



Instrumentação  
e Controle

# Catálogo



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# NIVOSWITCH

VIBRATING FORK LEVEL SWITCHES FOR LIQUIDS



**NIVELCO**

LEVEL SWITCHES

**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 overflow- 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/dm<sup>3</sup> density (*specific gravity*) and max. 10<sup>4</sup> mm<sup>2</sup>/s (0.1 ft<sup>2</sup>/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, overflow or dry-run protection, pump controls

### 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*)



RPS-101-0 test magnet



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



RFM-500



RNM-402



RBM-401-3



RCM-401  
cable version



RCM-402  
with M12  
connector



RCM-400  
with DIN connector

### 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.

Features		Liquids		
		Mini compact RC□-400	Compact RF□-400/500    RN□-400 Ex	
Metal housing		■	■	■
Plastic housing		-	■	-
Extension		■	■	■
High-polished version		■	■	■
Plastic-coated fork		■	■	-
2" process connection		■	■	■
1", 1½" process connection		■	■	■
Relay output		-	■	■
Electronic output		■	-	-
Electrical connection	Terminal	-	■	■
	DIN connector	■	-	-
	M12 connector	■	-	-
	Cable	■	-	-
Intrinsic safety version		■	-	-
Flameproof enclosure		-	-	■
DNV		-	■	-
Function setting (low-high level)		■ <sup>(1)</sup>	■	■
Function indication		■	■	■
Output test magnet		■	-	-

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

## TECHNICAL DATA

	Mini compact		Compact	
	RC□-400		RF□-400/500	RN□-400 Ex
Insertion length	69...3000 mm (2.72"...10 ft)			
Material of wetted parts	1.4571 stainless steel or ECTFE/PFA-coating			1.4571
Process connection	As per order code			
Process temperature	-40...+130 °C [-40...+266 °F] (see "Thermal 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 bar [580 psi] (4 MPa) (see pressure diagrams)			
Medium density	> 0.7 kg/dm <sup>3</sup> (>0.7 S.G.)			
Medium viscosity	≤ 10 000 mm <sup>2</sup> /s (cSt)			
Supply voltage	2-wire DC: 15...29 V DC		20...255 V AC / 20...60 V DC	
	2-wire AC: 20...255 V AC; 3-wire DC: 12...55 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 <sup>(1)</sup> 2× 0.5 mm <sup>2</sup> (AWG20) / 4× 0.75 mm <sup>2</sup> (AWG19) / 5× 0.5 mm <sup>2</sup> (AWG20)		2× M20×1.5 plastic cable glands for Ø6...Ø12 mm (Ø.236"...Ø.472") cable, 2× terminal blocks for max. 2.5 mm <sup>2</sup> (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)

<sup>(1)</sup> Available cable length: up to 30 m (100 ft).

## Ex INFORMATION

	Mini compact 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 protection	Intrinsically safe <sup>(2)</sup>		Flame-proof housing
Ex marking	IEC Ex	-	Ex d IIB T6...T4 Ga/Gb, -40 °C ≤ T <sub>amb</sub> ≤ +70 °C (-40 °F ≤ T <sub>amb</sub> ≤ +158 °F)
	ATEX	⊕ II 1G Ex ia IIB T6...T4 Ga	⊕ II 1/2 G Ex d IIB T6...T4 Ga/Gb
Intrinsic safety limits	U <sub>i</sub> = 29 V; I <sub>i</sub> = 100 mA; P <sub>i</sub> = 1.4 W; C <sub>i</sub> = 7 nF; L <sub>i</sub> = 0 mH	U <sub>i</sub> = 29 V; I <sub>i</sub> = 100 mA; P <sub>i</sub> = 1.4 W; C <sub>i</sub> = 15 nF; L <sub>i</sub> = 0 mH	-
Supply voltage	15...29 V DC		20...250 V AC (50/60 Hz) / 20...36 V DC
Electrical connection	DIN connector or M12 connector	3 m (10 ft) integrated cable <sup>(1)</sup>	2× M20×1.5 cable glands for Ø7...Ø12 mm (Ø.275"...Ø.472") cable with Ex d IIC protection
			2× terminal blocks for max. 1.5 mm <sup>2</sup> (AWG16) wire cross section, 2× ½" NPT internal threads for cable protective pipes.

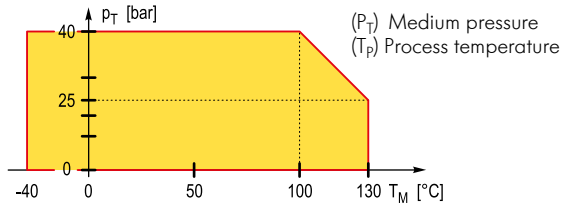
<sup>(1)</sup> Available cable length: up to 30 m (100 ft).

<sup>(2)</sup> Intrinsically safe vibrating forks must be powered by [Ex ia] certified devices, for example by UNICONT PKK-312-8 Ex.

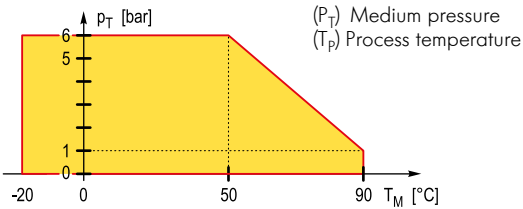
Temperature classes	T6		T5	T4
<b>Mini compact version for liquids (Ex ia)</b>				
Highest ambient temperature	+70 °C (+158 °F)		+60 °C (+140 °F)	
Highest process temperature	+70 °C (+158 °F)		+75 °C (+167 °F)	+95 °C (+203 °F) +130 °C (+266 °F)
<b>Compact version with flameproof enclosure (Ex d)</b>				
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 (+176 °F)	+95 °C (+203 °F) +125 °C (+257 °F)
Highest surface temperature	+75 °C (+167 °F)			+130 °C (+266 °F)

## THERMAL PROPERTIES

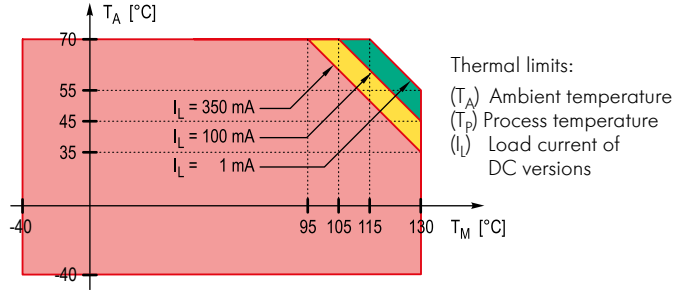
### Medium pressure – Process temperature



### Medium pressure – Process temperature PP flange version



### Mini compact version



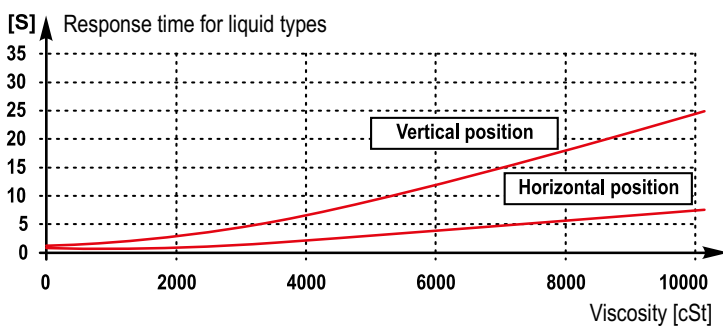
## OUTPUT PROPERTIES

		Compact type
Output		<b>RF□, RV□, RJ□ – 400/500</b>
Relay		1 or 2 (SPDT) relays 250 V AC, 8 A, AC1 / 250 V AC, 6 A, AC1
Response time	when immersed	≤ 0.5 s
	when free	≤ 1 s <sup>(1)</sup>

		Mini compact type	
Type		<b>RC□, RG□, RB□, RE□ – 400/500</b>	
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
		min. continuous	10 mA / 255 V; 25 mA / 24 V
max. impulse		1.5 A / 40 ms	
3-wire DC	Transistor switch	NPN or PNP output can be realized with appropriate wiring	
	Voltage drop (in switched-on state)	< 4.5 V	
	Current load (max. continuous)	350 mA / $U_{max} = 55$ V	
	Residual current (in switched-off state)	< 100 μA	
	Response time	when immersed	0.5 s
		when free	< 1 s <sup>(1)</sup>

<sup>(1)</sup> See viscosity diagram

## RESPONSE TIME DIAGRAM



## OPERATION

Compact and Mini compact version					
Power supply	Switching	Fail-Safe setting <sup>(2)</sup>	Status LED	Output	
				Relay	Electronic <sup>(3)</sup>
ON	High level				
	Low level				
OFF	-	-	High / Low		

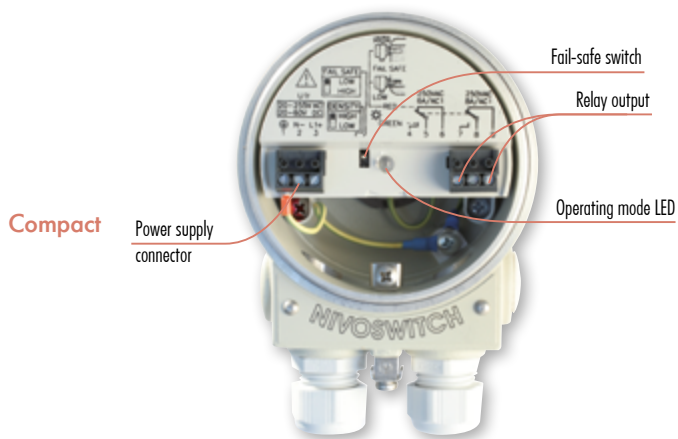
2-wire DC version			
Power supply	Switching	Status LED	Output
ON			14 ± 1 mA
			9 ± 1 mA
OFF	Fork immersed, or fork is free		-

### OPERATING MODE SWITCH

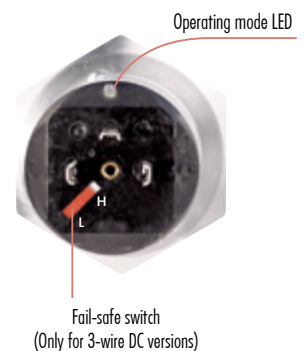
Compact	
Fail-safe	
 HIGH	Fail-safe alarm is indicated with de-energized relay or open state of the output
 LOW	

<sup>(2)</sup> In the case of the mini-compact version with integrated cable, it is determined by the appropriate wiring. <sup>(3)</sup> Only for 2-wire AC version.

## WIRING

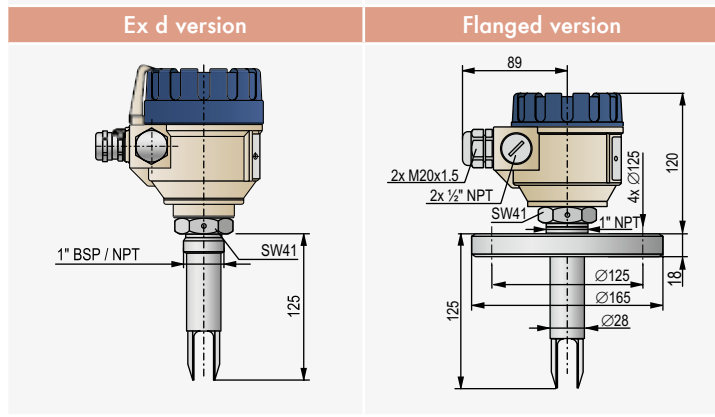
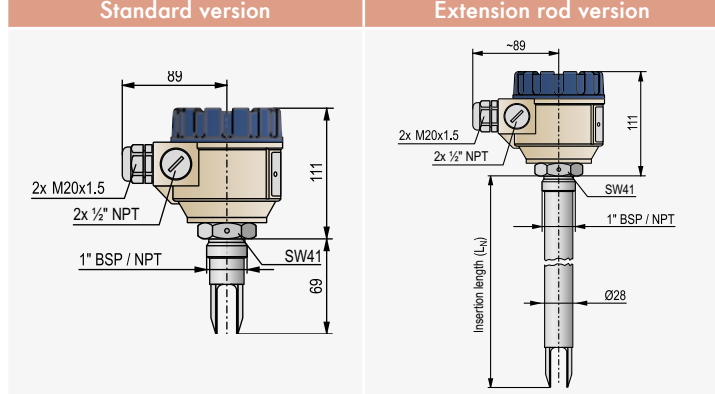


### Mini compact (connector version)

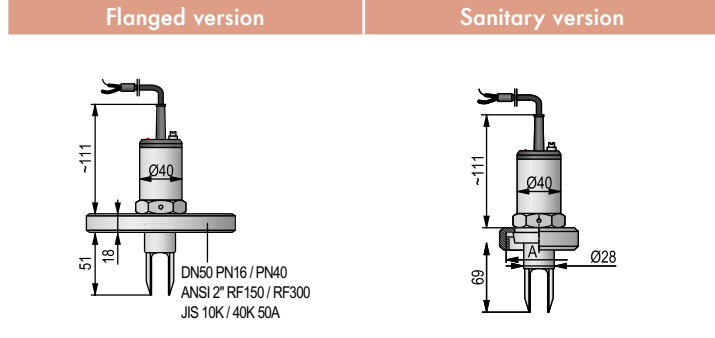
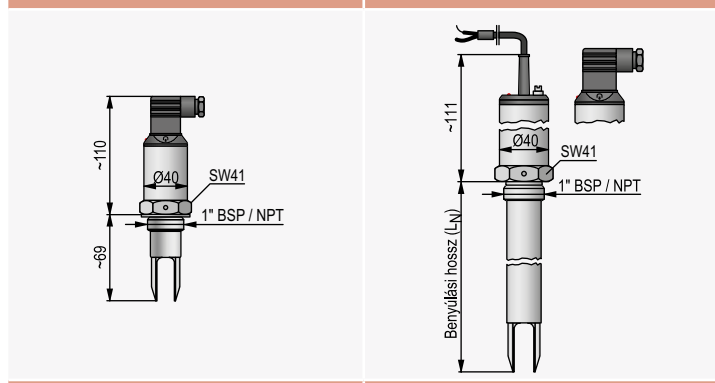


DIMENSIONS

Compact

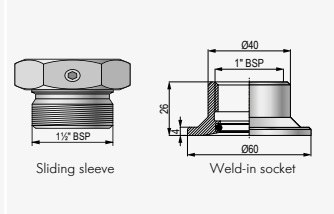


Mini compact



Other process connections      Accessories

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




# ALWAYS ON BOARD.

NIVOMAG | NIVOSWITCH | NIVOPOINT | PiLoTREK | MicroTREK





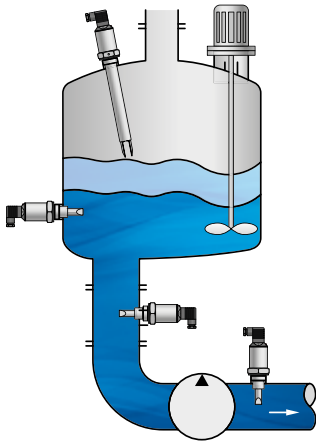




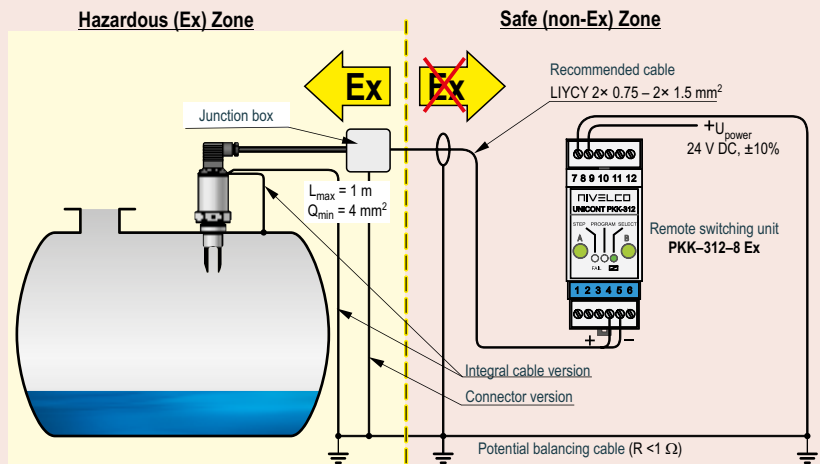
**NIVELCO.COM**



**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)

### Vibrating fork level switches for liquids

NIVOSWITCH R ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ (1)

Fork material		Code	Process connection		Code	Probe length			Code	Output / Ex		Code
Mini compact	1.4571 fork	C	BSP	1"	M	69 mm (2.7")	0	0	Mini compact	DIN conn.	2-wire AC	1 <sup>(7)</sup>
	1.4571 fork, highly polished	G		1½"	H	125 mm (4.9")	0	1			3-wire DC	3 <sup>(7)</sup>
	ECTFE-coated fork	B <sup>(2)</sup>		2"	C	200 mm (7.9")	0	2			2-wire DC	6 <sup>(7)</sup>
Compact	1.4571, without reed sensor	E <sup>(3)</sup>	NPT	1"	P	⋮	⋮	⋮	Mini compact	M12 conn.	2-wire DC / Ex ia	8 <sup>(8)</sup>
	1.4571 fork	F <sup>(3)</sup>		1½"	N	⋮	⋮	⋮			2-wire DC	K <sup>(7)</sup>
	ECTFE coated fork	V <sup>(2,3)</sup>	1½" TriClamp	T <sup>(4)</sup>	900 mm (35.4")	0	9	Mini compact	M12 conn.	2-wire DC / Ex ia	L <sup>(8)</sup>	
	1.4571 fork, highly polished	J <sup>(3)</sup>		R <sup>(4)</sup>	1 m (39.4")	1	0			Compact	Cable	3-wire DC
	1.4571 fork / Ex d housing	N	Dairy pipe DN40, DIN 11851	D <sup>(4)</sup>	⋮	⋮	⋮	2-wire AC	2 <sup>(7,13)</sup>			
	Stainless steel, highly polished / Ex d housing	M	Dairy pipe DN50, DIN 11851	E <sup>(4)</sup>	⋮	⋮	⋮	3-wire DC	4 <sup>(7,13)</sup>			
	Housing	Code	Code	DN40 PN40/25	S	3 m (118")	3	0	Compact	Cable	2-wire DC	7 <sup>(7,13)</sup>
				DN50 PN40, 1.4571	G	1 relay	0 <sup>(10)</sup>					
				2" ANSI RF600, 1.4571	B		2 relays	A <sup>(10)</sup>				
				JIS 40K 50A, 1.4571	K		1 relay / Ex d	N <sup>(11)</sup>				
DN50 PN16, PP				F <sup>(5)</sup>	2 relays / Ex d		P <sup>(11)</sup>					
2" ANSI FF150, PP				A <sup>(5)</sup>	1 relay / DNV		G <sup>(12)</sup>					
JIS 10K 50A, PP				J <sup>(5)</sup>	2 relays / DNV		H <sup>(12)</sup>					
Stainless steel flanges; welded	U <sup>(6)</sup>											

<sup>(1)</sup> The order code of an Ex version product should end in "Ex". <sup>(2)</sup> Only 1" BSP (PVDF) or flange (PP or ECTFE-coated) process connection. <sup>(3)</sup> Ex version not available. <sup>(4)</sup> Only available for the codes that starting with RB, RC, RG, RF and RJ. <sup>(5)</sup> Max. 6 bar (87 psi), -20...+90 °C (-4...+194 °F). <sup>(6)</sup> MF□-□□□-H type flanges (available from size DN40) should be ordered separately. <sup>(7)</sup> Only available for the codes that starting with RB, RC and RG. <sup>(8)</sup> Only available for the codes that starting with RC and RG. <sup>(9)</sup> Cable length up to 3 m (9.84 ft). <sup>(10)</sup> Not available for the codes that starting with RB, RC, RG. <sup>(11)</sup> Only available for the codes that starting with RN and RM. <sup>(12)</sup> RF version only, 1" BSP / 1" NPT and stainless steel flanged version only, with DNV certification <sup>(13)</sup> Cable length maximum 30 m (94.8 ft).

## ACCESSORIES

### 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.

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

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



RFM-500



RCM-401  
cable version

