# NIVOSWITCH

VIBRATING FORK LEVEL SWITCHES FOR LIQUIDS



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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. 10⁴ 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				
Features		Mini compact	Com	pact		
redivies		RC□-400	RF□-400/500	RN□-400 Ex		
Metal housi	ng					
Plastic housi	ng	-		-		
Extension						
High-polishe	ed version					
Plastic-coate	ed fork			-		
2" process of	connection					
1", 1½" proc	ess connection					
Relay output	Relay output					
Electronic ou	utput		-	-		
	Terminal	_				
Electrical	DIN connector		-	-		
connection	M12 connector		-	-		
	Cable		-	-		
Intrinsic safe	ty version		-	-		
Flameproof	enclosure	_	_			
DNV		-		-		
Function setting (low-high level)		<b>(</b> 1)				
Function ind	ication					
Output test	magnet		-	-		

<sup>&</sup>lt;sup>(1)</sup> Only for 3-wire DC versions

### **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



RPS-101-0 test magnet

RFM-500

RNM-402



RBM-401-3



RCM-401 cable version



RCM-402 with M12



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	eel 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 (−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)	` '					
Medium pressure	Up to 40 bo	ar [580 psi] (4 MPa) (see pressure diagrams)					
Medium density	> 0.7 kg/dm³ (>0.7 S.G.)						
Medium viscosity		$\leq$ 10 000 mm <sup>2</sup> /s (cSt)					
	2-wire DC: 1529 V DC						
Supply voltage	2-wire AC: 20255 V AC; 3-wire DC: 1255 V DC	20255 V AC / 2060 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 $^{(1)}$ $2\times$ 0.5 mm $^2$ (AWG20) / $4\times$ 0.75 mm $^2$ (AWG19) $/$ 5× 0.5 mm $^2$ (AWG20)	2× M20×1.5 plastic cable glands for Ø6Ø12 mm (0.236"0.472") cable, 2× terminal blocks for max. 2.5 mm² (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	$\sim$ 0.5 kg + 1.2 kg/m extension ( $\sim$ 1.1 lb + 1 lb/ft extension)	~1.3 kg + 1.2 kg/m extension (~2.85 lb + 0.8 lb/ft extension) $(\sim 2.85 lb + 0.8 lb/ft extension)$ $\sim 2.1 kg + extension$ $(\sim 4.63 lb + 0.8 lb/ft extension)$					

 $<sup>^{\</sup>mbox{\tiny (1)}}$  Available cable length: up to 30 m (100 ft).

### Ex INFORMATION

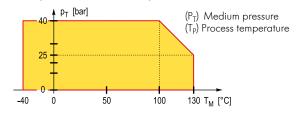
	Mini compact version		ompact version	Compact version (metal housing)
		RC□-400-8 Ex / L Ex (connector type)	RC□−400−9 Ex (cable type)	RN□ -400-N Ex, RN□ -400-P Ex, RM□ -400-N Ex, RM□ -400-P Ex
Explosion pro	otection	Intrin	nsically safe <sup>(2)</sup>	Flame-proof housing
Ex marking	IEC Ex		-	Ex d IIB T6T4 Ga/Gb, $-40$ °C $\leq$ T <sub>amb</sub> $\leq$ +70 °C $(-40$ °F $\leq$ T <sub>amb</sub> $\leq$ +158 °F)
	ATEX		Ga 😡 II 1G Ex ia IIC T6T4 Ga	
Intrinsic safety limits		$\label{eq:Ui} \begin{array}{l} U_i = 29 \; V;  I_i = 100 \; mA;  P_i = 1.4 \\ W;  C_i = 7 \; nF;  L_i = 0 \; mH \end{array}$	$U_i = 29 \text{ V; } I_i = 100 \text{ mA;}$ $P_i = 1.4 \text{ W; } C_i = 15 \text{ nF; } L_i = 0 \text{ mH}$	-
Supply volta	ge	]5	529 V DC	20250 V AC (50/60 Hz) / 2036 V DC
				2× M20×1.5 cable glands for Ø7Ø12 mm (0.275"0.472") cable
Electrical cor	nection	DIN connector or M12	3 m (10 ft) integrated cable <sup>(1)</sup>	with Ex d IIC protection
2.00	connector connector	s (is .i,egialod casio.	2× terminal blocks for max. 1.5 mm <sup>2</sup> (AWG16) wire cross section, 2× ½" NPT internal threads for cable protective pipes.	

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

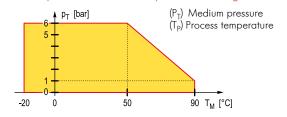
Temperature classes	Т	6	Т5	T4
Mini compact version for liquids (Ex ia)				
Highest ambient temperature	+70 °C (+158 °F)		+60 °C (+140 °F)	
Highest process temperature	+70 °C (+158 °F)	+75 °C (+167 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)
Compact version with flameproof enclosure (Ex d)				
Process temperature 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	. 0.5 9.0 (. 202 95)	+125 °C (+257 °F)
Highest surface temperature	+75 °C (+167 °F)	(+176 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)

### THERMAL PROPERTIES

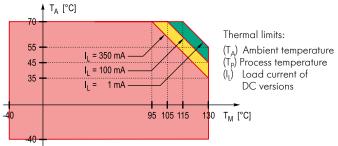
### Medium pressure – Process temperature



### Medium pressure - Process temperature PP flange version



## Mini compact version



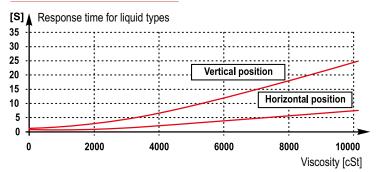
### **OUTPUT PROPERTIES**

		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	≤ 1 s <sup>(1)</sup>	

		Mini compact type			
Output		RC□, RG□, RB□, RE□-400/500			
DC gurrant chanc	••	When immersed: 14 mA ±1 mA			
DC correin chang	ge .	When free: 9 mA ±1 mA			
AC autout for car	ial connection	Voltage drop (in switched-on state): < 10.5 V			
AC output for serial connection		Residual current (in switched-off state): < 6 mA			
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 s	ge drop (in switched-on state) < 4.5 V				
Current load (max. continuous)		$350 \text{ mA} / \text{U}_{\text{max}} = 55 \text{ V}$			
Residual current (	in switched-off state)	< 100 μΑ			
Response	when immersed	0.5 s			
time	when free	< ] s <sup>(1)</sup>			
( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	Current change  AC output for ser  Current oad  Fransistor switch  Voltage drop (in section of the color of the current load (massessidual current (Response)	Current change  AC output for serial connection  max. continuous min. continuous max. impulse  Transistor switch  Voltage drop (in switched-on state)  Current load (max. continuous)  Residual current (in switched-off state)  Response  When immersed			

(1) See viscosity diagram

### RESPONSE TIME DIAGRAM





### **OPERATION**

	Compact and Mini compact version								
Power supply	Switching		Fail-Safe	Status LED	Output				
i ower suppry		Swiiching	setting <sup>(2)</sup>	Sidios EED	Relay	Electronic			
	High level		HIGH	0	1 4 2 7 5	I <sub>N</sub> U <sub>power</sub>			
ОИ	High		HIGH	0	14 27 5 8 -9 De-energised	I <sub>min</sub> U <sub>power</sub>			
ON	Low level		LOW	0	14	I <sub>N</sub> U <sub>power</sub>			
	Low		LOW	0	14 27 5 8 -9 De-energised	I <sub>min</sub> U <sub>power</sub>			
OFF	_	-	High / Low		14 27 5 8 9 De-energised	OFF			

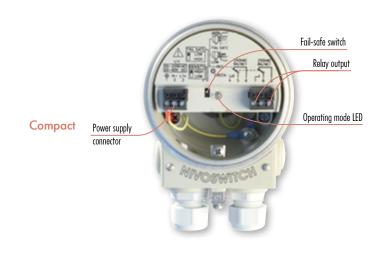
2-wire DC version								
Power supply	Switching	Status LED	Output					
ON.		0	14 ±1 mA					
ON		0	9 ±1 mA					
OFF	Fork immersed, or fork is free		-					

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

### OPERATING MODE SWITCH

	Compact						
	Fail-safe						
HIGH	Fail-safe alarm is indicated with de-energized relay or open state of the output						

### WIRING

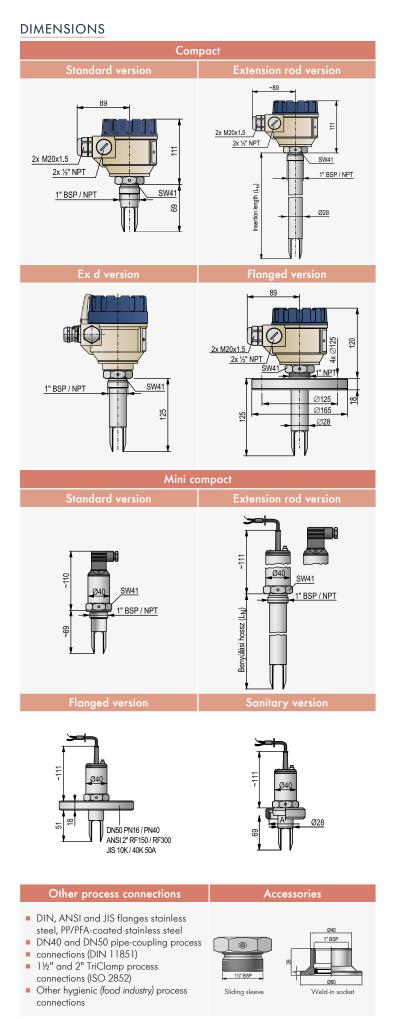


Operating mode LED

Mini compact (connector version)

Fail-safe switch

(Only for 3-wire DC versions)





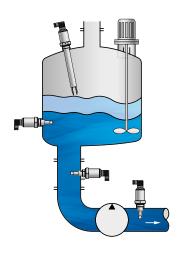


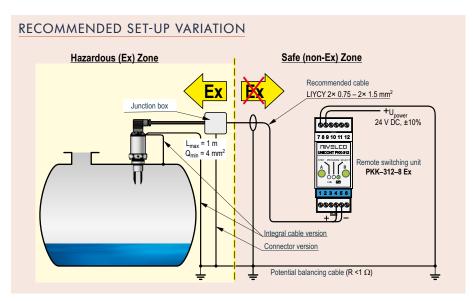






### INSTALLATION





- 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)

### Vibrating fork level switches for liquids

1	NIVOSWITCH	H R■		- <b>1</b> (1)								
			<u> </u>		$\overline{}$							
For	k material	Code	Process cor	nection	Code	Probe length	Co	de	Ou	tput	/ Ex	Code
	1.4571 fork	С		1"	М	69 mm (2.7")	0	0			2-wire AC	1(7)
pact	1.4571 fork, highly polished	G	BSP	11/2"	Н	125 mm (4.9")	0	1			3-wire DC	3 <sup>(7)</sup>
Mini compact	ECTFE-coated fork	B <sup>(2)</sup>		2"	С	200 mm (7.9")	0	2		DIN conn.	2-wire DC	6 <sup>(7)</sup>
¥	1.4571, without	E <sup>(3)</sup>	NPT	1"	P N	•	•				2-wire DC / Ex ia	8 <sup>(8)</sup>
	reed sensor 1.4571 fork	F(3)	INII	2"	L	:	:	:	ad	ë	2-wire DC	K <sup>(7)</sup>
	ECTFE coated fork	V <sup>(2,3)</sup>	1½" TriClar	np	T <sup>(4)</sup>	900 mm (35.4")	0	9	Mini compact	2 con	2-wire DC / Ex ia	L <sup>(8)</sup>
	1.4571 fork, (3)	J(3)	2" TriClamp		R <sup>(4)</sup>	1 m (39.4")	1	0	Mii		3-wire DC	M <sup>(7)</sup>
Compact	highly polished 1.4571 fork	J	Dairy pipe DIN 11851	DN40,	D <sup>(4)</sup>						2-wire AC	2 <sup>(7, 13)</sup>
ق	/ Ex d housing	Ν	Dairy pipe	DN50.	F <sup>(4)</sup>	•	:	:		Cable	3-wire DC	4 <sup>(7, 13)</sup>
	Stainless steel, highly polished	М	DIN 11851	,	E(*)	3 m (118")	3	0		ਤ	2-wire DC	7 <sup>(7, 13)</sup>
	/ Ex d housing			DN40 PN40/25		,					2-wire DC / Ex ia	9 <sup>(8, 9)</sup>
			DN50 PN4	•	G						1 relay	0(10)
Ho	using	Code	2" ANSI RF		В						2 relays	A <sup>(10)</sup>
Pai	nted aluminum	JIS 40K S0A, 1.457 I						•	1 relay / Ex d	N <sup>(11)</sup>		
Pla	Plastic 5 2" ANSI FF150, PP A <sup>(5)</sup>					Compact		2 relays / Ex d	P <sup>(11)</sup>			
110	3110	3	JIS 10K 50A		J(5)						1 relay / GL	G <sup>(12)</sup>
		Stainless ste welded	el flanges;	∪(6)						2 relays / GL	H <sup>(12)</sup>	

<sup>(1)</sup> 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. (\*9) Cable length up to 3 m (9.84 ft). (\*10) Not available for the codes that starting with RB, RC, RG, RG and RG.
(\*9) Cable length up to 3 m (9.84 ft). (\*10) Not available for the codes that starting with RB, RC, RG, RG. (\*11) Only available for the codes that starting with RB, RC, RG, RG. (\*12) RF version only, 1" BSP / 1" NPT and stainless steel flanged version only, with GL certification (\*13) Cable length maximum 30 m (\*94.8 ft).

### **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	1½" BSP	RPH-112-0	RPH-122-0
versions (14)	1½" NPT	RPN-112-0	RPN-122-0
Test magnet for mini compa	ct versions	RPS-	101-0

<sup>&</sup>lt;sup>(14)</sup> 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.





MICROWELL spol., s r.o. SNP 2018/42, 927 00, Šaľa