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)
- 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
- IP67, IP65/IP68 protection

APPLICATIONS

- For liquids: min. 0.7 kg/dm^3 (700 oz/ft^3) density and max. 10^4 mm^2/s (0.1 ft^2/s) viscosity, for solids: min. 0.01 kg/dm^3 (10 oz/ft^3) 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

CERTIFICATIONS

- ATEX (Ex ia G), (Ex d G)
- ATEX (Ex ta/tb D)
- IEC Ex (Ex d G)
- FM US/CA (I, Div 1, C, D)
- DNV GL (only for RF-400 compact types for liquids)

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 overfill- 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 freely 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 PKK** switching amplifiers. The **UNICONT PKK-312-8 Ex** intrinsically safe switching unit is designed to serve Ex rated vibrating forks.

RCM-400 RBM-401 RLH-302

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 ECTFE/PFA coating	Stainless steel 1.4571 (316Ti)	1.4571 (316Ti) or ECTFE/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/dm³ (700 oz/ft³)	≥ 0.01 kg/dm³ (10 oz/ft³)	> 0.7 kg/dm³ (700 oz/ft³)	≥ 0.01 kg/dm³ (10 oz/ft³)
Medium viscosity	≤ 10,000 mm²/s (cSt) (0.1 ft²/s)	–	≤ 10,000 mm²/s (cSt) (0.1 ft²/s)	–
Power supply	2-wire DC: 15 – 29 V DC	2-wire DC: 15 – 27 V DC	20 – 255 V AC or 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		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 0.5mm² (AWG 20) / 4x 0.75mm² (AWG 18) / 5x 0.5mm² (AWG 20)		2x M20x1.5 plastic cable glands for Ø6 – Ø12 mm (0.25 – 0.47 in) cable, 2x terminal blocks for max. 2.5 mm² (AWG 20 – 15) wire cross section, 2x ½" NPT internal threads for cable protective pipes.	
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 (98.4 ft).

SPECIAL DATA FOR Ex CERTIFIED MODELS

Type		For liquids		For solids
		Mini compact type with metal housing, 2-wire DC version[2]	Compact type with metal housing	
Ex proof marking	IEC Ex	-	Ex d IIB T6…T4 Ga/Gb, -40 °C ≤ Tamb ≤ +70 °C	-
	ATEX	⟨Ex⟩ II 1G Ex ia IIB T6…T4 Ga ⟨Ex⟩ II 1G Ex ia IIC T6…T4 Ga	⟨Ex⟩ II 1/2 G Ex d IIB T6…T4 Ga/Gb	⟨Ex⟩ II 1/2 D Ex ta/tb IIIC T140 °C Da/Db
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 / 20 – 50 V DC
Ambient temperature		T6…T4	-40 °C … +70 °C	
Electrical connection		Connector or maximum 3 m (10 ft) integrated cable	2x M20x1.5 cable glands for 7 – 12 mm (0.27 – 0.47 in) cable	
			with Ex d IIC protection	with Ex ta IIIC protection
			2x terminal blocks for max. 1.5 mm² (AWG 16) wire cross section, 2x ½" NPT internal threads for cable protective pipes.	

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

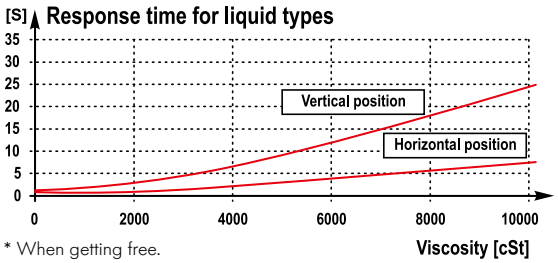
SPECIAL DATA FOR FM AND CSA CERTIFIED MODELS

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 mm² (AWG 16 – 18) wire cross section
Supply voltage		20 – 250 V AC or 20 – 36 V DC

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*



* When getting free.

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	
		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		
	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.

CERTIFICATIONS

FM APPROVED	FM Canada, Certificate No.: FM16CA0122X	IEC	BKI IECEx, Certificate No.: IECEx BKI 16.0002 issue No.: 0
FM APPROVED	FM US, Certificate No.: FM16US0224X	EAC	Ex Russia, Certificate No.: RU C-HU.МЮ62.B.04397
Ex	BKI ATEX, Certificate No.: BKI10ATEX0012X/1 BKI ATEX, Certificate No.: BKI16ATEX0031 BKI ATEX, Certificate No.: BKI16ATEX0011	DNV·GL	Marine Approval Certificate No.: TAA000018W

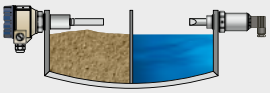
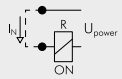
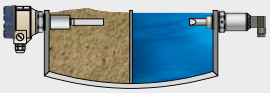
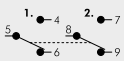
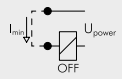
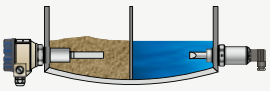
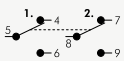
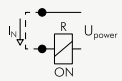
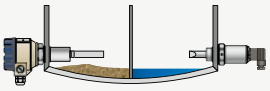
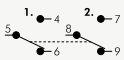
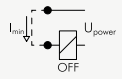
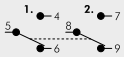
WIRING

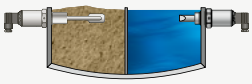
Mini compact (connector version)

Compact

[2] Only for 3-wire DC versions.
[3] Only for vibrating forks for solids.

OPERATION

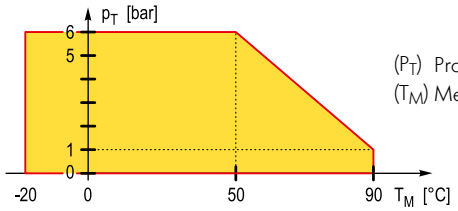
Compact and mini compact type						
Power supply	Switching		Fail-safe setting[1]	Status LED	Output	
					Relay	Electronic
ON	High level		high		 Energised	 ON
			high		 De-energised	 OFF
	Low level		low		 Energised	 ON
			low		 De-energised	 OFF
OFF	–	–	high or low		 De-energised	 OFF

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.

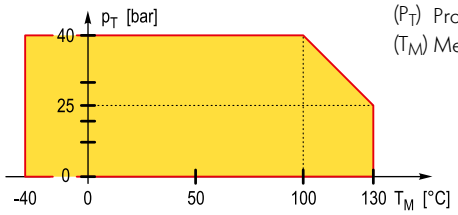
TEMPERATURE DATA

Process pressure – medium temperature PP flange version



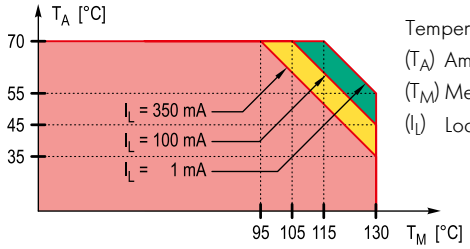
(P_T) Process pressure
(T_M) Medium temperature

Process pressure – medium temperature



(P_T) Process pressure
(T_M) Medium temperature

Mini compact version



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

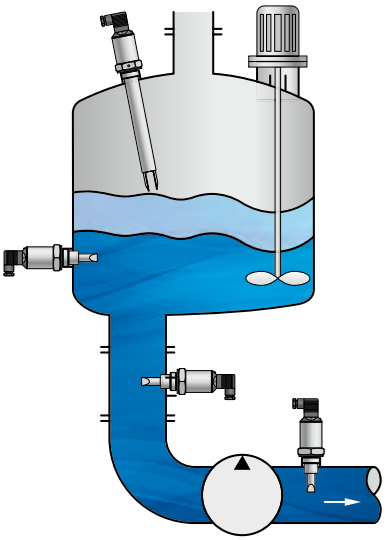
RVG-501

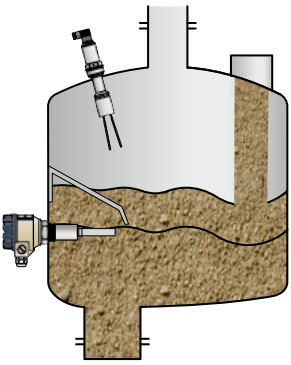
OPERATION MODE SWITCHES

Compact	
Fail-safe	
high	Fail-safe alarm is indicated with de-energised relay or open state of the output
low	

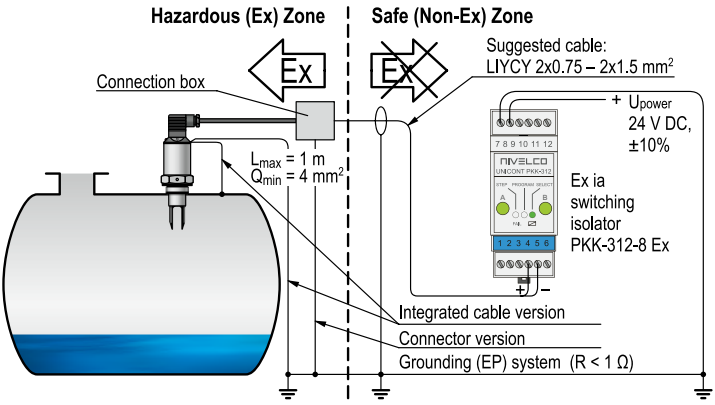
Compact	
Density	
high	Medium density ≥ 0.5 kg/dm³
low	Medium density < 0.5 kg/dm³

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.

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	RPH-122-0
	1½" NPT	RPN-112-0	RPN-122-0

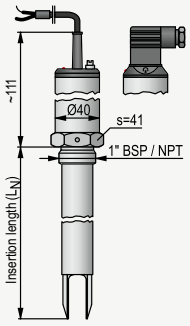
[1] For minimum 300 mm insertion length and maximum 6 bar medium pressure.

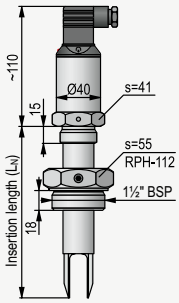
RPS-101-0 test magnet for mini compact versions

DIMENSIONS

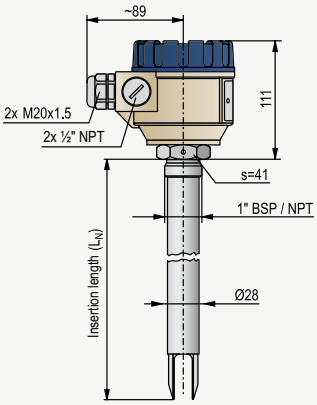
For liquids

Mini compact

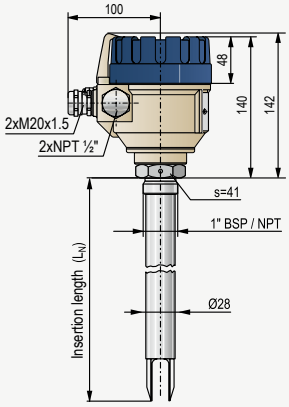




Compact

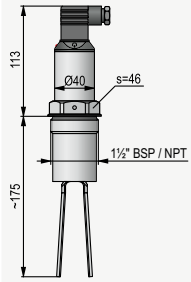


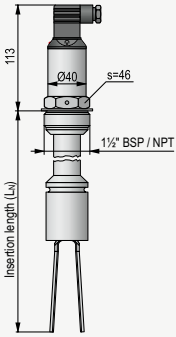
Compact – FM



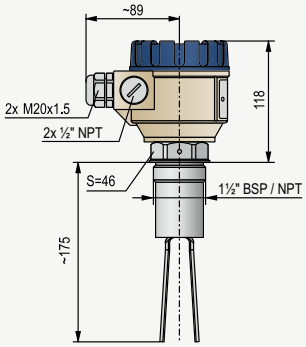
For solids

Mini compact



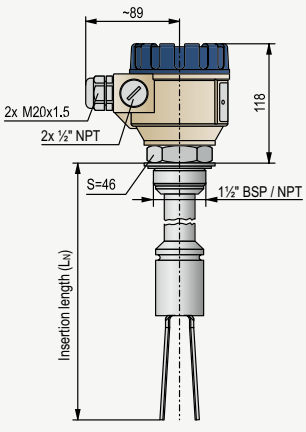


Compact

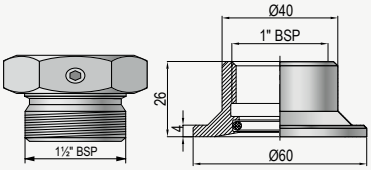


Other process connections

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



Accessories



Sliding sleeve

Weld-in socket

ORDER CODES (NOT ALL CODE VARIATION AVAILABLE)

Vibrating fork level switches for liquids

NIVOSWITCH R□□-□□□-□ (1)

Type		Code
Mini compact	ECTFE coated fork	B(6)
	1.4571 fork	C
	1.4571 fork, highly polished	G
Compact	ECTFE coated fork	V(6, 8)
	1.4571 fork	F(8)
	1.4571 fork, highly polished	J(8)
	1.4571 fork / Ex d housing	N
	Stainless steel, highly polished / Ex d housing	M

Housing	Code
Metal	4
Plastic	5

Process connection		Code
BSP	1"	M
	1½"	H
	2"	C
NPT	1"	P
	1½"	N
	2"	L
Dairy pipe DN40, DIN 11851		D(13)
Dairy pipe DN50, DIN 11851		E(13)
1½" TriClamp		T(13)
2" TriClamp		R(13)
DN50 PN40, 1.4571		G
2" ANSI RF600, 1.4571		B
JIS 40K 50A, 1.4571		K
DN50 PN16, PP		F(7)
2" ANSI FF150, PP		A(7)
JIS 10K 50A, PP		J(7)

Insertion length	Code	
69 mm (2.7 inch)	0	0
125 mm (4.9 inch)	0	1
200 mm (7.9 inch)	0	2
⋮	⋮	⋮
900 mm (3 feet)	0	9
1 m (3.3 feet)	1	0
⋮	⋮	⋮
3 m (10 feet)	3	0

Output / Ex			Code
Mini compact	DIN conn.	2-wire AC	1(3)
		3-wire DC	3(3)
		2-wire DC	6(3)
		2-wire DC / Ex ia	8(15)
	M12 conn.	2-wire DC	K(3)
		2-wire DC / Ex ia	L(15)
		3-wire DC	M(3)
	Cable	2-wire AC	2(3, 5)
		3-wire DC	4(3, 5)
		2-wire DC	7(3, 5)
		2-wire DC / Ex ia	9(14, 15)
Compact		1 relay	0(2)
		2 relays	A(2)
		1 relay / Ex d	N(4)
		2 relays / Ex d	P(4)

(1) The order code of an Ex version product should end in "Ex"
(2) Not available for the codes that starting with RB, RC, RG
(3) Only available for the codes that starting with RB, RC, RG
(4) Only available for the codes that starting with RN and RM
(5) Cable length maximum 30 m (94.8 ft)
(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
Compact / casted fork	F
Compact / welded fork	R
Mini compact / casted fork	C
Mini compact / welded fork	L

Housing	Code
Plastic	2(8)
Metal	3(11)

Process connection		Code
BSP	1"	M(12)
	1½"	H
NPT	1"	P(12)
	1½"	N
DN50 PN16, PP DIN		F
DN50 PN40, 1.4571 DIN		G
2" ANSI FF150 PP		A
2" ANSI RF600 1.4571		B
JIS 10K 50A PP		J
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)

Insertion length	Code	
125 / 137 mm (4.9" / 5.4")	0	1
200 / 175 mm (7.9" / 6.9")	0	2
300 mm (1 feet)	0	3
⋮	⋮	⋮
900 mm (3 feet)	0	9
1 m (3.3 feet)	1	0
⋮	⋮	⋮
3 m (10 feet)	3	0

Output / Ex			Code
Mini compact	Conn.	2-wire AC	1(11)
		3-wire DC	3(11)
		2-wire DC	6(11)
	Cable	2-wire AC	2(5, 11)
		3-wire DC	4(5, 11)
		2-wire DC	7(5, 11)
Compact		1 relay	0(10)
		2 relays	A(10)
		1 relay / Dust Ex ta/tb IIIC	B(10)

(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 RB, RC, RG, RF and RJ
(14) Cable length up to 3 m (9.84 ft)
(15) Only available for the codes that starting with RC and RG

ACCESSORIES TO ORDER

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

UNICONT PKK-312-□ (1)

Power supply	Code
230 V AC	1
110 V AC	2
24 V AC	3

Power supply	Code
24 V AC/DC	4
24 V AC/DC / Ex	8

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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