BSP)		RPG-101-0	-		
Sliding sleeve for extended versions ⁽¹⁴⁾	1½" BSP	RPH-112-0	RPH-122-0		
	11⁄2" NPT	RPN-112-0	RPN-122-0		
Test magnet for mini compact versions		RPS-101-0			

⁽¹⁴⁾ For minimum 300 mm (12") insertion length and up to 6 bar (87 psi) medium pressure.



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





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